energy networks association

ENA Service Standard Regulatory Policy & National Reliability Reporting Framework

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CONTENTS

Contents

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GLOSSARY

Glossary of terms

Service level payment – payment made by distribution businesses to a customer who experiences service performance below a certain threshold. Service level payment regimes can operate alongside an incentive regime or in isolation, and can be automatically payable or payable after application by the customer. Also referred to as Guaranteed Service Payments, Guaranteed Service Level Payments, Guaranteed Customer Service Standard Payments or Rebateable Performance Standards.

Service level incentive rate – used in an incentive regime, and usually reflect the incremental cost or value of improved reliability as an incentive or penalty, as opposed to a specific service standard target. Service performance is then the outcome of economic decision to invest based on the incentive to invest, determined by the ex-ante expectation of return on capital invested.

Service standard incentive regime – a regime that links revenue for distribution businesses to service standard performance. Such a regime can take a number of forms, including an elaborate "S-factor" regime, contracts, or direct revenue rewards/penalties for performance.

Service standard measure – the classes of data collected to assess service standards. Some examples of service standard measures include planned and unplanned SAIDI, SAIFI and CAIDI, power quality, call centre response and on-time appointment performance.

Service standard performance – individual network business' observable performance outcome for each service standard measure. Can also refer to the level of service experienced by the customer.

Service standard regime or regulation – regulatory approach used to deliver service standard outcomes associated with the approved or agreed level of revenue for the business. Can include service standard reporting, service level payments, incentive regimes, etc.

Service standard reporting – the public disclosure of service standard performance information either by a regulator or by a distribution business.

Service standards – a general term used in this paper to refer to the policy issue of the type of service experienced by customers and how this is influenced and determined by the regulatory regime. The term encompasses both measures and targets/rates, as they relate to outcomes under the regulatory regime.

Service standard target – a number or performance outcome specified for relevant service standard measures that are part of a reporting regime, a minimum standard requirement, or target under an incentive regime.

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SUMMARY

1. Policy summary

Policy Context

Australian Governments are currently developing a national framework for electricity and gas distribution and retail regulation. Under this framework, a number of regulatory and policy functions that are currently the responsibility of jurisdictional regulators and governments will move to the Australian Energy Regulator (AER) and the Australian Energy Market Commission (AEMC).

Across jurisdictions, current service standard regimes support multi-billion dollar capital investment strategies. They also embody community expectations of service delivery in that jurisdiction, and government priorities regarding service obligations, environmental and planning outcomes.

Developing a national approach to the regulation of service standards

The challenge is to develop a national approach to distribution service standard regulation that accommodates the different levels of maturity and reliability of networks across the country, the differing expectations of customers, and recognises network and capital investments that have occurred based on past service approaches and obligations. The ENA considers that a framework based on the following three principles should underpin a national service standards approach:

- The level of service offered is the result of an optimisation of price, service and risk elements, and should be recognised as such in economic regulation.
- The customer should be the primary source of information on the appropriate optimisation of price, service and risk. The customer should also be the primary source of information on what service delivery outcomes are important, and therefore what outcomes should be encouraged or required through the service standard regime.
- Customer preferences and the resulting outcomes must be managed within the constraints of other regulatory objectives, including network safety, power quality and community service obligations, to deliver jurisdictionally and business appropriate outcomes.

A national customer-focused approach to service standard regulation

A service standard framework under this approach would include:

- A variety of different customer preferences emerging across jurisdictions (and possibly between customer classes) that reflect current reliability levels, price and service level expectations in each jurisdiction/region.
- A variety of different regulatory approaches (rules-based, incentive, reporting) designed to encourage the different outcomes that are embodied in different customer preferences.
- The use of a variety of possible service reliability measures as part of a "toolkit" of ways to measure, require or encourage particular service outcomes under the different regulatory approaches. These measures should be nationally consistent and defined in line with the *National Reliability Reporting Framework*, released with this policy.

INTRODUCTION

2. Introduction

Australian governments are currently developing a national framework for electricity and gas distribution and retail regulation. Under this framework, a number of regulatory and policy functions that are currently the responsibility of jurisdictional regulators and governments will move to the Australian Energy Regulator (AER) and the Australian Energy Market Commission (AEMC).

This task presents a considerable challenge, particularly in the area of the economic regulation of service standards.

A number of different service standard regimes are currently in place across Australian jurisdictions. These regimes underpin substantial private and public sector investment in the network, as well as management strategies that balance investment in the network with other regulatory and commercial incentives.

As well as underpinning network investment and management, these service standard regimes embody community expectations with regard to service delivery within the jurisdiction, and government priorities with regard to service obligations, environmental and planning outcomes.

This paper outlines a policy for a customer-focused national regime for the economic regulation of service standards. It also includes a framework of nationally consistent service standard performance measures that can be part of service standard regulatory regimes.

This policy is consistent with the approach agreed by the Council of Australian Governments in the *Australian Energy Market Agreement*, amended by First Ministers on 2 June 2006.

3. The importance of the customer in service standard regulation

The regulatory bargain

The regulatory bargain encompasses an optimisation of the price, service and risk relationship between distribution businesses and customers embodied in a regulatory decision. This optimisation is usually resolved in competitive markets without government or regulatory intervention, however, service standard regulation is generally introduced into mature regulatory regimes for natural monopoly industries to ensure that incentives that drive capital efficiency do not lead to a reduction in service standard performance.

The central role of the customer in determining the regulatory bargain

It is important that the regulatory regime ensures that the balance struck between price, service and risk is appropriate, such that it does not discourage efficient investment. A key element of the service standard policy outlined in this paper is that customers should have a direct input in the decision over how this balance is struck.

In some jurisdictions, customers have been directly involved in these kinds of decisions through customer preference analysis, for example with customer willingness to pay surveys, threshold analyses, or values of customer reliability for unserved energy.[1] Willingness to pay surveys are usually conducted by the distribution business. The surveys ask customers about their level of satisfaction with current service reliability, power quality and company responsiveness (for instance call centre response times), and their willingness to pay more for better reliability, power quality, or responsiveness, or, perhaps to pay less for lower levels of service. These surveys also provide information to the distribution business and the regulator about appropriate levels of risk that the distribution businesses should be exposed to through incentives and penalties, by uncovering the service performance priorities of customers.

While these approaches do have some limitations, particularly where customer expectations may be unreasonable, they do improve the ability of distribution businesses and regulators to gauge broad customer preferences and priorities in service delivery. This information is then used to design the service standard regulatory regime, as well as the targets or incentive rates for service delivery to those customers, and they can underpin decisions to invest in the network where this is appropriate.

An advantage of this approach is that it increases awareness within the community that a decision on the optimisation of price, service and risk must be made, and the considerations that go into making this decision. The approach also involves a wider cross-section of the community in the decision over how the balance between price, service and risk is made than would normally be involved in a standard regulatory decision making process. This in turn decreases the likelihood of customer dissatisfaction with service and price outcomes, fostering more reasonable expectations within the community over service delivery.

Customer surveys and analysis are not a replacement for other community consultation or consumer advocacy. The ENA recognises that all Australian regulators currently have in place specific programs aimed to improve customer involvement

1. Customer assessments of these kinds have been undertaken in the Australian Capital Territory, Queensland, South Australia, Tasmania and Victoria as part of regulatory decision-making.

in regulatory decision-making processes. Customer preference analysis instead provides a basis for decisions over the appropriate development of the network, informing the distributor's submission to the regulator, as well as the regulator's decision on that submission. The ENA considers that community consultation is still a central part of the regulatory decision-making process.

The role of governments, distributors and the regulator in determining the regulatory bargain

Governments have a key role in ensuring a clear policy, legislative and regulatory framework is in place to govern the market. The Ministerial Council on Energy has clear responsibility for market and regulatory policy going forward, and in ensuring that the regulatory framework balances the needs of energy customers and industry in the delivery of efficient energy services. Individual jurisdictional governments also have a responsibility to ensure that any community service obligations (CSOs) and specific minimum service standards are clear and able to be recognised by the regulator and implemented by the distribution business.

Distribution businesses must comply with relevant regulatory rules, and develop price/service proposals that are consistent with those rules, including Law Objectives, Pricing Principles, CSOs, and any principles, rules or targets for service standard regulation. Under this framework, distributor price/service proposals should be based on information relating to customers' reasonable expectations of energy prices and service.

Currently in some jurisdictions, where direct customer preferences are not accessed, the regulator makes judgements on the appropriate optimisation of price, service and risk. The ENA considers that regulator should not substitute for the customer in determining customer preferences, or for governments in making policy. The regulator, in determining network price and service, should instead balance customer service expectations with the short term price changes that these service expectations may suggest.

4. Components of a national customer focused service standard regulatory regime

One outcome of using customer preference information to determine the appropriate optimisation of price, service and risk elements is that it is unlikely that these preferences will be the same across the country, or between customer classes. This fact has a number of implications for service standard performance, the design of service standard regimes, and the measures that are used to deliver service performance outcomes.

Service standard performance

There are a number of practical, technical and economic reasons why service standard performance can vary across jurisdictions and regions, as well as between the electricity and gas sectors, without undermining progress on a national service standard regulatory framework. These include:

- inherent physical differences between gas (underground) and electricity networks (generally above ground);
- different impact on amenity of customers resulting from outages
- inherent differences in the reliability characteristics of different networks, such as the proportion of the network that is Single Wire Earth Return (SWER) line, or degree of undergrounding in the network
- technical issues such as design and planning criteria
- differing local climatic conditions, such as storm, wind and lightning frequency and intensity, as well as vegetation growth (which is, for example, high in the tropics and low in arid regions)
- differing economic impacts of an outages, which usually mean that reliability expectations are higher in the CBD than in rural areas
- the local costs, compared with the achieved outcomes, of network performance improvements, meaning that high cost projects giving only marginal improvements may not be pursued
- customer preferences reflecting the preferred balance between service and price within a particular region or customer class.

Differing service standard performance levels are already reflected in jurisdictional customer service regimes that establish different service standards for CBD, urban and rural networks, and for domestic and heavy industrial customers.

Customer expectations can vary due to their past experiences of network service and price, sensitivity to supply disruptions, or overall standard of living in a region. For example, rural customers may understand that the costs of duplicating connection assets to outlying properties is very high and may accept the reliability risks that accompany this trade-off. They may choose to augment supply with on-site stand-by generation to reduce this risk. On the other hand, business customers may expect that contingent services are provided in the CBD, reflecting the high concentration of businesses in the CBD and large economic cost of outages. Better network reliability may also be a reason why some businesses choose to be situated in CBDs, rather than outlying suburbs.

The above factors can also interrelate, leading to unique preference outcomes in regions or customer classes. For example, in storm prone areas, undergrounding can lead to a large improvement in reliability, but is very costly. It may, nevertheless, be preferred because of the large gains that can be obtained in network reliability. In less storm-prone areas,

undergrounding may not lead to such large improvements in overall network reliability, and local reliability may already be quite high; it is therefore less likely to be preferred by customers as the high cost may not lead to large improvements in reliability, or customers may feel that improvements in reliability are not needed.

Service standard regimes

Service standard regimes are intended to focus network investment toward particular service outcomes. Differing customer preferences for service delivery can mean that different service standard regimes are more appropriate than others in different circumstances. Where the service outcomes sought are different, the regimes that are best able to encourage these outcomes may also be different.

Many different network service standard regimes are in place across Australia, composed of one, or a combination, of the following approaches:

- Monitoring or information requirements. This approach usually requires the distribution business to publish information about its service performance against a number of different service performance measures or benchmarks.
- Minimum service standards. This is a rules-based approach to setting service performance, where standards are mandated through rules or legislation.
- Service level payments. This approach sets a service performance threshold such that payments are made to customers if they experience service outside of that threshold.
- Financial service incentive targets or rates. This approach uses financial incentives and penalties on the distributor to encourage service performance outcomes. Such regimes may be based around specific service performance targets, or may set incentive rates such that distribution businesses deliver the service performance outcomes that balance the costs and benefits of investment with reference to the incentive rate.
- Contractual service standards. This approach is usually used between distributors and large customers who require a particular level of service reliability or power quality. The approach usually involves an agreement for capital contributions on the part of the customer to deliver improved service reliability to a particular site.

These approaches are suited to different outcomes in service delivery. For example, in some jurisdictions, the focus has been on raising service standards to a particular level. In this situation, a minimum service level approach, perhaps accompanied by guaranteed service level payments, may be deemed to be the most appropriate approach. When minimum targets are reached, an incentive-based approach may be introduced, to encourage efficient investment to manage performance around a particular target or with reference to a particular incentive rate.

There are also regulatory efficiency reasons why some approaches may be more appropriate than others. For example, almost all jurisdictions have looked at the possibility of introducing an incentive-based approach to the economic regulation of service standards. Some have found this approach appropriate, while others have found that the administrative costs may outweigh the expected benefits arising from the introduction of such a regime.

Service standard measures

One important aspect of a service standard regime is measuring and recording service standard performance. Service standard measures are the basis for many service incentive and monitoring regimes, as they track individual business' service standard performance. There are a number of measures that are used across jurisdictions for this purpose, including:

- Service reliability, including common industry measures such as SAIDI, SAIFI and CAIDI.
- Quality of supply, including monitoring electricity voltage and frequency.
- Customer service, including measuring aspects such as call centre response times and on-time arrivals for appointments.

Some jurisdictions also use input or planning measures or rules such as requirements for n-1 contingency planning.

Unfortunately, while many of these measures are used across jurisdictions, they are defined differently, with different inclusions and exclusions. They may therefore lead to misleading comparisons between the service standard performance of different businesses and inappropriate regulatory benchmarking of performance.

To avoid these problems, individual service standard regimes should draw from a tool-kit of nationally consistent service measures to encourage outcomes that reflect customer preferences.

The following criteria should be used for assessment of reliability measures in terms of applicability and suitability for use in service standard regimes. Measures should:

- be clearly defined, simple to present, objectively measurable over time and auditable
- be transparent and linked to service outcomes that customers value
- record aspects of performance that are predominantly in the control of network companies (be attributable to, or influenced by, distributors) and exemption criteria should recognise events that are not in the control of the distribution business
- provide information that enables stakeholders to judge the performance of the distribution business over time and to form a view as to whether network assets are being managed efficiently
- allow the distribution business to monitor performance to identify areas where improvements are required or as a basis for planning capital and maintenance expenditure
- be cost effective to implement

These criteria have been applied in the development of the proposed nationally consistent reliability measures toolkit outlined in the *National Reliability Reporting Framework*.

POLICY

5. Service standard regulation within a national regulatory framework

Creating a national framework out of a collection of customer preferences

The fact that service standard targets, regimes and measures may be different across different jurisdictions is not necessarily at odds with a national framework approach to distribution regulation. Differences between jurisdictions and customer classes can be expected where service levels and incentives are set with reference to customer preferences, as customer preferences can be expected to be different based on the perceived value of reliability compared with its cost, and past experience with service performance.

The challenge is to deliver a service standard regime that fits within the wider national regulatory framework and which accommodates jurisdictional differences in service standards and performance. The resulting regulatory framework, including service standard regulation, must also be workable; the national regulator must be able to effectively manage the information requirements of the regime and be able to assess the implications of jurisdictional obligations.

The ENA considers that there are three central elements necessary for a national approach to the economic regulation of service standards. They are:

- National principles for the development and regulatory assessment of the appropriateness of different service standard regimes
- Nationally consistent service standard measures to streamline information requirements for regulators and distribution businesses
- Compatibility with wider national energy regulatory and governance framework.

National principles for service standard regimes

The ENA considers that establishing common national principles for service standard regimes within the wider national regulatory framework is the most appropriate approach to achieve national consistency in the objectives of service standard regulation, and ensure that regimes are workable in practice. The AER can use these principles, as well as the *National Electricity Law* objective and pricing principles, to assess individual service standard regimes and determine whether they are appropriate and therefore should be approved.

The ENA recommends that service standard regimes should:

- have a clear objective related to the outcomes that are sought from the regulation of service standards
- reflect customer preferences in the jurisdiction/region in question
- be simple and transparent
- provide a balance between rewards and penalties that reflects service standard outcomes sought, taking account of financial risk
- recognise and accommodate technical, network design and safety factors that may influence possible service standard outcomes
- recognise and accommodate any government-set service standards already in place in the jurisdiction; and
- encourage efficiency.

In practice, service standard regimes should clearly state the service standard outcomes sought from regulation, and ensure that the measures adopted, as well as targets, incentive rates or penalties steer service performance towards the outcomes sought by customers.

Nationally consistent service standard measures

The ENA considers that an essential step in developing a national service standard regulatory regime is the creation of nationally consistent definitions and recording of service standard measures.

Currently, jurisdictional differences exist in the definitions of even widespread measures such as SAIDI and CAIDI. For example, most measures require some calculation of the customer base, but the definitions of customers (small and large), and the approaches to collecting information, differ across jurisdictions.

These differences are likely to contribute significantly to the information load on the AER, where the AER will need to consider the service data of different businesses, taking into account the assumptions behind the data. National consistency in service standard measure calculation and recording will reduce the complexity of these measures, and therefore the information requirements of the regulator in applying them nationally.

The proposed *National Reliability Reporting Framework* is available with this policy, which creates a consistent approach to data collection and the definition of commonly used service standard reliability measures.

Compatibility with wider national energy regulatory and governance framework

The Ministerial Council on Energy has developed a clear governance structure for the energy sector. This is based around defining the differing but complementary roles of the Ministerial Council on Energy and individual ministers, the Australian Energy Regulator, and the Australian Energy Market Commission. Responsibilities of these institutions are allocated as follows:

- Ministerial Council on Energy is responsible for high level policy guidance to the market as a whole, including implementation of the legislative framework within which the AER and the AEMC operate. The MCE has no involvement in the day-to-day operation of the market
- The Australian Energy Regulator is responsible for rules enforcement and economic regulation of natural monopoly energy infrastructure
- The Australian Energy Market Commission is responsible for rule making and market development
- Jurisdictional governments retain responsibility for elements not transferred to the national framework
- No residual distribution economic regulatory functions to remain with jurisdictional economic regulators

This framework is to be reflected in the *National Electricity Law* and *National Gas Law*.

The approach to service standards set out in this paper is consistent with the detailed elements of the *National Electricity Law* and *National Gas Law* agreed by energy ministers. Relevant elements include:

- Clear objectives and pricing principles
- A 'fit-for-purpose' regulatory decision making model
- Investment certainty for distribution businesses in meeting legislative requirements
- Clear links between the outcomes of economic regulation and evolving market, technical, safety and reliability standards
- Transparent implementation of non-economic objectives including community service obligations.

This approach is also consistent with the MCE decision that jurisdictional ministers will retain responsibility for setting service reliability standards where they choose to do so.

Service standard regulation within the national regulatory framework

Within the national principles for service standard regulation set out above, distribution businesses should develop and propose an appropriate service standard regime as part of its price determination submission to the AER. This service standard regime should use as its base information derived from an assessment of customer needs (for example, willingness to pay surveys or other customer threshold analyses). Customer preferences should be matched with a proposed investment strategy, service standard regime and measures that reflect those preferences.

This service standard approach recognises that:

- Approaches to service standard regulation will be specific to businesses, and take account of customer base, historical service standard performance, and assessments of customer needs
- Jurisdictionally-imposed service standard targets (where they are in place) must be incorporated into individual business' service standard proposals
- Distribution businesses have access to the most detailed information on possible investment and service performance scenarios for their network
- Distribution businesses have access to a broad cross-section of the customer base and information.[2]

The role of the regulator is then to assess the appropriateness of the approach proposed by the distributor. This includes an assessment of the degree to which the proposal satisfies the relevant Law and Rules, including legislative objectives, pricing principles, and the national principles for service regulation described above, as well as any jurisdictionally imposed obligations or targets. If the proposed approach does not satisfy these elements, then the regulator is able to require amendments or reject the service standard approach proposed. In some cases it may also be appropriate for assessment of customer preferences to be developed in consultation with the AER to provide assurances that the surveys are conducted appropriately.

2. Though actual surveys should be professionally designed and undertaken by trained surveyors. Some studies, in particular those with broader applications, such as the value of unserved energy, can be conducted by independent bodies.

Using customer preference information to determine the shape of the service standard regulatory regime and the outcomes that it encourages in each jurisdiction or region will lead to a diversity of approaches and outcomes across Australia. These approaches reflect a national framework approach through the common application of the service standard regime principles set by the MCE to all service standard regulatory regimes in Australia by the Australian Energy Regulator. This approach recognises the central role of the customer in determining the appropriate balance between price, service and risk, the different service standard regimes currently in place in different jurisdictions, and the network investments that these underpin.

Relationship between service standards and technical and safety regulation

Technical regulation of energy supply is expected to remain at the jurisdictional level, setting the effective minimum safety, power quality or service parameters of energy delivery. The service standard regime is a price/service regime, and is directly affected by the economic regulatory model. Important in this approach is the recognition that service standard regulation is an intrinsic part of economic regulation, and should not be undertaken by technical regulators.

If service standards are set both at a national level through a service standard economic regulatory regime, and through technical or economic regulators at a jurisdictional level, distributors would face the unacceptable risk of a dual regulatory regime for service standards.

National Reliability Reporting Framework

National Reliability Reporting Framework

FRAMEWORK

Introduction

Energy customers have a clear interest in service standard measurement and performance. Service standards measure aspects of the customer's experience of energy service delivery. They typically cover network reliability (for example the number of interruptions suffered and their duration), power quality (for example voltage variations and harmonics) and service responsiveness (for example timeliness and responsiveness of the supplier to requests for telephone assistance and the accuracy of billing).

Service standards also bear a direct relationship to the price of energy through the regulatory bargain, which seeks to optimise the price, service and risk relationship between customers and the network service provider.

It generally costs more to provide a higher level of service reliability and quality in electricity supply as more redundancy has to be built into the system to allow for unusual events. Changes in technology have changed consumers' demand for electricity service quality attributes. Greater use of computers and sophisticated electrical equipment has reduced preparedness to accept small voltage fluctuations in supply. An appropriate service standard reporting framework will allow performance of primary concern to customers to be measured in an objective and accurate way over time.

The ENA has developed this Reliability Reporting Framework as a basis for distribution businesses and the Australian Energy Regulator to move to nationally consistent definitions for service standard reliability measures. In the future, the ENA expects to develop similar frameworks for power quality and customer service responsiveness measures.

This Reliability Reporting Framework will evolve over time. Development of new or more accurate performance measures, improved understanding of network performance and changing consumer preferences and priorities all have to be accommodated, making the Framework dynamic rather than static. The intent of this Framework is to establish nationally consistent measures for currently used measures, as well as creating a basis from which new nationally consistent measures can emerge.

National policy context

Australian Governments are currently developing a national framework for electricity and gas distribution and retail regulation. Under this framework, a number of regulatory and policy functions that are currently the responsibility of jurisdictional regulators and governments will move to the Australian Energy Regulator (AER) and the Australian Energy Market Commission (AEMC).

It is expected that this transfer will be a primary driver for national consistency in economic and technical regulation of distribution networks.

National consistency, however, should not be pursued just for consistency's sake. Informational efficiencies that may arise from nationally consistent service standard regulatory approaches need to be balanced against the possible benefits of tailored approaches that take account of legitimate jurisdictional and individual business differences. A clear challenge for the Ministerial Council on Energy (MCE) and the AER will be to ensure that the unique aspects of the different network businesses and their operating environments are recognised and accommodated under the new national regulatory framework.

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Why develop nationally consistent definitions for reliability measures?

In 2002 the Utility Regulators Forum (URF) published a discussion paper titled National regulatory reporting for electricity distribution and retailing businesses.[1] The reporting framework presented in the URF discussion paper was the first attempt to form a nationally consistent basis for reporting service quality.

While most distribution businesses report on measures that are generally consistent with the URF framework, there remains considerable inconsistency in the way network performance is captured and reported against reliability measures. This is likely to present significant informational challenges for the AER under the new national distribution framework, especially if different businesses are reporting against the same measures using different assumptions or data sets. Inconsistency between measures will also make it difficult for customers and other stakeholders to understand the service performance of particular businesses, and to make informed comparisons between businesses.

The ENA considers that there are benefits in achieving national consistency in the definition and calculation of performance measures. National consistency in measure definitions will improve transparency in reporting service standard performance of individual businesses, help ensure like is being compared with like across businesses, and improve community understanding of what the measures represent.

The "toolkit" of measures presented in the current report represents a further refinement and extension of the URF framework to reflect current circumstances and requirements. In undertaking research to develop the toolkit, the ENA also studied the reporting frameworks used internationally. The measures presented in the toolkit are consistent with the range of measures currently used in most comparable overseas jurisdictions.

ENA National Service Standard Regulatory Policy

The ENA has developed a National Service Standard Regulatory Policy which addresses the challenges of developing a national regulatory framework for service standards, while recognising the unique aspects of the different network businesses and their operating environments. This Reliability Reporting Framework complements the ENA Service Standard Regulatory Policy.

The Service Standard Regulatory Policy envisages differing approaches to service standard regulation (including service standard regimes and targets) emerging across jurisdictions and possibly between customer classes. These service standard regulatory regimes are tied together under a national framework through a set of legislated high-level principles to which all distribution business proposals must conform, and against which the AER would assess the service standard proposals. The approach taken to service standard regulation should in part be based on customer preferences for service delivery.

1. These measures have become known as the SCNRRR measures, as they were proposed by the Steering Committee on National Regulatory Reporting Requirements.

Achieving national consistency in the definitions of service standard reliability measures is an important part of the ENA proposed regulatory approach. Under the approach, the array of possible reliability measures become a "toolkit", which can be used by businesses, with the approval of the regulator under the proposed service standard regulatory regime, to measure and encourage outcomes that customers value. It will also provide a focus for network business efforts to improve performance.

More details on the ENA Service Standard Regulatory Policy are available on the ENA website at www.ena.asn.au.

Scope of the National Reliability Reporting Framework

The Reliability Reporting Framework presented in this report provides a basis for moving to nationally consistent definitions for reliability performance measures. It also seeks to develop an improved understanding amongst network businesses, regulators and the community about using measures correctly within a service standard regime, as well as using the appropriate measures to encourage desired service standard outcomes.

Attachment 1 presents the proposed nationally consistent reliability measures toolkit. Relevant segmentations of the major measures are presented in Attachment 2 while some definitions of the basic components of the measures are presented in Attachment 3.

Attachments 1 and 2 include a table with the name of the measure (or level of segmentation), a technical definition of the measure/segmentation, and a description of what the measure tells stakeholders about network performance (ie. why the measure might be used).

The final column includes relevant commentary about the measure. In most cases, this column includes:

- some advantages of the measure;
- some disadvantages of the measure, for example, what the measure does not tell stakeholders, or information it does not reveal as a result of aggregation; and
- a list of the types of service standard regimes this measure could be used in and why.

The intention of this information is to enhance stakeholder understanding of reliability measures, and to ensure that the appropriate measures are used in the appropriate circumstances.

Accuracy

The accuracy of some measures is likely to vary across distribution businesses depending on the information systems they currently have in place.

In some instances, distribution businesses may need to develop information systems requiring additional investment to collect data not currently collected, or to collect it to a higher degree of accuracy than is possible given their current systems. Distributor information systems are generally improving over time with the increasing use of automated outage management systems, and distribution businesses whose customer databases are not integrated with connectivity information systems are moving to match the two. The latter will enable those distribution businesses to more accurately

measure SAIDI, SAIFI, etc based on actual rather than estimated numbers of customers affected by an outage.

While these ongoing initiatives are progressively improving the quality of available data, allowance will have to be made for the cost of upgrading systems to accommodate the provision of relevant nationally consistent reliability performance measures.

Appropriate data sets

There are a number of alternative reliability data sets that can be used for calculating sustained interruptions applied to average measures, which provide a basis for identifying underlying network performance and trends. The three data sets identified by SCNRRR are:

- Overall interruptions: All sustained interruptions experienced by customers, no matter what source or cause;
- Distribution Network Interruptions (DNI): All sustained interruptions originating from the distributor's asset ownership;
- Normalised Distribution Network (NDN): All sustained interruptions originating from the distributor's asset ownership, less particular excludable events. An excluded event may be due to an event beyond the control of the distribution business (eg customer requested interruption) or an extreme event (eg severe storm).

While all three data sets provide useful information, only the NDN dataset is appropriate for use in incentive based and minimum service standard regulatory schemes. This is because distribution businesses should only be penalised or rewarded for performance that is reasonably under their control. It is clearly unreasonable to penalise a distributor for interruptions suffered by customers but originating from other parts of the supply system such as generation or transmission.

Not excluding extreme events could potentially expose distribution businesses to unreasonable costs for low frequency events such as natural disasters, for which it is socially uneconomic for the network to be built to withstand. This is reflected in the Framework at Attachments 1 and 2.

A range of methods are currently used to define what constitutes an extreme event. The 2.5 beta statistical method as defined in IEEE Standard 1366-2003 (possibly with some modification to allow for tropical conditions) is proposed as an appropriate method in this Framework. It reduces any subjectivity about what constitutes an extreme event, it is based on 5 years of data, it is easy to apply, and is specific to the performance characteristics of the distributor's network.

A fourth data set may be required for the calculation of GSL payments. The range of events excluded for GSL purposes is generally smaller than that excluded in the NDN database. Development of appropriate exclusion trigger/criteria for GSL purposes remains the subject of further analysis by the ENA.

Appropriate method of identifying trend performance

By their very nature, service standard performance fluctuates from year to year, and is often highly correlated with the weather. This makes identifying the trend or underlying performance of a distribution business difficult. One method of identifying trend or underlying performance is to take a five year rolling average of performance under the relevant

measure. This will dampen the impact of unusual years, but may lead to underlying changes in trend performance taking longer to identify and may still not deal adequately with the correlation with the weather.

An alternative is to fit a regression line to the last several years' data to calculate a statistical trend. However, the latter will be sensitive to the number of years included in the regression. The ENA is undertaking further work to identify the most appropriate means of measuring trend performance.

Assessment criteria for reliability measures

Service Standard reliability measures are intended to capture information on specific service reliability performance. It is important, therefore, that they capture information appropriate for the purpose for which they are intended, and provide meaningful information on service performance.

Using measures inappropriately, either by using measures for a purpose for which they are not intended, or where the measure is not well defined, does not assist the distribution business or the regulator in understanding service reliability outcomes experienced by customers.

The following criteria should be used for assessment of reliability measures in terms of applicability and suitability for use in service standard regimes. Measures should:

- be clearly defined, simple to present, objectively measurable over time and auditable
- be transparent and linked to service outcomes that customers value
- record aspects of performance that are predominantly in the control of distribution businesses (be attributable to, or influenced by, distributors) and exemption criteria should recognise events that are not in the control of the distribution business
- provide information that enables stakeholders to judge the performance of the distribution business over time and to form a view as to whether network assets are being managed appropriately
- allow the distribution business to monitor performance to identify areas where improvements are required or as a basis for planning capital and maintenance expenditure
- be cost effective to implement

These criteria have been applied in the development of the proposed nationally consistent reliability measures toolkit outlined in Attachment 1, and the segmentation approaches and definitions presented in Attachments 2 and 3.

Issues to be resolved

As mentioned above, this Reliability Reporting Framework is dynamic. The development of new measures, as well as changes to current measures will continue, particularly as available information on network performance improves with the progressive installation of new and more sophisticated metering technologies, and network monitoring systems.

The ENA considers it critical that new measures be developed in line with the criteria outlined above, and in negotiation with distribution businesses and the regulator.

Timetable for moving to nationally consistent measures

It is recognised that not all distribution businesses may be able to meet the information gathering and reporting requirements of some of the measures as presented in this report at this point in time. However in the longer term, it should be recognised that there are benefits for all parties to move towards using measure definitions that are nationally consistent.

The timetable for moving to nationally consistent measure definitions should be business-specific. Appropriate timing will depend on the current information gathering and reporting capabilities and requirements applying to the particular business, the scope to change these practices within current information gathering capabilities, and potentially the need for the business to invest in new information systems to gather new or more accurate information.

Investment decisions will be dependent on the regulator recognising costs relating to systems upgrades to meet this framework.

Economic regulatory implications of nationally consistent measures

Businesses may also be constrained within existing regulatory determinations.

Moving to nationally consistent measures may interrupt the continuity of current business service standard performance data collection. Increased accuracy in information collected, as well as changes in the definitions of some key parameters of measures, may change the perceived reliability performance of some businesses.

Regulatory approaches and targets will need to accommodate changes in performance data that arise solely from changes in information collection, rather than the underlying performance of the distribution business. This will avoid businesses being unfairly penalised (or rewarded) under a service standard regime in cases where underlying performance has not changed.

Adoption of this Framework will be dependent on this issue being resolved satisfactorily between distribution businesses and the regulator. Businesses may not be prepared to move to the nationally consistent measures unless there is a clear mechanism in place to ensure that they will not be unfairly penalised under current service incentive regimes for changes in information gathering and analysis related to the adoption of this Framework.

Further work

While considerable detail is provided in the attachments on appropriate definitions for the most commonly used measures, further work and clarification is needed in other areas, in particular in relation to definitions of feeder sections, and the most appropriate characterisation of some of the less common measures.

The ENA is also working to develop similar framework documents for power quality measures, and customer responsiveness measures and approaches. The ENA intends to engage regulators and governments in discussions over the adoption of these documents, similar to the process being adopted for this Reliability Reporting Framework.

ATTACHMENT 1

"Toolkit" of Reliability Performance Measures

energy networks association

March 2007

Attachment 1: "Toolkit" of Reliability Performance Measures

Measure	Definition	Purpose	Commentary
Most frequently used measures			
SAIDI	System Average Interruption Duration Index: Total number of minutes, on average, that a customer on a distribution network is without electricity in a year. The sum of the duration of each sustained customer interruption (in minutes), divided by the total number of distribution customers. SAIDI excludes momentary interruptions (one minute or less duration).	To represent the customers' average performance, assisting with identifying the areas of the network that need improvement, resulting in better customer type performance in clear customer segmentation.	SAIDI provides an averaged measure of performance readily understandable by stakeholders, and addresses a reliability aspect - duration of interruptions - likely to be valued by customers. It indicates the interruption duration averaged across all customers - ie those actually suffering interruption as well as those not affected. It provides no information on the spread of interruption duration performance around the average and can thus mask poor performing parts of the network, if appropriate segmentation is not used. This average measure can be useful in monitoring, incentive and minimum service standards regimes but at an aggregate level does not provide useful information for remedial actions. Segmentation for monitoring would allow better identification of particular parts of the system which may require attention. Trend comparison for a distributor (or segment of the system) is more relevant than comparison between distributors with different system designs, configurations and environments. Some strategies to reduce SAIDI can have a perverse effect on MAIFI (or MAIFIe) which should be recognised. SAIDI is an almost universally reported measure of network performance.
SAIFI	System Average Interruption Frequency Index: Average number of times a customer's supply is interrupted per year. The total number of sustained customer interruptions, divided by the total number of distribution customers. SAIFI excludes momentary interruptions (one minute or less duration).	To represent the customers' average performance, assisting with identifying the areas of the network that need improvement, resulting in better customer type performance in clear customer segmentation.	SAIFI provides an averaged measure of performance readily understandable by stakeholders, and addresses a reliability aspect - frequency of interruption - likely to be valued by customers. It indicates the interruption frequency averaged across all customers - ie those actually suffering interruption as well as those not affected. It provides no information on the spread of interruption frequency performance around the average and can thus mask poor performing parts of the network, if appropriate segmentation is not used. This average measure would be suitable for use in monitoring, incentive and minimum service standards regimes but at an aggregate level does not provide useful information for remedial actions. Segmentation for monitoring would allow better identification of particular parts of the system which may require attention. Trend analysis for a distributor (or segment of the system) is more relevant than comparison between distributors with different system designs, configurations and environments. SAIFI is an almost universally reported measure of network performance

CAIDI	Customer Average Interruption Duration Index: Average duration of each interruption. The sum of the duration of each sustained customer interruption (in minutes), divided by the total number of sustained customer interruptions (SAIDI divided by SAIFI). CAIDI excludes momentary interruptions (one minute or less duration).	To represent the customers' average performance, assisting with identifying the areas of the network that need improvement, resulting in better customer type performance in clear customer segmentation.	CAIDI provides a different perspective on performance - it reflects the average duration of an interruption for the average customer. It is readily understandable by stakeholders, and addresses a reliability aspect - average duration of interruptions that have occurred - likely to be valued by customers. It provides no information on the spread of interruption duration performance around the average and can thus mask poor performing parts of the network, if appropriate segmentation is not used. It should not be regarded as a measure of response or restoration time - especially when applied at a system level - although it is related to these. It is possibly suitable for use as a monitoring measure, derivable as the ratio of SAIDI to SAIFI, but is not suitable for use in incentive or minimum service regimes (as it is not independent of the SAIDI and SAIFI measures). CAIDI is a frequently reported measure of network performance.
MAIFIe	Momentary Average Interruption Frequency Index event: Number of momentary interruption events per year (of 1 minute or less) divided by the total number of distribution customers. In calculating MAIFIe, each reclose operation of an automatic reclose device is not counted as a separate interruption. The successful automatic restoration of supply after any number of reclose attempts (1, 2, 3, 4 etc) is counted as one Momentary Incident (MAIFIe).	To measure the momentary interruption performance to customers	MAIFIe (MAIFI-events) is an averaged measure of the frequency of interruptions of short duration. It addresses a reliability aspect likely to be valued by customers, particularly given the increasing importance of computers and electronically controlled appliances. Being an average measure, it can mask poor performing parts of the network, if appropriate segmentation is not used. It is seen as better reflecting the number of occasions when power is temporarily interrupted before being quickly restored than MAIFI (below), as it records as a single event, the possible series of short interruptions generally occurring through the operation of automatic reclosing devices before restoration is achieved. MAIFI is seen as overstating the inconvenience of the interruptions when a series occur in a brief time before restoration is achieved. (If supply is not restored successfully by the automatic sequence, the event is removed from the MAIFI count and included as a single persisting interruption.) It is likely that some distributors are currently unable to provide this specific data on momentary interruption events and further investment in information systems would be required if the measure is adopted by businesses. The ENA is undertaking further work to examine the appropriate duration for a momentary outage / sequence (3 to 5 minutes rather than the present 1 minute) with the introduction of automated fault sectionalising schemes. The momentary event frequency would be suitable for use in incentive and minimum service standard regimes, as well as for monitoring purposes. MAIFIe (or, historically, more generally MAIFI) is frequently reported in measures of network performance.

MAIFI	Momentary Average Interruption Frequency Index: Number of momentary interruption events per year (of 1 minute or less) divided by the total number of distribution customers. In calculating MAIFI, each reclose operation of an automatic reclose device is counted as a separate interruption. Sustained interruptions which occur when a recloser locks out after several attempts to reclose should be deleted from MAIFI calculations	To measure the momentary interruption performance to customers	MAIFI has been the general averaged measure of the frequency of interruptions of short duration. It addresses a reliability aspect likely to be valued by customers, particularly given the increasing importance of computers and electronically controlled appliances. Being an average measure, it can mask poor performing parts of the network, if appropriate segmentation is not used. MAIFI was recognised by SCNRRR as optional "as some distributors are currently unable to provide data on momentary interruptions." As indicated above, MAIFI can overstate the inconvenience of momentary interruption, especially when supply is successfully restored during the switching sequence. It was the only frequency measure which could be derived from the operation counters of reclosers which were visited only periodically. MAIFI would be suitable for use in incentive and minimum service standard regimes, as well as for monitoring purposes, but is inferior to the MAIFIe measure listed above. MAIFI is frequently reported in measures of network performance.
Worst performing feeders			
Worst 10% of feeders	Proportion of feeders & prioritisation method - Performance of feeders covering the 10% of customers receiving the worst reliability performance by SAIDI or by SAIFI in each feeder category. This measure is usually accompanied by identification of which feeders are in the Worst 10% feeders list, and what actions are planned for improvement of these feeders.	To show the worst performing feeders in the network to focus improvement investment	This measure can complement the overall SAIDI and SAIFI measures by providing information on the spread of reliability performance and focuses attention on those customers receiving the worst reliability. Using feeders serving a proportion of customers served, rather than a simple proportion or absolute number of feeders per se, is preferred as it relates more closely to the spread of customer reliability experience. It identifies poorly performing locations allowing focused remediation. The disadvantage of this measure is that it is only a proxy for those receiving unacceptable reliability performance. Indefinite application of the same proportion of worst performing feeders may lead to progressive inclusion of more and more customers who are actually receiving acceptable performance. However, it is a readily implementable interim measure. It may provide useful monitoring information, and can be used in incentive or minimum service standards regimes to complement the overall average measures.

Feeders exceeding customer performance threshold	Feeder or Customer Standard method - The number of feeders whose performance is greater than respective customer thresholds of acceptable performance by SAIDI or by SAIFI in each feeder category. This measure is usually accompanied by identification of which feeders are in the Exceeding Threshold list, and what actions are planned for improvement of these feeders.	To show the worst performing feeders in the network to focus improvement investment	This measure can complement the overall SAIDI and SAIFI measures by providing information on the spread of reliability performance and focuses attention on those customers receiving the worst reliability. It has the advantage of only including feeders where reliability is worse than the specified threshold. It identifies poorly performing locations allowing focused remediation. The disadvantage of this measure is that it is dependent on the specification of thresholds for unacceptable reliability performance. It is likely that these levels will vary between distributors, according to location and according to the customer class concerned. It may provide useful monitoring information, and can be used in incentive or minimum service standards regimes to complement the overall average measures.
Other measures – Customer related			
CAIFI	Customer Average Interruption Frequency Index – The average frequency of sustained interruptions for those customers experiencing sustained interruptions. CAIFI is calculated as the total number of sustained customer interruptions, divided by the total number of distribution customers interrupted at least once. The customer is counted once in the divisor regardless of the number of times interrupted for this calculation. CAIFI excludes momentary interruptions (one minute or less duration).	To measure the average interruption frequency for all affected customers (SAIFI is the average interruption frequency for all customers served) CAIFI more accurately represents the average number of sustained interruptions experienced by affected customers than SAIFI does.	CAIFI has the advantage of focusing attention on the frequency of interruptions for affected customers only. However, in so doing, it may not well reflect actual reliability performance or improvement as no account is taken of the proportion of customers who are affected by interruptions. For instance, the average frequency of interruptions suffered by affected customers could rise marginally between two periods but the proportion of affected customers could fall substantially at the same time. CAIFI will only pick up the first of these changes where performance appears to have worsened whereas overall network performance has improved considerably. Given these limitations, CAIFI may only be suitable for monitoring purposes. CAIFI is not a widely reported measure.
Frequency measure, applied at feeder category segment/ sections urban, short rural and long rural	Interruption frequency measure is the number of times a customer is interrupted in a financial year. (A threshold may be specified above which GSL payments apply.)	Identifies an important attribute of customer service and allows identification of thresholds beyond which worse service is deemed unacceptable.	Interruption frequency segmented to individual affected customers (or those on a feeder section) is an important element in Guaranteed Service Level regimes where compensation is made directly to customers experiencing performance worse than a satisfactory threshold. The ENA is undertaking further work on identifying threshold levels for worst acceptable performance. It is likely that these levels will vary between distributors, according to location and according to the customer class concerned.

Duration measure, applied at feeder category segment/ sections urban, short rural and long rural	Interruption duration measure is when a customer experiences an interruption duration above a specific threshold.	Identifies an important attribute of customer service and allows identification of thresholds beyond which worse service is deemed unacceptable.	Interruption frequency segmented to individual affected customers (or those on a feeder section) is an important measure of reliability of supply as it directly affects individual customers. These measures form an important element in Guaranteed Service Level regimes where compensation is made directly to customers experiencing performance worse than a satisfactory threshold. The ENA is undertaking further work on identifying threshold levels for worst acceptable performance. It is likely that these levels will vary between distributors, according to location and according to the customer class concerned.
"X" sigma of feeder performance is less than "Y" times mean	A measure of the dispersion of feeder performance	Drives reduction in the average difference in feeder performance across all feeders or across a feeder category.	This is a supplementary aggregated analysis and presentation of feeder performance, quantifying the extent of poorly performing feeders or sections compared to the total network. It may be suitable as a monitoring measure, but is less likely to be directly relevant for other regimes. It is not as focused as other measures towards those feeders which are poor performers.
Percentage of customers experiencing greater than frequency matrix thresholds for events greater than 1 minute (sustained)	Measures the % of customers in particular frequency performance bands.	To show distribution of customer experience	This is a supplementary analysis and presentation of system interruption frequency performance, presented from a customer perspective. It may be suitable as a monitoring measure, but is less likely to be directly useable for other regimes as the information presented is quite detailed.
Percentage of customers experiencing greater than duration matrix thresholds for events greater than 1 minute (sustained)	Measures the fraction of customers in particular duration performance bands.	To show distribution of customer experience	This is a supplementary analysis and presentation of system interruption duration performance, presented from a customer perspective. It may be suitable as a monitoring measure, but is less likely to be directly useable for other regimes as the information presented is quite detailed.
Number of customers without supply for greater than "X" hrs or on more than "Y" occasions in a year	A measure of the number of customers receiving poorest performance by particular duration and frequency criteria	Focuses on customers which receive the worst reliability performance	These are supplementary analysis measures derived from the customer related frequency and duration measures above. They represent a monitoring aspect of the possible GSL measures for interruption frequency and duration above.
Interruption restoration rate	The percentage of interruptions restored within "X" hours of the fault occurring.	Drives reduction in duration by establishing a target % of interruptions to be restored within a target no. of hours	This measure analyses the duration of interruptions and time for restoration of supply at an event level. This aggregated restoration performance measure focuses on interruption events where the cause must be identified and removed and / or the system repaired. It does not consider the extent or effect of the event. It may be suitable as a monitoring tool.

Customer restoration rate	The percentage of interrupted customers restored within "Y" minutes of the fault occurring.	Drives reduction in duration by establishing a target percentage of customers to be restored within a target number of minutes	This measure analyses the duration of interruptions and the time taken for restoration of supply at a customer level. It is a supplementary measure that provides more information on the spread of performance across customers. This aggregated restoration performance measure focuses on the effect of interruption events on customers rather than on the event itself. It looks to the effect of the event, and might indicate whether restoration was well focused on the number of affected customers. It may be suitable as a monitoring measure but is unlikely to present information on a sufficiently consistent basis to be of use in other regulatory regimes.
System availability	Percentage of time supply is available to customers on average across the whole system. This measure is the converse of SAIDI, as a percentage of the year.	To show how "reliable" the network supply is. (SAIDI & SAIFI are measures of how "unreliable" the network is.)	This measure will highlight the very high reliability of the supply system, by concentrating on what does not cause inconvenience for customers. It will show very slight variation - SAIDI of 100 (minutes of equivalent system interruption per year of 525,600 minutes) shows a reliability of 99.98%, while doubling the interruption duration to 200 reduces the availability to 99.96%. Either figure by itself represents a very high availability performance, but does not highlight the difference between failure rates in the same "headline" way that SAIDI does. Although it does present the real picture of supply availability, its use might be regarded as cosmetic. ASAI (Average System Availability Index) is sometimes reported in measures of network performance.
Community outage frequency performance	Number of whole-community outages per annum	Focuses on community performance.	Interruption frequency segmented in an attempt to recognise that grouping by feeder type or section may not well reflect the impact of poor reliability on customers grouped into a community. There are difficulties in definition associated with the use of such a measure in different situations, particularly in establishing what the boundaries of the community are. For an individual distributor which can identify such community groupings it may form a useful monitoring measure.
Community outage duration performance	Average length of whole-community outages per annum	Focuses on Community performance.	Interruption duration segmented in an attempt to recognise that grouping by feeder type or section may not well reflect the impact of poor reliability on customers grouped into a community. There are difficulties in definition associated with use of such a measure in different situations, particularly in establishing what the boundaries of the community are. For an individual distributor which can identify such community groupings it may form a useful monitoring measure.

Period-of-Day performance (time matrix)	SAIDI & SAIFI performance in different periods of the day eg 05:00-10:00 h, 10:00-16:00 h, 16:00-22:00 h, 22:00-05:00 h	Drives focus on having planned outages in low-impact periods of the day, if justified, based on the value to the customer.	This is a supplementary analysis and presentation of system interruption duration and frequency performance, presented from a customer perspective. It may help to assess whether planned outages are timed to coincide with periods of least inconvenience to the customer. It may be suitable as a monitoring measure, but is less likely to be directly useable for other regimes as the information presented is quite detailed.
Percentage of interruptions affecting more than 1 customer	Shows the proportion of interruptions that affect multiple customers	Reveals the extent of multiple customer interruptions where more than just single customer outage management is needed. Drives reduction in large customer number interruptions, by interruption prevention techniques or by further network sectionalising to reduce the number of customers affected.	This measure allows the identification of events which affect more than a single customer recorded in the OMS and allows focus on interruptions which are of wider impact. It may be suitable as a monitoring measure, but is less likely to be relevant for other regimes.
Other measures – asset related			
Fault rate	The number of faults per 100 km of the network (both overhead line and underground cable).	To assist in identifying poorer performing parts of the network.	This is an aggregated measure reflecting the performance of the network per se, rather than the effect on customers. To some extent it can cancel out variations in customer density between distributors or various parts of a distributor's network. When segmented by feeder type, location, type or date of construction, it may provide useful performance monitoring of the network. Since it is an engineering rather than directly customer oriented measure, it is less likely to be suitable for use in other service standard regulatory regimes.
Energy Not Served (ENS)	The energy (kWh) that is not supplied during an interruption	Drives more equitable investment in performance improvement in consideration of the size of the customer or customers interrupted (in terms of energy consumption)	This represents an alternate or complementary measure of the effect of an interruption to the SAIDI and SAIFI measures which are based on customer numbers. It recognises that not all customers have the same requirements for supply, and would allow better comparison between events which affect a few large customers and those which affect a multitude of smaller customers. The necessary information (feeder pre-fault load etc) might presently be more readily available (or estimated) than actual customer numbers affected where connectivity details do not extend to the individual customer. It may form a useful tool for prioritising restoration or remediation within a distributor, but is an absolute number (rather than the percentage of system maximum demand following) so that any comparison between distributors would not be appropriate. The ENA is undertaking further work to develop measures that account for the size of loads, sensitivity or impact on customers interrupted.

System Minutes Lost	Number of minutes the equivalent Maximum Demand of the system is interrupted	Drives more equitable investment in performance improvement in consideration of the size of the customer or customers interrupted (in terms of system maximum demand)	This represents an alternate or complementary measure of the effect of an interruption to the measures based on customer numbers. It converts the ENS energy measure above to a representation in terms of the maximum demand of the relevant system and might allow some comparison between distributors. The disadvantage of this measure (and the ENS measure above) is that it does not show the number of customers interrupted nor the duration of interruption. The ENA is undertaking further work to develop measures that account for the size of loads, sensitivity or impact on customers interrupted.

Measure Segmentation

ATTACHMENT 2

energy networks association

March 2007

Attachment 2: Measure Segmentation

Segmentation	Definition	Purpose	Commentary
Exclusion segmentation			
Reporting performance using the Overall, Distribution & Normalised datasets	Overall - all interruptions. Distribution Network Interruptions (DNI) - all interruptions less transmission outages and directed load shedding. Normalised Distribution Network (NDN) - DNI less planned outages and major event days.	Overall is what the customer experiences. DNI is what happens on a distributor's network. NDN is what happens on a distributor's network minus extreme event days.	A number of alternative datasets can be used to calculate interruption performance. While all three provide useful information, only the NDN dataset is suitable for use in incentive based, minimum service standard and GSL regulatory schemes. This is because it is the only one to calculate interruptions on the basis of events for which the distributor can reasonably be held accountable. Data on all three bases are currently available.
Overall	All interruptions as experienced by customers, no matter what source or cause	To represent the total performance experienced by the customer	This dataset shows the total "raw" performance experienced by customers enabling discussion of reliability of supply with customers on the same basis as customers see it. However, it does not show underlying improvement or worsening of performance that is attributable to the distributor as opposed to other parts of the supply chain. Major events also tend to skew observed performance using this dataset. Since this dataset is influenced by the performance of other parts of the electricity supply chain (eg. generator failure) and by events beyond the distributor's control, it is only suitable for monitoring purposes.
Distribution Network Interuptions (DNI)	All interruptions originating from the Distributor's assets	DNI segmentation used to represent only the Distributor's network performance to the customer	This dataset shows that part of the performance experienced by customers arising from the distribution network. However, it does not separate the impact of major events that may skew the representation of the distribution network's underlying performance. Since this dataset does not exclude events beyond the distributor's control, it is only suitable for monitoring purposes.

Segmentation	Definition	Purpose	Commentary
Normalised Distribution Network (NDN)	All interruptions originating from the Distributor's assets ownership, less particular exclusion events covering events beyond the control of the distributor (see Table 2) and extreme events. There are a number of options for defining extreme events including: - T med - statistically exceptional interruptions (using Major Event Day threshold methodology) - 3 SAIDI - agreed exceptional events (where event equates to 3 SAIDI minutes for Distributor) - 5% customers - agreed exceptional events (where event affects more than 5% of customer base) Different exclusions are used in various Distributors for different needs.	NDN segmentation used to represent the Distributor's underlying performance by excluding "outlier events" that may skew the view of the underlying performance. The exclusions may represent major events that the Distributor is not expected to be able to manage (eg natural disasters, major weather events, etc) or the exclusions may represent statistically based "outliers" that are statistically "special" events of the electricity supply "process" (see next).	The main advantage of the NDN dataset is that it shows the distributor's underlying performance for which it can reasonably be held accountable. Excluding "outlier" events prevents extreme events from skewing the data and excluding events beyond the distributor's control provides a fairer basis for assessing performance of the network. There are a number of ways of determining excludable extreme events. Using a Customer impact threshold with a weather or natural event criteria for extreme events (eg 5% of customers or 3 SAIDI minutes) has been used in some jurisdictions but has led to considerable dispute over the event criteria. Using a statistical threshold offers a more objective means of determining outliers and recognises that the supply network is a "process" in which unacceptable outliers occur statistically. The ENA favours use of the 2.5 Beta statistical method. The disadvantage of the NDN dataset is that it does not show the total performance the customer experiences. While all three data sets provide useful information, only the NDN dataset is appropriate for use in incentive based, minimum service standard and GSL regulatory schemes. This is because distribution businesses should only be penalised or rewarded for performance that is reasonably under their control. It is clearly unreasonable to penalise the distributor for interruptions suffered by customers but originating from other parts of the supply system such as generation or transmission or directed load shedding. Not excluding extreme events could potentially expose distribution businesses to unreasonable costs for low frequency events such as natural disasters for which it is socially uneconomic for the network to be built to withstand.
2.5 Beta method of classifying extreme events	As per IEEE 1366, potentially modified to apply from midday to midday instead of midnight to midnight.	To normalise reliability data by removing abnormal days of network performance thus revealing the inherent reliability of the network. Detail of the outages on these major event days is reported separately. This method provides an objective means of identifying Major Event Days	The 2.5 Beta method provides an objective statistical means of identifying extreme event days which should remove disputation associated with methods currently used in some jurisdictions. By removing extreme events which it would be socially uneconomic to strengthen the network to withstand from the calculation of average measures, along with specified events beyond the control of the DB, incentive and minimum service standard schemes would be better targeted. The 2.5 Beta method is also suitable for monitoring based on the NDN data set. The IEEE definition is based on a reporting period of midnight to midnight. This may not properly capture the impact of tropical storms which typically occur in the evening. A reporting period of midday to midday may be more appropriate for Australian conditions. The ENA is doing further work to investigate the impact of making this change.
Guaranteed Service Levels	Events beyond the control of the distributor should be excluded from GSLs, ie an NDN database should be used for GSL purposes.	Distributors should not be penalised for events that they cannot be reasonably expected to mitigate via prudent asset management	The range of events excluded for GSL purposes is generally smaller than that excluded in the NDN database using the 2.5 Beta method. Development of an appropriate exclusion method for GSL purposes remains the subject of further analysis by ENA.

Segmentation	Definition	Purpose	Commentary
Use of normalised SAIDI and SAIFI measures for setting minimum service standards	Events beyond the control of the distributor should be excluded from calculating MSS, ie the NDN database should be used for MSS purposes	MSS are designed to set a minimum level of service that customers should expect from the distributor, which means that the distributor's performance in delivering electricity to customers against the MSS should only be measured on the basis of factors that the distributor has control over.	The advantage of setting minimum service standards on the basis of the NDN dataset is that distributors' performance in meeting those standards is assessed on the basis of events over which they can reasonably be expected to have control. The disadvantage is that minimum service standards will not be assessed on the same basis as the reliability experience the customer observes. However, using the NDN dataset ensures consistently underperforming parts of the network are identified and not misrepresented by abnormal or exceptional events.
Customer segmentation			
Method of determining the customer base	Average of customer numbers at the start & finish of a reporting period (ie the SCNRRR method)	To determine the appropriate number of customers for use with customer based indicators	Averaging the number of customers at the start and end of a reporting period is a simple method all distributors can now implement and is likely to be a good approximation for all regulatory regime types. While determining customers on a daily basis would be more accurate, it is not clear whether the benefits of this would exceed the additional information system costs. The ENA is undertaking further work to assess these two methods. The certain identification of the number of customers affected by an event may require more complete integration of system and customer data than exists in all distribution businesses at this time.
Exclusions from the customer base	All unmetered supplies and vacant accounts to be excluded when calculating the customer base.	To ensure that only actual customers are included in customer base	Excluding the number of unmetered supplies from the reliability performance customer base has the advantage of ensuring consistency across all distribution businesses and maintaining the integrity of the customer based measures for all regulatory regime types. The disadvantage is that specific unmetered supplies (eg traffic lights and some special street lighting) may be of particular importance to customers. However, consistent differentiation of which unmetered supplies should be included by all distribution businesses is impractical. It is proposed that any reporting of specific unmetered supplies be handled separately by agreement between the distribution business and the regulator.
All customers	Measures average customer performance at the Distributor's whole of system level. Total system level performance only.	To provide a measure that relates to the whole system performance	Using all customer based performance measures has the advantage of providing a whole-of-business assessment suitable for use in all regulatory regime types which can be readily implemented by all distributors. However, it masks variations in performance in different locations and at different levels of the network. It says nothing about the reliability performance received by worst affected customers nor the distribution of performance around the average figure. Current measures weight all customers equally, making no allowance for different sizes and load sensitivities. The ENA is doing further work on how these differing customer characteristics could be incorporated.

Segmentation	Definition	Purpose	Commentary
Community level (Customers supplied at community level)	Measures performance of community groups	To measure of performance of electricity supply to communities of different sizes and locations	This would enable performance of different sized communities to be measured and managed. Communities are a stakeholder group which may require different management to individual customers. However, clear and consistent identification of what constitutes a "community" is more difficult to obtain than feeder classification. Given that most measures seek to focus distributor attention on performance to individual customers rather than to communities, as well as the definitional difficulties involved this measure may only be suitable for monitoring purposes.
Zone substation segmentation reporting	Measure of average performance of all customers supplied by each zone substation	The purpose of the Zone Substation segmentation is to remove problems of changing feeder open-points for feeder level performance measurement.	This approach could improve the stability of measures as load-shifting between adjacent feeders is absorbed within the zone substation area. Also, the effects of whole-of-network programs (eg vegetation management) can often be seen better at a zone substation level than at feeder level. However, the zone substation levels involve a higher level of aggregation and thus provide highly "averaged" performance information. They mask poor performing areas within the zone substation area. Given this, they are likely to be only suitable for monitoring purposes.
Use of the SCNRRR feeder categories CBD, urban, short-rural and long-rural for segmentation	CBD: A feeder supplying predominantly commercial, high-rise buildings, supplied by a predominantly underground distribution network containing significant interconnection and redundancy when compared to urban areas. Urban: A feeder which is not a CBD feeder, with actual maximum demand over the reporting period per total feeder route length greater than 0.3 MVA/km. Rural short: A feeder which is not a CBD or urban feeder with a total feeder route length less than 200 km. Rural long: A feeder which is not a CBD or urban feeder with a total feeder route length greater than 200 km.	The purpose is to delineate between the differing network load densities and geographic spread of the customer bases. (Also see Feeder Section reporting below)	The SCNRRR definitions were introduced as a first step to attempting to measure performance provided to four broad, relatively "homogeneous" customer types. The categories are defined by feeder lengths, load and redundancy. While generally accepted over recent years and used in all types of regulatory regime types, the segmentations have significant limitations. If a segmentation is too broad, actual customer performance becomes too averaged and worst performance, or particular customer groups' performance, could be hidden by the averaging across the customer base. This happens particularly in the Short Rural category of customers where it is a frequent occurrence that a Short Rural feeder supplies suburban customers and then supplies rural customers further downstream. These two customer bases usually have differing expectations of their reliability of supply. Similarly, some feeders supplying major regional centres are classified as rural. Definitions based on customer density can also be affected by a lack of discrimination between large and small demand customers. Use of feeder section categorisation appears to be the most viable alternative to pursue to more closely approximate the performance received by similar customers (see below).

Segmentation	Definition	Purpose	Commentary
The use of feeder sections for reporting	A feeder section is that part of a high voltage feeder between the (zone) substation circuit breaker and the first switching device; or between subsequent switching devices. Measure of average performance of all customers supplied by the feeder section	A feeder section is a useful asset identification mechanism as it is the smallest whole part of the network that will be automatically interrupted for a momentary or a sustained outage. Generally, customers are grouped into more homogeneous customer preferences in these feeder sections.	The use of feeder section segmentation will better reflect like-customer groupings for feeders that traverse through disparate demographic and environmental conditions and better reveal variation in performance hidden in feeder level average measures. They will be suitable for use in all regulatory regime types and be one step closer to measuring and managing performance at the customer level. This level of performance reporting is now more achievable for many distributors with the recent development of more sophisticated outage management systems. A number of issues remain to be resolved regarding the exact definition of feeder sections the feasibility of alternative approaches and this is the subject of ongoing work by the ENA. Ideally, feeder section definitions would be based on customer attributes that describe customer preference eg "all suburban customers", "customers in rural township", etc. Note that the latter have quite different characteristics and preferences to customers in a rural area, even though both groups may be the same electrical distance from the zone substation.
Customer Class Segmentation	Segmentation into customer classes (see across, and below)		At this stage the benefits of moving to this level of segmentation are unlikely to outweigh the costs involved and feeder section segmentation is likely to provide the best option. Customer segmentation definitions and measurement frameworks could be developed at a later stage, after feeder section level segmentation is implemented. Until then, customer class measures would only be suitable for monitoring purposes.
Residential Customer class	Measure of average performance to all residential customers on that segment Combine this segmentation with other segmentation eg measure of performance of residential customers on a feeder.	To identify residential customers as a separate customer segmentation, and having separate residential customer performance targets.	This would enable measurement and management of this relatively homogenous customer class while recognising that residential customer preferences for reliability are markedly different to those of business customers. However, distribution networks rarely solely supply residential-only areas. Feeders are usually mixed with some or many business customers and distributors sometimes do not hold the information required to distinguish residential and business customers.
Business Customer class	Measure of average performance to all business customers on that segment Combine this segmentation with other segmentation eg measure of performance of business customers on a feeder. May have sub-categories of business customer groups depending on size/impact (eg corner store, production factory, nursing home, water treatment plant)	To identify business customers as a separate customer segmentation, and having separate business customer performance targets.	This would enable measurement and management of this relatively heterogeneous customer class. Business customer preferences for reliability are markedly different to those of residential customers but also differ markedly between different types of businesses. Distribution networks sometimes supply business-only areas, but mixed residential-business feeders are more common and distributors sometimes do not hold the information required to distinguish residential and business customers or different types of businesses other than on the basis of size of consumption.

Segmentation	Definition	Purpose	Commentary
Major Customer class	Measure of average performance to all major customers on that segment. Combine this segmentation with other segmentation eg measure of performance of major customers on a feeder. May have sub-categories of major customer groups depending on customer size/impact (eg mine, smelter, hospital, shopping centre).	To identify major customers as a separate customer segmentation, and having separate major customer performance targets.	This would separately identify major customer performance from other customer classes to enable more focused performance management. However, in most cases there are already Connection and Access Agreements in place with major customers and major customers can negotiate and manage their own supply performance needs more effectively than small customers. This reduces the relevance of a major customer performance category.
Individual customer level	Measures individual customer performance	To provide a measure for individual customer performance	This segmentation would provide individual customer interruption and performance statistics enabling the best customer granularity for comprehensive customer performance management. It would be suitable for monitoring, GSL and minimum service standard purposes but would be too fine a level to be practical for incentive schemes. Its implementation would require the ability to comprehensively identify all affected customers accurately and their exact location on the network. While the uptake of automated outage management systems is improving the availability of affected customer information, some distributors still have some way to go to be able to do this and achieve full integration of their customer and connectivity databases.
Worst served customers	Use of a minimum service standard for worst performing feeders based on normalised performance	Setting an MSS for WPF sets a standard for ongoing performance, and ensures the electricity network business continues to maintain improved service to the customers on feeders within the WPF group.	This has the advantage of ensuring sufficient focus is maintained on the worst served customers and that efforts are made to bring them to at least a minimum acceptable level of reliability. The difficulty is in determining what the minimum service standards should be. It is likely that these levels will vary between distributors, according to location and according to the customer class concerned. The ENA is undertaking further work on methodologies for determining worst performing measure customer standards.
Asset/Network segmentation			
Individual assets	Segments asset performance at individual asset type level (usually Mean Time Between Failures (MTBF) measures used in this segmentation). Asset types used can include: Line assets segmentation (eg poles, cross arms, air break switches, distribution transformers, etc) Substation assets segmentation (eg transformers, circuit breakers, Isolators, busbars, secondary systems, etc)	Represents individual asset type performance	The advantage of these measures is that they provide asset-focused failure rate and performance statistics enabling generalised asset type comparisons between distributors. However, it needs to be recognised that no two distributors have the same operating conditions, and direct benchmarking is inappropriate without understanding and allowing for different operating conditions. While the measures do not provide information that directly relates to the performance observed by individual customers, they provide engineering information that is an important input to providing outcomes that meet customer expectations. As these measures are only indirectly related to customer outcomes, they may only be suitable for monitoring purposes.

Segmentation	Definition	Purpose	Commentary
Network hierarchy performance	Segments asset performance (outage frequency and restoration time) at different supply chain levels (usually represented by an availability measure in this segmentation) eg upstream, subtransmission, zone substation, distribution line, distribution transformer, distribution low voltage	Represents network level performance for comparison with other distributor network level performance	These are engineering measures which assist in the identification of customers receiving poor performance. They enable generalised comparison of supply chain segment performance statistics with other distributors, facilitating understanding and improvement where appropriate. However, no two distributors have the same supply chain structure or operating conditions, and direct benchmarking is inappropriate without understanding and allowing for different network structure and operating conditions. As these measures are only indirectly related to customer outcomes, they may only be appropriate for monitoring purposes.
Outage type segmentation			
Segmentation of outages into Planned, Unplanned and Emergency	A Planned Interruption is where the Distributor purposefully interrupts the continuity of supply, whether the required notice of planned outage is given or not. An Unplanned Interruption is where an outage has occurred and supply has or should have been interrupted by a protective device. Emergency outage of network component may cause interruption to supply for which no notice can be given – usually associated with an urgent interruption to supply which has a safety or potential network impact if not attended to.	Enables performance and trends in planned, unplanned and emergency interruptions to be observed	The advantage of this segmentation is that it separates out planned outages which are likely to cause less inconvenience to customers than unplanned outages. The planned/unplanned segmentation is currently widely used and is suitable for monitoring, GSL, minimum service standard and incentive regulatory regimes. While emergency outages are closely related to unplanned outages in that the interruption to customers is "forced" upon the distributor, there could be some benefit in providing separation of unplanned and emergency outages to investigate and monitor unplanned response times and capabilities. However, the definition of emergency outages would need to be clarified and made uniform. It is not clear that the benefits from introducing the emergency classification would exceed the system costs involved, particularly seeing that unplanned and emergency outages are indistinguishable to the customer.
Outage Cause segmentation			
Use of cause segmentation reporting	Segments performance into causes of outage. There are many levels of cause detail to suit different applications, eg the Annual Report would require only 8-10 causes, while detailed asset performance analysis might require far more detail to enable asset performance trends or special causes to emerge.	To find primary causes of outages to customers	The advantage of this segmentation is that it directly relates customer performance to asset/network performance issues and both "internal" and "external" causes. It needs to be recognised that outage causes may largely reflect the environmental conditions facing the distributor but this will assist customers and stakeholders understand the origin of interruptions and the variety of issues that a distributor has to manage. This segmentation only provides information on the causes of interruptions rather than their duration and frequency. Cause reporting is likely to be only suitable for monitoring performance. The ENA currently has a work program underway to establish suitable outage cause definitions.

Segmentation	Definition	Purpose	Commentary
Determination of trend performance			
5 year rolling averages	Average of the last five yearly values of an indicator.	The need to find an appropriate measure to reveal underlying performance in the face of somewhat random reliability events.	By their very nature, reliability measures fluctuate from year to year, and are often highly correlated with the weather. This makes identifying the trend or underlying performance of a distribution business difficult. One method of doing this is to take a five year rolling average of the relevant performance measure. This will dampen the impact of unusual years but may lead to underlying changes in trend performance taking longer to identify and may still not deal adequately with the correlation with the weather. An alternative is to fit a regression line to the last several years' data to calculate a statistical trend. However, the latter will be sensitive to the number of years included in the regression. The ENA is undertaking further work to identify the most appropriate means of measuring trend performance.

ATTACHMENT 3

Definitions of the Basic Components of the Measures

energy networks association

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Attachment 3: Definitions of the Basic Components of the Measures

Item	Definition
Distribution Authority's Network	A distributor's network is a network of electricity lines and associated equipment operated by the distribution authority, used for the distribution of electricity. The distributor's network starts at the bulk supply point form the transmission company and ends at the customer's connection point.
Customer Interruption	A customer interruption is any loss of electricity supply to a customer associated with an outage of any part of the electricity supply network including outages affecting a single premise but does not include disconnection by a retailer. The customer interruption starts when recorded by equipment such as SCADA or, where such equipment does not exist, at the time of the first customer call relating to the network outage. An interruption may be planned or unplanned. An interruption may be sustained or momentary. A sustained customer interruption is any loss of electricity supply to a customer associated with an outage of any part of the electricity supply network of more than one minute duration.
Network Outage	A Network Outage is where a normally energized element of the network is out of service due to a planned or unplanned incident. A Network Outage may or may not result in customer interruptions.
Customer	A Distribution Customer is defined in terms of a connection point between a distribution network and customer that has been assigned a unique National Metering Identifier (NMI) or an agreed point of supply otherwise.
Major Industrial or Commercial Customer	Customers with a consumption greater than 160 MWh per year
Customer Base	The number of distribution customers is calculated as the average of the number of customers at the start and the close of a relevant period . Indices are calculated on whichever reporting period is required. Note: Unmetered street lighting supplies are excluded. Other unmetered supplies are also excluded from the calculation of reliability measures but may be subject to separate reporting. Inactive / vacant accounts are excluded.
Undefined Customers	Customers that are not yet linked to the electrical connectivity database, but are physically supplied with an electricity service.
Sub-transmission	The collection of assets (sub-transmission lines, cables, zone-substations and associated equipment) whose purpose is to distribute power in bulk from transmission substations to zone substations which feed the distribution network or a particular customer.
Regulator	The Technical regulator is the governing body that sets minimum service standards and reporting requirements within the Distribution Code or equivalent. Requirements are usually part of the distribution authority license conditions. The Economic regulator sets the distributor's revenue, capital and operating requirements and may carry out a performance monitoring and reporting role on behalf of the Technical regulator.
Stakeholder	Owner of the business, customers, regulators, government (local / state), customer lobby groups, retailers, transmission company, employees of the business,.
Feeder	A high voltage feeder is a line used to distribute electricity from a subtransmission (zone) substation, and supplies distribution transformers which directly supply customers. A distribution feeder commences at a zone substation Circuit Breaker (CB) and continues to every customer downstream of the CB. A feeder is currently the base level of reliability performance measurement. Customer outages are assigned to the feeder level of the network for base-level reliability measurement.

Item	Definition
Feeder Section	A feeder section is that part of a high voltage feeder between the (zone) substation circuit breaker and the first automatic switching device; or between subsequent automatic switching devices. A feeder section is a useful asset identification mechanism as it is the smallest whole part of the network that will be automatically interrupted for a momentary or a sustained outage
Zone Substation	A zone substation is usually the boundary substation between the subtransmission system and the distribution feeder system. It is usually a substation where one or a number of distribution feeders emanate to supply the surrounding customers.
Major Interruptions	An incident involving network assets, but not persons (employee or public), that falls within any of the following three categories: - an incident where a network operator's published reliability planning standards are not met. - a major or prolonged reliability event, being a loss of supply to more than 20,000 customers for more than one minute, or to multiple urban customers for more than 12 hours, or to multiple rural customers for more than 24 hours (other than as a result of major natural events, planned outages, failure of another operator's transmission system or directed load shedding, operator error or third party damage). Causes of these outages would typically involve failure of a network asset such as a type of cable, termination, current transformer (CT), voltage transformer (VT), transformer, surge diverter etc.

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