Australian Energy Market Commission

RULE CHANGE

DRAFT RULE DETERMINATION

National Electricity Amendment (Alternatives to grid-supplied network services) Rule 2017

Rule Proponent
Western Power

26 September 2017

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About the AEMC

The AEMC reports to the Council of Australian Governments (COAG) through the COAG Energy Council. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the COAG Energy Council.

Summary

The Australian Energy Market Commission (Commission) has decided not to make a draft rule on alternatives to grid-supplied network services at this time in response to the rule change request by Western Power.

Western Power, an electricity distributor in Western Australia, submitted a rule change request to the Commission which sought to remove certain barriers to distributors deploying alternative technologies and methods of providing distribution services, such as transitioning customers to off-grid supply. The rule change, if it were made, would apply in jurisdictions that have adopted the National Electricity Law and Rules (NEL and NER).[1]

The Commission supports enabling off-grid supply but considers that a broader package of changes to laws, rules and jurisdictional instruments is required to protect consumers. The Commission's draft determination is not to make a draft rule at this time as a change to the NER could not address a lack of customer protections for off-grid customers and may be invalid due to inconsistencies with the NEL. The Commission sets out recommendations regarding a package of changes to enable efficient off-grid supply in this draft determination.

The Commission invites submissions on this draft rule determination by **8 November 2017**.

Off-grid electricity supply

In Australia, as well as internationally, the cost of providing off-grid electricity supply has recently dropped significantly, as the costs of solar PV and batteries decline. In some cases, it may be cheaper to provide off-grid supply than to maintain and replace long power lines linking remote customers to the national grid. Moving to off-grid supply could potentially offer additional benefits such as improved reliability for remote customers and reduced bushfire risks.

Off-grid supply may take the form of an individual power system or a microgrid.

An individual power system is a power system that supplies electricity to an individual consumer and that is not physically connected to the national electricity system. Typically, it includes a combination of solar PV, energy storage batteries and a diesel generator.

A microgrid is a power system that supplies electricity to multiple consumers and that is not physically connected to the national electricity system. This could include anything from a large town to two farms connected to each other. Power may be supplied by any mix of local generation and storage, and behind-the-meter generation and storage. Some remote Indigenous communities, island resorts and mining towns are currently supplied by microgrids.

1 Western Australia has not adopted the NEL and NER. However, at the time Western Power submitted the rule change request, it considered that Western Australia may adopt them.

Customers are currently able to establish off-grid supply at a new property instead of paying for a connection to the grid, or disconnect from the grid and arrange their own power supply (with some restrictions).

However, not all customers face price incentives to move to off-grid supply where it would be efficient for the grid as a whole for them to do so. Customers at new properties without an existing grid connection would choose between paying for a grid connection (which may be quite costly) and obtaining off-grid supply. Customers in remote areas who are currently connected to the grid are in a different situation - they are only likely to move to off-grid supply if it is no more expensive than their current tariff for grid power.

The tariffs paid by most grid-connected remote customers do not reflect the high costs of supplying those specific customers. Instead, tariffs tend to reflect the average cost of supplying power to all customers in the distributor's area. State laws and policies play a role in this.

Therefore, remote grid-connected customers may not wish to move to off-grid supply provided by a competitive provider, even when there would be economic benefits overall compared to maintaining the grid connection. If these customers purchased off-grid supply systems from competitive markets they face costs which are likely to be higher than the subsidised prices they pay for grid supply. In this situation, where there may effectively be a barrier to off-grid supply competing with grid supply, distributors would be required to maintain the more expensive grid connection.

As a result, there may be situations where it is efficient to allow distributors to offer off-grid supply as a regulated service where competition is not practicable and off-grid supply would be cheaper than maintaining a grid connection.

Commission's assessment of the rule change request and issues raised

The Western Power rule change request identifies a real issue that the Commission considers should be addressed. Currently, a combination of factors prevent both distributors (as economically regulated entities) and the competitive market from providing off-grid supply to customers with a grid connection, even where moving off-grid could reduce overall costs. This could result in all customers paying more than they need to for distribution services.

Western Power proposes changes to the definition of "distribution service" in the NER to ensure such off-grid supply is a distribution service, for which distributors may receive regulated returns (depending on how the Australian Energy Regulator, the AER, classifies the service). However, the proposed changes would result in inconsistencies between the NEL and the NER, by disrupting the mirroring between the term "distribution service" in the NER and the term "electricity network service" in the NEL. This would make the proposed rule invalid.

It is clear that, for a customer, the risk profile of off-grid supply is quite different from that of grid supply, as there are currently substantial differences between the energy-specific consumer protections available to grid-connected customers and those available to off-grid customers. In several states the full suite of protections under the National Energy Retail Law and Rules (NERL and NERR) cease to apply when a

customer moves off-grid. The Commission is not able to address these issues through changes to the NER under this rule change request.

Therefore, the Commission's draft determination is not to make a draft rule at this time, as a change to the NER could not address a lack of customer protections for off-grid customers and may be invalid due to inconsistencies with the NEL. The Commission is also concerned with the potential negative impacts on consumers through gaps in the regulation of service reliability and access to retail competition in some situations.

This draft determination follows consultation with stakeholders and our assessment of the rule change request against the national electricity objective. Overall, the Commission considers that the proposed rule change would not, or is not likely to, contribute to the achievement of the national electricity objective.

A co-ordinated package of changes to a range of laws, rules and jurisdictional instruments is required to fully address these issues. The COAG Energy Council is currently considering these issues and developing solutions through its energy market transformation work program.

The Commission has considered how off-grid supply could be provided efficiently to selected edge-of-grid customers, in a way which avoids unnecessary network expenditure while protecting the long-term interests of electricity customers. There are four main changes that would be required:

1. Incorporate locational signals into cost-reflective network tariffs so that customers have improved incentives to choose off-grid supply if it is cheaper than grid supply.
2. Amend the NERL and NERR and/or relevant jurisdictional instruments to implement an appropriate regime of energy-specific consumer protections for off-grid customers, including reliability standards and (if necessary) price controls.
3. Amend the NEL as required to allow distributors to provide off-grid supply as a distribution service. This would allow the provision of off-grid supply to be subject to economic regulation.
4. Amend the NER to allow distributors to provide, as distribution services, microgrid and individual power system services, with conditions to protect customers and avoid distorting the evolution of competition for off-grid supply services. The proposed conditions are as follows:

Customer eligibility conditions

- The customer is (or has recently been) receiving a distribution service that is classified as a standard control service.
- Appropriate customer consent criteria have been met.

Service supply conditions

- Distributors are prohibited from investing in individual power system assets, meaning that distributors must obtain these services on the contestable market (unless an exemption is granted).
- Customer relationships and billing are managed by a retailer (or equivalent).

Contents

1 Western Power's rule change request

In September 2016, Western Power, an electricity distributor based in Western Australia, made a request to the Commission to make a rule regarding alternatives to grid-supplied distribution services (rule change request). Although the NER do not apply in Western Australia, any person may submit a rule change request.[2]

This chapter provides information on the rule change request and the rule change process, including:

- Western Power's rationale for the rule change request
- the solution proposed by Western Power to the issue identified in the rule change request
- current arrangements and relevant definitions
- the rule making process to date and the consultation process for this draft rule determination.

1.1 Rationale for the rule change request

The NER do not permit distributors to provide electricity to customers from off-grid systems as a distribution service

In its rule change request, Western Power stated that 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. Western Power stated that this intent is generally supported in the NER by the underlying philosophy of least cost investment, technology neutrality and service-based economic regulation.

Western Power is concerned that, in some situations, the NER may unintentionally create a barrier to the use of certain technologies to provide distribution services (as that term is defined in the NER), and effectively deny customers the benefits of delivery of not only the most cost-effective services, but also potentially more reliable and safe services.[3]

Specifically, Western Power argued that uncertainty in the ability of distributors to deploy new technologies arises due to ambiguity in the definition of a "distribution service" in the NER.[4] Together with the related definitions of "distribution system" and "distribution network", Western Power argued that the NER could result in services provided by means of certain assets - particularly off-grid assets - not qualifying as a distribution service.[5]

If a service does not qualify as a distribution service, it cannot be economically regulated and a distributor will not be able to recover regulated revenue for providing

2 NEL section 91(1).

3 Rule change request, cover letter.

4 Rule change request p. 3.

5 The Commission holds similar views to the proponent on this point, as discussed further in section 3.5.

those services. Therefore distributors may be reluctant to invest time and resources to explore the merits of using off-grid technology to help deliver efficient services for customers.[6]

The off-grid technology of interest to Western Power is a "stand-alone power system", which it describes as modular hybrid renewable energy solutions usually comprised of solar PV panels, batteries, diesel generation and supporting infrastructure.[7] Western Power noted that microgrids should also be considered.[8] The Commission defines a microgrid as a power system that supplies electricity to multiple customers and that is not physically connected to the national grid.[9] The supply of electricity to customers via individual power systems or microgrids is referred to as off-grid supply.

Western Power stated that distributors may wish to deploy these off-grid systems as lower-cost alternatives to grid-connected network solutions (such as maintaining and replacing existing poles and wires) so as to meet their regulatory obligations and licencing requirements to facilitate the supply of electricity to customers.[10] However, Western Power argued that due to issues with the definition of "distribution service", the NER may not permit distributors to provide off-grid supply as a distribution service, even where it would be less costly than maintaining existing lines.

Western Power also noted that remote customers with an existing grid connection have no incentive to move off-grid on their own, as they do not face the full costs of maintaining the network assets, which are spread across all customers. In this context, an off-grid solution is only likely to eventuate if undertaken by the distributor as an economically regulated service.[11] This is because an off-grid system would be likely to be more expensive for a customer than the rates they pay for grid supply, if the customer has to pay the full costs of the off-grid system.

Allowing distributors to provide electricity to customers from off-grid systems as a distribution service would provide several benefits

Western Power stated that there would be many benefits in allowing distributors to provide off-grid supply as alternatives to traditional network options, particularly for remote customers with a grid connection (i.e. customers with no incentive to go off-grid on their own). These benefits include:

- **Least cost investment**: The near-term opportunity from the deployment of off-grid supply as an alternative to network renewal can provide significant cost benefits to customers in the national electricity market. Using assumptions that

6 Rule change request p. 3.

7 Rule change request p. 11. The Commission uses the term "individual power system" for such systems, and defines them as a power system that supplies electricity to an individual customer and that is not physically connected to the national grid. (The NER define national grid as "The sum of all *connected transmission systems* and *distribution systems* within the *participating jurisdictions*.")

8 Rule change request p. 20. Western Power does not provide a definition of microgrid.

9 Excluding local electricity systems in the Northern Territory, as defined in the *National Electricity (Northern Territory) (National Uniform Legislation) Act* 2015 and other forms of isolated networks deemed to be a distribution system and/or distribution service under jurisdictional instruments.

10 Rule change request p. 3.

11 Rule change request p. 26.

appear relatively conservative, Western Power's modelling identifies an estimated 2,702 candidates for individual power systems on its network over the next ten years, resulting in a net benefit of $388 million (over 50 years) compared to the cost of replacing existing network assets.[12] Western Power considers that similar opportunities are likely to emerge across all regions within the national electricity market.[13]

- **More efficient network investments**: 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 individual power systems, with a shorter asset life, provides additional option value. Off-grid supply options are also smaller incremental investments compared to traditional investments such as replacing rural feeders and upgrading substations, which are a more lumpy type of investment. Therefore allowing off-grid options would enable better targeting of costs, especially on feeders with modest or low growth.[14]
- **Reliability**: Individual power systems may present a more reliable supply of electricity than poles and wires, particularly in bush-fire prone areas. Many areas in which individual power systems are being considered are in fringe-of-grid areas subject to extreme weather and/or rough terrain. This often results in low levels of reliability for customers. Individual power systems are also less prone to external risks such as fire, wind, lightning and traffic which can affect the reliability of grid supply.[15]
- **Safety**: The fact that individual power systems are less prone to external risks such as fire, wind and lightning is also likely to increase safety to consumers. The maintenance of these systems may also be safer than the maintenance of poles and wires in difficult terrain.[16]
- **Improved aesthetics and practicalities associated with maintaining and preserving land**: Customers surveyed by Western Power considered an individual power system less of an intrusion than poles and wires, both in terms of visual amenity and in terms of maintaining the assets and surrounding land.[17]

1.2 Proposed solution

Western Power proposed to overcome the barriers posed by the current definition of a "distribution service" in the NER by expanding the definition to capture non-network options that replace or are a substitute for part of a distribution system. Accordingly,

12 Rule change request p. 23. Savings are expressed in net present value, using a 6.53 per cent discount rate (according to information provided separately by Western Power).

13 Rule change request, p. 11.

14 Rule change request p. 23.

15 Rule change request, p. 11.

16 Rule change request, p. 23.

17 Rule change request, p. 23.

Western Power proposed that the definition be amended as set out in Box 1.1 (proposed additions are underlined):

Box 1.1 Proposed rule change[18]

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 Service 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*.

Western Power described the proposed rule as follows:[19]

> "This proposed rule change seeks to clarify that alternatives to network options may be classified as providing *distribution services*. The three limbs of the [proposed definition of distribution service] 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*."

1.3 Current arrangements and relevant definitions

For the purposes of understanding the proposed rule, the current definitions of the relevant terms under the NER are as follows:[20]

distribution service	A service provided by means of, or in connection with a *distribution system*.
distribution system	A *distribution network*, together with the *connection assets* associated with the *distribution network*, which is connected to another *transmission or distribution system*. *Connection assets* on their own do not constitute a *distribution system*.
distribution network	A *network* which is not a *transmission network*.

18 Rule change request p. 15.

19 Rule change request p. 15.

20 NER chapter 10.

identified need	The objective a *Network Service Provider* ... seeks to achieve by investing in the *network*.[21]
network	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*.
network option	A means by which an *identified need* can be fully or partly addressed by expenditure on a transmission asset or a distribution asset which is undertaken by a *Network Service Provider*. For the purposes of this definition, transmission asset and distribution asset has the same meaning as in clause 5.10.2.
non-network option	A means by which an *identified need* can be fully or partly addressed other than by a *network option*.

To provide some context, the services provided by distributors are regulated in different ways (or are not regulated) depending on whether they are distribution services or not, and if they are distribution services, whether and how they are classified by the Australian Energy Regulator (AER).[22]

Supplying electricity to customers via poles and wires connected to the national grid is a core distribution service that is currently classified as a standard control service. Distributors earn regulated returns for these services. A distributor typically charges all customers receiving a standard control service from that distributor the same price for that service (rather than charging different customers different prices depending on the cost to provide that service to the customer).[23] The rule change request seeks to allow off-grid supply to be treated in the same way, by making it a distribution service and allowing the AER to determine how it should be classified and regulated.

Under the AER's Ring-Fencing Guideline, distributors are not permitted to provide services that are not distribution or transmission services (unless the AER has granted a waiver).[24] Currently, as off-grid supply is unlikely to constitute a distribution (or transmission) service,[25] it is unlikely that a distributor would be permitted to provide it. An affiliate or subsidiary of a distributor could provide off-grid supply, but

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21 This term and the related terms *network option* and *non-network option* were moved to chapter 10 of the NER under the National Electricity Amendment (Demand management incentive scheme) Rule 2015.

22 Details regarding service classification are set out in the consultation paper in section 4.1 and Appendix A.

23 The impact of this approach is discussed in section 3.4. However, the National Electricity Amendment (Distribution Network Pricing Arrangements) Rule 2014 requires distributors' pricing decisions to be guided by the objective that prices should reflect a distributor's efficient costs of providing services to each customer. Distributors are in the process of transitioning customers to more cost-reflective network prices, subject to restrictions under jurisdictional laws.

24 AER, Ring-Fencing Guideline - Electricity Distribution, November 2016 (Ring-Fencing Guideline), section 3.1(b).

25 For the reasons discussed in the rule change request, summarised above, and section 3.5.1.

distributors are not permitted to cross-subsidise such services using regulated returns.[26] These issues are discussed in more detail in section 3.5.

1.4 The rule making process

On 14 June 2017, the Commission published a notice advising of its commencement of the rule making process and consultation in respect of the rule change request.[27] A consultation paper identifying specific issues for consultation was also published. Submissions closed on 18 July 2017.

The Commission received 17 written submissions as part of the first round of consultation, and these submissions are published on the Commission's web page for this rule change request.[28] The Commission considered all issues raised by stakeholders in submissions. Issues raised in submissions are discussed and responded to throughout this draft rule determination.

Issues that are not addressed in the body of this document are set out and addressed in Appendix A.

1.5 Consultation on draft rule determination

The Commission invites submissions on this draft rule determination by **8 November 2017**.

Any person or body may request that the Commission hold a hearing in relation to the draft rule determination. Any request for a hearing must be made in writing and must be received by the Commission no later than 3 October 2017.

Submissions and requests for a hearing should quote project number **ERC0215** and may be lodged online at www.aemc.gov.au or by mail to:

Australian Energy Market Commission
PO Box A2449
SYDNEY SOUTH NSW 1235

26 Ring-Fencing Guideline section 3.2.

27 This notice was published under s. 95 of the NEL.

28 www.aemc.gov.au. Project reference ERC0215.

2 Draft rule determination

The Commission supports enabling off-grid supply but considers that a broader package of changes to laws, rules and jurisdictional instruments is required to protect consumers. As explained further in sections 2.2 and 2.3 below, the Commission's draft rule determination is not to make a draft rule.

This chapter outlines:

- the rule making test for changes to the NER - contributing to the achievement of the national electricity objective
- the reasons why the Commission's draft rule determination is not to make a draft rule at this time. These reasons include inconsistencies with the NEL as well as the likely failure to contribute to achievement of the national electricity objective.

2.1 Rule making test

2.1.1 The national electricity objective

The Commission may only make a rule if it is satisfied that the rule will, or is likely to, contribute to the achievement of the national electricity objective.[29] This is the decision making framework that the Commission must apply.

The national electricity objective is:[30]

> "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 has been assessed on the basis of the likely contribution to the achievement of the national electricity objective in the jurisdictions in which the NEL and NER apply.[31]

2.1.2 Making a more preferable rule

Under section 91A of the NEL, the Commission may make a rule that is different (including materially different) to a proposed rule (a "more preferable rule") if it is satisfied that, having regard to the issue or issues raised in the rule change request, the more preferable rule will or is likely to better contribute to the achievement of the national electricity objective.

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29 NEL section 88.

30 NEL section 7.

31 These jurisdictions are Queensland, New South Wales, the Australian Capital Territory, Victoria, Tasmania, South Australia and the Northern Territory. The NEL and NER do not currently apply in Western Australia.

Further information on the legal requirements for making this draft rule determination is set out in Appendix C.

2.1.3 Requirement for consistency with NEL

The NEL sets out the scope of the Commission's rule making power. As explained in section 2.2, this scope is impliedly limited by the requirement that any rule made by the Commission under a relevant head of rule-making power must not be inconsistent with the NEL.

2.2 Reasons for not making a draft rule - inconsistencies with the NEL

2.2.1 The proposed rule would likely lead to inconsistencies with the NEL

As set out in section 1.2, Western Power proposed to amend the definition of "distribution service" in the NER in order to address what it considered to be ambiguity with the term.[32] The purpose of the amendments is to either broaden the scope of the term distribution service or, to the extent that the scope of the term is currently unclear, clarify that it does encompass a non-network option of the kind described in the proposed definition.

Consistent with Western Power's views in its rule change request, the Commission considers that Western Power's proposed rule would, on the face of it, fall within the scope of the Commission's rule-making powers under section 34(1)(a)(iii) of the NEL (referred to here as the "activities rule-making power"), which provides that the Commission may make rules:[33]

> "for or with respect to … regulating … the activities of persons (including Registered participants) participating in the national electricity market or involved in the operation of the national electricity system…"

However, the breadth of the activities rule-making power is impliedly limited by, among other things, the requirement that any rule made under that power is not inconsistent with the NEL.

The term "electricity network service" as defined in the NEL mirrors the term "distribution service" in the NER (with the exception that the former captures both distribution and transmission services):[34]

Electricity network service definition in NEL	Distribution service definition in NER
A service provided by means of, or in connection with, a transmission system or	A service provided by means of, or in connection with, a distribution system.

32 Rule change request p. 15.

33 This conclusion is made on the basis that the proposed amendments apply only to non-network options that are owned, controlled or operated by a distributor. The Commission considers that its rule-making power under section 34(1)(a)(iii) of the NEL extends generally to the activities of those persons, rather than to the activities of those persons only to the extent such activities relate to participating in the national electricity market or involve the operation of the national electricity system.

34 NEL section 2. NER chapter 10.

Electricity network service definition in NEL	Distribution service definition in NER
distribution system.	

Changes to "distribution service" in the NER, as proposed in the rule change request, would disrupt the mirroring between that term and the term "electricity network service" in the NEL. Specifically, broadening the definition of distribution service under the NER would give that term a broader meaning than the term electricity network service has under the NEL (insofar as the latter term relates to distribution services).

The resulting inconsistency between the definitions would purport to authorise the AER to exercise broader powers under the NER than is contemplated under the NEL. More specifically, if the amendments under the proposed rule were made, the NER would purport to authorise the AER to make a "distribution determination"[35] for services that are likely to be outside the scope of services to which the AER's economic regulatory functions and powers relate under the NEL.[36]

Accordingly, the proposed rule (if made) would be likely to infringe an implied limitation on the activities rule-making power - namely, the implied limitation that the NER not be inconsistent with the NEL. As a result, the proposed rule would be invalid.

2.2.2 Inconsistency issues may also arise with potential more preferable rule

As noted in section 2.1.2, the Commission can make a more preferable rule that is different to the proposed rule if it is satisfied that the more preferable rule will, or is likely to, better contribute to the achievement of the national electricity objective. The Commission has considered whether any inconsistencies between Western Power's proposed rule and the NEL may be avoided by adopting an alternative solution to the issues raised in Western Power's rule change request.

Potential more preferable rule: amendments to the definition of "distribution system"

Among other alternatives, the Commission considered whether amendments to the definition of "distribution system" under the NER would have the same intended effect as the proposed rule, without giving rise to inconsistencies between the NER and the NEL.

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35 The NEL defines a "distribution determination" by reference to "electricity network services" that are the subject of economic regulation under the NER. If the proposed rule was made, an off-grid supply service would purportedly be the subject of economic regulation under clause 6.1.1 of the NER, but it would not be an electricity network service within the (unamended) NEL definition of that term.

36 Under section 2 of the NEL, "AER economic regulatory function or power" is defined as "a function or power performed or exercised by the AER under this Law or the Rules that relates to—
(a) the economic regulation of services provided by— i. a regulated distribution system operator by means of, or in connection with, a distribution system; or ii. a regulated transmission system operator or AEMO by means of, or in connection with, a transmission system; or
(b) the preparation of a network service provider performance report; or
(c) the making of a transmission determination or distribution determination; or
(d) an access determination."

The definitions of a distribution system in the NEL and in the NER are set out below:[37]

Distribution system definition in NEL	Distribution system definition in NER
The apparatus, electric lines, equipment, plant and buildings used to convey or control the conveyance of electricity that the Rules specify as, or as forming part of, a distribution system.	A *distribution network*, together with the *connection assets* associated with the *distribution network*, which is connected to another *transmission* or *distribution system*. *Connection assets* on their own do not constitute a *distribution system*.

The words, "that the Rules specify as, or as forming part of, a distribution system" in the definition in the NEL indicate that the NEL leaves the detailed delineation of what is, and what is not, a distribution system to be dealt with by the definition of that expression in the NER. Accordingly, amending the term distribution system in the NER to address the issues raised in Western Power's rule change may be less likely to give rise to inconsistencies between the NER and NEL than taking the approach of amending the term distribution service.

Concerns with amendments to the definition of "distribution system"

However, the Commission, like Western Power, is concerned that the capacity of the NER to specify particular assets as forming part of the distribution system may be limited by the words "used to convey or control the conveyance of electricity" in the definition of distribution system in the NEL. It may be difficult to characterise certain new technologies (particularly individual power systems) as being used to "convey or control the conveyance of electricity" when they are not connected to a wider distribution system.[38]

Further, the Commission considers that amending the definition of distribution system in the NER would give rise to inconsistencies in how the regulatory framework under the NEL would apply to off-grid supply services and traditional distribution services provided by distribution businesses. For example, "network service provider" is defined under the NEL as:[39]

> "a Registered participant registered for the purposes of section 11(2) that owns, controls or operates a transmission system or distribution system that forms part of the interconnected national electricity system."

As such, even if a person who owns, controls or operates a distribution system that does not form part of the "interconnected national electricity system"[40] is registered as a Distribution Network Service Provider in respect of a traditional interconnected

37 NEL section 2. NER chapter 10.

38 Rule change request p. 18.

39 NEL section 2.

40 Interconnected national electricity system is defined in section 2 of the NEL as "the interconnected transmission and distribution system in this jurisdiction and in the other participating jurisdictions used to convey and control the conveyance of electricity to which are connected – (a) generating systems and other facilities; and (b) loads settled through the wholesale exchange operated and administered by AEMO under this Law and the Rules."

distribution system, it is unlikely that person would be a "network service provider" for the purposes of off-grid supply.

Unless the definition of network service provider in the NEL is amended to remove the requirement to be connected to the interconnected national electricity system, broadening the definition of distribution system under the NER to capture off-grid supply is likely to result in certain provisions in the NEL regarding network service providers not applying to the provision of off-grid supply. These provisions include arrangements for access disputes, the making of access determinations,[41] the preparation of network service provider performance reports[42] and the application of the form of regulation factors[43] (collectively referred to here as the "NSP provisions").

To the extent it is desirable for the NSP provisions to apply to off-grid supply, one potential alternative could be to introduce new, separate requirements in the NER mirroring the NSP provisions, but applying only to off-grid supply by distributors. However, the Commission considers that such an alternative would undermine the deliberate delineation between those aspects of the regulatory framework that are contained within the NEL and those contained within the NER and is likely to give rise to a lack of clarity in the broader regulatory design.

The Commission considers that amendments to "distribution system" would not be desirable, given the potential inconsistencies in how the NEL would apply to off-grid supply and more traditional distribution services if the definition of distribution system was amended under the NER (or if amendments with similar effect were made) without concurrent changes to the NEL.[44]

2.3 Reasons for not making a draft rule - assessment criteria

2.3.1 Assessment criteria

In assessing the rule change request against the national electricity objective, the Commission considered the following principles (as outlined in the consultation paper):

- **Efficient provision of electricity services**: Supplying electricity in the most efficient manner possible so as to achieve the lowest possible cost of supply over the long term is a key element of the national electricity objective. The Commission has considered the cost implications of grid versus off-grid supply options and whether there are existing mechanisms that restrict or enable optimum choices to be made between grid and off-grid supply options.
- **Service reliability**: Electricity supply services have a suite of characteristics that encompass both price and non-price elements (for example, reliability). A common concern is to ensure that cost savings are not achieved at the expense of service reliability. The Commission has considered the cost/reliability trade off in

41 NEL sections 2A, 125-134.

42 NEL section 28F.

43 NEL section 2F.

44 As discussed in chapter 4, changes to the NEL should be made at the same time as changes to the NER to ensure there is a consistent, and sufficiently certain, regulatory framework at the level of both the NEL and the NER.

considering the rule change request, together with mechanisms that currently exist or could be implemented to address reliability issues.

- **Risk profile**: Customers moving from grid to off-grid supply may be exposed to potential risks not faced by grid-connected customers, for example as a result of no longer being covered by consumer protections in the NERL and NERR. These risks could result in consumers facing higher prices or receiving poorer service. The Commission has considered which of these risks exist and how they might be managed.
- **Impact on competition**: A move to off-grid supply provided by the distributor may have the effect of reducing the possibility of such customers accessing alternative competitive supply options. The Commission has considered whether this is likely to be a material issue and if so whether other benefits are sufficient to offset any competition impacts.
- **Technology neutrality**: Rules that are technology neutral (and therefore do not distort investment choices) are essential to achieving long-term dynamic efficiency and therefore achievement of the national electricity objective. The Commission has considered whether the proposed rule change would positively or negatively impact on technological neutrality.

2.3.2 Assessment of draft rule against assessment criteria

Considering each of the assessment criteria described above, the Commission has concluded that making a draft rule as part of this rule change process, without associated law changes, would be likely to have:

- a positive effect in respect of efficient provision of electricity services and technology neutrality
- mixed effects in respect of service reliability and impact on competition
- a negative effect in respect of risk profile.

Having weighed the importance of each criterion in relation to meeting the national electricity objective, the Commission's draft determination is that, overall, a draft rule would not meet the objective, in the context of the current regulatory framework for off-grid supply. While a draft rule has potential to be beneficial, it would not be in the long-term interests of consumers without a series of changes to other instruments (such as the NEL and relevant jurisdictional laws) which the Commission has no power to make. Accordingly, and bearing in mind the inconsistency issues discussed in section 2.2, the Commission's draft rule determination is not to make a draft rule at this time.

The Commission's views in relation to each of the assessment criteria are as follows:

Criteria	Commission comments
Criteria where draft rule could have a positive effect	
Efficient provision of electricity services	A draft rule could enable the more efficient provision of electricity services, reducing overall network costs. Currently distributors are not able to make optimum choices between grid and off-grid supply, and a draft rule would help to address this issue. This would result in lower prices for consumers in the

Criteria	Commission comments
	long term.
Technology neutrality	A draft rule would improve the technological neutrality of the NER, as the NER would no longer specify that distribution services must be supplied through a connection to the national grid. Alternatives such as off-grid supply could compete with grid supply on a more equal footing.

Criteria where draft rule could have mixed effects

Service reliability	For remote grid-connected customers, service reliability is often lower than average (as indicated by Figure 3.2 and Figure 3.3 in chapter 3). Improved reliability is a potential benefit of moving to off-grid supply, as noted by Western Power in the rule change request and by several stakeholders.[45] However, as discussed in Appendix B, the reliability provisions that apply to grid-connected customers do not apply (in most cases) to off-grid customers. Therefore, while a well-designed and -maintained off-grid system can be very reliable, off-grid customers would have no regulatory protections if in practice reliability is lower than expected, or reduces over time as components age. Many stakeholders commented that off-grid customers should have the protection of reliability standards.[46] A draft rule could not adequately address this issue as reliability requirements are largely set and enforced through state instruments, such as distributor licence requirements. Service reliability standards are jurisdictional functions under the Australian Energy Market Agreement and so the Commission does not consider it appropriate to include detailed provisions on such standards in the NER.[47] Reliability requirements could potentially be included in a contract between a customer and a provider of off-grid services, but negotiating suitable provisions would require a considerable degree of knowledge regarding the operation of off-grid systems, which most customers are unlikely to possess. Some form of reliability regulation is therefore likely to be required where off-grid systems are supplied as a regulated service. Given the importance of reliability to customers, the Commission considers the lack of reliability requirements for off-grid supply to be a significant concern.
Impact on competition	The rule change request raises several complex issues relating to competition, as discussed in chapter 4 of the consultation paper. There is currently a market for off-grid systems focussed on customers without an existing grid connection and those few customers who choose to leave the grid for reasons other than cost savings. A draft rule may increase competition in the market for off-grid supply systems, by increasing the demand for these systems to include remote grid-connected customers who currently have no incentive to go off-grid.[48] A draft rule would also allow for competition between different forms of electricity supply (grid supply and off-grid supply), in circumstances where no such competition currently exists.[49] There is also potential for off-grid system maintenance, and system replacement when

45 See section 3.3.3.

46 See section 4.3.3.

47 Australian Energy Market Agreement between the Commonwealth of Australia and all state and territory governments, entered into on 30 June 2004, clause 14.7(d) and Annexure 2 section 19, "Service reliability standards - standards to ensure network security and reliability".

48 Providers of off-grid systems could compete to sell products or services to distributors. This issue is discussed further in section 4.4.

49 Incentive issues are discussed in section 3.4.

Criteria	Commission comments
	necessary, to be provided on a competitive basis. However, a customer moving from grid supply to off-grid supply may have reduced access to retail competition. While some stakeholders have put forward models for off-grid supply that would allow customers to switch to different retailers in the same way they are able to do while grid-connected, it is not clear that these models would be practical.[50] Some of the disadvantages caused by the absence of retail competition could be overcome by introducing some form of price control for off-grid supply, to protect against monopoly pricing. Such a change could not be made under this rule change request but, as discussed above for the issue of service reliability, would require a package of changes to jurisdictional instruments and potentially the NERL and NERR.
Criterion where draft rule would have a negative effect	
Risk profile	It is clear that, for a customer, the risk profile of off-grid supply is quite different from that of grid supply, as there are currently substantial differences between the energy-specific consumer protections available to grid-connected customers and those available to off-grid customers. These are discussed in Appendix B. In addition to the reliability issues noted above, in several states the full suite of protections under the NERL and NERR cease to apply when a customer moves off-grid. Off-grid customers in Queensland and Victoria, while they may retain some energy-specific protections, may not necessarily receive the same level of protections as they received while grid-connected.[51] While general protections under the Australian Consumer Law and some jurisdictional safety provisions would continue to apply to off-grid customers, the Commission considers that these do not provide sufficient protection for the relevant customers, given that electricity is an essential service. The relevant customers for this rule change request are not those choosing to move off-grid for their own reasons, but rather customers identified by a distributor as those who could be more efficiently supplied through an off-grid system, for the benefit of all customers. It is not appropriate for these customers to lose protections including access to hardship policies, restrictions on disconnections, requirements for regular and accurate bills, and additional protections for customers on life support, among many others. While these consumer protection issues can be addressed, the Commission is not able to address them through changes to the NER under this rule change request.[52] Providing for customers moving to off-grid supply to receive appropriate protections would require a package of changes to jurisdictional instruments and potentially changes to the NERL and NERR. Comments regarding these potential changes are set out in section 4.3.5.

50 Stakeholder comments on this issue are discussed in section 4.3.1.

51 For example, the service levels specified in Queensland's Electricity Distribution Network Code differ in some respects depending on whether the customer is supplied through a "long rural feeder" or an "isolated feeder". Under this code as well as under Victoria's Electricity Distribution Code, while specified service levels may apply to microgrids it is not clear whether they would also apply to individual power systems.

52 The scope of this rule change request is limited to the NER and does not extend to any changes to the NERR that are not necessary, consequential or corresponding to any NER rules. See section 91 of the NEL with respect to the Commission's powers to make necessary, consequential or corresponding NERR rules in respect of a rule change request made under the NEL.

3 Causes and extent of the issue identified by Western Power

This chapter discusses the issue identified in the rule change request in more detail, and presents:

- distributor data indicating that grid supply in low-density areas (with fewer customers per kilometre of line) can be more costly, and less reliable, than for high-density areas
- data indicating that the costs of key components of off-grid systems - solar PV panels and batteries - have fallen recently and are expected to fall further in coming years
- research and stakeholder submissions on the potential savings and other benefits from moving certain customers in low-density/ high-cost areas to off-grid supply
- information on the incentive and regulatory issues that prevent these potential benefits from being realised under the current NER and tariff structures - the barriers to off-grid supply by the competitive market, and barriers to off-grid supply by distributors.

3.1 In low-density areas, grid supply can be costly and unreliable

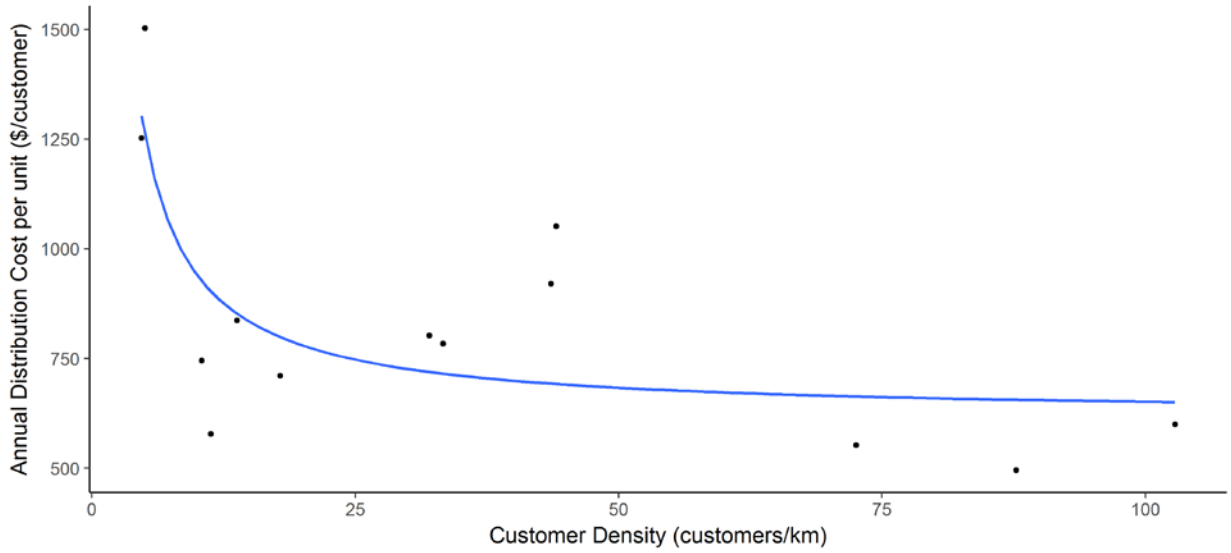
3.1.1 Grid supply to low-density areas can be more costly than for high-density areas

Distributors report data on their costs and operations to the AER in regulatory information notices, including information on the costs to supply electricity through the grid and on the reliability of the supply. This data shows that, across the 13 distributors in the national electricity market, as customer density (measured as number of customers per kilometre of line) falls, annual costs per customer connection increase. Distributors with a lower average number of customers per kilometre of network exhibit a higher average annual cost per connection.

Figure 3.1 highlights that the highest cost distributor has an average annual service cost of around $1,500 per customer and has a customer density of below 10 customers per network line kilometre. This is in contrast to the lowest average cost distributor which exhibits an average service cost of around $500 per customer and has a customer density of around 90 customers per network line kilometre.[53]

53 Analysis is based on the average for the period 2011 to 2015 using information sourced from distributor regulatory information notices. Customer density for each distributor is measured as number of connections divided by total line length. Costs for each distributor are based on a return on assets using regulatory asset base values multiplied by a weighted average cost of capital of 5.7%, regulatory depreciation and actual operating expenditure.

Figure 3.1 Distribution service delivery costs generally increase as customer density decreases



Source: Distributor data reported in regulatory information notices (2011-2015); Commission analysis.

In its submission on the consultation paper, Endeavour Energy affirmed that cost to serve customers in edge of grid areas is more expensive due to additional network infrastructure being required to supply electricity.[54]

3.1.2 Low-density areas may receive less reliable grid supply than high-density areas

For grid-connected customers, there is also a clear relationship between customer density and reliability of electricity supply. Distributors with a lower average number of customers per kilometre of network tend to exhibit lower performance on standard measures of reliability (as well as higher average costs).

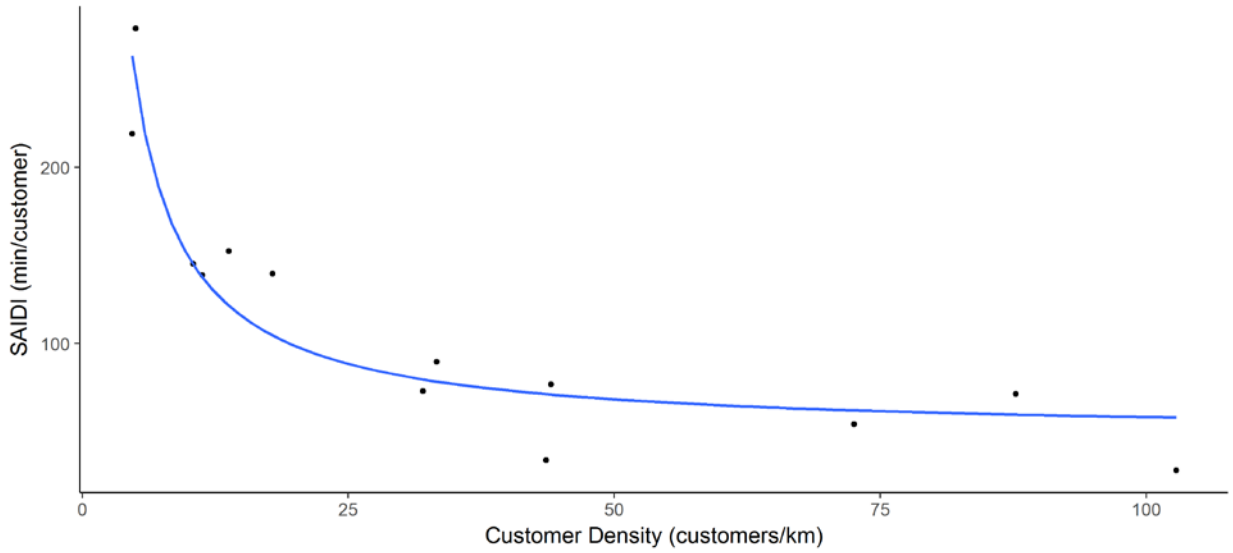
The standard measures of service quality or reliability are the system average interruption duration index (SAIDI) measured in average minutes of service interruption, and system average interruption frequency index (SAIFI) measured as the average number of interruptions experienced by customers per annum. High SAIDI and SAIFI results mean there are more frequent and longer interruptions, and thus lower service quality (or reliability).

Figure 3.2 shows the relationship between customer density and average interruption duration (SAIDI) for each of the 13 distributors in the national electricity market. It shows that lower customer density tends to be associated with longer average system interruptions. Specifically, the lowest customer density distributors have a SAIDI over five times higher than the highest density distributors.[55]

54 Endeavour Energy submission p. 1.

55 Analysis is based on the average for the period 2011 to 2015 using information sourced from distributor regulatory information notices. Customer density for each distributor is measured as number of connections divided by total line length.

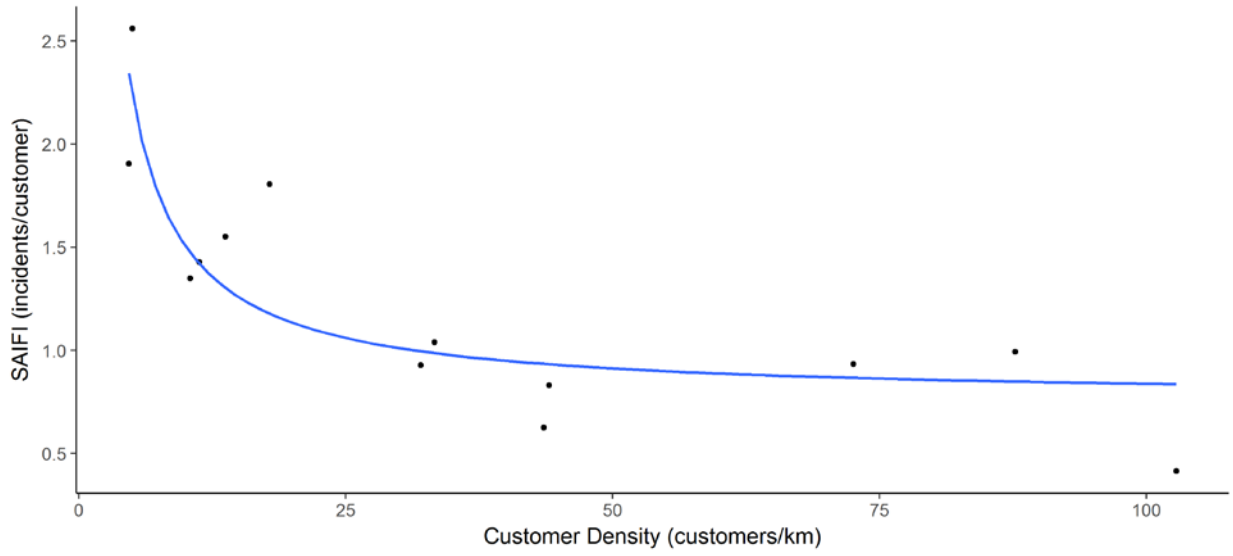
Figure 3.2 Service interruptions are generally longer as customer density decreases (SAIDI)



Source: Distributor data reported in regulatory information notices (2011-2015); Commission analysis.

A similar pattern is seen with the average frequency of interruptions (SAIFI) as shown in Figure 3.3. This figure shows that lower customer density tends to be associated with more frequent service interruptions. Specifically, the lowest customer density distributor has a SAIFI over five times higher than the highest density distributor.

Figure 3.3 Service interruptions are generally more frequent as customer density decreases (SAIFI)



Source: Distributor data reported in regulatory information notices (2011-2015); Commission analysis.

Note that, for Figure 3.1, Figure 3.2 and Figure 3.3, data for each distributor reflects the average for that distributor's entire service area and does not indicate the variations (in density, costs and reliability) that may occur within the service area. Even stronger correlations, with greater extremes, would be expected if this data was available at a higher resolution.

Data from Western Power confirms that grid-connected customers in remote areas may be subject to extended outages: its remote customers who were offered off-grid supply in a trial would, if grid-connected, have had outages averaging over 60 hours in the 10 months of the trial.[56]

3.2 Costs of off-grid system components are falling

In Australia as well as internationally, the costs of off-grid supply are reducing, driven largely by the significant recent reductions in solar PV and battery costs. This trend in cost reduction is expected to continue, particularly in relation to batteries.

3.2.1 Recent cost reductions

Information from Bloomberg New Energy Finance indicates that, globally:

- Solar PV prices have dropped rapidly over the last 10 years. In the course of 2016, module prices dropped by 30 per cent.[57]
- Battery prices reduced by 70 per cent in the past five years.[58] Between 2015 and 2016 alone, battery prices decreased 22 per cent.[59]

In Australia, the costs of inverters have halved from 2016 to 2017,[60] and fully-installed residential storage systems are thought to cost around $904/kWh in 2017 (GST inclusive), 47 per cent lower than in 2016.[61]

3.2.2 Expected future cost reductions

Bloomberg New Energy Finance predicts that:

- Solar PV module prices will drop 20 per cent in 2017, compared to 2015, and will probably drop another 20 per cent in the three years to 2020.[62]
- There will be a further reduction in battery prices of at least 15 per cent in 2017.[63]
- Battery packs are likely to experience cost declines at a rate of 19 per cent for every doubling of production due to productivity and efficiency improvements.[64]

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56 Western Power submission p. 4.

57 Bloomberg New Energy Finance, Technology Cost Declines: Potential game changers for the renewable energy industry, 1 August 2017 (BNEF August 2017 report).

58 Bloomberg New Energy Finance, The shift to 'base-cost' renewables: 10 predictions for 2017, M. Liebreich & A. McCrone, 18 January 2017. Data from the US Department of Energy, as reported by The Economist, supports this: lithium-ion cells (the basic components of batteries) cost over US$1,000/kWh in 2010, but in 2016 they were in the US$130-200/kWh range. The Economist, After electric cars, what more will it take for batteries to change the face of energy? 12 August 2017, drawing on data from the US Department of Energy.

59 BNEF August 2017 report.

60 Bloomberg New Energy Finance, Economic for some: Grid-scale batteries in Australia, 3 April 2017.

61 Bloomberg New Energy Finance, Australia behind the meter PV and storage forecast, A. Wilton, 22 February 2017.

62 BNEF August 2017 report.

63 Bloomberg New Energy Finance, The shift to 'base-cost' renewables: 10 predictions for 2017, M. Liebreich & A. McCrone, 18 January 2017.

- Fully-installed residential storage system prices in Australia will continue to decrease to $502/kWh by 2040, a further 44 per cent reduction on 2017 prices.[65]

System monitoring and control components are also improving rapidly, and expanding the range of cost-effective solutions available.[66]

3.2.3 Estimated costs of individual power systems

In addition to component costs, a range of factors affect the costs of off-grid supply. These factors may include, for example, the number of customers, the solar resources in the location, the difficulty in accessing the location, the desired level of reliability, the presence of existing behind-the-meter generation, the level and variability of energy demand, the ability of the customers to change their energy usage patterns, and the cost of removing the line to the grid.

Due to the number of variables it is not possible to estimate the costs of microgrids generally - costs must be determined on a case-by-case basis. Some estimates of the upfront costs of "grid quality" individual power systems[67] have been made, although there is considerable variance:

- depending on the technology used (diesel/ solar/ wind, with batteries), approximately $45,000 - $110,000[68]
- for a "typical regional or remote residential user", approximately $50,000[69]
- in the order of $150,000 - $200,000 per unit for the individual power systems procured for Western Power's pilot project[70]
- for a particular customer in a case study by Endeavour Energy, $200,000 - $250,000 (with a caveat that this price is specific to the location and level of service needed).[71]

3.3 Moving some customers to off-grid supply can benefit all customers

Given that it can be costly to provide electricity via the grid in low-density areas, and that the costs of off-grid system components have dropped sharply in recent years, it is not surprising that recent research and stakeholder submissions support Western Power's conclusion that, in some areas, it would be more cost-effective to supply

64 Bloomberg New Energy Finance, Economic for some: Grid-scale batteries in Australia, 3 April 2017.

65 Bloomberg New Energy Finance, Australia behind the meter PV and storage forecast, A. Wilton, 22 February 2017.

66 See for example SA Power Networks Distribution Annual Planning Report p. 23.

67 That is, systems that have been designed to have reliability and safety at least equivalent to grid-supplied electricity.

68 Alternative Technology Association, Stand Alone Power Systems as an alternative to Grid Connection at the Fringe of Grid, Summary for policy makers, May 2012 (ATA 2012 paper), Table 5, p. 12.

69 PIAC submission p. 3.

70 Western Power submission p. 2.

71 Endeavour Energy submission p. 5.

electricity via off-grid systems than to maintain and replace existing links to the grid. Other benefits may also accrue.

3.3.1 Research on situations where off-grid supply could be cost-effective

A report by Energy Networks Australia and the CSIRO stated that:[72]

> "In a limited number of circumstances, standalone power systems and micro-grids are likely to become a lower cost alternative to traditional grid supply arrangements over the next 10 years.
>
> Almost $700 million could be saved by supplying these connections, usually farms, with a standalone power system or standalone power systems. Transitioning existing grid connected remote customers to alternative supply via micro-grids or standalone power systems is also likely to result in a lower cost overall in certain circumstances. This can also result in other benefits such as reduced bushfire risk."

A report by Energeia found that for most new connections requiring a line of over three kilometres, and for small, remote towns, an off-grid solution is already more cost-effective than grid supply.[73]

A report by the Alternative Technology Association (ATA) stated that:[74]

> "Given the distances involved and low density of customer connection points in fringe of grid areas, in many cases it will be more cost effective to meet customer energy requirements with a SAPS [individual power system] rather than by network augmentation. Importantly, this will likely be the case irrespective of whether the policy rationale is to meet increasing demand on a constrained network; improving power quality; replacing aging or damaged assets; or for policy objectives such as for bushfire start risk mitigation."

The modelling conducted for this report indicated that individual power systems could be more cost effective than a $100,000 network upgrade (depending on the assumptions used).[75]

Taking a global perspective, the International Renewable Energy Agency considered that:[76]

> "By 2025, autonomous renewable mini-grids [microgrids] will be able to provide both basic and high tiers of service at competitive prices, leading to massive commercialisation and deployment to remote areas globally. As the costs decline, renewable mini-grids will make more economic sense and will

72 Electricity Network Transformation Roadmap: Final report, April 2017, p. 42.

73 Energeia, Cutting the Cord: The Australian Outlook for New Microgrids to 2026, November 2016, p. 2.

74 ATA 2012 paper, p. 6.

75 ATA 2012 paper, p.13.

76 Innovation Outlook: Renewable Mini-grids, Summary for policy makers, IRENA, March 2017, p. 12. Note that this report relates to microgrids powered by renewable sources only.

increasingly compete with the extension of main grids. By 2035, renewable mini-grids will be a cost-competitive option even in areas close to the main grid."

This report indicates that the deployment of high-service microgrids (providing continuous power) is currently "mature" in Canada and the United States, and in parts of East and South Asia and Oceania, and "emerging" in many other jurisdictions.[77] Developing settings to allow the efficient use of off-grid supply in Australia (as discussed in chapter 4) may lead to Australian entities emerging to help supply the significant demand for off-grid solutions in neighbouring countries.

3.3.2 Stakeholder comments on potential cost savings

Stakeholder submissions on the consultation paper generally agreed that it could be cheaper to supply certain customers in remote, low-density areas by off-grid supply rather than grid supply, and that given the current level of cross-subsidies received by such customers, moving them off-grid could reduce distribution costs for all customers.

General comments on the cost effectiveness of off-grid supply

Energy Networks Australia (ENA) and a range of distributors stated that off-grid supply could be more cost-effective than grid supply.[78]AusNet Services stated that the rule change has the potential to deliver improved customer outcomes by reducing costs, and that cost savings at identified customer sites could be significant, particularly in areas of the highest bushfire risk where AusNet Services is required to replace bare-wire power lines with insulated overhead power lines, undergrounded power lines or other technologies.[79] It stated that customers would ultimately be the beneficiaries if network businesses are able to adopt a range of technologies to provide network services ranging from traditional network assets through to off-grid solutions.[80]

Non-distribution entities including EMC Lendlease, S&C Electric, the ATA and the Public Interest Advocacy Centre (PIAC) also acknowledged that off-grid supply could be more cost-effective than traditional network solutions in certain circumstances.[81]

Examples of potential cost savings

Some stakeholders provided estimates of the cost savings that could be achieved by deploying off-grid supply in substitution for traditional network options. The extent of the estimated cost savings varied depending on the nature of the service required and the location among other variables, however the examples given showed significant potential savings:

- As noted in section 1.1, Western Power estimated savings of approximately $388 million over a period of 50 years by moving 2,702 customers to off-grid supply.[82]

77 Innovation Outlook: Renewable Mini-grids, Summary for policy makers, IRENA, March 2017, p. 6.

78 Submissions from Endeavour Energy, p. 1; Horizon Power, p. 2; SA Power Networks (SAPN)/ Citipower/ Powercor, p. 2; ENA, p. 4; Essential Energy, p. 1.

79 AusNet Services submission, pp. 1, 2.

80 AusNet Services submission, p. 1.

81 Submissions from PIAC, p. 4; ATA, p. 3; EMC Lendlease, p. 3; S&C Electric, p. 2.

- Essential Energy estimated that off-grid supply could be deployed to up to 8,430 of its customers in the next 10 years, resulting in avoided capital expenditure of up to $513 million. It noted that these figures are indicative and would be influenced by customer acceptance of off-grid supply and how cost items such as retirement of existing infrastructure are handled under the NER.[83]
- Endeavour Energy estimated cost savings of approximately $477,000 over 40 years for moving an individual customer to off-grid supply.[84]
- AusNet Services compared the lowest forecast costs of power line replacement (using Lo Sag network currently under development for bushfire areas) to an individual power system (consisting of solar PV, battery and back-up diesel generation) in the Chiltern area. Based on 2016 cost estimates, it found that the individual power systems were cheaper for approximately one third of the sites studied. For those sites, the savings ranged between 4 and 54 per cent.[85]

Comments on cost-effectiveness increasing over time

In its submission, PIAC noted the decreasing costs of off-grid supply. It stated that an individual power system with a capital outlay of around $50,000 would supply a typical regional or remote residential household with a level of reliability at least as high as the level it would receive from the grid, for a much lower ongoing and operating cost. It noted that the same system would have cost approximately $78,000 in 2011.[86]

Horizon Power also stated in its submission that it anticipates that the cost-effectiveness of individual power systems will continue to improve as the competitive market supplying these solutions develops and matures. Horizon Power stated that it is proactively accelerating this development process in support of customer-orientated utility-grade individual power systems.[87]

3.3.3 Stakeholder comments on other potential benefits from moving to off-grid supply

Stakeholders also mentioned a range of other benefits that were likely to arise if off-grid solutions were adopted.

Improved reliability

A number of stakeholders, including AusNet Services, Western Power, SAPN/ Citipower/ Powercor, Endeavour Energy, EMC Lendlease and ENA, stated that off-grid supply was either more reliable or likely to be more reliable than grid-supplied

82 Rule change request p. 11. The details of the case study are set out in Attachment 1 to the rule change request.

83 Additional information from Essential Energy, dated 8 September 2017.

84 Endeavour Energy submission p. 1. Another distributor indicated, on a confidential basis, that it could save a similar amount (over 20 years) by moving two customers in one identified location to off-grid supply.

85 AusNet Services submission p. 4.

86 PIAC submission pp. 13-14.

87 Horizon Power submission p. 2.

energy.[88] Stakeholders commented that this was due to individual power system quality not being impacted by network disturbances,[89] and being less affected by extreme weather events or bushfires.[90]

Stakeholders also provided case studies which demonstrated that (at least over the short period tested so far) high-quality off-grid solutions can lead to increased reliability for the customers who move off-grid:

- Western Power stated that its pilot individual power system project, which has been operational from 1 August 2016, has demonstrated significant reliability improvements when compared to grid connected supply. The pilot project allowed for a direct comparison of reliability outcomes, as it deployed individual power systems to customers while maintaining energised lines. In the 10 months from 1 August 2016 to 31 May 2017, average outages avoided for the six customers in the pilot were just under 60 hours per customer.[91]
- AusNet Services conducted islanding tests as part of its Mooroolbark mini-grid trial to test power quality outcomes. The tests were designed to discover how the participating homes would perform off-grid, including in terms of system functionality and performance. The results showed that voltage stability improved relative to grid-connected supply, as well as achieving uninterrupted supply.[92]
- Horizon Power deployed five individual power systems to bushfire-affected customers following the Esperance bushfires in late 2015. It stated that one year on, customer satisfaction levels with the individual power system technology has been overwhelmingly positive due to significantly improved power reliability, among other factors.[93]

Other benefits

Stakeholders including AusNet Services, Endeavour Energy, SAPN/ Citipower/ Powercor, Horizon Power, the ATA and EMC Lendlease stated that off-grid supply would improve safety by lowering bushfire risk.[94] Endeavour Energy stated that the bushfire risk would be lower, for example, where the overhead network could be removed from heavily vegetated and remote areas.[95]

Endeavour Energy further stated that off-grid supply would also improve emergency response times by eliminating the need to identify the location of a fault on a potentially

88 Submissions from AusNet Services, p. 6; Western Power, pp. 3-4; SAPN/ Citipower/ Powercor, p. 2; Endeavour Energy, p. 1; EMC Lendlease, p. 7; ENA, p. 4.

89 AusNet Services submission p. 6.

90 Submissions from AusNet Services, p. 6; Endeavour Energy, p. 4.

91 Western Power submission p. 4.

92 AusNet Services submission p. 6.

93 Horizon Power submission p. 2.

94 Submissions from AusNet Services, p. 1, Endeavour Energy, p.1; SAPN/ Citipower/ Powercor, p.6; Horizon Power, p. 2; ATA, p. 3; EMC Lendlease, p. 3. Potential savings from fewer bushfires were not estimated but could be significant.

95 Endeavour Energy submission p. 1.

extensive line, reduce local and community disturbance from line maintenance activities, and improve aesthetics and vegetation regrowth.[96]

3.3.4 Analysis

These stakeholder comments, supported by the data discussed in sections 3.1 and 3.2, indicate that some customers in the least dense areas of the national grid (remote or rural areas, also often identified as "edge of grid") may be good candidates for off-grid supply, when considering both price and reliability of electricity. If these customers move from grid supply to off-grid supply, the total costs of providing distribution services to all customers (including those off-grid customers) could be lower, and the customers who move off-grid may have greater reliability. Additional benefits such as reduced bushfire risk and improved land amenity may also arise.

The total potential savings across the national electricity market are unknown, as most distributors have not yet prepared a detailed assessment of potential savings in their areas. It is likely that the potential savings will vary between distribution areas: distributors with a relatively high proportion of customers in remote or low-density areas may see greater savings. However, it seems clear that there are already a number of grid-connected customers in high-cost areas (very remote areas, or areas subject to bushfires where new, more expensive lines are required) who could be more cost-effectively supplied by off-grid supply.

The number of grid-connected customers who could be more cost-effectively served by off-grid supply, and the total savings available, are likely to increase over time as the costs of solar PV and batteries, the main components of off-grid systems, are predicted to continue to decrease in coming years (as discussed in section 3.2), unlike the costs of maintaining lines in remote areas.

It is very difficult to quantify the other potential benefits of moving to off-grid supply, such as reduced bushfire risk and improved land amenity. However, if even one bushfire is avoided, this could save many millions of dollars for property owners and insurers.

3.4 Barriers to off-grid supply - competitive market

3.4.1 High-cost grid-connected customers have no incentive to go off-grid

Customers are currently free to move to off-grid supply at any time, but very few have appropriate incentives to do so. Despite the high costs of serving remote grid-connected customers, and recent declines in the cost of off-grid systems, the costs of off-grid supply are likely to be higher than the costs remote customers are currently paying for supply via the grid.

Electricity tariffs for customers in remote areas are often significantly less than the cost to supply those customers. In part, this difference is due to jurisdictional requirements or policies to charge all grid-connected residential customers in the jurisdiction the same rates for electricity supply (known as postage-stamp pricing). Some jurisdictions

96 Endeavour Energy submission p. 7.

also have subsidies for remote customers.[97] Even in jurisdictions without explicit subsidies or postage-stamp pricing requirements, for historical and other reasons, distributors do not tend to have granular location-specific pricing for standard distribution services; instead, all customers of the same type (e.g. residential) in a distributor's area are charged the same price for these services. Therefore, prices charged to customers in high-supply-cost areas (e.g. remote areas) are often considerably lower than the cost of supplying those customers, and vice versa for customers in areas where the cost to supply is low.[98]

Where a grid-connected customer would have to pay more for off-grid supply than the subsidised amount they pay for grid supply, the customer has no financial incentive to go off-grid.

The incentive issue is illustrated in Figure 3.4 below.[99] Line A indicates the per-customer cost to provide electricity via the national grid; it varies with customer density.[100] The dashed line, Line B, indicates the prices paid by grid-connected customers, on the basis that electricity supply costs are averaged across all customers in the distributor's area and location-specific cost differences are not passed through.[101] Line C indicates the per-customer cost to provide electricity via off-grid supply; for this illustration we assume this does not change with customer density (unlike grid supply costs).

In the low customer density area on the left of the graph, the gap between Line A and Line C indicates the potential savings from moving these high-cost customers from grid supply to off-grid supply (and if these savings were achieved, Line B - prices paid by all customers - may decrease marginally). However, Line C is higher than Line B, so these customers would pay more if they chose to move from grid supply to off-grid supply, and would have no incentive to do so if they were paying for an off-grid system themselves.

Over time, Line C is expected to fall (as off-grid supply components continue to get cheaper) so the potential savings from moving high-cost customers to off-grid supply will increase. However, as long as Line C remains higher than Line B, customers have no financial incentive to move off-grid.

97 These are discussed in Appendix A of the consultation paper.

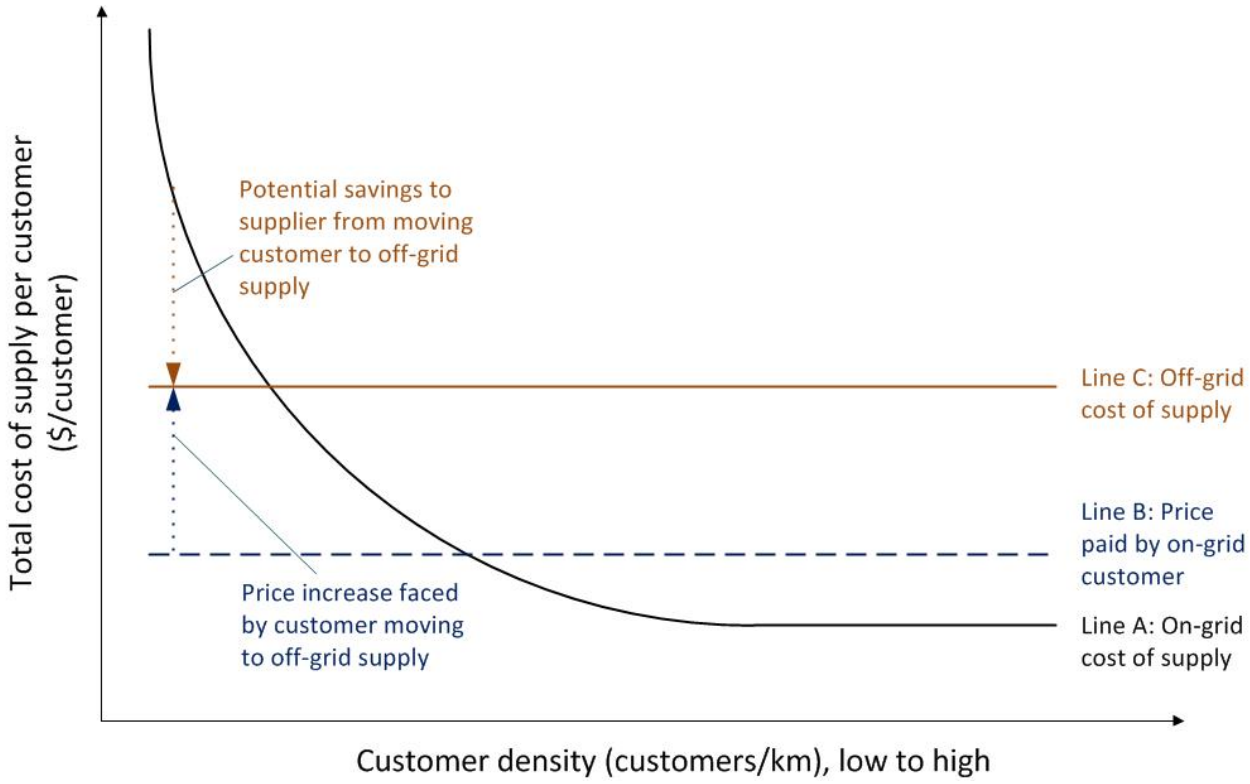
98 For example, in the lower-density parts of Western Power's service area (which form a high proportion of the whole service area), customers pay 11.4 per cent or less of the cost to supply them (including the cost of replacing lines when necessary), whereas customers in denser parts of the service area pay 200% or more of the cost to supply them. Rule change request p. 31, figure titled "Revenue to cost ratio by network maintenance zone". Other distributors may have similar disparities.

99 Note that this graph is for illustrative purposes only and is not based on actual data.

100 The curve of this line is supported by the data graphed in Figure 3.1.

101 This is a simplification for the purposes of illustration.

Figure 3.4 Illustration of incentive issue



3.4.2 Stakeholder comments on incentive issue

A number of stakeholders, including Western Power, AusNet Services, Essential Energy, Ausgrid, Endeavour Energy, ENA, the ATA and PIAC, acknowledged that as the average price that customers pay for network services in remote areas does not reflect the cost of supply, there is a lack of incentive for grid-connected customers to move to off-grid supply.[102]

3.5 Barriers to distributors providing off-grid supply

Notwithstanding the benefits of off-grid solutions, the Commission considers that there are a number of current barriers to distributor-led initiatives in this regard.

3.5.1 Off-grid supply is unlikely to be a distribution service

The Commission agrees with Western Power that a key barrier to distributor-led off-grid supply is that off-grid supply is unlikely to be a "distribution service" under the NER.

A "distribution service" is defined in the NER as “a service provided by means of, or in connection with, a distribution system”. The definition of "distribution system" in the

102 Submissions from Western Power, p. 2; AusNet Services, p. 5; Essential Energy, pp. 1-2; Ausgrid, pp. 2 - 3; ENA, p. 8; Endeavour Energy, p. 3; ATA, p.2; PIAC, p. 11.

NER includes the requirement that the system "is connected to another transmission or distribution system".[103]

The scope of services that may constitute services provided "by means of or in connection with" a distribution system for the purposes of the NER, is difficult to define precisely. However, the Commission considers that two general observations can be made:

- Services provided "by means of" a distribution system are those services provided wholly or very substantially by or through the network and connection assets that together form a distribution system. Off-grid services are clearly not provided "by means of" an interconnected distribution system.
- Services that are provided "in connection with" a distribution system are those services that have a clear functional nexus with a distribution system, but which are not necessarily provided through equipment or facilities that are physically connected with a distribution system.[104]

While the range of services that may fall within the category of services provided "in connection with" a distribution system is potentially very broad, off-grid supply is unlikely to be considered a distribution service for the purposes of the current definition.[105]

In the context of this rule change, off-grid supply is a self-contained system provided in lieu of, or in substitution for, a part of a distribution system.

The meaning and synonyms for the phrase "in connection with" that have been noted in relevant case law include: "forming part of"; "having to do with"; and "being bound up with".[106] In their ordinary application, the Commission considers that none of these terms easily encompass a relationship between two physically unconnected things (in

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103 NER chapter 10, glossary. The situation is different in the Northern Territory. In applying modified versions of the NEL and NER from 1 July 2016, the Northern Territory expanded the definition of "distribution system" to include distribution systems declared to be local distribution systems in the Northern Territory. (See the definition of "distribution system" at Sch 2, item 22 of the National Electricity (Northern Territory) (National Uniform Legislation) (Modification) Regulations (NT) and the definition of "local distribution system" at Sch 1, item 3 of the *National Electricity (Northern Territory) (National Uniform Legislation) Act* (NT) as in force at 1 July 2016.) This has the effect that each of the declared local distribution systems in the Northern Territory is a distribution system for all purposes in the NEL and the NER as they apply in the Northern Territory (notwithstanding the lack of connection with other systems).

104 There has been judicial consideration of the phrases "by means of" and "in connection with" in the context of the operation of the NEL and other statutory frameworks. In *Ergon Energy* (2012) 213 FCR 576 at [53] -[54], Logan J suggests the expression "by means of" in the context of the NEL refers to services provided directly through a distribution system. Other cases that have considered the phrases in different statutory contexts include *Alinta Asset Management Pty Ltd v Essential Services Commission* (No.2) [2007] VSC 210 and *Collector of Customs v Cliffs Robe River Iron Associate*s (1985) 7 FCR 271.

105 Note, however, that in Queensland a specified microgrid, the Mount Isa-Cloncurry supply network, is deemed to be a distribution system (and services provided by the network are deemed to be distribution services) for the purposes of certain chapters of the NER, under the state Act applying the NEL in Queensland. See *Electricity – National Scheme (Queensland) Act* 1997, Part 3.

106 See Pearce and Geddes, *Statutory Interpretation in Australia* (8th Edition, 2014) at [12.8].

this case an off-grid system and an interconnected distribution system), where the former is established in place of the latter.

As such, it is difficult to conclude that the relationship between off-grid supply and a distribution system is sufficiently close to constitute "in connection with" a distribution system for the purposes of the term distribution service under the NER. Off-grid supply is therefore unlikely to be a distribution service under the current definition of that term. This is consistent with the concern expressed by Western Power in the rule change request.

3.5.2 Impact of Ring-Fencing Guideline

The Ring-Fencing Guideline prohibits distributors from providing services other than distribution and transmission services, except where the distributor has been granted a waiver from this restriction.[107] Distributors therefore would not be permitted to provide off-grid supply, as it is unlikely to be a distribution service.

Off-grid supply can be provided as a non-distribution service through a subsidiary or other affiliate of a distributor. However, the Ring-Fencing Guideline imposes certain restrictions on distributors' interactions with such affiliates. For example, a distributor is not able to cross-subsidise the provision of non-distribution services through regulated revenue earned from the provision of distribution services.[108]

Accordingly, a distributor's subsidiary or affiliate (or a third party) is unlikely to be able to provide off-grid supply at a price competitive with the cross-subsidised price for grid supply currently paid by remote customers (see section 3.4).

The AER may grant a waiver from the prohibition on distributors providing non-distribution services where a distributor is required by law to provide the non-distribution services. One example given by the AER of such services is "isolated network services in remote areas".[109] Ergon Energy has applied for a waiver of several ring-fencing obligations in relation to services provided to customers in its isolated systems, as those services are regulated by the Queensland government.[110]

Nonetheless, distributors are still unlikely to provide off-grid supply as a non-distribution service in these circumstances, as a waiver from the prohibition will not allow distributors to cross-subsidise the provision of non-distribution services through the regulated revenue earned from distribution services. This is because the cost allocation methodology and cost application principles in the NER, which require distributors to attribute costs between different categories of distribution services, and the ring-fencing requirement to maintain separate accounts for different categories of services, will remain applicable. Accordingly, distributors will still be unlikely to be able to provide these off-grid services at a price that is competitive with the price paid by remote customers for grid-supplied services.

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107 Ring-Fencing Guideline sections 3.1(b), (e).

108 Ring-Fencing Guideline section 3.2.

109 AER, Electricity distribution ring-fencing guideline explanatory statement, November 2016, p. 57.

110 Ergon Energy, Ring-Fencing Guideline: Waiver Applications, 31 July 2017, pp. 25-29. The AER has not yet published a final decision on this waiver application.

3.5.3 Impact of restrictions on disconnection

Under the NERR, it appears that small customers cannot be moved to off-grid supply unless they request disconnection, and therefore a distributor cannot unilaterally choose to move a customer to off-grid supply.

The NERR contain restrictions on disconnection, which (in the case of electricity) is defined as opening a connection in order to prevent the flow of energy to the premises.[111] A connection is defined as a physical link between a distribution system and a customer's premises to allow the flow of energy.[112] Combining the relevant definitions, a disconnection would be opening a physical link between a grid-connected distribution network and a customer's premises, in order to prevent the flow of energy to the premises. This would seem to cover moving to off-grid supply;[113] the customer will, in that case, continue to receive a flow of energy, but not via the link to the grid.

Disconnection is only permitted in certain circumstances, for example if customers do not pay their bills. Moving to off-grid supply, on the grounds that it is more cost effective than replacing a long line in a remote area, is not currently a permitted reason for disconnection by a distributor (or a retailer) under the NERR.[114]

Customers are able to request their retailer to arrange disconnection.[115] It appears, therefore, that under the current NERR customers can only move off-grid (whether they seek to supply their own electricity or they have entered an agreement with a distributor or other party to supply it) if they request a disconnection.

While it appears that a customer cannot be moved off-grid unless they have requested a disconnection (and entered into a new arrangement with their new supplier), there is no requirement that the customer be fully informed of the consequences of their decision.[116]

In the context of a potential transition to off-grid supply, small customers would be unlikely to request disconnection if they would be moved to off-grid supply at a price higher than the cross-subsidised price they currently pay.

The requirement for a customer request for disconnection would not necessarily apply in jurisdictions that have not adopted the NERL and NERR. Jurisdictional laws or licence requirements may, however, impose restrictions on disconnections by distributors.

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111 NERL section 2.

112 NERL section 2. The definition of 'distribution system' in the NER currently includes a requirement for connection to another transmission or distribution system.

113 This outcome may change if the definition of "distribution system" is changed to include off-grid systems.

114 See Part 6 of the NERR and section 12 of the model terms and conditions for deemed standard connection contracts, in schedule 2 of the NERR.

115 NERR rule 118.

116 With the possible exception of circumstances where the customer is in a jurisdiction where the NERL applies to off-grid supply (see Appendix B), and the provider of off-grid supply is a retailer to which the provisions on explicit informed consent for entry into new contracts apply. NERL Part 2, Division 5.

In combination, the issues discussed in sections 3.5.1, 3.5.2 and 3.5.3 mean that distributors cannot currently provide off-grid supply at a cross-subsidised price, and without the cross-subsidy customers would not choose to leave the grid.

3.6 Conclusions

The factors discussed in this chapter clearly indicate that the issue raised by Western Power is a real one: there is the potential for significant cost savings and other benefits to all customers from moving certain customers to off-grid supply. However, a combination of incentive and regulatory issues currently prevent these benefits being obtained.

4 Package of suggested changes to support efficient moves to off-grid supply

The Commission considers that moving certain remote grid-connected customers to off-grid supply could offer significant benefits.[117] However, these customers should not be expected to move to off-grid supply unless it is offered to them at a price, and with protections, similar to those for electricity supplied via the national grid. Distributors are in a position to know which grid-connected customers could more cost-effectively be served by off-grid supply (as distributors know the costs of maintaining grid supply in each location), and distributors have a mechanism for providing services to all of their customers at the same price. For these reasons the benefits of off-grid supply could - and, the Commission considers, should - be obtained by allowing distributors to provide off-grid services to certain customers as regulated "distribution services" (with appropriate legislative and other additional regulatory changes), once consumer protection issues have been addressed.

To provide for customers to move to off-grid supply where efficient, while meeting the assessment criteria discussed in section 2.3.1, a package of changes will be required across a range of instruments including the NEL, NER, jurisdictional laws and regulations, other jurisdictional instruments such as distributor licences, and potentially the NERL and NERR.

This chapter discusses certain features of the package of changes which the Commission considers will be important in achieving the best outcome for consumers, including:

- encouraging more location-specific distribution pricing (which may be done together with targeted support for electricity costs of remote customers, if desired by jurisdictions)
- providing for consumers who move off-grid to reduce distribution costs to receive appropriate protections, including in relation to the price and reliability of electricity supply
- allowing distributors to provide off-grid services as "distribution services" under the NER in certain circumstances and with appropriate restrictions.

4.1 COAG Energy Council should continue its work relating to off-grid supply

In August 2016 the COAG Energy Council published a consultation paper on regulatory issues relating to off-grid systems, on which it received a number of submissions (including one from the Commission).[118] It held a stakeholder forum on these issues in September 2016.

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117 The benefits of off-grid supply are discussed in section 3.3.

118 Stand-alone energy systems in the Electricity Market - Consultation on regulatory implications, Energy Market Transformation Project Team, 19 August 2016. Submissions and further information are available at: http://www.coagenergycouncil.gov.au/publications/energy-market-transformation-%E2%80%93-consultation-processes

The COAG Energy Council has recently stated that this work will continue. A working group including the Energy Market Transformation Project Team (EMTPT) and other relevant agencies will look at certain issues relating to the regulation of off-grid supply.

In Energy Market Transformation Bulletin 5, published in August 2017, the COAG Energy Council stated that:

> "Ministers agreed that consistency is desired in jurisdictional frameworks for the regulation of stand-alone power systems. Therefore, Ministers agreed EMTPT should engage with relevant jurisdictional bodies and regulators and the Australian Energy Regulator to develop a best practice model for jurisdictional regulation of 'off-grid' stand-alone power systems.
>
> Ministers further agreed to EMTPT developing a proposal for changes to the national framework to address regulatory gaps for transferring from grid connected energy services to stand-alone power systems and relevant regulatory arrangements. EMTPT will consult with stakeholders in developing this scope of work."

The Commission encourages the COAG Energy Council to proceed with this work, including by publishing proposed action items with indicative timeframes. The Commission remains ready to provide assistance when required.

The Commission sets out below a series of recommendations regarding the regulation of off-grid supply to assist with this work and to inform potential future rule change requests on these issues.

4.2 Encourage more location-specific distribution pricing

4.2.1 The importance of location-specific pricing

The NER require distributors' pricing decisions to be guided by a pricing objective - that network prices should reflect a distributor's efficient costs of providing services to each consumer (generally referred to as cost-reflective network tariffs).[119] As discussed in the Commission's final report on the Distribution Market Model,[120] locational signals are an important part of fully cost-reflective network tariffs (together with temporal signals, i.e. time-of-use pricing). The final report described locational signals as "signals that reflect the costs of supplying network services to consumers at a particular location in the network."[121] Incorporating these signals in tariffs would tend to increase distribution tariffs for customers in remote areas and reduce them for customers in high-density areas (based on the density-cost association indicated in Figure 3.1).

Including locational elements in distribution tariffs may help address the incentive issue discussed in section 3.4, if retailers pass through the locational elements in retail tariffs. Remote customers with location-specific tariffs are likely to choose off-grid

119 Network pricing objective, NER cl. 6.18.5, introduced in the National Electricity Amendment (Distribution Network Pricing Arrangements) Rule 2014.

120 Published on 22 August 2017. Available on the Commission's website under project code SEA0004. Section 4.2 of the final report discusses network tariffs.

121 Distribution Market Model final report p.51.

supply if it is cheaper than grid supply (provided that reliability and other protections for off-grid customers are also addressed, as per section 4.3).

Certain jurisdictions have requirements that make locational signals difficult or ineffective, such as uniform tariff policies and opt-in approaches to new distribution network tariff structures.[122] These requirements are driven by social and equity objectives. However, there may be ways in which those objectives can be achieved in tandem with efficient pricing. For example, subsidies could be provided to consumers as direct payments rather than through reduced electricity costs.

4.2.2 Stakeholder comments on location-specific pricing

A number of stakeholders including AusNet Services, Ausgrid, SAPN/ Citipower/ Powercor, Endeavour Energy and ENA stated that while locational pricing is theoretically possible, it is unlikely to occur in the short-term.[123]

Endeavour Energy and ENA stated that such a solution would raise questions of social impact and equity, forcing customers in rural areas to access a public utility on unreasonable terms.[124] Endeavour Energy stated that ultimately sharing network costs across all network users offers significant social benefits that greatly outweigh any associated costs.[125]

SAPN/ Citipower/ Powercor stated that wider exposure to demand or time based pricing would be a more preferable first step.[126] Ausgrid noted that customer research conducted on its behalf suggested that customers do not support rural and remote customers paying more for their electricity, even where this would be more cost-reflective and reduce their electricity bills. Ausgrid's Customer Consultative Committee indicated similar views.[127]

4.3 Provide appropriate protections for consumers moving to off-grid supply

As discussed in section 2.3.2, a key reason why the Commission's draft determination is not to make a draft rule at this time is that customers in New South Wales, Tasmania and South Australia who move off-grid pursuant to such a rule would lose their energy-specific consumer protections under the NERL and NERR. Microgrid customers in Queensland and Victoria may retain some energy-specific protections but at a lower level; customers with individual power systems in those states may not be eligible for any distribution service level protections. These issues cannot be addressed through changes to the NER or the NERR.

122 Some of these are discussed in Appendix A to the consultation paper.

123 Submissions from Endeavour Energy, p. 2; SAPN/ Citipower/ Powercor, p.2; Ausgrid, p. 3; AusNet Services, p. 5; ENA, p. 8.

124 Submissions from Endeavour Energy, p. 2; ENA, p. 7

125 Endeavour Energy submission p. 9.

126 SAPN/ Citipower/ Powercor submission p.2.

127 Ausgrid submission p. 3.

General consumer protections would continue to apply to off-grid customers under the Australian Consumer Law. However, given the importance of electricity as an essential service, the Commission considers that customers who move to off-grid supply to reduce distribution costs (thereby benefiting all electricity customers by reducing overall costs) should continue to receive appropriate energy-specific consumer protections. This does not mean that the full suite of protections in the NERL and NERR are necessarily appropriate for all types of off-grid supply. Careful consideration needs to be given to which protections, at which levels, are appropriate for large microgrids, small microgrids, and individual power systems. This is consistent with the approach taken in relation to embedded network customers in the Commission's recent draft report on its Review of regulatory arrangements for embedded networks.[128]Some of the key consumer protection issues are discussed below.

4.3.1 Retail competition

While connected to the national grid, customers are able to switch retailers at any time, including when another retailer provides a more attractive offer. Retail competition can play a valuable role in keeping prices down. Some stakeholders consider that it would be possible to retain retail competition with off-grid supply in a way that (for customers) is similar to grid supply. These options are outlined briefly below.

Stakeholder models for off-grid supply with retail competition

AusNet Services considered that arrangements could be made for the provision of network services via off-grid assets that allow customers to preserve the same electricity supply services as those that are conventionally grid-connected. This includes access to retail competition.[129] Under this model, customers moving to distributor-supplied individual power systems would remain on their existing market offers and continue to access the full range of retail offers. Both the customer's premises and the generation asset (procured by the distributor but operated by a separate registered entity) would have National Metering Identifiers assigned and have metering to account for all generation and consumption. As the Commission understands this model, the customer would pay the retailer for electricity consumed, and the retailer would pay AEMO the wholesale market spot price for that electricity, as if the customer were grid-connected. AEMO would make payments to the registered entity operating the off-grid generation asset for the electricity it produces, with the amount of the payments determined by reference to wholesale spot market prices (but AEMO would not dispatch that electricity). The registered entity would make payments to the distributor for the system (less the entity's fees).[130]

PIAC's submission set out several potential models for providing and pricing off-grid supply. One of these models which may be consistent with retaining retail competition involves the retailer charging the customer under a normal market offer but making no wholesale payments for electricity from the off-grid system. The distributor would

128 Commission, Review of regulatory arrangements for embedded networks, Draft report, 12 September 2017, Sydney.

129 AusNet Services submission p. 6.

130 AusNet Services submission p. 8.

receive the usual distribution use of system payments from the retailer. The costs of procuring and maintaining the off-grid system would be included in the distributor's total operating expenditure allowance in its revenue proposal and hence recovered from all customers. This would reduce costs for the off-grid customer's retailer[131] and encourage retail competition for such off-grid customers. This would likely need to be reviewed if distributor-supplied off-grid systems become more common such that the revenue associated with them became a material part of the overall network revenue.[132]

Commission views

The Commission considers that the potential for retail competition should be a factor when determining the appropriate models of off-grid supply, but acknowledges that it may be difficult to retain effective retail competition in practice.

The Commission has not undertaken an extensive analysis of models for retail competition, but it appears that to implement the models outlined above would require a range of changes to the NER as well as to AEMO systems and procedures, which could be costly.[133] Furthermore, if off-grid supply increases to a substantial level, these models may cause price distortions.

4.3.2 Retail price controls

If it is not practicable to retain full retail competition for off-grid customers, the Commission does not consider that this should rule out the efficient use of off-grid systems where this would save distribution costs for all customers. In the absence of effective retail competition, some form of regulation of electricity prices is likely to be necessary to protect customers of distributor-led off-grid supply (who did not choose to go off-grid for their own reasons) from monopoly pricing risks, given that electricity is an essential service.

Stakeholder comments on retail price controls

Several stakeholders provided suggestions as to how retail prices could be equitably maintained:

- S&C Electric stated that there are a variety of different business models that may support the "fair operation" of an individual power system. It stated that the distributor could manage and maintain an individual power system while a separate entity manages the retail aspects, with periodic review of the network costs and the energy costs.[134]
- The ATA stated that distributor-owned off-grid supply could be vertically integrated, with appropriate price controls for supply of energy. It stated that this

131 This is due to the fact that there would be no need for a bespoke arrangement between the retailer and the distributor for payments for electricity from the off-grid system, since the retailer would not be making any such payments.

132 PIAC submission pp. 7, 8.

133 For example, the AusNet model appears to require a range of changes to the NER to accommodate price setting and settlement processes for generators operating outside the national grid, certain changes to AEMO's systems, as well as changes to state NERL application Acts, as discussed in section 4.3.5.

134 S&C Electric submission p. 2.

could be under the exemptions framework, or perhaps ideally, through new rules in the NERR designed to complement the proposed rule in order to produce consistent and equitable price outcomes for vertically integrated energy supply in these circumstances.[135]

- Ausgrid noted that the Western Power proposal for distributor installation of an individual power system would enable the tariff to be regulated through the network arrangements and the Tariff Structure Statement. Under this proposal, the charge levied by the distributor would encompass the efficient costs of providing the energy through the off-grid system.[136]
- PIAC stated that if there is no ability to change retailer or retail offer, appropriate regulatory oversight is needed to ensure the customer is paying an efficient price. This may take the form of price regulation for the entire off-grid supply to the customer. Or it may take the form of a regulated price for the generation and retail components of the off-grid supply, while the network component is regulated as under a normal grid connection.[137] An example pricing approach would be to allow cost recovery through a retailer using a regulated price for the efficient operation of off-grid systems. This provides an incentive for distributors to provide the service at or below the regulated prices, but would impose additional obligations on the AER or jurisdictional regulators to set and monitor these benchmark efficient operating costs. This may require a range of prices to be set depending on the configuration and scale of the off-grid systems.[138]

Commission views

The Commission considers that where possible it is better to focus on enabling effective competition rather than regulating prices. However, if effective retail competition in off-grid supply is not possible, price regulation may be appropriate.

The pricing condition in the AER's retail exempt selling guideline provides an example of a price control that could be adapted for off-grid supply, although the Commission does not necessarily consider that off-grid price controls should be imposed via an AER exemption process. The relevant condition is as follows:[139]

> "Condition 7 - Pricing
>
> 1. An exempt person must not charge the exempt customer tariffs higher than the standing offer price that would be charged by the relevant local area retailer for new connections, if the local area retailer were to supply that quantity, or estimated quantity, of energy directly to the premises of the exempt customer.

135 ATA submission p. 7.

136 Ausgrid submission p. 2. This would regulate the network price only and not the price the retailer charges the customer, so is unlikely to be effective to protect consumers.

137 PIAC submission p. 19.

138 PIAC submission pp. 7-8.

139 AER (Retail) Exempt Selling Guideline, version 4, March 2016, p.35. Appendix A-2, Core exemption conditions. Currently, sales of electricity to off-grid customers in NSW, Tasmania and South Australia are not required to be either authorised or exempt, and so this guideline does not apply.

2. An exempt person must provide notice to the exempt customer of any change in the exempt customer tariff as soon as practicable and no later than the exempt customer's next bill.

3. An exempt person must not impose any charge on an exempt customer that could not be charged by the relevant local area retailer for new connections under a standard retail contract.

4. An exempt person must limit any fee charged to a customer for late payment to a recovery of reasonably incurred costs by the exempt person as a result of the customer's late payment."

Alternative approaches may be considered. For example, it may be possible to achieve sufficient price controls by imposing limits on increases from the prices set at the commencement of the off-grid retail contract.

Price controls based on standing offers may still result in customers paying more than they would for energy in the competitive retail energy markets. The average standing offer can be as much as $507 more annually than the best market offer, and standing offers have been increasing more relative to market offers over time.[140] The AER has observed that embedded network customers often pay close to the standing offer price cap.[141]

4.3.3 Reliability

As discussed in sections 2.3.2 and 3.3.3 and Appendix B, remote customers moving to off-grid supply may, at least initially, receive better reliability than they experienced with a grid connection,[142] but would lose many of the regulatory protections relating to reliability that are available to grid-connected customers. As reliability of electricity supply forms part of the national electricity objective, the Commission considers that having appropriate reliability standards for off-grid supply would be a prerequisite for a rule allowing distributor-led off-grid supply being able to meet the national electricity objective.

Stakeholder comments on reliability requirements for off-grid supply

A number of stakeholders commented on the need for appropriate reliability standards for customers transitioning to distributor-led off-grid supply:

- Endeavour Energy stated that it is essential that customers are provided with appropriate levels of reliability, and that this level of reliability should be at least as good as can be obtained through grid-connected supply.[143]
- ENA and Energy Queensland stated that customers moving to off-grid supply should continue to benefit from the current regulatory framework mechanisms for the protection of grid-connected customers, such as reliability and quality

140 Commission, 2017 Retail energy competition review, 25 July 2017, Sydney, p. 104.

141 AER, submission on Commission consultation paper on Review of regulatory arrangements for embedded networks, p. 9.

142 See Figure 3.2 and Figure 3.3 regarding the reliability of grid supply in low-density areas.

143 Endeavour Energy submission pp. 2, 12.

standards (noting that in individual cases these may require flexibility in application due to the particular characteristics of the off-grid solution).[144]

- SAPN/ Citipower/ Powercor agreed with the statement above, and stated that relevant standards may include technical parameters such as voltage levels in relation to quality of supply, Guaranteed Service Level payments, the Service Target Performance Incentive Scheme, and requirements to publish and use best endeavours to meet reliability targets in relation to reliability standards.[145]
- AGL stated that service delivery to remote communities may require a higher degree of prescription in relation to reliability standards.[146]
- S&C Electric and EMC Lendlease stated that consumer protections regarding the reliability of off-grid supply are required before the NER should allow distributor-led transition to off-grid supply.[147]
- Ausgrid noted the materiality and complexities of the issues regarding the reliability requirements that would apply to off-grid customers. Accordingly, it stated that engaging with customers to ensure that they are fully informed of all consequences before an individual power system is installed would be crucial.[148]
- ENA stated that some state-based reliability and performance licence conditions for electricity distributors may also need to be revised to include provisions for off-grid supply.[149]

Certain stakeholders suggested that no specific measures to ensure off-grid reliability standards would be required. AusNet Services stated that arrangements could be made for the provision of distribution services via off-grid assets that allow customers to preserve the same electricity supply services as those that are conventionally grid-connected. This includes access to reliability standards, in addition to retail competition and consumer protections.[150] Western Power stated that no specific additional reliability protections would be required, assuming that once the NER are amended in the way it proposed, off-grid customers would fall within the bounds of jurisdictional network reliability measures, and where applicable, reliability incentive measures such as the AER's Service Target Performance Incentive Scheme.[151] It considered that the distributor-led model provides for reliability improvements to be included in performance measures and incentive payments (or avoided penalties).[152]

144 Submissions by ENA, p. 8; Energy Queensland, p. 6.

145 SAPN/ Citipower/ Powercor submission p. 5.

146 AGL submission p. 3.

147 Submissions by S&C Electric, p. 7; EMC Lendlease, p. 7.

148 Ausgrid submission p. 2.

149 ENA submission p. 9.

150 AusNet Services submission p. 7. See section 4.3.1 for an outline of this proposal.

151 It is not clear whether these measures would apply to, or have any effect in relation to, off-grid systems. Reliability requirements in the context of off-grid supply are discussed in Appendix B.

152 Western Power submission p. 7.

Commission views

The Commission considers that it is important to have reliability standards that apply to microgrids and individual power systems, with appropriate enforcement mechanisms. These standards do not necessarily need to be the same as those that apply to grid-connected customers.

While the Commission has not undertaken an extensive analysis of appropriate reliability requirements, the Commission considers that for microgrids, it may be suitable to provide a guideline reliability standard, or range, and require the entity designing a microgrid to consult with the community regarding the exact standard that will apply in that microgrid. For individual power systems, reliability standards may need to be set in relation to the demand that the system was designed to meet.

Making the proposed rule would not, in itself, be sufficient to ensure that existing reliability standards apply to off-grid supply; individual power systems, in particular, appear unlikely to be covered.[153] If distributors are to be permitted to provide off-grid supply (for example in the circumstances outlined in section 4.4), reliability standards for off-grid customers could be provided by amendments to distributors' jurisdictional licences. Service reliability standards are jurisdictional regulatory functions under the Australian Energy Market Agreement and so the Commission considers it inappropriate to include detailed provisions on these standards in the NER.[154]

4.3.4 Other protections

The NERL and NERR contain a range of additional energy-specific consumer protections. Many (but perhaps not all) of these protections would remain valuable in an off-grid context, although amendments may be required, depending on the model used to provide off-grid supply. Protections specific to off-grid supply may also be useful. As with reliability and price protections, the Commission considers that having other appropriate consumer protections for off-grid supply provided under a distributor-led model would be a prerequisite for a rule allowing distributor-led off-grid supply being able to meet the national electricity objective.

Stakeholder views on existing protections that should apply to distributor-led off-grid supply

In addition to price and reliability protections as discussed above, stakeholders considered that the following existing protections would be relevant for off-grid supply provided under a distributor-led model:

- obligations to supply the customer[155]
- dispute resolution procedures[156]
- quality and service standards[157]

153 See Appendix B for further details.

154 Australian Energy Market Agreement, clause 14.7(d) and Annexure 2 section 19, "Service reliability standards - standards to ensure network security and reliability."

155 ENA submission p. 8.

156 Submissions by ENA, p. 8; PIAC, p. 20; ATA, p. 13.

- access to a retailer's hardship programs and repayment plans and access to rebates and vouchers[158]
- strict limitations on retailers and distributors around the conditions under which the customer may be disconnected, with particular protections for customers with life support equipment[159]
- clear and fair contract terms.[160]

Stakeholder views on new protections that should apply to distributor-led off-grid supply

Given the differences between grid supply and off-grid supply, PIAC and the ATA considered that certain new protections specific to off-grid supply would be warranted:

- clearly demonstrating the explicit informed consent of the customer, with particular emphasis on the customer's understanding of the differences between living with a grid connection and living with off-grid supply[161]
- a transition period for customers where the premises is electrically isolated but not yet physically disconnected from the grid. This will allow the customer to trial off-grid supply for a period and, if they opt out of off-grid supply and instead decide to retain the grid connection, new grid connection infrastructure would not be needed[162]
- full disclosure of detailed product information to allow for straightforward repairs and identification of the correct replacement parts for off-grid systems[163]
- a prudential fund or insurance against the failure of the off-grid system.[164]

Commission views

The Commission has not undertaken a detailed analysis of the consumer protections that would be appropriate for off-grid customers as part of considering this rule change request, as this rule change request relates only to the NER and consumer protections are largely provided through the NERL and NERR. However, the Commission's view is that customers moving to distributor-led off-grid supply should be able to expect many of the same protections as standard supply customers, where they are applicable to off-grid supply. For example, in addition to the specific protections mentioned by stakeholders above, the following protections could be considered when developing a consumer protection regime for off-grid customers:

- requirements regarding accurate metering of electricity usage (if customer bills are based on electricity usage)[165]

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157 Submissions by ENA, p. 8; Energy Queensland, p. 6; Essential Energy, p. 2; Endeavour Energy p. 2.

158 Submissions by PIAC, p. 8; ATA, p. 10.

159 PIAC submission p. 8.

160 Submissions by PIAC, p. 20; ATA, p. 13.

161 Submissions by PIAC, p. 20; ATA p. 9, p. 13.

162 Submissions by PIAC, p. 20; ATA p. 13.

163 PIAC submission p. 20.

164 Submissions by PIAC, p. 20; ATA, p. 13.

- requirements regarding regular billing, with bills to include clear information on the basis for the amount charged[166]
- standard terms and conditions for off-grid retail contracts (while also allowing other contracts to be offered).[167]

The Commission also agrees with stakeholders that additional off-grid-specific protections may be necessary.

This is consistent with the approach taken in the relation to embedded network customers in the Commission's draft report on the Review of regulatory arrangements for embedded networks.[168] This draft report proposed establishing minimum customer protections for embedded networks, with some flexibility to exempt providers from inappropriate requirements, and some additional obligations specific to embedded network situations.

4.3.5 Options for providing consumer protections

Consumer protections for off-grid customers could be provided under separate jurisdictional laws and regulations (preferably harmonised across jurisdictions). Some jurisdictions, for example South Australia, already have relatively advanced regulatory frameworks for off-grid supply, and similar arrangements could be developed in other jurisdictions.

The NERL and NERR currently provide a range of consumer protections in each jurisdiction which has adopted the NERL.[169] These instruments are another option for providing the off-grid price controls and other consumer protections discussed in sections 4.3.2 and 4.3.4. In order to do so, two sets of changes would need to take place:

- the state Acts adopting the NERL as a law of the state in New South Wales, Tasmania and South Australia would need to be amended to allow the NERL (and consequently the NERR) to apply to off-grid customers[170]
- the NERL and the NERR would need to be amended so that relevant provisions would apply to off-grid customers and irrelevant ones would not. For example, if customers with individual power systems cannot switch retailers in the same way

165 See for example rule 20 of the NERR, which requires compliance with the metering rules in chapter 7 of the NER.

166 See for example NERR Part 2, Division 4 (Customer retail contracts - billing).

167 See for example NERL Part 2, Division 3 (Standing offers and standard retail contracts for small customers) and Division 4 (Market retail contracts for small customers).

168 Commission, Review of regulatory arrangements for embedded networks, Draft report, 12 September 2017, Sydney.

169 These jurisdictions are Queensland, New South Wales, the Australian Capital Territory, Tasmania and South Australia.

170 *National Energy Retail Law (South Australia) Act* 2011 (SA) section 16; *National Energy Retail Law (Adoption) Act* 2012 (NSW) Schedule 1, section 11 and *National Energy Retail Law (NSW) No.37a*, section 3A; *National Energy Retail Law (Tasmania) Act* 2012 (Tas) section 17. See Appendix B.

as grid-connected customers, the customer transfer provisions may need to be amended, or restricted in their application.[171]

It is also possible that consumer protections for off-grid supply in the NERL and NERR and those in multiple jurisdictional laws and regulations could be harmonised.

4.4 Allow distributors to provide off-grid supply with certain restrictions

4.4.1 Need for distributor involvement

For the reasons set out at the start of this chapter, the Commission considers that distributors have a role to play in the efficient use of off-grid supply.[172] Specifically, distributors should be permitted to provide off-grid supply to certain customers as a "distribution service" regulated under the NER, once the consumer protection issues discussed above for those customers have been addressed. To best contribute to the achievement of the national electricity objective, certain conditions relating to customer eligibility and capital expenditure should be imposed. These conditions are discussed in sections 4.4.2 and 4.4.3 below.

4.4.2 Proposed preconditions for off-grid supply: identifying eligible customers

Grid connection precondition - Commission and stakeholder views

To avoid damaging the competitive market for off-grid systems, the Commission considers that distributors should only be permitted to provide regulated off-grid services where the use of off-grid supply would result in network savings and the customer has no financial incentive to obtain off-grid supply from the competitive market, i.e. those who currently receive electricity at a price lower than the price they would be required to pay for competitively-provided off-grid supply ("eligible customers"). For the reasons discussed in section 3.4, eligible customers will be those who currently have a grid connection and are therefore receiving regulated standard control distribution services; new developments without an existing grid connection should not be eligible. Customers who were connected to the grid prior to a bushfire or other natural event which destroyed the grid connection should also be considered eligible customers.

Certain stakeholders commented on whether only grid-connected customers should be eligible for distributor-led off-grid supply:

- Essential Energy and ATA stated that the proposed rule change should only be relevant to those customers who are currently connected to the grid. A request for a new connection should be able to be satisfied through the contestable market.[173]

171 The NERL and NERR apply to gas as well as electricity. The form(s) of energy to which amendments in respect of off-grid supply apply would need to be clearly specified.

172 However, this role may diminish if distribution tariffs are, in future, changed to include strong locational signals which are passed through to customers.

173 Submissions from Essential Energy, p. 1; ATA, p. 5.

- S&C Electric stated that off-grid supply should be an option available to the distributor for existing connected communities or new, never connected, communities, if it can be demonstrated that a microgrid delivers a secure supply at lowest cost to the connected customers.[174]

Distributor assessment of off-grid supply option - Commission and stakeholder views

A precondition that the distributor has found off-grid supply to be more cost-effective than grid maintenance may be required. Distributors have existing incentives to provide distribution services efficiently.[175] If the NEL and NER are amended such that distribution services include off-grid services, these existing incentives would apply in relation to off-grid supply. When expenditure on an existing line is required, distributors would therefore have drivers to assess whether line maintenance or off-grid systems would be more cost-effective, and to choose the most cost-effective option (subject to appropriate customer consent provisions, as discussed below). Distributors are required to undertake a regulatory investment test when proposing capital expenditure over $5 million. Whether these incentives and tests are sufficient or further prescription is required for off-grid supply should be considered.

PIAC and Endeavour Energy commented on this issue as follows:

- PIAC's view was that a less detailed investment test than a regulatory investment test should be applied for any projects of less than $5 million that only supply a small number of customers. It suggested an appropriate threshold for this test might be $100,000 per customer served.[176]
- Endeavour Energy considered that existing regulatory arrangements should ensure that, once distributors are permitted to provide off-grid supply, they will not simply adopt traditional network solutions where more efficient (off-grid) alternatives exist.[177]

Customer consent - Commission views

Another point to consider in relation to customer eligibility is the role of customer choice in the decision to move to off-grid supply. Currently it appears that customers cannot be moved to off-grid supply unless they request to be disconnected.[178] This may change depending on the exact wording of the changes to the NEL and NER that includes off-grid supply as a distribution service or distribution system, as moving to off-grid supply may no longer constitute a disconnection.

It may be appropriate to require the distributor or retailer to obtain the customer's explicit informed consent, potentially with specific information requirements on the implications of moving to off-grid supply as suggested by stakeholders (see section

174 S&C Electric submission p. 2.

175 The ex-ante network regulatory framework in chapter 6 of the NER provides an overarching incentive for least cost network service provision. This incentive is enhanced and calibrated through specific incentive schemes for operating (the efficiency benefit sharing scheme) and capital expenditure efficiency (the capital expenditure sharing scheme).

176 PIAC submission p. 3.

177 Endeavour Energy submission p. 11.

178 See section 3.5.3.

4.3.4).[179] If consumer protections and service standards equivalent to those for grid-connected supply are put in place, there is an argument that customers should not be able to refuse to be moved to off-grid supply, given that refusal would result in all customers paying higher distribution costs. In a community where a microgrid has been assessed to be the more efficient option, or a number of sites need to be converted to individual power systems to allow the inefficient replacement of a line to be avoided, it may be considered sufficient if a certain percentage of the customers provide their explicit informed consent to move off-grid.[180]

Such changes would require amendments to the NER and NERR, and potentially a change to (or clarification of) the definition of "de-energisation" in the NERL, to provide that, while moving from grid supply to off-grid supply does not constitute a disconnection, there are consent provisions which must be followed.

Customer consent - stakeholder views

A number of stakeholders, including Ausgrid, PIAC and the ATA, stated that explicit informed consent should be required before distributors move customers to off-grid supply.[181] PIAC stated that it has concerns around shortcomings of the current information obligations under the NERL, for instance there is no requirement to disclose information in plain English and to ensure it is provided by someone competent to do so, but considers that obligations around explicit informed consent are essential to ensure that customers are given sufficient information and understand their rights and obligations and the terms of the off-grid service contracts they enter into.[182]

The ATA stated that in situations where a community may be retrofitted to a microgrid, requirements for the explicit informed consent of end-users should be enforced. As customers in a microgrid are giving up key benefits of the mainstream energy market - including the security of the grid as a backup - this consent must be predicated on a comprehensive information and consultation program spelling out the risks and benefits in detail. Anything less than the explicit informed consent of all end-users raises the risk of some households leaving the retail market or the conventional network against their will. On the other hand, requiring unanimous consent raises the risk that a single customer will have an effective veto over a project that meets the wider community's needs – which seems a perverse outcome in large communities. The ATA noted that similar issues are already evident with regard to retrofitting embedded networks into apartment complexes and shopping centres. The ATA stated that the

179 See NERL Part 2, Division 5 (Explicit informed consent).

180 Embedded network regulation provides an example, though the implications of moving to off-grid supply are more significant. Under the AER's network exemption guideline, conversion of an existing site to an embedded network (brownfield conversion) requires the AER's approval. The applicant must conduct a marketing campaign to inform tenants and may apply to the AER for approval if it can demonstrate that 85 per cent or greater of tenants and/or residents have agreed to conversion to an embedded network. (AER, Electricity network service provider - registration exemption guideline, version 5, March 2016, section 4.9, pp. 67-70.)

181 Submissions from Ausgrid, p. 2; PIAC, p. 18; ATA, pp. 12, 13.

182 PIAC submission p. 18.

requirement of explicit informed consent should be incorporated into the regulations governing microgrids.[183]

Ausgrid and the AER indicated that questions relating to the customer's consent to move off-grid should be considered together with questions relating to the customer's right to request to be reconnected to the grid.[184] The AER stated that mechanisms would need to be designed to avoid any potential to burden other customers with the costs of reconnection.[185]

4.4.3 Proposed conditions relating to distributor provision of off-grid supply

In addition to the preconditions discussed above, the Commission considers that certain conditions should be imposed on distributor provision of off-grid supply, for reasons similar to those set out in the draft determination on the contestability of energy services rule change request.[186]

The draft rule for the contestability of energy services rule change request[187] aims to facilitate competition in the emerging contestable energy services market by introducing restrictions on distributors' ability to earn regulated returns on "behind the meter" assets (assets electrically connected to the network on the metering point side of the connection point at a retail customer's premises, which may include, for example, rooftop solar systems and battery storage). This means that to access the functions that assets located behind the meter can provide (such as demand response) distributors will need to pay customers or third parties for such functions rather than investing in the assets themselves. Given that the supply of individual power systems does not have natural monopoly characteristics, similar restrictions should apply in relation to the provision of individual power systems by distributors.

The result of such a restriction would be that a distributor could not invest in the assets to provide individual power systems itself, but could procure the provision of individual power systems from third parties (including ring-fenced affiliates), and supply the electricity from such systems to customers as part of its off-grid distribution service. This restriction would assist in the development of the market for provision of off-grid systems. Exemptions from this restriction may be available in certain circumstances under the draft contestability rule.

The draft contestability rule would apply to provision of microgrids in the same way that it applies to provision of distribution services in the national electricity market. That is, it would restrict investments by distributors “behind the meter” but not to investments "in front of the meter" for the purpose of providing distribution services for customers connected to the microgrid.

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183 ATA submission pp. 12, 13.

184 Submissions from Ausgrid, p. 4; AER, attachment p. 21.

185 AER submission, attachment p. 21.

186 Available on the Commission website, www.aemc.gov.au, with project reference ERC0206.

187 Draft National Electricity Amendment (Contestability of energy services) Rule 2017, referred to here as the draft contestability rule.

In addition to the restriction regarding capital expenditure on individual power systems, the Commission considers it important that off-grid customer relationships and billing are managed by an authorised retailer (or equivalent under jurisdictional legislation). Retail services with respect to off-grid supply should not be included in the revised definition of "distribution service". A specific prohibition is not required given the ring-fencing requirements that already apply to distributors (noting that distributors may apply for exemptions from these requirements in certain circumstances).[188]

Stakeholder comments on service supply conditions

A number of stakeholders suggested that off-grid solutions should be competitively procured and/or subject to a competitive tender. Aspects of the models proposed may therefore fall within the ambit of the Commission's restriction on behind-the-meter assets in the draft contestability rule.

AGL stated that it was firmly of the view that any regulatory framework governing stand-alone power systems must ensure free and informed customer choice and competitive mechanisms to maintain price and service discipline. AGL stated its preferred regulatory approach would be to subject the provision of off-grid supply to competitive market delivery through an open and transparent tender process.[189] S&C Electric stated that there should be a competitive process for the supply off-grid supply, with the distributor being the supplier of last resort.[190]

As a general principle, Red and Lumo were opposed to the idea that competitive assets like solar, storage and embedded generation be provided to consumers as a regulated distribution service. However, they stated that in some very specific circumstances, it would make economic sense for a distributor to supply the remote consumers through an individual power system as a regulated distribution service. This would only be the case where:

- the distributor has gone to tender for off-grid assets and there was no interest from the market
- the impacted consumers were remotely located, and
- off-grid supply would be cheaper than a traditional network solution.[191]

Endeavour Energy considered that it would be preferable for customers to have access to competitive offers for each component of off-grid supply. It stated that competitive providers likely already exist for installation and maintenance of generating systems, and billing. The key barriers these suppliers face is being unable to compete with the cross-subsidised distribution charges. If this issue is addressed by allowing distributors to fund the off-grid solution, it is likely to stimulate growth in these markets.[192]

188 The Ring-Fencing Guideline is discussed in section 3.5.2.

189 AGL submission pp. 2, 3.

190 S&C Electric submission p. 7.

191 Red & Lumo submission p. 1.

192 Endeavour Energy submission p. 11.

AusNet Services' proposed model involved off-grid assets being owned by the distributor but being operated by and registered with an intermediary.[193]

The ATA and PIAC supported the distributor owning and operating the off-grid assets. They stated that distributor provision of off-grid supply under the proposed rule would be subject to the requirements for efficient service provision. This could involve the distributor procuring contestable services in delivering its service. However, requiring customers to procure different aspects of their energy supply from the market would be too complex. PIAC stated that this could be a poor outcome for customers because it would likely require multiple contractual relationships, and potentially unclear responsibility if things went wrong, which may mean that customers are left without a clear means of recourse, and it would be a significant departure from arrangements under a traditional grid connection.[194]

4.4.4 Changes to NEL and NER that may be required

With the NEL as it currently stands, amending the NER to allow distributors to provide off-grid supply as a "distribution service" would raise a number of legal issues, as detailed in section 2.2. In particular, introducing such changes to the NER without making concurrent changes to the NEL is likely to give rise to inconsistencies between the NEL and the NER as well as introduce inconsistencies within the NEL in respect of how off-grid supply services and existing distribution services provided by distributors are regulated.

In order to allow distributors to provide off-grid supply service as a distribution service, the Commission recommends that a package of amendments be made to both the NER and the NEL.[195] To achieve a regulatory framework that applies to off-grid supply services and traditional distribution services in a consistent and sufficiently certain manner, the Commission recommends that consideration be given to amending the NEL in the following ways:

- Amend the term "electricity network service" or, alternatively, "distribution system" to incorporate off-grid supply as a service that clearly falls within the scope of an "electricity network service" under the NEL and "distribution service" under the NER and, as such, is a service that may be subject to economic regulation by the AER. Subject to the specific form of the restrictions referred to in section 4.4.3, changes would also need to be made to allow off-grid supply to be a distribution service despite the distributor not owning, operating or controlling the assets used to provide such services.
- Ensure that terms such as "network service provider", "regulated network service provider" and "AER economic regulatory function or power" apply in a consistent manner to all "electricity network services" (whether they be off-grid supply or traditional distribution services).

193 AusNet Services submission p. 8.

194 PIAC submission pp. 7, 19 - 20. ATA submission p. 7.

195 Potential changes to jurisdictional instruments and/or the NERL and NERR in relation to consumer protections are discussed in section 4.3.5.

- Qualify the application of the term "interconnected national electricity system" where necessary to accommodate distributors providing off-grid supply services.

Depending on the preferred approach to distributor provision of off-grid supply, different or additional amendments to the NEL may be required.

The NEL and the NER adopt closely-matching definitions of key expressions that are central to the regulatory regime for both transmission and distribution of electricity. As such, any changes to the regulatory framework to allow distributors to provide off-grid services must be made in a way that does not disrupt these parallels between the NEL and NER.

A range of changes to the NER will be required in order to allow distributors to provide off-grid supply as a distribution service with the restrictions proposed above. A review of the NER, and potentially also the NERL and NERR, will also be necessary to identify the flow-on effects of changes to key definitions such as "distribution service" or "distribution system."[196] A series of changes to other definitions and provisions may be needed to apply the appropriate policy settings in the context of off-grid supply.

Jurisdiction-specific instruments such as state laws or licences could not, on their own, provide for distributor provision of off-grid supply in the manner described above. Distribution services are regulated under the NEL and NER (including the economic regulation that allows distributors to provide certain distribution services at flat rates), rather than under state law.[197]

196 For example, changing the definition of "distribution system" to allow distributors to provide off-grid supply is likely to affect distributors' connection obligations under chapter 5A of the NER (Electricity connection for retail customers). Specifically, this change could mean that moving a customer from grid supply to off-grid supply would be a "connection alteration" under clause 5A.A.1, and that once off-grid supply has been established, it would constitute a "connection" for the purposes of chapter 5A. This may mean that an off-grid customer would not be able to request a further connection to the national grid. The appropriate policy positions regarding negotiations on such connection alterations require further consideration. In addition, terms such as "connection point" may need to be revised to accommodate off-grid supply and the restrictions referred to in section 4.4.3.

197 The Australian Energy Market Agreement provides for a range of functions, including distribution economic regulation and distributor connection service obligations, to be "National Distribution and Retail Regulatory Functions".

Abbreviations and defined terms

AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ATA	Alternative Technology Association
COAG	Council of Australian Governments
Commission	Australian Energy Market Commission
consultation paper	The consultation paper on the rule change request that was published by the Commission on 14 June 2017
EMC Lendlease	Energy Made Clean / Lendlease joint venture
EMTPT	Energy Market Transformation Project Team of the COAG Energy Council
ENA	Energy Networks Australia
individual power system	A power system that supplies electricity to an individual customer and that is not physically connected to the national grid
MCE	Ministerial Council on Energy, now known as the COAG Energy Council
microgrid	A power system that supplies electricity to multiple customers and that is not physically connected to the national grid, but excluding local electricity systems in the Northern Territory, as defined in the *National Electricity (Northern Territory) (National Uniform Legislation) Act* 2015 and other forms of isolated networks deemed to be a distribution system and/or distribution service under jurisdictional instruments
NEL	National Electricity Law
NER	National Electricity Rules
NERL	National Energy Retail Law
NERR	National Energy Retail Rules
off-grid supply	The supply of electricity to end-use customers (consumers) via individual power systems or microgrids, including all services involved in providing and maintaining those systems
PIAC	Public Interest Advocacy Centre
proposed rule	The change to the definition of "distribution service" in the NER, proposed by Western Power on page 15 of the rule change request
Ring-Fencing Guideline	AER's Ring-Fencing Guideline - Electricity Distribution, November 2016
rule change request	The rule change request submitted to the Commission by Western Power titled *Removing barriers to efficient network investment*, dated September 2016

SAIDI	System average interruption duration index, a measure of reliability
SAIFI	System average interruption frequency index, a measure of reliability
SAPN	SA Power Networks

A Summary of other issues raised in submissions

This appendix sets out the issues raised in the first round of consultation on this rule change request and the Commission's response to each issue. If an issue raised in a submission has been discussed in the main body of this document, it has not been included in this table.

Stakeholder	Issue	Commission response
Costs and benefits of transitioning to off-grid supply		
AGL, p. 5	Notes Western Power's description of the costs and benefits of transitioning from grid supply to off-grid supply. While these figures present positively against the costs associated with grid supply, AGL does not believe that they present an accurate picture of the full benefits that could be gained if the provisions of off-grid supply were subjected to the rigour of the contestable market. AGL is confident that the competitive delivery of these services would result in better price and service outcomes for consumers.	The Commission agrees that the competitive supply of off-grid solutions could lead to lower costs than the regulated supply of these services, where competition is feasible. Nonetheless, the Commission notes that the competitive supply of these services is not always feasible, particularly for customers with an existing grid connection, for the reasons set out in section 3.4.
The need for distributor-led initiatives for off-grid supply		
EMC Lendlease, pp. 2- 3	Due to the trust barrier and commercial barriers associated with Government and cross-subsidies, there may need to be a transition stage for distributors to initially deliver and manage off-grid supply until the contestable market is fully established.	The Commission agrees that in areas where competition has not yet emerged for the provision of these services, the AER may need to regulate these services. Where uniform tariff policies apply and a distributor can cross-subsidise these services, the Commission does not consider that anyone except a distributor would be able to provide these services at a price that is comparable to the price of the subsidised grid supplied services. This would be the case for a period that is not just transitional. See section 3.4.
Endeavour Energy p. 3	Distributor-led solutions would be required to overcome the incentive issue (discussed in section 3.4 of this draft determination). Allowing distributors to fund off-grid solutions (by applying a cross-subsidy) would greatly increase the likelihood that edge-of grid customers would consent to these solutions (as off-grid solutions could then be provided on	The Commission agrees.

Stakeholder	Issue	Commission response
	comparable terms to grid-supplied energy).	
Cotton Australia/ NSW Irrigators' Council/ QLD Farmers' Federation, p. 2	The stakeholders support solutions that provide non-capital network services, but believe that these options can be achieved through reforms to the existing payment structure for the demand management innovation allowance and demand management incentive scheme (DMIS and DMIA). However, this outcome can only be realised if the DMIS and DMIA are amended such that they provide adequate incentives for the networks to pursue non-capital network services.	DMIS and DMIA would not apply in respect of off-grid supply currently, as those programs relate to inputs into distribution services, and supply by means of off-grid assets would be unlikely to be a distribution service. These programs could potentially play a role in incentivising distributors to look at off-grid options if the NER are amended to include off-grid supply as a distribution service. Reforms to DMIS and DMIA are beyond the scope of this rule change request.
Appropriate forms of regulation for off-grid supply		
SAPN/ CitiPower/ Powercor, p. 4	If off-grid supply (as an input or a service) forms a standard control service, the Commission noted in the consultation paper that off-grid supply would be provided by distributors 'as a vertically integrated monopoly'. The stakeholders disagree because there would be competition for off-grid customers, and the stakeholders are not seeking to be the customers' retailer.	The Commission considers that while distributors should be able to provide off-grid supply to customers (after consumer protections have been introduced), distributors should not be permitted to purchase individual power systems as part of capital expenditure. The Commission agrees there should remain a role for a retailer. See section 4.4.
EMC Lendlease, pp. 2- 3	EMC Lendlease considers that off-grid supply should not be considered a natural monopoly, as the relevant technology is available in the market and is not characterised by high cost.	The Commission shares these concerns and does not consider that off-grid solutions are natural monopolies.
AER attachment pp. 2, 3, 17, 21	The AER supports detailed consideration of all possible ownership models, and notes the significant scope for competitive provision of both grid-connected and completely isolated energy systems. The AER supports the COAG Energy Council fully testing the proposition that distributors are the natural or default entity to be providing off-grid services. The AER has a range of tools available to regulate energy sellers, from	As set out in chapter 4, the Commission considers that there is need for a distributor-led initiative in relation to the provision of off-grid supply in specific circumstances. The Commission agrees that there are a variety of different regulatory regimes that may be suitable in relation to off-grid supply in varying circumstances.

Stakeholder	Issue	Commission response
	retailer authorisations through to deemed exemptions. Any level of regulation should be proportionate to the level of protection energy customers need, and the specific circumstances of the energy sale. The AER has a preference for a light-handed regulatory framework to apply where the regulation of microgrids is determined to be necessary. The design of this regime might draw on aspects of the embedded networks model. However, care will be required to find a model that allows a balance to be struck between flexibility and complexity.	
AGL, p. 4; Cotton Australia/ NSW Irrigators' Council/ QLD Farmers' Federation, p. 5	AGL considers that distributors operating under the NER should comply with the Ring-fencing Guidelines where they seek to provide off-grid supply. The industry stakeholders seek clarification on the interaction between the rule change request and the Ring-Fencing Guidelines.	As supply by means of off-grid assets is currently unlikely to be a 'distribution service' under the NER, if a distributor wanted to provide such off-grid supply it would have to do so by way of a separate legal entity in accordance with the Ring-Fencing Guidelines. Distributors are unlikely to do so, as they would be unable to cross-subsidise the provision of these services between regional and rural customers, and they would therefore have to offer the service at a cost higher than the cost that customers currently pay for grid-supplied services. Customers would be unlikely to take up these services at this cost. See section 3.5.
Energy Queensland, p. 3	Considers that the issue of whether regulation is required or the type of regulation that may be required needs to be explored further. In this regard, it is critical to not stifle an emerging market with over-regulation or inappropriate regulation, particularly where there may be demonstrated benefits to customers.	The Commission considers that regulation of distributor-led off-grid supply is required for the reasons set out in chapter 4. The Commission agrees that inappropriate regulation may be problematic.
Energy Queensland, p. 5	Considers that existing regulatory arrangements for these systems should be grandfathered and not included in the scope of this rule change as there is no evidence to suggest that there is a failure under this framework.	Because the Commission has not made a draft rule, the Commission has not provided any recommendations on specific transitional arrangements.
Cotton Australia/	There is considerable uncertainty as to how the operations and regulatory framework may need to change to accommodate these new technologies.	The Commission acknowledges these concerns. The Commission has decided not to make a draft rule.

Stakeholder	Issue	Commission response
NSW Irrigators' Council/ QLD Farmers' Federation, p. 3	The Commission should consider the issue of consumer protection. The Commission should be cautious about introducing significant amendments to the NER prior to there being clarity regarding avenues to transition to a more modern electricity grid.	
Requirements for the successful operation of the proposed rule change		
Essential Energy, p. 2.	The degree of success of the rule change may be dependent on interoperability between different State laws. This will require further investigation at the Federal and State level to ensure that the proposed Rule change can be implemented to the benefit of all involved. Given the nature of these potential complexities, Essential Energy requests that the Commission host a roundtable with the relevant distributors and ENA to discuss and agree the most appropriate path forward for the proposed rule change.	While the Commission is not making a draft rule, it agrees with Essential Energy's comment that the success of any future regime or any rule change may depend on the interoperability of different State laws.
Appropriate definitions of individual power systems and microgrids		
Energy Queensland, p. 6	Considers that distinct definitions of what constitutes the various types of off-grid supply in the market is required. This would avoid any inherent ambiguity that would otherwise exist, by allowing industry to have a common understanding of the respective configurations and the essential demarcation of being able to interconnect with the national grid.	The Commission agrees that consistent definitions would be useful. The working definitions of 'off-grid supply', 'microgrid' and 'individual power system' used by the Commission for the purposes of this draft determination are set out following chapter 4. These definitions turn on whether there is a physical connection to the national grid (whether or not it is always energised), as this is currently the requirement for the NER, NERL and NERR to apply.
The appropriate classification of off-grid supply if captured by the NER		
SAPN/ CitiPower/ Powercor,	Do not believe that off-grid supply is a service as characterised by the Commission, but rather, is correctly characterised as an input to a service. The relevant service is a distribution service, which has been and will	The Commission considers that off-grid assets are inputs to the provision of a service, but that service would be unlikely to be a 'distribution service' under the current definition of that term. If that

Stakeholder	Issue	Commission response
pp. 3, 4	continue to be classified as a standard control service.	term or the term 'distribution system' are amended to include supply by means of off-grid assets, off-grid assets could be included as inputs into distribution services classified as standard control services.
Disconnection and customer consent under the NERL		
PIAC, p. 4	In relation to the definition of disconnection, if the distributor is providing the individual power system as a regulated service in lieu of a traditional grid connection, then the individual power system should be considered part of the distribution system. This will make clear that the customer is still subject to the protections under the NERL as they were while still grid-supplied, and that the distributor can recover the efficient costs of providing this service. This also makes clear under the NERL that the distributor and/or retailer must obtain the explicit informed consent of the customer.	Even if the NEL and NER are amended to allow off-grid supply to be considered part of the distribution system, this would not affect the restriction in the Acts adopting the NERL in NSW, South Australia and Tasmania that restrict NERL protections to grid-connected customers. See Appendix B. Explicit informed consent and disconnection issues are discussed in section 3.5.3 and section 4.4.2.
Risk of customer installing own system		
Energy Queensland, p. 7	Consideration as to customer choice and needs must be catered for while balancing the investment risk of a distributor or market provider. If, for example, a customer is supplied with an off-grid system, either regulated or unregulated, and remains on regulated retail tariffs, the customer may still have a driver to install their own individual power system to reduce their energy costs. In this situation, the energy supply for a site may be duplicated on both the demand side from the customers' direct investment and the network side from distributor investment in off-grid supply. If this were to occur without any co-ordination or consideration, the capital investment may be duplicated and the regulated assets pose a stranding risk. However, the distributor-provided off-grid system would be unable to be decommissioned due to the regulated nature of the connection and the requirement to provide a minimum supply standard as the customer needs change.	The Commission acknowledges that this is a possibility but does not consider that it is likely to occur often in practice, provided that the off-grid supply provided to a customer meets the customer's needs.

B Reliability requirements and consumer protections in the context of off-grid supply

B.1 Reliability requirements for off-grid supply

B.1.1 Jurisdictional reliability requirements

State and territory governments set the level of reliability that must be provided by transmission and distribution networks. In most Australian states and territories, entities seeking to provide distribution services (defined in different ways in different jurisdictional instruments) are required to obtain distribution licenses. Reliability requirements may be included as licence conditions, often in the form of a requirement to pay customers specified amounts if defined standards are not met. Alternatively, reliability requirements may be set out in the state energy code or regulations.

Whether these reliability requirements apply to any off-grid systems a distributor operates depends on the language and definitions in the licence or the regulation. In many cases these documents were not drafted with off-grid supply in mind.

Some examples of jurisdictional reliability requirements for distributors, and how they might apply in the context of off-grid supply, are discussed below.

Queensland

The Electricity Distribution Network Code provides reliability standards for 'isolated feeders' which would include microgrids. These standards apply to entities holding distribution authorities; in practice, only Ergon Energy is listed as having isolated feeders.[198]

New South Wales

The reliability and performance conditions for distributors' licences specify interruption duration and frequency standards for metropolitan and non-metropolitan customers, which could potentially apply to off-grid customers supplied by distributors. There are also overall reliability standards and individual feeder standards, but these are unlikely to apply to off-grid supply given the definition of 'feeder' that is used.[199]

Victoria

The Electricity Distribution Code defines 'distribution system' in a way that could potentially include microgrids. Distributors are required to publish reliability targets

198 Electricity Distribution Network Code (first edition) s. 2.3.9.

199 Reliability and Performance Licence Conditions for Electricity Distributors, commencing 1 July 2014, available at: https://www.ipart.nsw.gov.au/files/sharedassets/website/trimholdingbay/electricity_-_regulatory_instruments_-_dnsp_conditions_14_-_19_-_july_2014.pdf (see schedules 2, 3 and 5); Ausgrid distributor licence 28 November 2016, available at: https://www.ipart.nsw.gov.au/files/sharedassets/website/shared-files/licensing-administrative-electricity-network-operations-proposed-new-licence-conditions/ausgrid-ministerial-licence-conditions-1-december-2016.pdf.

and to make payments to customers for sustained interruptions, including customers supplied by 'short rural feeders' (which could include microgrid customers).[200]

Tasmania

The Tasmanian Electricity Code specifies reliability performance standards for various categories of communities, including low density rural.[201] These standards apply to 'distribution network service providers', meaning a person who owns, controls or operates a distribution network which is connected to another transmission or distribution system,[202] and refer to interruptions on such an interconnected system. It appears that these requirements would not apply to off-grid supply, which would not be an interconnected system.

B.1.2 Reliability performance targets set by the AER

Certain performance targets, including in relation to reliability, are set by the AER as part of the service target performance incentive scheme for distributors. This scheme is stated to apply to the distribution services that are classified as standard control services.[203]

If the NER are changed so that off-grid supply becomes a distribution service, the targets in the performance incentive scheme would apply to off-grid supply only if this service was classified as a standard control service.[204]

B.1.3 Reliability standard under the NER

The NER provide for a reliability standard to be established, which indicates the expected proportion of energy demand that is at risk of not being supplied to consumers, termed 'unserved energy', in a region in a given financial year. This is currently set at 0.002 per cent in all regions.[205] It applies only to the level of reliability provided in the national electricity market by electricity generators and the interconnectors between states.

The reliability standard is not a regulatory or performance standard that is 'enforced'. Rather it is a planning standard which national electricity market planning processes associated with generators and interconnectors must seek to satisfy. It indicates to the market the required level of supply to meet demand on a regional basis.

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200 Electricity Distribution Code (version 9, December 2015), ss. 5.1, 5.2, 6.3.

201 Tasmanian Electricity Code s. 8.6.11.

202 Tasmanian Electricity Code chapter 14, Glossary.

203 The Electricity distribution network service providers - Service target performance incentive scheme (November 2009) was established pursuant to Rule 6.6.2 and is available on the AER website, www.aer.gov.au. The AER is currently reviewing this scheme and consulting on the development of a Distribution Reliability Measures Guideline (AER reference 60666).

204 Section 2.1(a) of the Electricity distribution network service providers - Service target performance incentive scheme (November 2009).

205 Rule 3.9.3C. This setting is currently under review as part of the Reliability Panel's Reliability Standard and Settings Review. More information is available on the Commission website under project code REL0064.

As this standard relates to reliability provided in the national electricity market, it does not currently cover the reliability of off-grid supply, as generators in individual power systems or microgrids are (by definition) not connected to, and cannot sell to, the national electricity market. Customers who move from grid supply to off-grid supply would therefore no longer receive the benefit of the reliability standard.

However, the reliability standard may provide a useful yardstick when an off-grid system is established otherwise than through the initiative of individual customers, for example, if distributors consider that it is efficient to move off-grid in a certain area,[206] or when property developers choose off-grid supply rather than establishing a grid connection to a new development. It may be possible for new rules, regulations or standards to require that in determining the appropriate size and configuration of off-grid generation and storage equipment, expected unserved energy should be no more than the reliability standard. (Customers choosing to go off-grid may wish to make their own trade-off between the level of service sought and the cost incurred to provide that level of service, the trade-off at the heart of the reliability standard.)

B.1.4 System security under the NER

Power system security refers to the safe scheduling, operation and control of the power system (the national grid together with generation) on a continuous basis, within defined technical limits, even if there is an incident such as the loss of a major transmission line or large generator. It deals with the technical parameters of the power system such as voltage, frequency, the rate at which these might change and the ability of the system to withstand faults.[207]

Because the security requirements in the NER apply to the national grid, they do not currently apply to off-grid supply. In relation to microgrids, appropriate security settings will need to be determined in each case, and are likely to be very different from those developed for the national grid. In relation to individual power systems, the concept of system security appears to be less relevant.

B.2 Application of NERL and NERR to off-grid supply

The NERL and the NERR currently apply in the Australian Capital Territory, Tasmania, South Australia, New South Wales and Queensland. In certain of those jurisdictions the NERL and NERR apply to off-grid supply; in other jurisdictions they do not.

206 Noting that, under the current NERR, a distributor cannot move a customer off-grid unless the customer requests disconnection – see section 3.5.3.

207 Chapter 4 of the NER addresses power system security. System security market frameworks are currently under review; see project code EPR0053 on the Commission website.

B.2.1 Jurisdictions in which NERL is restricted to grid supply

In Tasmania, South Australia and New South Wales, the Acts adopting the NERL specify that the NERL applies only in relation to the sale (and supply, in Tasmania) of electricity:[208]

> "to customers whose premises are connected, or are to be connected, to the interconnected national electricity system within the meaning of the NEL."

Thus, in those states the NERL and NERR would not apply to the sale or supply of electricity to customers via off-grid supply, even if the NER are changed to include off-grid supply as a distribution service. A customer who moves from grid supply to off-grid supply would lose the protections in the NERL and NERR. However, off-grid customers would still be covered by general laws such as the Australian Consumer Law and any applicable state laws.

B.2.2 Jurisdictions in which NERL is not restricted to grid supply

Queensland and the Australian Capital Territory do not appear to restrict the application of the NERL and NERR to grid-connected customers.

In those jurisdictions, the NERL and NERR would apply to off-grid supply. However, an entity selling electricity via off-grid supply in those jurisdictions may be eligible for an exemption from the requirement for retailer authorisation under the NERL.[209] Exempt sellers still have to comply with a range of conditions relating to the exempt selling, which can be tailored to the circumstances, but the regulatory requirements are lower than for authorised retailers.[210]

In Queensland and the Australian Capital Territory, therefore, the protections that apply to customers who move from grid supply to off-grid supply would depend on whether the entity selling electricity to them is authorised or exempt, and if exempt, on which conditions the AER has imposed.

B.2.3 Victoria

Victoria, which has not adopted the NERL, has a number of energy codes (including the Energy Retail Code) which contain provisions similar to the NERL.[211] It does not

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208 *National Energy Retail Law (South Australia) Act* 2011 (SA) s16; *National Energy Retail Law (Adoption) Act* 2012 (NSW) Schedule 1, s11 and *National Energy Retail Law (NSW) No.37a*, s3A; *National Energy Retail Law (Tasmania) Act* 2012 (Tas) s17.

209 See Part 5, Division 6 of the NERL, Part 9 of the NERR, and the AER (Retail) Exempt Selling Guideline, version 4, March 2016. Depending on the circumstances of the off-grid supply, an individual exemption may be required as the supply may not meet the criteria for the deemed or registrable exemptions.

210 Conditions that may be imposed by the AER include conditions relating to an obligation to supply, pricing restrictions, billing and payment arrangements, information provision, disconnection and reconnection, choice of retailer, concessions and rebates, dispute resolution, and arrangements for life support customers. The core exemption conditions are set out in Appendix A-2 to the Exempt Selling Guideline.

211 Other codes containing consumer protections include the Electricity Customer Transfer Code, Electricity Customer Metering Code, and the Code of Conduct for Marketing Retail Energy. The

appear that the application of these codes is restricted to grid-connected customers. In the Energy Retail Code, "customer" is defined as a customer of a retailer licensed under state law. If an off-grid customer does not have a contract with a licensed retailer, the protections of the Energy Retail Code and the related codes may not apply (unless the provider has an exemption containing conditions requiring the entity to comply with certain codes).

codes are available at:
http://www.esc.vic.gov.au/energy/regulation-legislation/codes-guidelines/codes/.

C Legal requirements under the NEL

This appendix sets out the relevant legal requirements under the NEL for the Commission to make this draft rule determination.

C.1 Draft rule determination

In accordance with section 99 of the NEL the Commission has made this draft rule determination in relation to the rule proposed by Western Power.

The Commission has determined not to make a draft rule.

The Commission's reasons for making this draft rule determination are set out in chapter 2.

C.2 Commission's considerations

In assessing the rule change request the Commission considered:

- its powers under the NEL to make the proposed rule;
- the rule change request;
- submissions received during first round consultation; and
- the Commission's analysis as to the ways in which the proposed rule will or is likely to, contribute to the national electricity objective.

There is no relevant Ministerial Council on Energy (MCE) statement of policy principles for this rule change request.[212]

C.3 Power to make a rule

Section 2.2 describes the limitations on the Commission's power to make a rule in respect of the rule change request.

C.4 Application in the Northern Territory

From 1 July 2016, the NER, as amended from time to time, apply in the Northern Territory, subject to derogations set out in regulations made under the Northern Territory legislation adopting the NEL (referred to here as the NT Act).[213]

The NT Act provides for an expanded definition of the national electricity system in the context of the application of the national electricity objective to rules made in respect of the Northern Territory, as well as providing the Commission with the ability to make a

212 Under s. 33 of the NEL the Commission must have regard to any relevant MCE statement of policy principles in making a rule. The MCE is referenced in the Commission's governing legislation and is a legally enduring body comprising the Federal, State and Territory Ministers responsible for Energy. On 1 July 2011 the MCE was amalgamated with the Ministerial Council on Mineral and Petroleum Resources. The amalgamated council is now called the COAG Energy Council.

213 NT Act: *National Electricity (Northern Territory) (National Uniform Legislation) Act* 2015. Regulations: National Electricity (Northern Territory) (National Uniform Legislation) (Modifications) Regulations.

differential rule that varies in its terms between the national electricity system and the Northern Territory's local electricity system.

The Commission has determined not to make a draft rule and, consequently, has not made a differential rule in respect of the Northern Territory.