

Our ref: 40948849
Contact: Jai Thomas (08 9326 6109)

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Mr John Pierce
Chairman
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

363 Wellington Street
Perth WA 6000
GPO Box L921 Perth WA 6842

T: 13 10 87 | Fax: 08 9225 2660
TTY 1800 13 13 51 | TIS 13 14 50

Electricity Networks Corporation
ABN 18 540 492 861

enquiry@westernpower.com.au
westernpower.com.au

Dear Mr Pierce,

Rule Change Proposal - Removing barriers to efficient network investment

Network businesses around Australia are increasingly looking to emerging technologies to help meet their objectives of delivering safe, reliable and affordable electricity services to their customers. This intent is generally supported in the National Electricity Rules (NER) by the underlying philosophy of least cost investment, technology neutrality and service-based economic regulation.

However, Western Power is concerned that, in some situations, a lack of clarity in the NER may unintentionally create a barrier to the use of such technology, and effectively deny customers the benefits from delivery of not only the most cost-effective services, but also potentially more reliable and safe services.

This rule change proposal seeks to overcome the identified barriers by proposing an expansion of the term "distribution service" in the NER, which will provide Network businesses and the AER the flexibility required to ensure the underlying philosophy of the regulatory framework is delivered on. Western Power considers that the proposed change to the NER is consistent with the National Electricity Law, and within the bounds of the Australian Energy Market Commission's rule-making powers.

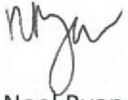
An example of such an investment option which may not meet the current definition is stand-alone power systems (SPS). Western Power considers the near-term opportunity from the deployment of SPS as an alternative to network renewal can provide significant benefit to customers in the NEM.

Western Power modelling identifies an upper bound estimate of 2,702 candidate SPS customers on its network over the next ten years, resulting in a net benefit of \$388m compared to replacing existing network assets. Western Power considers similar opportunities are likely to emerge across almost all regions within the NEM.

The key benefit of the rule change will be the ability of network businesses and their customers in the NEM to realise the benefits of previously out of reach least-cost investment opportunities, with the potential for enhanced service performance. This places downward pressure on customer tariffs, and is likely to improve customer outcomes.

If you wish to discuss our proposal, please contact myself on (08) 9326 4083 or noel.ryan@westernpower.com.au; or Jai Thomas on (08) 9326 6109 or jai.thomas@westernpower.com.au

Yours sincerely



Noel Ryan
Economic Regulation Manager

Removing barriers to efficient network investment

Rule Change Request

September 2016

Contents

1	Summary.....	3
2	Name and address of rule change proponent	6
3	Description of the proposed Rule	6
4	Nature and scope of the issues the rule change seeks to address	7
4.1	New technologies are allowing services to be provide more efficiently.....	7
4.2	Proposed Solution	12
5	Contribution to the achievement of the National Electricity Objective	21
6	Expected costs, benefits and impacts of the proposed rule.....	22
6.1	Benefits	22
6.2	Impacts and Potential Costs.....	24
7	Stakeholder consultation.....	27
8	Australian Energy Market Operator’s Declared Network functions	28
	Attachment 1: Case study	29
1.1	Background	29
1.2	The Stand-alone Power System (SPS) Opportunity	31
1.3	Analysis	32

1 Summary

New technologies are providing electricity customers with many different options and more control in the way they use electricity. They could also allow Distribution Network Service Providers (DNSPs) to meet their regulatory obligations to provide a safe, reliable and secure network through alternative means than traditional network investment. However, Western Power is concerned that, despite an underlying philosophy of least cost investment, technology neutrality and service-based economic regulation, a lack of clarity in the National Electricity Rules (NER) may unintentionally create a barrier to the use of certain types of technology that will deliver not only the most cost-effective services, but also potentially more reliable and safe services.

Uncertainty in the ability of DNSPs to deploy new technologies arises because of the definition of *distribution service* in the NER. Together with the related definitions of *distribution system* and *network*, the NER could imply that services provided by means of certain assets may not qualify for classification as a *distribution service* if they:

- are not used to convey or control the conveyance of electricity; or
- do not connect a premises to a distribution network.

If a technology option does not satisfy these conditions, it is then up to the Australian Energy Regulator (AER) to interpret whether the option is provided “in connection with” the *distribution system* and so whether the related service is a *distribution service*. There is considerable uncertainty about the application of this expression towards options involving new technology solutions. This proposed rule seeks to remove this uncertainty.

If a service does not qualify for classification as a *distribution service*, it cannot be economically regulated. This means that a DNSP cannot recover regulated revenue for that service. In addition, if a DNSP is not certain that the AER is able to classify a service provided by means of a non-network option as a *distribution service*, then it may be reluctant to put the time and effort in exploring the merits of such technology to help deliver efficient services for customers.

An example of such a non-network option which may not meet the current definition is stand-alone power systems (SPS). A SPS is not connected to a distribution network, nor do many components of a SPS convey, or control the conveyance of, electricity. Yet a SPS could be deployed by a DNSP as an alternative to a network solution (such as replacement of existing poles and wires) so as to meet its regulatory obligations and licence requirements to facilitate the supply of electricity to a customer. This could be achieved at a potentially much lower cost, as well as potentially providing a more reliable and safer outcome for both customers and the DNSP than a network solution. Similar uses of new technology in network services are likely to emerge in the future across the National Electricity Market (NEM).

Through this rule change request, Western Power is seeking to ensure that the definition of *distribution service* facilitates the achievement of efficient costs as intended under the NER economic regulatory framework by:

- removing any technology bias which could exist in the current definitions, thereby enabling DNSPs to have choice in the type of assets employed;
- promoting consistency between the planning obligations on DNSPs under Chapter 5 of the NER and the economic regulation frameworks under Chapter 6 of the NER; and
- aligning the flexibility currently provided to the AER regarding its approach to expenditure approvals and its approach to service classification.

The proposed rule does this by amending the definition of *distribution service* to enable the AER to consider whether to classify non-network options as providing a *distribution service* where they are used to replace,

or in substitution for, a network investment. Critically, the proposed rule also places limitations on the circumstances under which non-network options can be classified as *distribution services*. These limitations will constrain the exercise of this additional scope to the definition of *distribution services* to situations where the new technology solution is used specifically to address a need for investment as part of a regulated network service and so would not otherwise be provided through a competitive market. This will promote efficient outcomes for customers and will not impede the development of competition in markets that use the same technology solutions.

Through this rule change process, the Australian Energy Market Commission (AEMC) will be able to provide clarification and certainty to the market on the range of assets which can provide a *distribution service* consistent with the provisions of the National Electricity Law (NEL). Clarifying the AER's power to enable DNSPs to adopt more efficient technologies, combined with existing frameworks that require the benefits of lower costs to flow through to customers in the form of lower prices, this rule change will benefit consumers across the NEM through more efficient investment in network services. For example, in the case of SPS, Western Power estimates that it could be deployed as a more efficient service to approximately 2,702 Western Power customers over next ten years, resulting in avoided capital expenditure of \$388m compared to replacing existing network assets.¹ Similar benefits could be achieved in other remote regions within the NEM, such as Queensland, New South Wales, Victoria South Australia and Tasmania.

Western Power considers the costs of this proposed rule change to be minimal and that it would be straightforward to consider the potential use of non-network options as part of the AER's service classification considerations. While the application of the rule change to some technologies may have implications for the operation of the National Energy Customer Framework, we believe these issues are most appropriately addressed in the COAG Energy Council's work program on emerging technologies and that this rule change request can be considered independently of those issues.

It is important to note that this rule change request is not only about removing barriers to SPS. Western Power uses SPS as an example to demonstrate both the problems that currently arise and the benefits that may accrue from addressing a wider problem in the NEM; that is, the lack of clarity regarding what assets DNSPs in the NEM may invest in to provide *distribution services*. It is against this broader objective of clarifying the meaning of distribution services that this rule change should be assessed.

While this lack of clarity is one barrier that currently prevents DNSPs from investing in SPS where it is more efficient to do so, the proposed rule does not seek to implement all the necessary conditions to allow this investment to occur. Indeed, some of the barriers to SPS are outside of the AEMC's functions and powers, and so cannot be addressed as part of a rule change request. Others, such as customer protection issues, are being addressed through other processes. For this reason, the proposed rule does not seek to implement all the necessary consumer protections and other conditions for SPS.

While Western Power is not currently part of the NEM, the Western Australian Government is in the process of implementing reforms to the electricity sector that would, among other things, see Western Power regulated by the AER under Chapter 6 of the NER, rather than under existing jurisdictional legislation. Western Power's first intended Regulatory Control Period (RCP1) under the NER is targeted for commencement on 1 July 2018.

Western Power acknowledges that the Australian Energy Market Commission must assess whether this rule change request is in the long term interests of consumers of electricity in the NEM, which at this stage does not include customers in Western Australia. While Western Power uses analysis of its own network to

¹ Indicative modelling by Western Power has found that the use of SPS would result in a net present value saving of \$388m over 50 years compared to replacing existing network assets.

provide a quantitative estimate of the benefits to customers that may accrue as a result of this rule change request, we consider that similar benefits are likely to be available to customers across the NEM.

Further, the quantitative benefits of this rule change have only been assessed in relation to one outcome that could be facilitated through the proposed rule; that is, installing SPS in place of traditional network expenditure. More fundamentally, the objective of this rule change is to clarify what DNSPs can invest in to efficiently provide *distribution services* and so remove a barrier to the use of emerging technology that will deliver not only the most cost-effective services, but also potentially more reliable and safe services. The benefits from providing greater certainty, and thereby facilitating deployment of efficient investment in the provision of regulated network services, will accrue to electricity customers across the NEM.

2 Name and address of rule change proponent

Western Power
363 Wellington St
Perth
WA 6000

Western Power contact: Jai Thomas, 08 9326 6109

3 Description of the proposed Rule

The purpose of this rule change request is to ensure that the definition of *distribution service* facilitates the achievement of efficient costs as intended under the economic regulatory framework set out in Chapter 6 of the NER. The proposed rule does this by clarifying that potential technology solutions which could be deployed by a DNSP in providing network services are able to be captured in the definition of a *distribution service* and therefore are able to be classified as a *distribution service* for regulation under Chapter 6 of the NER.

Classification is important to electricity customers because it determines the need for, and scope of, regulation applied to *distribution services* central to electricity supply. It also determines which types of costs incurred by DNSPs are able to be recovered from customers through regulated charges.² If the current Rules create a barrier to particular types of technology solutions which could be used by the DNSP to provide a regulated service, then the DNSP will be biased against exploring such solutions and instead favour more traditional network investment.

The current definition of *distribution service* lacks clarity as to whether emerging technology solutions are included. It is defined as “a service provided by means of, or in connection with, a *distribution system*”. The phrase “in connection with” suggests a degree of flexibility in the types of assets that can provide *distribution services*. However, the extent of that flexibility is unclear. The NER definition for *distribution system* is tied to the definition of “*network*” which covers “apparatus, equipment, plant and buildings used to **convey, and control the conveyance** of electricity to customers excluding any *connection assets*” (emphasis added).

The interaction of these definitions means that any technology option which contains assets or equipment which are not considered to be used to convey or control the conveyance of electricity and which are not *connection assets* must instead be considered to provide services “in connection with” the *distribution system* in order for the AER to be able to classify that technology option as providing a *distribution service*.

The rule change proposal attempts to remove any confusion about the scope of the words “in connection with” with respect to emerging technology solutions by clarifying that services provided by means of a potential non-network option, subject to defined conditions, meets the definition of *distribution service*. This will ensure that there is no barrier or regulatory uncertainty about whether the AER can classify these solutions as a *distribution service* for any DNSP.

² For *distribution services*, the AER makes its classification decisions subject to a range of factors set out in the NER, with particular focus on the extent of competitive pressures relating to the service. *Distribution services* are categorised as either being direct control, negotiated or unclassified (or unregulated). Direct control services are further sub-divided into either standard control or alternative control services. Costs incurred in standard control services are averaged across all customers while for alternative control or negotiated services, the costs are charged to those customers who benefit directly from that specific service. The AER has no role in regulating unclassified or unregulated services.

Western Power considers that uncertainty is created if the scope of the expression “in connection with” is left for the AER to determine when it makes its decisions on service classification as part of the distribution determination. This uncertainty could remove any incentive for DNSPs to commit the necessary time and resources to explore the full potential of such technology in order to present evidence to inform the AER’s considerations. This will make it difficult for the AER to properly assess the merits of classifying the services, especially given that the service classification arrangements under Chapter 6 of the NER implicitly assume that the assets that provide *distribution services* have already been constructed.

Western Power believes that this matter of the application of the words “in connection with” with respect to emerging technology solutions is of importance to the market and requires careful consideration by the AEMC.

The proposed rule also introduces a number of safeguards to ensure this amendment is only exercised when it is in the interest of customers and delivers more efficient outcomes to customers, including:

- the technology solution will replace, or be a substitute for, part of the existing *distribution system* which the DNSP would otherwise be required to invest in to meet a regulatory obligation or licence requirement;
- a non-network option would potentially be a more efficient means of meeting that obligation; and
- the technology solution is owned, controlled or operated by a DNSP and so the customer has not opted for the service provided by means of the technology to be provided by a third party through a competitive service offering.³

These safeguards, together with existing frameworks embedded in the NER that promote efficient expenditure by DNSPs and require that only monopoly services are regulated, will ensure that allowing the AER to classify DNSPs’ deployment of new technology solutions as a *distribution service* will not act as a barrier to competition emerging in these markets and ensure that customers pay only the efficient costs of providing that service.

4 Nature and scope of the issues the rule change seeks to address

The purpose of the framework for network regulation as set out in Chapter 6 is to make sure that charges for regulated network services reflect the efficient costs of providing those services. The arrangements for distribution service classification is an important component to that framework as it determines the scope of services which are subject to the framework and hence the types of expenditure which can be recovered through regulated charges.

The purpose of this rule change proposal is to remove any barriers to efficient solutions being deployed in the provision of regulated network services and to make sure that the arrangements for classifying *distribution services* are in line with the efficiency principles under-pinning the NER. Chapter 6, which sets out a framework for the economic regulation of services, focuses on the provision of services rather than the nature of assets and therefore it is important that the definition of *distribution service* supports this principle.

4.1 New technologies are allowing services to be provide more efficiently

Advances in technology are fundamentally transforming the way in which energy services can be provided. Increasingly, electricity consumers are investing in their own sources of generation, primarily rooftop solar PV, and soon may invest in storage as prices for batteries reduce. Following a recent period of high growth

³ For example, in the case of SPS by voluntarily agreeing to be disconnected from the network.

in electricity prices, driven primarily by investment in traditional poles and wires, customers want greater control over how their energy is produced and the prices that they pay.

DNSPs are also actively considering how best to utilise the benefits of new technologies in meeting their regulatory obligations towards facilitating the supply of electricity for customers. Such new technologies have the potential to reduce the costs of investing in, operating and maintaining their networks, and improve the quality of services and reliability provided to customers.

These costs savings can then be passed on to consumers through lower prices. For example, in some instances it may be more cost effective for network businesses to provide consumers with a stand-alone power system (SPS), rather than replacing existing network assets, particularly for those consumers on the fringe of the grid.

Irrespective of the technology used to provide a service, the Rules should be sufficiently flexible to allow DNSPs, as well as customers, to identify and invest in the most efficient option to deliver a reliable, safe and secure supply of electricity. Technology advances mean that the market has entered a new era and the Rules need to be agile and flexible to support the necessary industry transformation.

4.1.1 The principles underpinning the NER encourage efficient outcomes

The NER are intended to encourage efficient investment by DNSPs and, as such, have evolved over time to reduce any biases towards one solution over another. Consistent with this philosophy, an important principle underpinning the NER is technology neutrality. This was highlighted by the AEMC in their Integration of Storage report:⁴

An underlying principle of energy market regulation in Australia has been technology neutrality. That is, the rules are not designed to bias the deployment of storage or any other technology. Rather the rules have been designed to encourage efficient, market-based outcomes and so not act as a barrier to the use of whatever technology delivers the most cost-effective service.

This is a fundamental principle that should allow DNSPs and others the flexibility to invest in solutions that are most appropriate for their customers. A number of amendments have been made to the NER to reflect this principle and have helped achieved more efficient outcomes for electricity customers.

First, under Chapter 6 of the NER, the AER is required to regulate outcomes and services, rather than the assets used to provide those services. This recognises that in order to lower costs to consumers, DNSPs should have the flexibility to choose the most efficient and effective option to meet their regulatory obligations.⁵ *Distribution services* are therefore intended to be classified by reference to the characteristics of a particular service, not by reference to the underlying assets.

Second, to encourage DNSPs to consider alternatives to network options, requirements were introduced for DNSPs to explicitly consider non-network options when a need arises to invest in new assets. The Regulatory Investment Test for Distribution (RIT-D) requires that, when the value of new capital expenditure in relation to augmentation exceeds \$5 million, DNSPs must conduct an open and transparent project assessment process. This process requires consideration of credible non-network options as an alternative to network assets. The AER has recently submitted a rule change request to the AEMC that involves, amongst other things, the extension of the RIT-D to also cover replacement expenditure above the same threshold.⁶ If the AEMC decides to change the scope of the RIT-D to also include replacement

⁴ AEMC, Integration of Storage: Regulatory Implications, Final report, 3 December 2015, Sydney, pii.

⁵ Including the operational and capital expenditure objectives prescribed in Chapter 6.

⁶ AER, Request for Rule Change – Replacement expenditure planning arrangements, 30 June 2016.

expenditure, we note Western Power's proposed rule change could complement the AER's objectives by enabling DNSPs to potentially consider a wider suite of non-network options under the RIT-D assessment.

As a final example, incentive schemes have been introduced to remove any bias DNSPs might have towards employing network, rather than non-network, solutions. The demand management incentive scheme provides incentives for DNSPs to invest in demand management options as an alternative to network investment. This scheme has recently been reformed by the AEMC to improve its effectiveness and scope. As recognised by the AEMC this scheme when applied by the AER, has the potential to encourage more efficient expenditure decisions by distribution businesses, which may reduce costs to consumers over time.⁷ This proposed rule change utilises the definitions introduced into the NER under the demand management incentive scheme rule change.

While these changes have provided DNSPs with incentives to consider alternatives to network investment in order to reduce costs and so prices for their customers, this rule change proposal identifies a potential barrier in the NER that could prevent DNSPs from achieving the very outcomes that the Rules are intending to promote. As it is necessary for all aspects of the Rules to work collectively and in a consistent manner, Western Power considers that the definition of *distribution service* needs to be assessed.

4.1.2 The NER must be clarified to promote technology neutrality in a changing environment

Western Power is concerned that, despite the embedded philosophy of technology neutrality in the NER, aspects of the Rules lack clarity and, as a result, may unintentionally create a barrier to the use of technology that will deliver not only the most cost-effective services, but also potentially more reliable and safe services.

This barrier arises because of uncertainty about what assets may be used to provide the services that the AER is able to regulate. DNSPs can only recover regulated revenue for services that are classified as *distribution services* by the AER. If it is not clear that a particular asset can be used to provide a *distribution service*, then there is no guarantee that a DNSP will be able to recover revenue for services provided by means of those assets.

This issue about the lack of clarity regarding what assets are captured in the definition of a network service has also been raised by the AEMC in the context of transmission.⁸ In its consultation paper for the Transmission connection and planning agreements rule change, the AEMC states:

"There is a lack of clarity in the Rules regarding a number of elements of the regulation of services required for connections. This uncertainty stems in part from definitions in Chapter 10 of the Rules that provide limited guidance and contain some ambiguity. The disconnect between the provisions in Chapter 5 that specify the connection process and those in Chapter 6A that govern the economic regulation of services also adds to uncertainty. Therefore, the current arrangements leave it open to transmission network service providers' interpretation and discretion about which services they provide and how they are regulated.

.... This uncertainty is also related to a difference in approach between Chapters 5 and 6A of the Rules. Chapter 5 relates to the connection process and is primarily focused on asset provision. In contrast, Chapter 6A, which sets out a framework for the economic regulation of services, focuses on the provision of services and implicitly assumes that the assets that provide those services have already been constructed. Prior to the introduction of Chapter 6A of the Rules, the system for classifying transmission services was primarily based on the function of the

⁷ AEMC, 20 August 2015, Rule Determination, Demand Management Incentive Scheme

⁸ AEMC, 26 November 2015, Consultation Paper, Transmission Planning and Connection Agreement, pages 55 and 59.

underlying assets. When Chapter 6A was introduced, transmission services became classified by the characteristics of the service without reference to the underlying assets”.

While under Chapter 6A it is up to each transmission network service provider to interpret what assets may provide *transmission services*, the arrangements are different for DNSPs. In the case of distribution, it is the AER that determines the classification subject to a range of factors set out in the NEL and the NER, with particular focus on the extent of competitive pressures relating to the service. Therefore DNSPs are not afforded the same degree of discretion as transmission businesses to decide which assets can be deployed in providing *distribution services*.

The definition of *distribution services* should encompass those services that a DNSP is required to provide in order to meet its regulatory obligations and licence conditions. The way in which a DNSP can recover the costs associated with providing *distribution services* is then regulated by the AER. However, it is not clear that the current definition of *distribution services* provides for new technologies that DNSPs may be able to employ in order to meet their regulatory obligations.

Consequently, it is not clear how DNSPs could recover the costs associated with services provided by means of those new technologies. Without certainty that they can recover their costs, DNSPs do not have an incentive to adopt what may be a lower cost, more reliable and safer solution in order to meet their regulatory obligations. Therefore the NER may be driving outcomes that are not consistent with the National Electricity Objective (NEO).

Barriers to DNSPs investing in the most efficient means of meeting their regulatory obligations may exist because the definition of *distribution services* ultimately links the concept of providing a service with a particular type of asset. This can be seen by considering the relevant definitions:

- **Distribution network** is defined as “a network which is not a transmission network”.
- **Network** is defined as “the apparatus, equipment, plant and buildings used to convey, and control the conveyance of, electricity to customers (whether wholesale or retail) excluding any *connection assets*. In relation to a Network Service Provider, a network owned, operated or controlled by that Network Service Provider”.
- **Distribution system** is defined as “a distribution network, together with the *connection assets* associated with the *distribution network*, which is connected to another *transmission or distribution system*”.
- **Distribution service** is defined as “a service provided by means of, or in connection with, a *distribution system*”.

Services provided by means of assets that form part of the *network*, and assets that are necessary to provide a *connection asset*, clearly fall within the scope of a *distribution service*. That is, assets that are used to convey, and control the conveyance of, electricity. However, the use of the phrase “or in connection with” in the definition of *distribution service* provides some degree of flexibility in the types of assets that may fall within this definition and implies that assets that may not necessarily be used to convey, and control the conveyance of, electricity could also be deployed in the provision of regulated services. However, the breadth of that flexibility is uncertain.

Further, the capital expenditure objectives and operating expenditure objectives set out in chapter 6 of the NER focus on outcomes for customers. That is, it is the outcomes that are regulated, not the inputs. The definition of *distribution service* therefore should not distinguish solutions based on the type of asset that is used by a DNSP.

4.1.3 Example: stand-alone power systems

One example where this issue manifests is in stand-alone power systems (SPS). While this example focuses on the experience of Western Power so as to provide a tangible, quantitative example of the problem, the

issue is equally applicable to DNSPs already in the NEM, particularly in areas that have large networks with low population density, such as Ergon Energy’s network, and parts of South Australia and Tasmania.

Western Power has a number of network assets at the edge of the grid that, over the next few years, will need to be replaced. These assets were constructed between the 1950s and 1980s under rural electrification policies and are at, or approaching, the end of their useful life. The condition of these assets is deteriorating, which has implications for Western Power’s compliance with Service Standard Benchmarks and subsequent license conditions.

Western Power has two broad options to address network issues in these areas:

- a network solution, which could involve network augmentation, network operations changes or maintenance strategies; or
- non-network options, which include demand-side management activities and solutions connected with the network, such as local network-connected generation or storage.

In some circumstances, for customers at the edge of the grid, it may be more cost effective, more reliable and safer to provide these customers with SPSs, rather than augment or replace the network. SPS are modular hybrid renewable energy solutions usually comprised of solar PV panels, batteries, diesel generation and supporting infrastructure.

SPS are likely to incur a lower total cost than network replacement on some parts of the grid in rural and remote areas, where the line length and associated cost to service individual customers is high. Installing an SPS would provide savings for customers across the network through reduced network use of system charges, not just the individual customers affected. Western Power has estimated that a net benefit of approximately \$388m in avoided expenditure⁹ is achievable by deploying SPS to as many as 2,702 customers over the next 10 years, compared to replacing existing network assets (see Attachment 1 – Case Study).

Further, a SPS may also represent a more reliable supply of electricity than poles and wires, particularly in bushfire prone areas. Currently, a high proportion of customers at fringe-of-grid locations are likely to experience substandard power reliability. SPS are likely to be more reliable than network alternatives in many instances, as they are less prone to external risks such as fire, wind, lightning and traffic.

Customers that Western Power has approached about potentially installing a SPS have indicated that they would also derive additional benefits from having a SPS rather than power lines. These benefits include:

- practicalities associated with maintaining and preserving the land over which the lines run; and
- aesthetic benefits.

Finally, investing in more expensive and longer-lived assets also increases costs associated with the risk of stranded assets. Under the current frameworks, customers could be required to continue to finance network assets even where they are no longer required. In contrast, the use of SPSs, with a shorter asset life, provides additional option value.

Attachment 1 to this rule change request provides a more detailed case study of the financial benefits that would flow to customers from allowing DNSPs to invest in SPS as an alternative to network options.

Despite these clear financial, safety and reliability benefits, DNSPs cannot currently deploy SPS as an alternative to a network option. Such assets do not form part of a DNSP’s *connection assets*, as they are not connected to the distribution network. Further, they cannot be said to form “the apparatus,

⁹ NPV over 50 years.

equipment, plant and buildings used to convey, and control the conveyance of, electricity to customers”, since the majority of an SPS does not transport electricity. Therefore they cannot be defined as *network*. As neither *network* nor a *connection asset*, they cannot be defined as providing a service *by means of a distribution system*.

This issue only arises for customers with an existing network connection. New customers seeking to connect to the network are required to pay for the cost of that connection. Consequently they face a cost reflective price signal and DNSPs are able to recover the cost of the connection from that customer. In this scenario, the customer would be able to nominate a competitive provider to install a SPS on their own terms.

Western Power is not seeking to be able to supply a SPS to new customers through its regulated business. Rather, we are seeking a more efficient solution where existing customers do not face the cost of maintaining their network connection and so have no incentive to install an SPS.

4.1.4 Application to *transmission services*

Western Power has only considered this rule change in the context of the provision of *distribution services*. However, there may be merit in expanding the proposed rule change to *transmission services*. The problem identified in the definition of *distribution services* could apply equally to the definition of *transmission services*. Therefore there could also be significant benefits to increasing the flexibility of transmission network service providers to adopt new technologies in place of traditional network investments. For this reason, Western Power believes it worthwhile for the AEMC to also consider the application of this rule change request to transmission. However, Western Power has not considered the implications, costs or benefits of doing so, or whether it would be likely to contribute to the achievement of the NEO.

4.2 Proposed Solution

The legislative framework for DNSPs as set out in the NEL and NER is based on the concept that the role of DNSPs is to connect, and provide access to, *customers* to a *network*, which conveys, or controls the conveyance of, electricity. The framework also recognises that, in this role, services may be provided by DNSPs in connection with the *distribution system*, which provides the means of *connection* to and conveyance of a supply of electricity.

The rationale for this rule change is to recognise that there could be other assets/technologies which may not obviously comprise equipment used to “convey or control the conveyance of electricity”, but which could be more efficiently used by DNSPs in providing regulated services to customers. We consider that this recognition is consistent with the current framework, which has an inherent flexibility by virtue of the definition of *distribution service*. The proposed rule change is a clarification of the inherent flexibility and is drafted to limit the exercise of this flexibility to circumstances where it is in the long term interests of consumers of electricity.

Broadly, we considered two solutions:

- A narrow rule change that specifically permits the AER to classify SPS as a regulated service where it is potentially efficient to do so and where that outcome would not otherwise arise through the competitive market.
- A broader rule change that recognises that future technology developments are uncertain and that there may be alternative means for DNSPs to meet their regulated obligations that we cannot now foresee.

Our preferred option is to introduce greater flexibility into the Rules to provide a set of arrangements that can, as far as possible, adapt to new technologies and circumstances.

Under this proposed solution, the AER will continue to apply the service classification arrangements as prescribed in clause 6.2 of the NER. They will now have additional guidance to consider whether non-network options which potentially could be used to provide network services and include assets which may be considered not to convey or control the conveyance of electricity, should be classified as a *distribution service*. In its considerations on this matter, the AER will continue to have regard to the factors specified in NER clause 6.2.1(c) and the AER's classification of services will apply for the duration of a regulatory control period.¹⁰

The AER will set out its likely approach to the classification of *distribution services*, including any relevant non-network options, in its framework and approach paper that is published at the initiation of the distribution determination process. The classification of services adopted in a distribution determination must be as set out in the relevant framework and approach paper unless the AER considers that, in light of the DNSP's regulatory proposal and the submissions received, there are good reasons for departing from that classification.¹¹

DNSPs, and any other stakeholder, will have the opportunity to submit evidence and comment on the potential classification of non-network options during the consultation process on the AER draft framework and approach paper. However it will ultimately be the AER's decision whether services provided by means of such non-network options will be classified as a *distribution service*. Hence our proposed solution does not seek to amend the arrangements for classification of *distribution services*.

If the assets, equipment and plant used in the non-network option are captured by the definition of *distribution service*, then under clause 6.2.1 of the NER these services can be classified by the AER. This could either be as a *direct control service* or a *negotiated distribution service*. It is expected that such solutions will be classified as a direct control service as the classification of negotiated *distribution services* is not common in the NEM with the AER mainly classifying non-standard control services as *alternative control services*.¹²

Therefore the draft Rule will enable the expenditure associated with non-network options to be recovered as either a *standard control service* or as an *alternative control service*. As the AEMC is aware, the arrangements under Chapter 6 as administered by the AER ensures that both of these charges reflect the efficient cost of providing those services.

This approach is consistent with the AER's recently published Draft Ring-Fencing Guideline for Electricity Distribution. The Ring-fencing Guideline sets out the ring fencing obligations DNSPs must comply with if they intend to provide energy related services. These draft ring fencing obligations depend on the nature of the service and not on the underlying technology or asset. Through clarifying the definition of *distribution service*, this rule change complements the ring fencing arrangements proposed by the AER and facilitates the achievement of the AER's principles. Similarly, this rule change request seeks to allow DNSPs to invest in non-network solutions only where they do so in order to provide a regulated service and there is no potential for competitive services to occur as there is no customer driven transaction.

The remainder of this section sets out our proposed solution to the issues identified in the previous section on this basis. However, ultimately Western Power's more immediate concern is that to begin to address the barriers in the NER to installing SPS as a first step to providing DNSPs with the necessary ability to invest in more efficient, safe and reliable assets for its customers.

¹⁰ There is no scope under the NER for the AER to change its classification of services or to classify new services within a regulatory control period.

¹¹ NER, cl.6.12.3(b).

¹² The exception is South Australia and this reflects the historical treatment of these services prior to its transition to the NER.

4.2.1 Clarifying the definition of *distribution service*

Western Power recommends the AEMC amends the NER to clarify the interpretation of “in connection with” within the definition of *distribution service* so as to permit a wider range of technologies to fall within the scope of *distribution service*.

As explained in section 4.2.2, we consider that the AEMC has the powers under the NEL to make a rule to provide more clarification on how to interpret “in connection with”.

In its Integration of Energy Storage report, the AEMC considered that *distribution service* is broadly defined. Specifically, the AEMC stated that:¹³

The words ‘in connection with’ [in the definition of distribution service] appear to imply that the service does not itself need to utilise assets that fall within the scope of the ‘distribution system’ (defined as a distribution network and related connection assets), but can be provided by any assets or other means provided that the service is being provided ‘in connection with’ a distribution system. This potentially allows for services provided behind the meter to be defined as a distribution service.

This suggests the AEMC considers there is some ambiguity in the interpretation of the definition of *distribution service*.

The expression “in connection with” has been considered in the context of statutory interpretation. In particular, it was considered in relation to the definition of *distribution service* in the NER in *Ergon Energy Corporation Ltd v AER* [2012] FCA 393 (***Ergon Energy Case***). In his decision, Justice Logan clarified that “in connection with” does not mean that that the service must be provided by the *distribution system*, noting:

The narrow focus on the ‘distribution system’ is achieved by ‘by means of’. The remaining part of the composite phrase, ‘in connection with’ does not require that the service be provided via the ‘distribution system’ as defined, only that the service be connected with that system. To construe ‘in connection with’ as requiring that the service be provided via the distribution system as defined would duplicate a field already covered by ‘by means of’. In context, synonymous phrases for ‘in connection with’ are ‘in association with’ or ‘in conjunction with’.

Western Power agrees that this definition is currently ambiguous and, as a result, limits the range of technology solutions that a DNSP is likely to adopt in meeting its regulatory obligations and licence requirements. Given this ambiguity, it would be preferable for the NER to be amended to clarify the technologies that may be provided by a DNSP “in connection with” a *distribution system*.

Our proposed solution is to amend the definition of *distribution service* so as to permit services provided by means of non-network options to be classified as *distribution services* (and so allow DNSPs to recover revenue for these services via its regulated revenue) where:

1. The DNSP must undertake expenditure in order to provide services so as to meet its regulatory obligations or licence requirements; and
2. It is potentially more efficient for the DNSP to provide those services via a non-network solution.

To achieve this, Western Power proposes the following changes to the definition of *distribution service* (the changes to the current definition are shown in underline):

¹³ AEMC, Integration of storage: Regulatory Implications, Final report, 3 December 2015, Sydney p.13.

distribution service A service provided by means of, or in connection with, a *distribution system*. Without limiting the phrase 'in connection with', a service provided by means of a *non-network option* is a service provided in connection with a *distribution system* if the *non-network option*:

- (a) replaces or is a substitute for part of a *distribution system*;
- (b) could potentially be a more efficient method of addressing the *identified need* to which the *non-network option* responds; and
- (c) is owned, controlled or operated by a *Distribution Network Services Provider*.

For the purpose of this definition, *identified need*, when used in the definition of *non-network option*, is to be read as if the reference to *network* in that definition is a reference to *distribution system*.

To support this definition, we note that there are three definitions that will be introduced into chapter 10 of the NER on 1 December 2016 when the *National Electricity Amendment (Demand Management Incentive Scheme) Rule 2015 No. 8* comes into effect. These are the definitions of *identified need*, *network option* and *non-network option*.

This proposed rule change seeks to clarify that alternatives to network options may be classified as providing *distribution services*. The three limbs of the definition place constraints on the circumstances under which non-network options may be classified as *distribution services*. These limitations will ensure that the exercise of the expression “in connection with” in respect of new technology solutions are confined to where that service is clearly associated with the regulated functions of a DNSP and therefore is in conjunction with the *distribution system*. This is consistent with the ruling by J Logan in the Ergon Energy Case.

The first limb of the proposed definition requires that services provided by means of a non-network asset can only be classified as *distribution services* if the non-network asset replaces, or is a substitute for, part of a *distribution system*. The intention of this limb is to restrict the classification of services provided by means of non-network options as *distribution services* to those that would otherwise be provided by means of *distribution network* assets or *connection assets*. That is, a DNSP must make an investment so as to meet its regulatory or licence obligations and the customer being supplied by the service cannot, or has no incentive to, access the service through a competitive provider.

The second limb requires that a service provided by means of a non-network option can only be classified as a *distribution service* if it is potentially more efficient than providing that service by means of a network option. The intention of this limb is to only allow a service provided by means of a non-network option to be classified as a *distribution service* where investment in the non-network option has the potential to be more efficient than investment in the network, and therefore is more likely to result in reduced costs and so reduced prices for customers.

Strictly, this second limb may not be necessary given the efficiency principles in Chapter 6 and is somewhat inconsistent with the process that the AER follows to first classify services and subsequently assess whether proposed expenditure is efficient. The purpose of the AER classifying services as *distribution services* is to determine which network services need to be subject to regulation and the nature of that regulation. Generally, this is a question of whether the service can be provided competitively. The question of efficiency of service provision is addressed later as part of the revenue determination. Despite this, we have included an efficiency measure so as to emphasise that a service provided by means of a non-network option should only be classified as a *distribution service* where it is more likely to result in a more efficient outcome than providing that same service by means of a *network* or *connection asset*.

The third limb requires that a non-network asset can only be used to provide *distribution services* where that asset is owned, controlled or operated by a DNSP. This is consistent with the definition of *network*, and helps to confine the interpretation of “in connection with” in relation to a *distribution system* to circumstances where there is a clear association with the existing *distribution system*.

The final amendment expands the definition of *identified need* so as to capture *connection assets* for the purposes of the definition of *distribution service*. This recognises that DNSPs currently invest in two categories of assets: *network assets* and *connection assets*. DNSPs should have the flexibility to invest in non-traditional technology in place of, or in substitute for, each of these asset types.

The Chapter 6 arrangements for regulation of revenue and prices does not distinguish between the type and nature of the assets employed by the DNSP. As stated by the AER in its Preliminary Position paper for its electricity ring fencing guideline:¹⁴

“As the NER is currently written, the AER cannot prohibit a network service provider from acquiring and using any type of asset”

Therefore our proposed solution will remove a potential inconsistency in the service classification framework and the regulation of revenue through removing any technology bias in the definition of *distribution service*.

4.2.2 Consistency with the NEL

The NEL includes a number of provisions which confer and articulate the AEMC’s rule making powers.¹⁵ The scope of the AEMC's powers under section 34 of the NEL is very broad. It includes power to make rules for or with respect to (among other things):

- the operation of the national electricity system for the purposes of the safety, security and reliability of that system; and
- the activities of persons (including Registered participants) participating in the national electricity market or involved in the operation of the national electricity system.

These provisions confer AEMC's power to make the proposed rule change because an amendment which clarifies that a service may be 'in connection with' a distribution system if it is provided by a non-network option owned, controlled or operated by a DNSP:

- is a rule in respect of the security and reliability of the national electricity system, as it will permit DNSPs to replace aging infrastructure in that system by assets which are more secure and reliable in order to meet their regulatory obligations; and
- is a rule in respect the activities of a DNSP, which is a Registered participant and a person involved in the operation of the national electricity system.

Western Power notes that the first limb of the AEMC's rule making power listed above makes reference to the 'national electricity system', and this term is also used in the NEO. This may raise a question as to whether new technologies that are not physically connected to a distribution system form part of the 'national electricity system'. However, it is not necessary to form a view in relation to this question. It is sufficient that the proposed rule relates to the operation of the system and activities of a DNSP, being a party involved in the operation of the system.

Therefore, as the rule-making power relates to the operation of the system and activities of a DNSP, then it is considered that is not necessary for the potential non-network option per say to be part of the

¹⁴ AER – Electricity Ring Fencing Guideline – Preliminary Positions, April 2016 p.18

¹⁵ Section 34

interconnected national electricity system nor connected to the system, for the AEMC to consider this rule change proposal.

Western Power also notes that the subject matter for the NER as detailed in Schedule 1 of the NEL, confers powers in relation to the regulation of *distribution services* and terms and conditions for the provision of electricity network services, or any class of electricity network services. Hence we consider that the AEMC has the powers under the NEL to consider and make a rule in relation to the problem identified in this proposal.

We note in this context the following related definitions which are included in the NEL:

Distribution determination means a determination of the AER under the Rules that regulates any one or more of the following:

- a) The terms and conditions for the provision of electricity network services that are the subject of economic regulation under the Rules,.; and
- b) The revenue an owner, controller or operator of a *distribution system* earns or may earn from the provision by the owner, controller, or operator of electricity network services that are the subject of economic regulation under the Rules

Electricity network service, means a service provided by means of, or in connection with, a transmission system or *distribution system*.

Distribution system means the apparatus, electric lines, equipment, plant and buildings used to convey or control the conveyance of electricity that the Rules specify as, or forming part of, a *distribution system*.

The definition of electricity network service is inherently expansive as it may be a service provided:

- a) ***by means of*** a transmission system or distribution system; or
- b) ***in connection with*** a transmission system or distribution system.

We consider that any clarification of the meaning of 'in connection with' in the NER definition of *distribution service* which is consistent with the language of the definition of electricity network service, is within the AEMC's rule-making power. Further, from a policy perspective, we recognise that it is preferable to constrain the amendment to solutions which are provided in substitution for, or as a replacement for part of the *distribution system* (which includes *connection assets*). Otherwise such solutions could be provided to customers in the competitive market by persons other than a DNSP.

We also consider that the proposed rule change is consistent with the powers of the AER under the NEL.

¹⁶The AER's economic regulatory functions and powers, as defined in the NEL, include the economic regulation of services provided by a regulated distribution system operator 'by means of, or in connection with, a distribution system'. For the reasons outlined above, it is clear that the NEL contemplates that the NER can regulate (and the AER may be given regulatory functions with respect to) services which are provided 'in connection with' the distribution system.

It is implicit that this may involve services being provided by assets which do not form part of the distribution system – otherwise the services would be provided 'by means of the distribution system' and there would be no need for the more expansive words 'in connection with'. Where services are provided by such assets, however, they must nevertheless have a sufficient nexus with the distribution system as to be properly characterised as being provided 'in connection' with it. It is not necessary for the purpose of this rule change request to determine the precise scope of those words, and whether they would extend to a

¹⁶ Which could be considered to support and affirms the interpretation that AEMC has the powers under the NEL to make a rule on this matter.

rule change dealing more generally with new technologies or the deployment of SPS by persons other than DNSPs.

This proposed rule change is limited to the specific circumstances in which new technologies are deployed by a DNSP as an alternative, more efficient means of fulfilling its regulatory obligations with respect of the distribution system, and in this scenario the service is clearly on provided 'in connection with' the distribution system.

Western Power has considered whether it is necessary to propose changes to any related definitions or provisions, including the definition of distribution system. Western Power notes that the definition of distribution system contained in the NEL does allow the AEMC to determine the scope of the definition to some degree through changes to the NER. This is because the NEL defines distribution system as 'the apparatus, electric lines, equipment, plant and buildings used to convey or control the conveyance of electricity that the Rules specify as, or forming part of, a distribution system' (emphasis added).

We considered whether it would be appropriate to amend the definition of distribution system to include new technologies involving assets not physically connected to the distribution system. However, we were concerned that the capacity of the NER to specify particular assets as forming part of the distribution system is constrained by the words 'used to convey or control the conveyance of electricity'. It may be difficult to characterise some new technologies (such as SPS) as being used to 'convey or control the conveyance of electricity'.

For that reason we considered an amendment to the definition of distribution services provided a clearer basis for implementing the policy objective of this rule change request. As discussed further below, Western Power has not identified any instances where the proposed clarification of the definition of distribution services requires a change to the definition of distribution system or other provisions in the NER. However, such consequential changes could be considered by the AEMC in accordance with section 91B of the NEL should they become evident in the course of its consideration of, and consultation on, the proposal.

4.2.3 Consequential amendments to the proposed solution

When considering a rule change proposal, the AEMC must consider any consequential impacts of the draft Rule on other parts of the NER and NERR.

The term *distribution service* is used predominately in Chapter 6 with some additional references in Chapter 5 of the NER. It is also used in a number of definitions in Chapter 10. We have not identified any instances where this proposed Rule would impact or change the intention of other parts of the NER where the term *distribution service* is used beside the service classification arrangements.

In the case of some technology solutions, the application of customer protections for those jurisdictions which have adopted the National Electricity Customer Framework (NECF) may be impacted. For example, if remaining barriers to SPS are addressed (see below), this proposed rule creates the possibility that some customers may receive a *distribution service* but will no longer be connected to the *distribution system*. In those circumstances the application of the NERL and NERR provisions governing the distributor-customer relationship, such as the model terms and conditions for deemed standard connection contracts set out in Schedule 2 to the NERR, would not apply. This is because the NERL and NERR provisions dealing with the distributor-customer relationship operate on the premise (either explicit or implicit) that the customer is connected to the distribution system.

More generally, Western Power recognises that the nature of some non-network options, such as SPS, could substantially change the nature of the service provided to the customer. Currently, if a customer becomes supplied off-grid, the terms and conditions associated with their SPS are negotiated directly with

the supplier. Western Power notes that if the service is not provided by an Authorised Retailer, there is no regulatory intervention, nor recourse to the energy Ombudsman and the NERR does not apply. We note that these issues are the same if the customer either voluntarily decides to disconnect from the network or the DNSP installs SPS as an alternative to network replacement.

These consequential issues concerning the implications of the rule for the operation of the NECF certainly warrant consideration by the AEMC. However, Western Power notes that consumer protection issues relating to alternative technology solutions, including SPS, are currently the subject of consultation by the COAG Energy Council. They have released two relevant papers, one relating specifically to stand-alone energy systems and the other relating to consumer protections for behind the meter electricity supply.¹⁷ In light of those consultation processes, Western Power does not consider it would be appropriate to seek to address in detail the NECF implications in this rule change.

Equally, however, Western Power does not consider that it would be prudent to delay consideration of this rule change proposal until the outcome of those consultation processes is known. This rule change is merely facilitative – it is seeking to remove a general barrier within the NER and there remains sufficient discretion under the NER to ensure that the AER's ability to classify services as *distribution services* would only be exercised when it is in the long term interests of customers.

Further, consumer protections are one of a number of issues that must be addressed before DNSPs are able to invest in SPS or similar technologies, as discussed further below. This rule change request is not seeking to resolve all barriers to implementing SPS, many of which are not within the AEMC's functions and powers, and some of which are already being addressed through other processes. Rather, it seeks to clarify an aspect of the rules that is currently preventing efficient investment from occurring. As this rule change is seeking to address a generic barrier in the NER, we do not see any reason to delay making this rule change until other such matters have been resolved.

4.2.4 Other barriers to the deployment of new technologies

Western Power recognises that other barriers exist to the deployment of some technologies, including SPS. However, Western Power considers that amending the NER to permit such solutions is an important first step. Further, the proposed rule addresses a current inconsistency in the NER.

Some of the issues preventing the deployment of SPS in Western Australia, which may apply in other jurisdictions, include:

- Western Power does not have the power under its enabling legislation to “supply” electricity;
- Western Power does not have any statutory land access powers enabling it to install, run and maintain SPS equipment; and
- if Western Power installs a SPS, then it arguably has an obligation to connect any other applicant who is seeking an electricity network connection who is within 100 metres of the SPS.

Consequently a number of jurisdictional legislative instruments would also need to be amended to facilitate the deployment of SPS by Western Power and, most likely, other DNSPs.

However, these jurisdictional impediments should not be viewed as negating any benefits associated with amending the NER. As technologies quickly evolve, regulatory frameworks must be sufficiently flexible to allow customers to benefit from the new services and lower costs that technology can provide. At the very least, the NER should not present a barrier from deploying more cost effective, reliable and safe outcomes for customers.

¹⁷ <http://www.scer.gov.au/publications/energy-market-transformation-%E2%80%93-consultation-processes>

Further, the Western Australian Government has indicated a willingness to remove jurisdictional impediments to the deployment by Western Power of SPS. In the context of its current reform process, the Western Australian Government has stated:¹⁸

Regulatory barriers to Western Power's substitution of stand-alone electricity systems in place of network services in regional areas should be removed, subject to adequate consumer protection measures being established to ensure that regional customers continue to receive electricity services at acceptable standards.

Consequently, while jurisdictional impediments may currently present a barrier to the deployment of SPS, there is a reasonable expectation that these will be removed over time, at least in Western Australia.

The proposed rule change may not remove all existing barriers in the NER to deploying all types of new technologies. One reason for this is because the definition of *distribution system* requires that, in order to be defined as a *distribution system*, a *distribution network* or *connection asset* must be connected to another *transmission or distribution system*. Consequently micro grids which, by definition are not connected to another distribution or transmission system, would not be captured within the definition of a *distribution system*. Further, under the proposed drafting, they would not be captured within the definition of a *distribution service*.

The AEMC may wish to consider whether other potential technology types, such as micro grids, should be captured.

4.2.5 COAG Energy Council's work on emerging technologies

Western Power understands that the COAG Energy Council has a forward work program to consider a number of issues relating to emerging technologies, and that the AEMC is expecting a rule change request relating to this.

As discussed above, the COAG Energy Council has recently released consultation papers on stand-alone energy systems and consumer protections relating to energy supply products and services behind the meter. The COAG Energy Council has also indicated that it will submit to the AEMC a rule change request to promote the contestable provision of services from emerging technologies.¹⁹

While the COAG Energy Council's program is likely to be complementary to this rule change request, Western Power considers that the underlying issues raised in this rule change request are sufficiently different such that it can be progressed in the absence of any additional rule change requests relating to emerging technologies.

Ultimately, Western Power considers that SPS provide a more efficient, reliable and safe means to provide certain customers with access to electricity. To this end, this rule change request seeks certainty for DNSPs to enable investment in SPS. However, this rule change request raises more fundamental issues regarding whether the underlying principle of technology neutrality is being met and the need to promote consistency between chapter 5, which focuses on asset provision, and chapter 6, which focuses on service provision. For this reason, Western Power considers that this rule change request should be considered based on its own merits rather than its interaction with any rule change request from the COAG Energy Council.

¹⁸ https://www.finance.wa.gov.au/cms/Public_Uilities_Office/Electricity_Market_Review/Electricity_Market_Review_-_Phase_1.aspx

¹⁹ COAG Energy Council, Meeting Communique, 19 August 2016, p2.

5 Contribution to the achievement of the National Electricity Objective

The NEO states that:

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

- (a) price, quality, safety, reliability and security of supply of electricity; and
- (b) the reliability, safety and security of the national electricity system.”

This rule change request is more likely to contribute to the achievement of the NEO than the status quo by providing DNSPs with the flexibility to invest in the most efficient means of meeting their regulatory obligations and licence requirements. Permitting DNSPs to use new technologies as they become available will allow the most efficient option to be identified, resulting in:

- Lower costs to DNSPs in the NEM, and so lower prices for consumers over the long term; and
- Potentially a more reliable and safer supply of electricity to customers in the NEM.

The proposed rule change is also consistent with important principles underpinning the NER; that is:

- it is the service or outcome that should be regulated to encourage the most efficient outcome, not the asset; and
- the NER should be technology neutral and not promote one solution over another.

The proposed rule is not constrained to a single technology type. Rather, the proposed rule has been drafted in such a way so as to allow as wide a group of technology types as possible. It is not possible to know what technologies may become available over the medium and long term. Providing a robust set of rules that are sufficiently flexible to remain relevant and appropriate in the future will avoid costly delays associated with future rule change requests.

The proposed rule does not pose a barrier to the competitive provision of services by third parties. The proposed rule is limited to circumstances where DNSPs must undertake investment in order to meet regulatory obligations. It does not preclude DNSPs from going to the market to appoint a third party services provider, where appropriate and efficient to do so.

Further, ultimately the AER has the discretion to classify services as *distribution services*. In determining whether a service should be classified as a *distribution service* and therefore subject to regulation, the AER must consider the form of regulation factors set out in section 2F of the NEL.²⁰ These include, amongst other things, the extent to which those, or similar, services could be provided by a third party. In further

²⁰ The form of regulation factors are: (a) the presence and extent of any barriers to entry in a market for electricity network services; (b) the presence and extent of any network externalities (that is, interdependencies) between an electricity network service provided by a network service provider and any other electricity network service provided by the network service provider; (c) the presence and extent of any network externalities (that is, interdependencies) between an electricity network service provided by a network service provider and any other service provided by the network service provider in any other market; (d) the extent to which any market power possessed by a network service provider is, or is likely to be, mitigated by any countervailing market power possessed by a network service user or prospective network service user; (e) the presence and extent of any substitute, and the elasticity of demand, in a market for an electricity network service in which a network service provider provides that service; (f) the presence and extent of any substitute for, and the elasticity of demand in a market for, electricity or gas (as the case may be); (g) the extent to which there is information available to a prospective network service user or network service user, and whether that information is adequate, to enable the prospective network service user or network service user to negotiate on an informed basis with a network service provider for the provision of an electricity network service to them by the network service provider.

classifying a service as either a *standard control service* or an *alternative control services*, the AER must have regard to, amongst other things, the potential for development of competition in the relevant market and how the classification might influence that potential.²¹

This process provides a safeguard mechanism to ensure that services provided by means of non-network assets will only be classified as *distribution services* where the AER is satisfied that, amongst other things, there are barriers preventing the third party provision of such services. As a result, permitting DNSPs to invest in alternative technologies in certain circumstances, such as SPS where they would replace an otherwise more costly network asset, will not prevent competition developing in markets where competition is feasible.

In assessing this rule change request against the NEO, it is important to be clear about the objective that this rule change is seeking to achieve. The proposed rule seeks to provide clarity regarding what assets DNSPs in the NEM may invest in to provide *distribution services*. While one consequence of this proposed rule is that it would remove one of several barriers to DNSPs investing in SPS rather than network where it is efficient to do so, it is against this broader objective that the rule change should be assessed.

6 Expected costs, benefits and impacts of the proposed rule

6.1 Benefits

Western Power considers that the draft rule will deliver considerable benefits to customers across the NEM through the immediate impact of providing clarification and in the long term through facilitating deployment of efficient investment in the provision of regulated network services.

By providing clarification on the interpretation of the expression “in connection with” with respect to new technology, the proposed Rule will provide certainty to DNSPs regarding the possibility that the AER could permit the utilisation of different types of new technologies in providing regulated services and recovering the efficient costs of doing so. This clarification will provide confidence to DNSPs to explore new options and promote innovation in the provision of network services. This will complement other aspects of the chapter 6 framework including the recent reforms introduced by the AEMC to the demand management incentive scheme.

Chapter 6, which sets out a framework for the economic regulation of services, focuses on the provision of services and implicitly assumes that the assets that provide those services have already been constructed. However if there is uncertainty in the classification of assets, the DNSP will not make the initial investment. Therefore it is necessary for the AEMC to make this rule change now to provide this certainty.

It will also remove any doubt on behalf of the AER regarding the scope of new technology solutions within the definition of *distribution service* and its ability to include such expenditure with its revenue determination. As part of its transition to the national regulatory framework, Western Power underwent a truncated Framework and Approach process with the AER. During this process, Western Power proposed an expanded interpretation of key terms to allow SPS to be classified as a *direct control service*. However, the AER considered that the broad implications of SPS required careful consideration by policy makers, and as such were unable to agree with the Western Power proposal. Similar issues are likely to arise with DNSPs already in the NEM.

In the long term, this rule change will seek to benefit consumers of electricity in the NEM through more efficient investment. Allowing DNSPs to adopt more efficient technologies, combined with existing frameworks that require the benefits of lower costs to flow through to customers in the form of lower

²¹ NER clause 6.2.2(c).

prices, will reduce costs to customers over time. Depending on the technology, customers may also benefit from more reliable and safer services.

For example, Western Power estimates that SPS could be deployed as a more efficient service to approximately 2,702 customers over next ten years, resulting in a net benefit of \$388m compared to replacing existing network assets. As well as lower prices to electricity customers on Western Power's network, customers with the SPS would benefit from:

- Higher levels of reliability. Currently, customers on the fringe of the network typically face lower levels of reliability than their urban counterparts. A SPS could therefore increase the levels of reliability experienced by such customers.
- Improved safety. SPS are less prone to external risks such as fire, wind and lightning. They are also easier to maintain than poles and wires, which often span steep terrain and can be difficult to access.
- Improved aesthetics and practicalities associated with maintaining and preserving the land over which the lines run. Customers surveyed by Western Power considered a SPS less of an intrusion than poles and wires, both in terms of visual amenity and in terms of maintaining the assets and surrounding land.

While these quantitative benefits are derived using Western Power's network as an example, a similar level of benefits are likely to accrue to customers in the NEM. Any DNSP that has a portion of its network in an area with low population density could derive benefits from installing SPS. The benefits are likely to be highest in areas that have a large portion of their network covering rural and regional areas.

The extent of such benefits will depend on the particular nature of non-network options captured by this rule change proposal.

Efficiency of network charges could also be improved given the nature and type of emerging technologies compared to traditional network assets. There are a number of reasons for this:

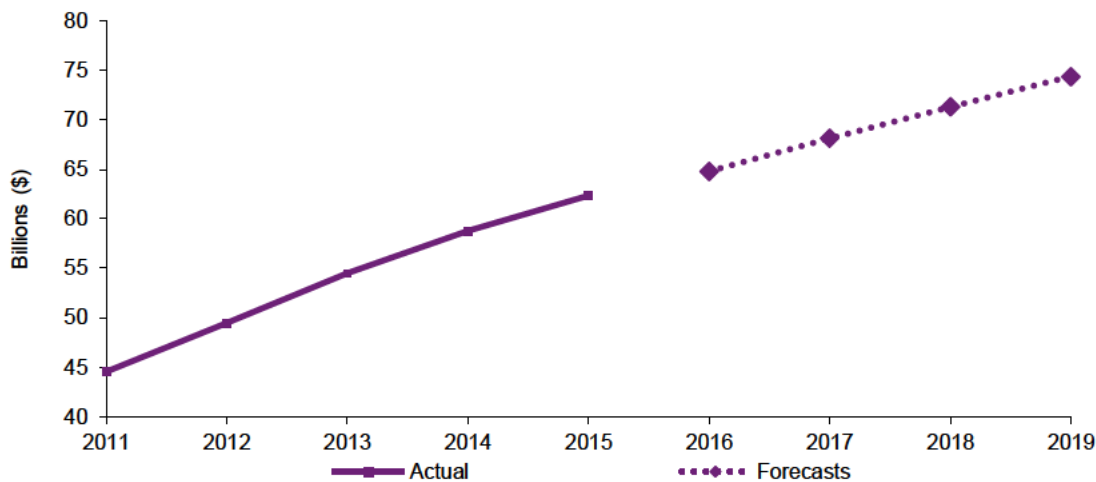
- New technology options tend to have a shorter asset life compared to traditional network assets, such as poles, wires and transformers. Under the current frameworks, customers could be required to continue to finance network assets even where they are no longer required. In contrast, the use of SPSs, with a shorter asset life, provides additional option value. This is consistent with the range of benefits to be assessed under the RIT-D as prescribed in Chapter 5 of the NER.
- New technology options might enable the DNSP to make smaller incremental investments compared to traditional investments such as replacing rural feeders and upgrading stations which are a more lumpy type of investment. This would enable better targeting of costs especially on feeders with modest or low growth.

For these reasons, increasing the flexibility in the range of assets that can be used for regulated network services will help to make the sector more resilient to future transformation driven by technology advances.

In assessing the benefits of this proposed rule, the AEMC could note the increasing proportion of network charges due to the capital component of costs. Financing the return on investment and asset depreciation are the largest cost contributors to a DNSP's regulated revenue, and can account for up to 75% of total annual allowed revenue. As shown in Figure 1, DNSPs' RABs have increased significantly in the past 5 years, with an average annual nominal growth of 7%. The AER has approved future increases of, on average, 5%

per year up to 2019 in the recent round of distribution revenue determinations.²² This makes customer electricity bills sensitive to any movements in the rate of return.

Figure 1: Electricity Distribution Total RAB between 2010 to 2019 \$bn nominal



Therefore the need to ensure that the RAB reflects efficient network solutions is important given the impact on customer bills of inefficient capital expenditure. To achieve this, the Rules should not act to constrain the range of options which a DNSP can consider in assessing the need for expenditure. Permitting the AER to classify new technology solutions as *distribution services* is required and timely.

The achievement of these benefits is related to the frequency and circumstances of when the AER would exercise the ability to classify new technology solutions as *distribution services*. As explained above, it is difficult to predict what type of technology solutions could materialise in the future. Further, there may be other regulatory issues that need to be addressed before certain types of new technology can be employed in the provision of regulated network services.

However, we strongly consider that it is not necessary for the AEMC in its assessment to estimate the likelihood of the AER exercising this ability nor to consider delaying the rule change until other reforms are in place. There are a number of reasons for this:

- Delaying assessing this change until other issues have been addressed will only add to the time until such more efficient solutions can be deployed by DNSPs.
- This proposal has identified a potential inconsistency in the current NER which could be acting to undermine the efficiency and technology neutrality principles. Therefore this issue should be address immediately.
- Irrespective of whether this amendment would result in different solutions being used, the amendment will provide clarification and certainty for market participants regarding the potential use of such options as a regulated network service. This will enable DNSPs to properly consider such solutions as alternatives to network assets. Therefore this provides more discipline, evidence and transparency that expenditure recovered from customers reflect the efficient costs of providing that service.

6.2 Impacts and Potential Costs

Impacts and potential costs associated with this proposed rule can be categorised as either:

²² Analysis for figure 1 reflects the sum of opening RAB values for each year for DNSPs (excluding any transmission assets) and is based on recent AER distribution determinations, except for TasNetworks which is based its regulatory proposal for the 2017-2019 determination.

- a) costs for the AER associated with administering the amendment;
- b) impacts on different market participants and how such impacts affect the economic efficiency of the market; or
- c) impacts on customers.

Overall Western Power considers that the impact on AER regulatory costs to be minimal and, more importantly, there are no negative impacts on the economic efficiency of the market and impacts on customers can be managed.

6.2.1 AER Costs

The AER may incur small costs associated with the proposed rule as it will impact the AER's regulatory approach and costs. The AER will need to consider the classification of an additional set of potential services.

There could also be an impact on the approaches and methodologies used by the AER in assessing revenue proposals. As an example, the proposed rule may influence the AER's ability to undertake benchmarking. The AER is required to undertake a benchmarking exercise to inform its decisions on DNSPs' revenue determinations. This includes consideration of the cost of meeting reliability standards. There may be implications for the AER in relation to its ability to conduct this task where reliability standards are being met by means of assets other than network assets.

It is unlikely that such implementation costs associated with the proposed rule change will exceed its benefits, given the AER's expertise in the market and knowledge of emerging technologies.

6.2.2 Impacts on market participants

In theory there could be a negative efficiency impact if allowing DNSPs to use regulated revenues to invest in certain technologies, such as storage and embedded generation, prevented competition from developing in such markets. Western Power notes the AEMC's concerns regarding the ability of DNSPs to invest in technology behind the meter.²³

The merits or otherwise of allowing DNSPs to compete in the provision of behind the meter technology and services, while relevant, is not the subject of this rule change request. This is being addressed through the AER's ring fencing guidelines. Rather, Western Power is only seeking to enable this to occur where there is no scope for competition and where a DNSP would otherwise be required to invest in costly network assets. As explained earlier, the proposed rule is consistent with the AER's draft ring fencing guidelines.

For reasons discussed above, Western Power considers there are sufficient safeguards currently in the NER to prevent a DNSP from using regulated revenue to provide a service that could be provided through the competitive market. Ultimately, it is the AER that will determine whether a service provided via behind the meter technology should be classified as a *distribution service* and so subject to economic regulation and a regulated return through its ring-fencing guidelines and classification of services. Therefore making this rule change would not negatively impact the development of competitive markets in new technology solutions.

In deciding how to classify services, the AER will have regard to the likelihood of a competitive market outcome consistent with the NEL form of regulation factors. The AER should consider the extent of competition which could eventuate not only from the perspective of whether there are third parties willing to provide the service, but also whether it is realistic that there will be a buyer for the service. All

²³ AEMC, Integration of Storage: Regulatory Implications, Final report, 3 December 2015, Sydney.

commercial transactions need a buyer and a seller. In the absence of a buyer (i.e. customer) there is no transaction and hence no competitive market and it therefore would not make sense to classify such non-network options as a competitive service in such circumstances. This rule change recognises this principle.

Taking SPS as an example, existing customers are already guaranteed the supply of electricity to certain reliability levels via their connection to the grid. They do not face the full costs of maintaining the network assets, which are spread across all customers. Consequently they have no financial incentive to install their own SPS. Where a customer has not made an explicit decision to disconnect from the grid and actively seek to install a SPS by themselves, there is no potential for a competitive service provider to offer that service as there is no buyer. An SPS solution in this instance is only likely to eventuate if undertaken by the DNSP as a regulated service. There may be other examples of non-network options where a customer does not have the financial means or capability to enter into the market (e.g. renters) and purchase a competitive service.

There may be incremental impacts on generators, transmission network services providers, retailers and other market participants or energy service providers relating to the upstream or downstream impacts of more efficient investment by DNSPs. However, there will be no new administrative requirements or direct costs of any of these entities under the proposed rule.

DNSPs themselves may incur additional costs in expanding their consideration of technology options for meeting their regulatory obligations and licence requirements. However, these are expected to be minor.

6.2.3 Impact for customers

As discussed above, this rule change request is likely to benefit all consumers of electricity through more efficient expenditure by DNSPs in the long run. The exact nature of any other impacts may depend on the nature of the technology employed. To provide an example, this section discusses the impact for customers from a SPS, noting that implications under the NERL and NERR were discussed in section 4.2.3.

First, it is important to note that no customers will be required to take up a SPS and leave the grid as a result of this proposed rule. Consumers with existing connections are entitled to remain connected to the grid, and consumers requiring new connections have regulated rights in respect of the provision of connection offers under Chapter 5A of the NER and the provision of connection services under the NERR (for example, a distributor must provide customer connection services in respect of a customer's premises).²⁴ The COAG Energy Council has suggested that it may not be clear whether customers have a legal right to object to being disconnected from the grid as a result of having a SPS installed.²⁵ However, in Western Power's view, a SPS would only be deployed in place of network maintenance and replacement where the customer chooses to voluntarily exercise the option to disconnect from the network.

Second, certain technologies may have different levels of reliability and, if lower than could be provided by a network, could impose additional costs on customers. If a SPS faults, for example, there is no back-up available from the grid. However, DNSPs are subject to jurisdictional reliability standards and would need to be confident that the chosen technology would allow a DNSP to meet all its regulatory obligations and licence requirements. Further, in the example of SPS, this would likely only be deployed to customers at the fringe of the network which historically has been less reliable and more likely to be subject to issues such as bush fires. Consequently a SPS could actually increase reliability for these customers.

In addition to jurisdictional reliability standards, DNSPs are also subject to the AER's Service Target Performance Incentive Scheme. This proposed rule enables such customers to continue to be captured by

²⁴ NERR rule 79(4).

²⁵ COAG Energy Council (Energy Market Transformation Project Team), Stand-alone energy systems in the Electricity Market, Consultation on regulatory implications, 19 August 2016, p7.

this incentive scheme as, irrespective of how a service is provided, if it is classified as a *standard control service*, then reliability performance will be captured by the scheme. Consequently, this draft rule should not be considered as weakening the reliability requirements placed on DNSPs.

Finally, we note that the savings resulting from avoided capital expenditure will accrue to all customers, not just customers that receive a SPS. Under existing arrangements, all consumers connected to a DNSP's network would incur a proportion of the costs associated with maintaining a line through their distribution use of system charges, even where that line only serves one customer. The exact level of benefit for electricity customers as a whole will depend on the level and extent of such cross-subsidies.

It is also worth emphasising that the proposed rule change would not give DNSPs an inherent right to install an SPS and recover the costs associated with doing so through its regulated revenue. Rather, the proposed rule change would provide the AER with the ability to decide whether services provided by a SPS should appropriately be classified as *distribution services*.

7 Stakeholder consultation

In developing this rule change request, Western Power has consulted with:

- Its customers
- Other DNSPs
- Other industry bodies.

7.1 Customer Engagement

Western Power conducts annual engagement with Consumers in order to understand their preferences and incorporate feedback into business strategies and expenditure proposals. An extensive series of consumer engagement interviews, workshops and surveys were conducted in late 2015, with the consolidated outcomes available on the Western Power website.²⁶ One of the key outcomes of the engagement was the expectation from customers that Western Power should pursue innovative technologies where they can deliver better price and reliability outcomes, specifically:

- 85% of customers thought Western Power should investigate alternative technologies – if it reduced their bill.
- 81% of customers thought Western Power should investigate alternative technologies – if it improved their reliability.

In order to further understand customer attitudes and amenability specifically for Stand-Alone Power Systems, Western Power engaged a third party research organisation to undertake explorative conversations with 30 regional customers. Most participants were business or hobby farmers living as couples or families, with in-depth interviews conducted via telephone. The findings were:

- In general, amenability to stand-alone power systems was high, with 80% of those interviewed at least partially open to the idea of having such a system.
- All participants who were open to SPS's however, would still require reassurance as to its viability, both in terms of cost, reliability and electricity supply capacity.

²⁶ <https://www.westernpower.com.au/media/1719/customer-insights-report-2016.pdf>

Participants largely fell into one of three segments:

- Open (~40%): In favour of the idea of SPS and can actively see the benefits of the system - largely need reassurance as to viability (both in terms of cost and in terms of electricity supply)
- Moderately open (~40%): Also favour the idea, however would require more solid evidence as to its suitability for their specific requirements - need convincing of viability (and sharing of 'success stories')
- Closed (~20%): Closed either due to situational or attitudinal factors. Those closed due to situational factors are not receptive due to their current circumstances however would consider SPS should their circumstances change. Those closed due to attitudinal factors were not receptive to SPS due to their investment in getting onto the network and expectations for that investment to pay off. These customers currently have a low current receptivity to SPS creating difficult path for engagement

The aspects of SPS's that were found most appealing were:

- The independence offered by such a system, including removal of infrastructure from usable farmland
- Improved safety and reliability relative to network supply

Those aspects that were of most concern were:

- Sufficiency of electricity supply
- Responsibilities regarding maintenance

Western Power has utilised the outputs of this consultation in the design of its SPS pilot project, which undertook candidate identification and customer recruitment in late 2015 (see Attachment 1 for more information).

7.2 Engagement with other DNSPs

Western Power has engaged DNSPs across Australia on the broad issue of network investment in regional areas and the identification of Stand-Alone Power Systems as a potential alternative, both in the context of a rule change proposal, and its pilot project. The issues identified were generally an emerging issue for DNSPs with regional infrastructure and Western Power has had detailed discussions with DNSPs in Queensland, NSW, Victoria and Tasmania on the approach to the pilot and candidate identification analysis.

7.3 Engagement with other industry bodies

Western Power has briefed the Commonwealth Department of Energy and Environment on the proposed rule change approach.

8 Australian Energy Market Operator's Declared Network functions

This proposed rule change will not affect AEMO's declared network functions.

Attachment 1: Case study

Western Power is a Western Australian State Government-owned corporation that connects more than one million customers via the Western Power Network, located in the South West of Western Australia. The Western Power Network forms the vast majority of the South West Interconnected Network (SWIN), which together with all of the electricity generators, comprises the South West Interconnected System (SWIS).

While Western Power is currently regulated by the Western Australian Economic Regulation Authority, the Western Australian Government is in the process of implementing reforms that would, among other things, bring regulation of Western Power under the auspices of Chapter 6 of the National Electricity Rules. This includes regulation by the AER, with Western Power's first intended Regulatory Control Period (RCP1) under the NER commencing 1 July 2018.

Western Power notes that until those reforms are implemented, the NER will not apply to Western Power and consequently the benefits that accrue from this rule change request will not apply to Western Power customers. However, if this rule is made, and once Western Power is subject to Chapter 6, Western Power will be able to invest more efficiently in assets to the benefit of its customers. Further, the benefits from the proposed rule change will not only apply to Western Australian customers. Rather, the issues raised below are equally applicable to many DNSPs already operating in the NEM. Consequently, the benefits from the proposed rule change will have immediate effect for customers in the NEM.

Western Power has a statutory obligation to connect customers to the network and maintain a network service. In practice, this means that Western Power must maintain the geographical coverage of the network as it currently exists and invest in the replacement and augmentation of assets as necessary to meet the loads of customers within the network.

1.1 Background

Significant sections (approximately 38,000 km)²⁷ of Western Power's fringe-of-grid assets were constructed under rural electrification policies of the State Electricity Commission of Western Australia between the late 1950s and the 1980s.

At present, the network in these regions typically exceed 35 years of age and in general terms are at, or approaching, the end of their useful life. The condition of these assets is deteriorating over time, which has implications for Western Power compliance with its expected network service performance, measured using Service Standard Benchmarks.²⁸

Figure 1 shows the installation age of HV overhead carriers throughout the South West Interconnected Network (SWIN). It shows that the oldest sections of Western Power's network are through the Wheatbelt and Great Southern regions of the State, with some old network sections in metropolitan areas.

Options to address network issues are generally defined as traditional network options, such as network replacement and augmentation, network operations changes or maintenance strategies, and alternative options, which are largely demand-side management activities (on the customer side of the meter) and solutions connected within the network (e.g. local network-connected generation or storage).

²⁷ Booth. R., and Coulter. T. *Rural Electrification Policies in Western Australia*, Electric Energy Conference, Sydney 13-17 October 1980.

²⁸ Service Standard Benchmarks (SSB) "means the benchmarks for service standards for a reference service in an access arrangement" (*Electricity Networks Access Code 2004* s 1.3). Western Power's SSBs under AA3 are contained in the amended proposed 2013-2017 access arrangement at <http://www.erawa.com.au/access/electricity-access/access-arrangements/2012-2017-western-powers-approved-revised-access-arrangement-aa3>



Figure 1: SWIN Distribution HV carrier by age

1.1.1 The Cost Recovery Challenge

It should be noted that in many cases outside the metropolitan area, tariff revenue does not cover the life-cycle replacement cost of traditional network assets. As depicted in image 2, in some locations on the network, less than 10% of cost to serve over a 50 year period is recovered directly from customers, with the balance being subsidized by the remaining tariff base.

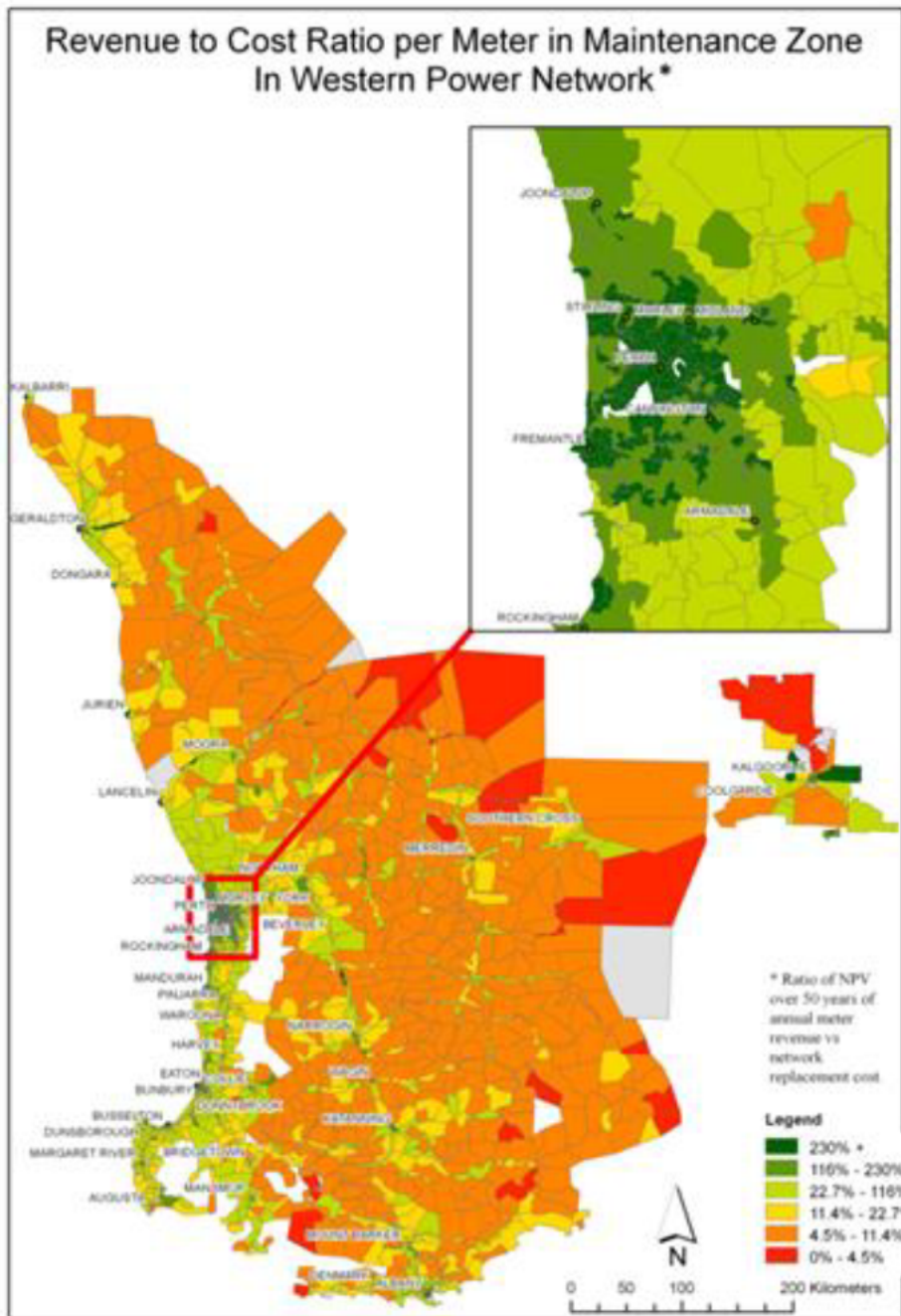


Figure 2: Revenue to cost ratio by network maintenance zone

1.2 The Stand-alone Power System (SPS) Opportunity

In some network replacement circumstances it may be more cost effective, more reliable, and safer, for electricity to be provided by means of a stand-alone power system (SPS). SPS are modular hybrid renewable energy solutions usually comprised of solar PV panels, batteries, diesel generation, and supporting infrastructure (e.g. equipment enclosures and balance of system components). An example is provided in Figure below.



Figure 3: Example of SPS installation - Source: Powerco (New Zealand)

SPSs are likely to incur a lower total cost than network replacement on specific parts of Western Power’s fringe-of-grid network, where the line length and associated cost to serve individual customers is high. In addition, a high proportion of customers at these fringe-of-grid locations are likely to experience substandard power reliability. SPSs are likely to be more reliable than a network alternative in many instances, as they are less prone to external risks (e.g. fire, wind, lightning and traffic).

At present, Western Power is conducting a trial in partnership with Horizon Power, and the local retailer Synergy. Western Power is able to undertake the pilot under the current jurisdictional regulatory arrangements as the pilot participant properties will remain connected to the network. If the pilot is successful, the network will be unable to be decommissioned prior to the resolution of the regulatory barriers to doing so. Under the trial, Synergy will continue to provide the customer retail relationship. The trial has recruited 8 participant households in the Ravensthorpe area. SPS systems were installed during June 2016.

Western Power has conducted detailed modelling and analysis of the SPS opportunities on its network. This analysis is described below.

1.3 Analysis

Western Power analysis has used two GIS modelling techniques to identify and validate potential SPS candidates:

- A “spur-based” model – modelling larger sections of network dedicated to multiple customers
- A “path-tracing” model – modelling dedicated sections of network for individual customers

Both models seek to quantify the distance of dedicated network and associated replacement cost for traditional network investment, and is compared to the cost of an SPS to provide an identification of SPS candidates. Costs are modelled in NPV terms over a 50 year period.

The modelling is then filtered using an age-based approach to indicate likely investment requirements of the next 10 years, and can be further filtered based on the expenditure thresholds.

1.3.1 Inputs

The models use the following inputs to identify current network connected customers that are candidates to receive an SPS.

Table 1 – Input data for SPS identification

Input	Description
Network GIS data	56,566 kilometres of network and 193,288 meter points in total have been modelled, using Western Power Geographic Information Systems.
Meter consumption history	Meter points are assessed for consumption history and included where SPS is a realistic supply option (to a maximum average daily consumption of 50kWh). The average daily consumption for each customer on a given spur over a two year period is calculated to determine the SPS size.
Network Rebuild Cost	The rebuild cost for each spur is obtained by calculating the cost by construction type and length of each span in the spur. Network costs have been calculated over 50 years and includes the upfront capital expenditure and a uniform annual operational cost.
SPS Cost	<p>The SPS cost for each spur is obtained by first determining the size of the SPS solution required at each connection point, via historic meter data, and aggregating the individual SPS costs. Costs for eight standard SPS sizes are available ranging from 2 kWh to a maximum of 50 kWh.</p> <p>SPSs costs have been calculated over 50 years, including replacement components, diesel fuel costs and operational costs.</p>
Network age filter	Given the difficulty in forecasting an exact replacement date for each segment of network, conductor age has been used as a proxy for likely investment trigger. Conductor asset condition generally declines at around 50 years.

The net present cost of the SPS(s) required to serve the identified customer(s) is compared with the net present cost of rebuilding the respective section of the distribution network. SPS candidates are identified where the SPS cost modelled is lower than the network rebuild cost. A tolerance as well as an age filter is then applied to ensure a margin of error and that the respective network sections are sufficiently aged.

1.3.2 Spur Based SPS Model

In this model, SPS candidates are sought on the edges of the electricity network in rural areas in a downstream approach. Network segmentation is used to define spurs (see figure 4), and each spur is assessed based on its length and customer characteristics.

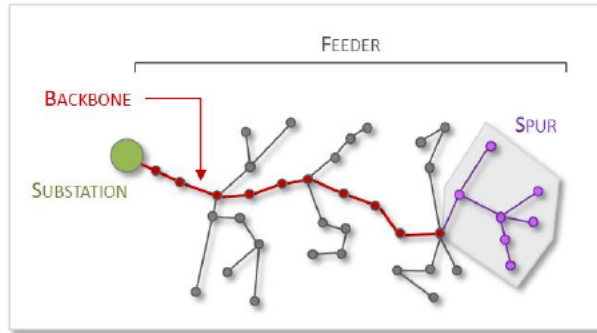


Figure 4: Example of a section of the network replaced via SPS using Spur Based model

1.3.3 Spurs and Segments

The electrical network is split into spurs and segments. Segments are:

- Connected switchable sections that are similar age and material (see figure 5)
- Length < 2km for metro (soft constraint)
- Length < 5km for rural (soft constraint)

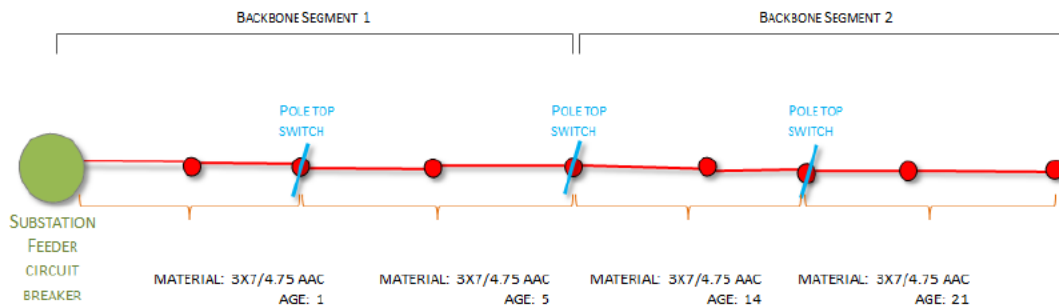


Figure 5: Example of network segments

Spurs are:

- Collection of connected segments (see figure 6)
- Branch off backbone circuit delineated by a protective device
- Does not interconnect back with other adjacent feeders or its own feeder backbone
- Number of customers \leq 10% of total customers on backbone

Key  IDENTIFIED BEGINNING OF A SPUR

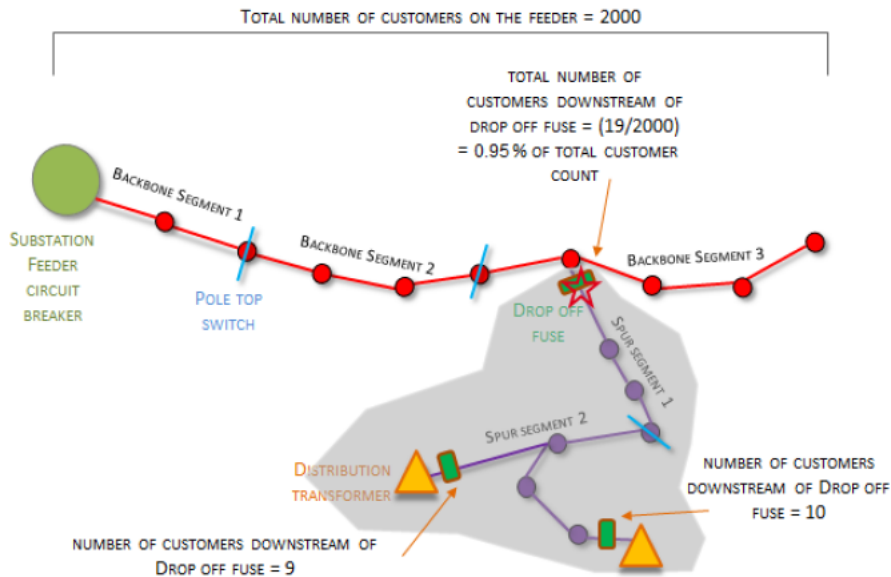


Figure 6: Example of network spurs

1.3.4 Path Tracing Based SPS Model

The Path Tracing model determines viable SPS candidates through tracing the dedicated network sections from customer meter points on the edge of the network (i.e. working backwards from the meter point). The procedure ceases when an intersection node or a distribution transformer is found. The network is modified to reflect the customer(s) chosen to be viable SPS candidates and the process repeats until there are no viable SPS candidates on the edge of the network. An age based criteria can also be applied.

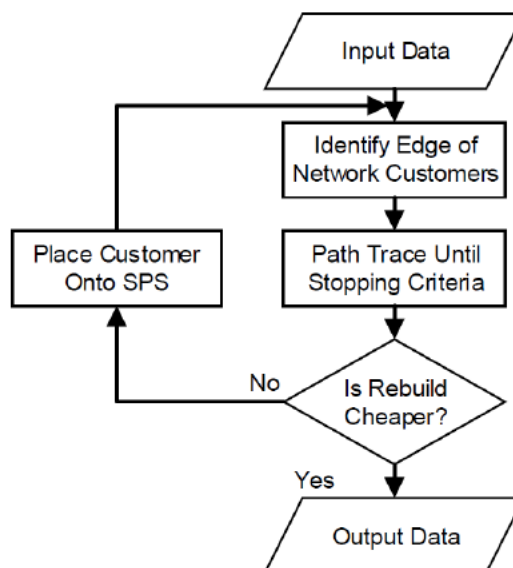


Figure 7: Overview of Path Tracing Based SPS model

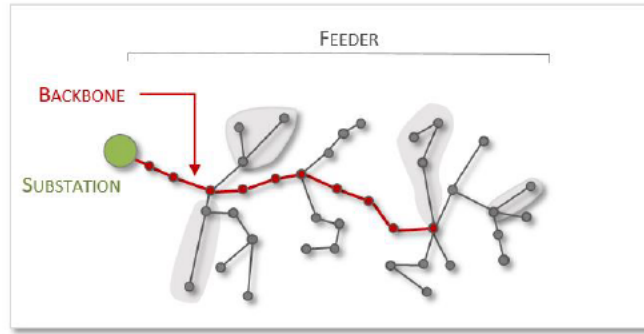


Figure 8: Example of network sections replaced via SPS using Path Tracing model

Network Connectivity

Unlike the Spur Based model, the Path Tracing model does not define groups of poles and distribution transformers into segments or spurs. As a result:

- Sections placed onto SPS are not limited to spur definitions and thus smaller network sections can be allocated onto SPS.
- The model only considers the adjacent node(s) along the path trace and may miss larger cluster opportunities (i.e. multiple customers in a given network section) for SPS selection – hence use of the alternate Spur Based model.

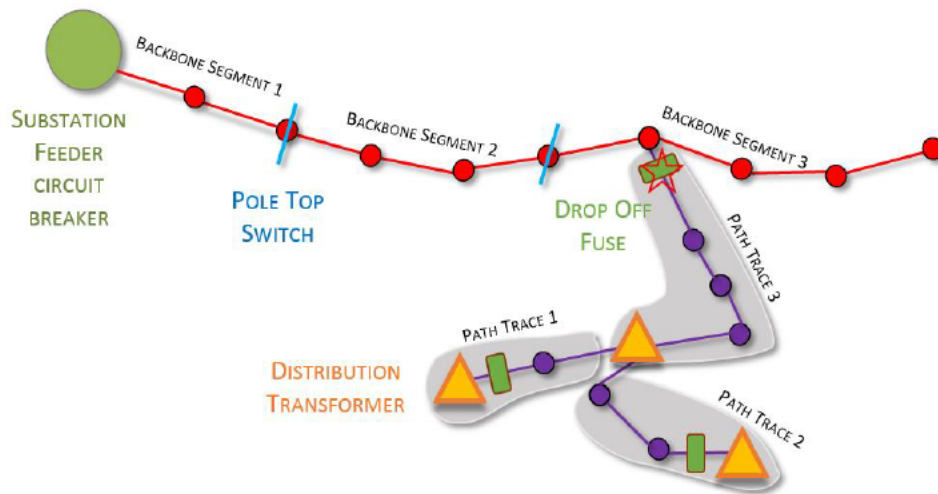


Figure 9: Example of the subsections placed onto SPS

1.3.5 Modelling Output

The combined outputs of each of the modelling techniques provide a cost for replacement for both traditional network and SPS.

SPS candidates are identified where the SPS cost modelled is lower than the network rebuild cost. Tolerances have been applied to further segment the SPS candidates - tolerances less than 1 indicate that SPS is the cheaper option in total, whilst the 0.8 and 0.5 filters calculate the SPS cost to a percentage of the network cost (i.e the 0.5 filter shows sites where the 50 year SPS cost is a minimum of 50% or lower than the network rebuild option).

Additionally 'age' refers to the length averaged conductor age for the sections of line under consideration, indicating likely short to medium term investment timeframes.

The modelling identifies a total of 2,702 meter points as meeting the criteria of forecast SPS cost of less than 80% of the network rebuild cost and average conductor age of 40+ years. The modelling indicates that the NPV over 50 years under this scenario is \$388m.

Scenario	Number of SPS candidates	SPS Cost (50 yrs)	Network Cost (50 yrs)	Variance	Total line length - Kilometers
Tolerance < 1	8,379	\$1,253m	\$2,290m	\$1,037m	19,663
Tolerance < 0.8	6,148	\$901m	\$1,897m	\$996m	15,591
Tolerance < 0.8 & Age > 40	2,702	\$407m	\$795m	\$388m	6,732
Tolerance < 0.8 & Age > 35	4,376	\$652m	\$1,333m	\$681m	11,490
Tolerance < 0.5	3,472	\$476m	\$1,508m	\$1,031m	7,613
Tolerance < 0.5 & Age > 40	858	\$118m	\$353m	\$235m	2,606
Tolerance < 0.5 & Age > 35	1,580	\$218m	\$659m	\$441m	5,121

Figure 10 shows the location of the identified candidate sites using the 40+ years conductor age and 80% expenditure threshold scenario on the Western Power network.

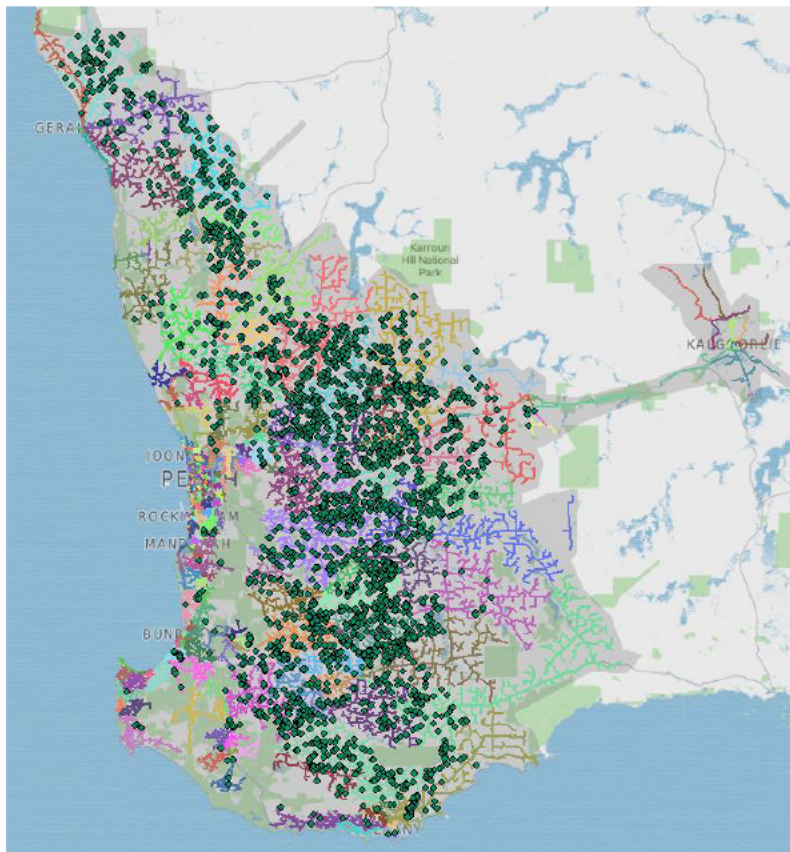


Figure 10: SPS candidate sites using the 40+ years conductor age and 80% expenditure threshold scenario