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COAG Energy Council Secretariat
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By email: energycouncil@environment.gov.au

Dear COAG Energy Council Secretariat

Consultation paper on stand-alone energy systems

The Australian Energy Market Commission (AEMC) welcomes the opportunity to make a submission to the COAG Energy Council's consultation on the regulatory arrangements for stand-alone energy systems. The Commission considers this is an important and timely review of these arrangements.

There are currently gaps in the regulatory framework regarding stand-alone energy systems. These gaps primarily relate to the fact that the supply of electricity to customers via stand-alone energy systems is largely excluded from the national regulatory framework, in relation to both economic regulation and consumer protections. This could restrict the efficient uptake of stand-alone energy systems and result in detriments to consumers through higher prices and lower reliability and safety of electricity supply.

It is likely that these detriments will grow over time if they are not addressed. This is because the decreasing costs of distributed energy resources provide significant opportunities for increased efficiency of electricity supply through stand-alone energy systems. The gaps in the current arrangements are likely to restrict these efficiencies from being realised.

The AEMC proposes officials develop a consumer protection and economic regulatory framework to allow the efficient uptake, investment in, and supply and use of stand-alone energy systems. This could occur under either state or national regulatory arrangements or a combination of the two.

Importantly, such a framework would not result in regulation of all stand-alone energy systems. Instead, it would allow for assessment of the market characteristics of the services being provided to consumers and then determination of the appropriate form (if any) of economic regulation, reliability, safety and consumer protection requirements for each stand-alone energy system.

The attached submission organises the issues relating to stand-alone energy systems into four key questions and provides information on each of these questions:

1. What models of supply should this consultation focus on?
2. Why are changes to the regulatory framework for stand-alone energy systems important?
3. What principles should guide the development of a consistent regulatory framework for stand-alone energy systems?
4. What are the key questions that need to be answered to develop a regulatory framework for stand-alone energy systems?

The Commission has been undertaking research into these areas internally and are happy to provide further analysis of stand-alone energy systems and welcome the opportunity to assist the Energy Council in ongoing assessment of these issues.

If you have any questions or require further information please contact Richard Owens, Senior Director, at richard.owens@aemc.gov.au or on (02) 8296 7810.

Yours sincerely

A handwritten signature in cursive script that reads "Anne Pearson".

Anne Pearson
Chief Executive

Att: AEMC submission on stand-alone energy system consultation paper

Attachment

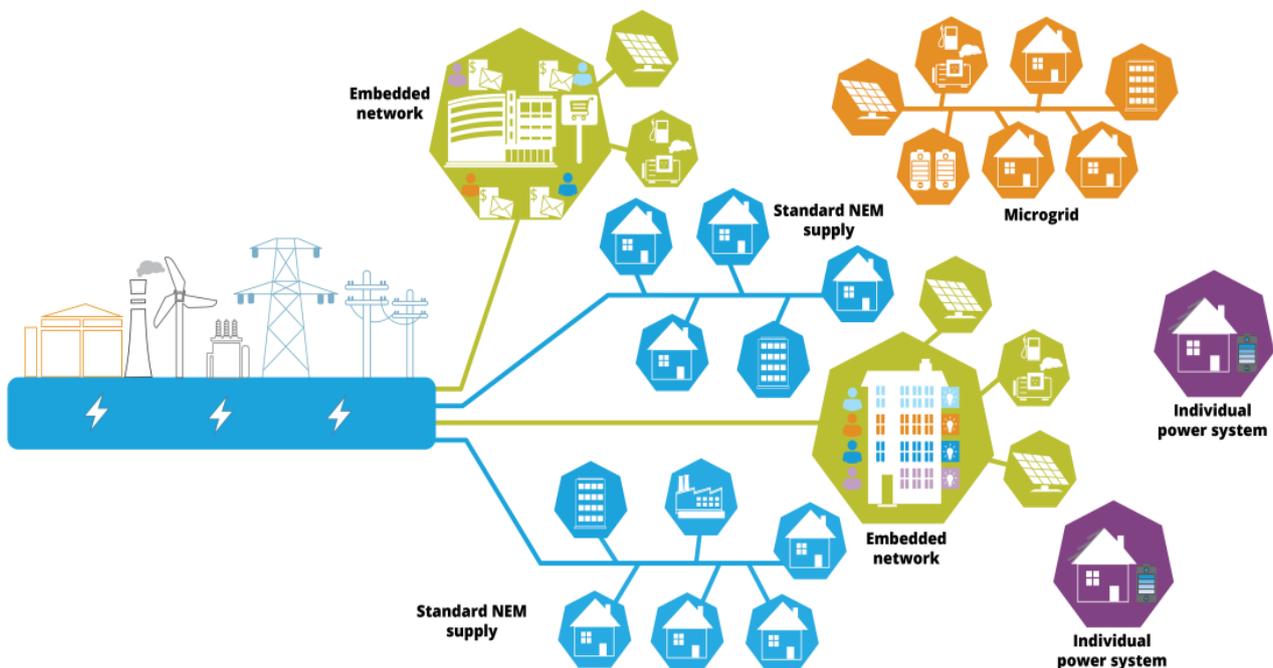
AEMC submission on stand-alone energy system consultation paper

1. What models of supply should the consultation process focus on?

It is important to clearly delineate the types of systems that this consultation process will address. Rather than focusing on a technical definition of 'stand-alone energy system', the Commission considers that it would be helpful to take a step back and look at the four core models that currently exist for the supply of electricity to consumers:

- **Standard supply through the National Electricity Market (NEM).** This is the conventional supply model where electricity is supplied through the 'national grid'.
- **Embedded network.** This is where the premises are physically connected to the NEM, but the local section of the network is owned and operated by a party that is not the registered Local Network Service Provider (LNSP).
- **Microgrid.** Under this model, multiple customers are connected to a grid, but that grid is not physically connected to the NEM.
- **Individual Power System (IPS).** An individual customer which is not connected to the NEM and is supplied by on-site generation.

The characteristics of these models of supply are discussed in more detail in the following sections.



Standard NEM supply

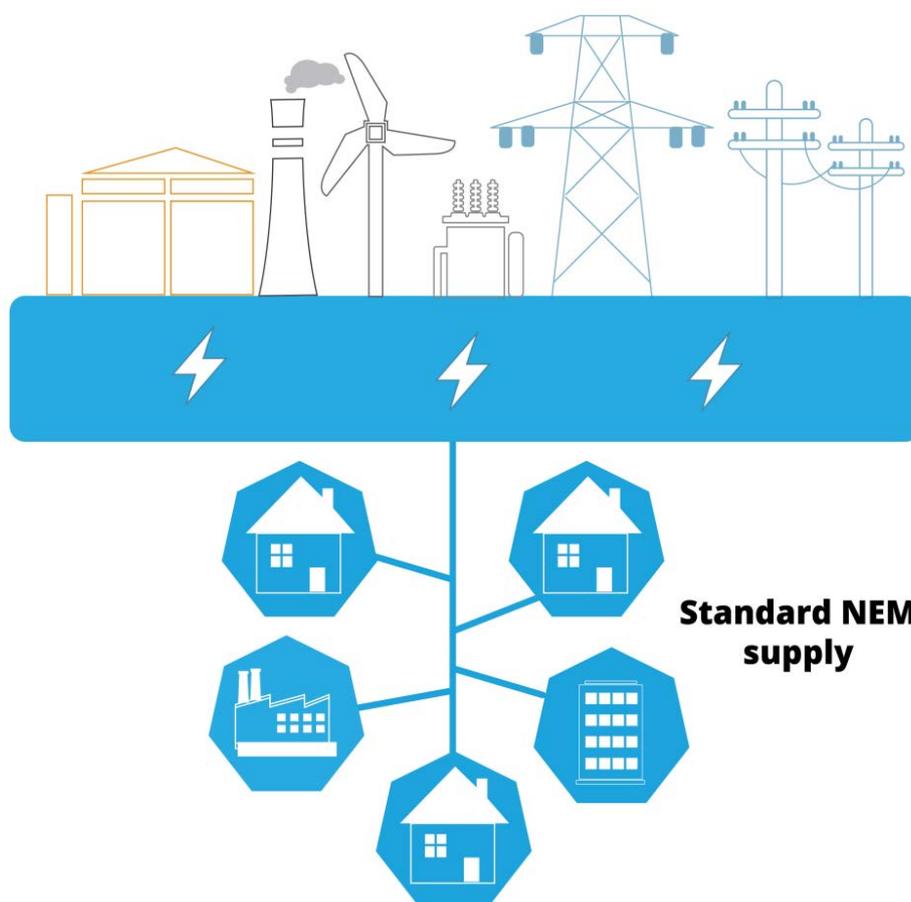
This is the traditional supply model for the vast majority of electricity consumers in NEM jurisdictions. In this model, a combination of large and small generators supply energy which is transported through interconnected transmission and distribution networks to consumers across the eastern seaboard.

Market structures

Competitive wholesale and retail markets allow for competition between providers and consumer choice. Regulated network businesses supply the monopoly network infrastructure.

Regulation

Generators, network service providers and retailers are regulated under the National Electricity Law and Rules, and the National Energy Retail Law and Rules (together, the National Framework).



Embedded network

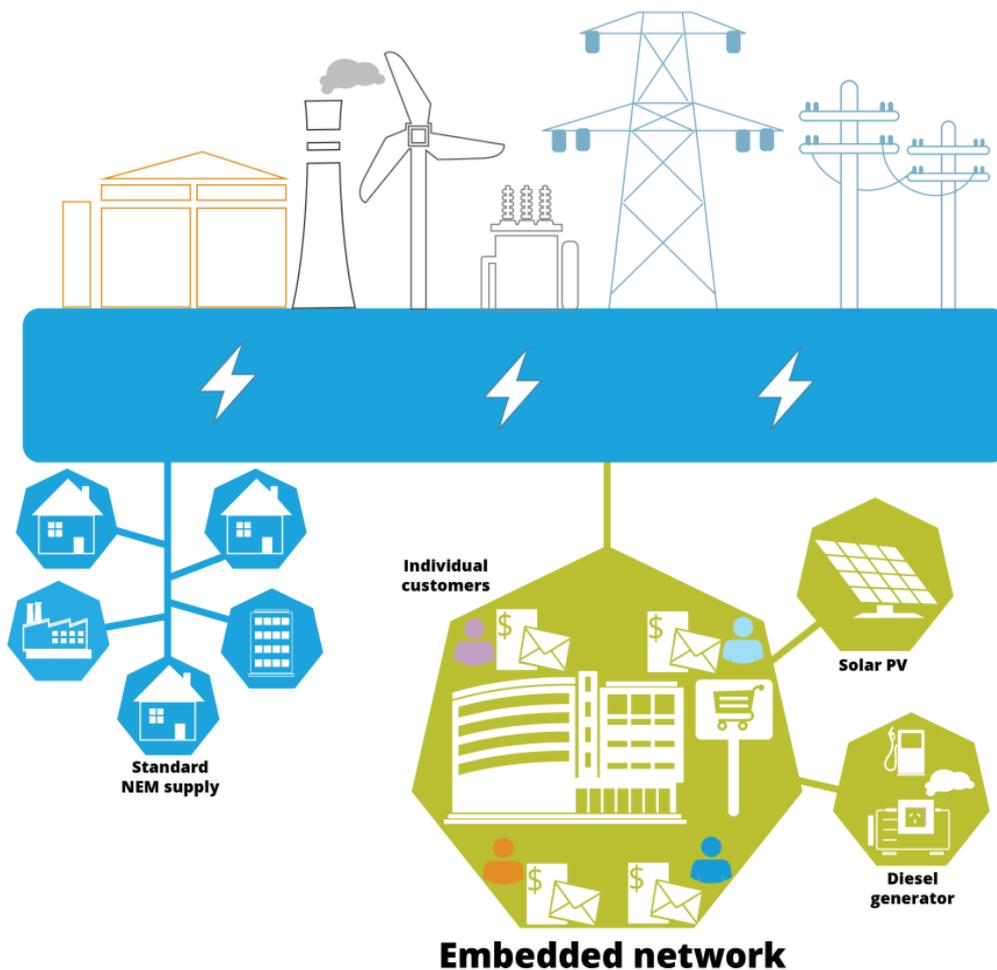
Embedded networks have the same physical characteristics as NEM supply. The key difference is that a party other than the registered local network service provider owns and operates the local area of the network that connects to customers. This party is known as an embedded network operator and is usually the embedded network customers' retailer as well. Embedded networks are regulated under the National Framework.

Market structures

The embedded network operator becomes the natural monopoly network provider of the local section of the network. In some jurisdictions the embedded network operator is a monopoly retailer, and in others it is possible for customers to choose an offer from an authorised NEM retailer.

Examples

Shopping centres, retirement villages, apartment complexes and caravan parks. The ownership models and drivers for their creation are diverse. Embedded networks may occur as greenfield or brownfield developments.



Microgrid

A microgrid is any connection of multiple customers 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. This definition should exclude those microgrids that will be treated as if they are connected to the NEM if their jurisdiction adopts the National Framework (i.e. in NT and WA).

Market structures

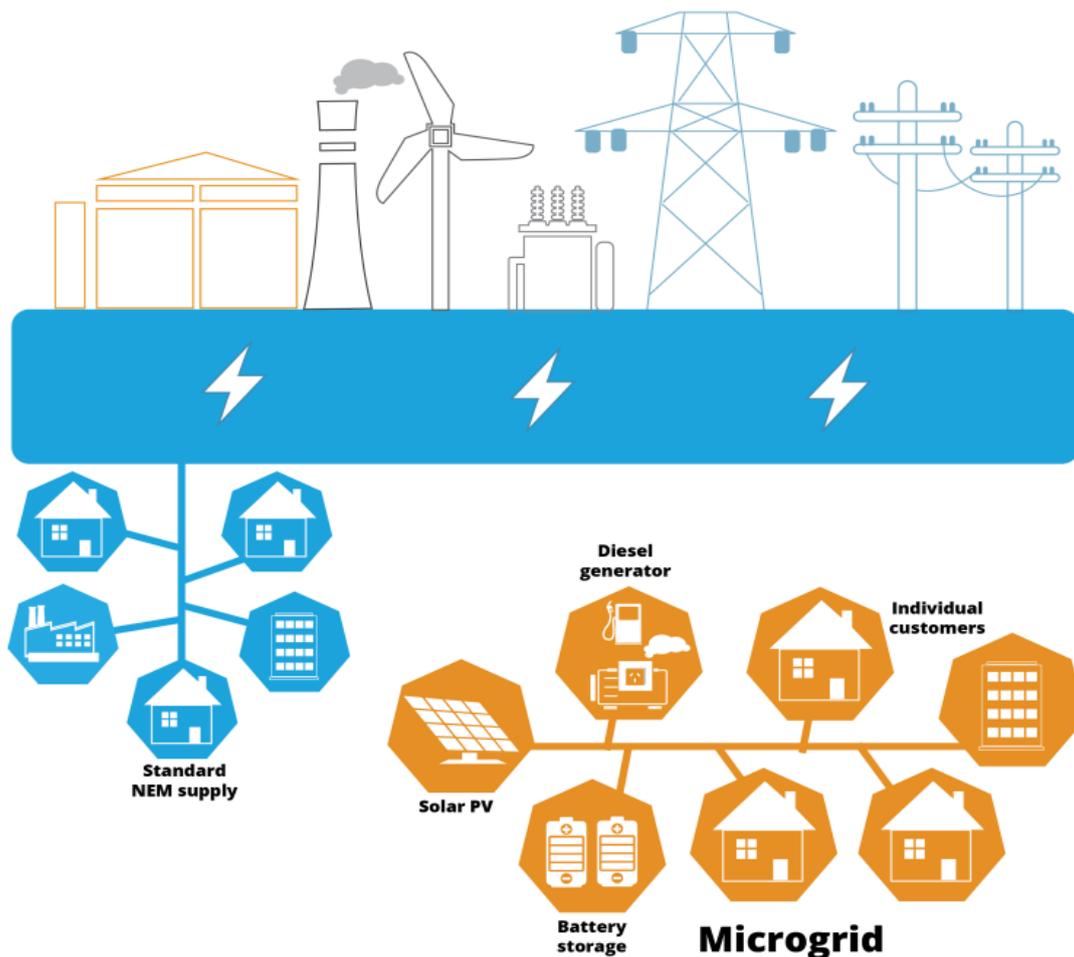
Market structures are quite variable, depending on the scale and complexity of the microgrid.

Regulation

Microgrids are not regulated under the National Framework as they are not connected to the NEM – except for certain microgrids in QLD (see p16). State laws and the Australian Consumer Law apply. Some existing microgrids have site-specific regulation.

Examples

Microgrids take many forms. Remote Indigenous communities, island resorts and mining towns are often supplied by microgrids.



Individual power system (IPS)

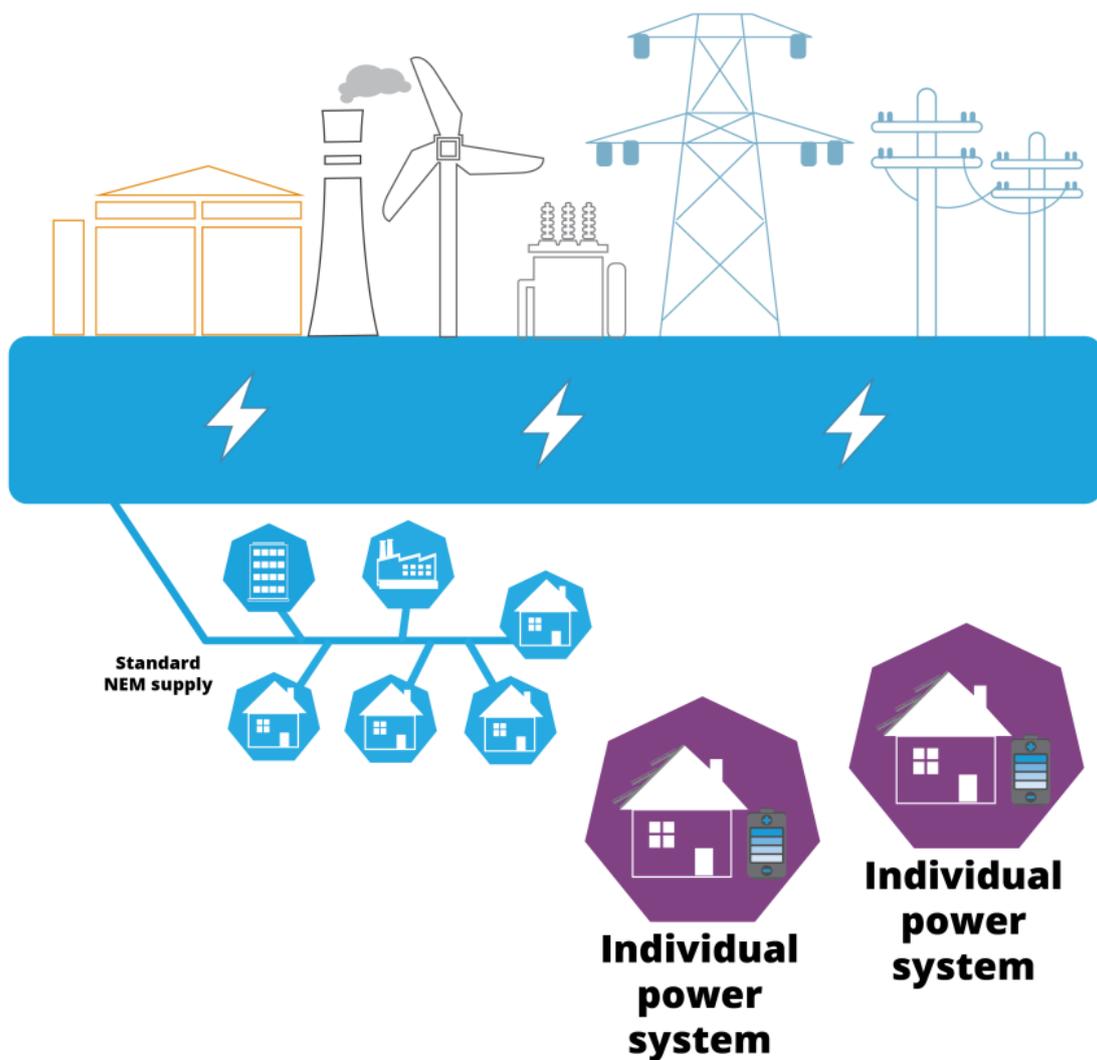
An IPS is an individual customer with its own supply sources, not connected to the national electricity system or a microgrid. Typically, it includes a combination of solar PV, energy storage and a back-up diesel generator. This model of supply is becoming more competitive with grid supplied electricity in a larger number of fringe of grid areas as the costs of solar PV and batteries decline.

Market structures

IPS may be provided by a network operator as a vertically integrated monopoly, on a trial basis (eg in WA), or chosen by customers as a contestable service.

Regulation

IPS are not regulated under the National Framework. They are subject to state regulation and Australian Consumer Law.



What models of supply should be considered?

Microgrids and IPS do not currently fall under the National Framework and should therefore be the core focus of this consultation process.

The consultation paper suggests that there may not be a need to focus on IPS (p5) because where customers choose to go “off-grid”, economic regulation will not be required. However, it is important to note that in some cases, the decision may be made by the LNSP, not the customer, and economic regulation may be appropriate.

The Commission does not propose that existing microgrids or IPS necessarily be brought under the National Framework. These would continue to be regulated under state law unless a state government chose to transition them to the new framework.

It is also important that changes between forms of supply (particularly moves from NEM-connected to a microgrid) are covered by regulation. This is a key area and should be in scope. These issues are addressed in more detail on pages 9 and 15-16.

Models already covered under current framework

The standard NEM supply and embedded network models are already captured under the National Framework and therefore do not need to be included as part of the consultation process.

The issue of “thin connections” for embedded networks has also been raised. This is where there is enough embedded generation within an embedded network to supply all of the customers and therefore the embedded network can, at times, operate in islanded mode. These situations already fall under the National Framework (as long as some form of physical connection remains) and therefore should not be considered in this consultation process. Where changes to the regulation of embedded networks are desired, they can be made through the normal rule change process.

2. Why are changes to the regulation of stand-alone energy systems important?

Benefits of stand-alone energy systems: Price

The consultation paper sets out the benefits available from allowing the most efficient option to be chosen to supply customers in each case. The Commission supports these views.

Some stakeholders have provided estimates of the benefits if microgrids and IPS were able to be utilised:

- Western Power estimates that allowing it to supply customers in remote areas of its grid with IPS instead of replacing ageing parts of its network would save approximately \$500m over the next ten years. (Rule change request, 9/9/16.)
- Oakley Greenwood report for Energy Supply Association of Australia (January 2015) notes that it is difficult to assess potential savings, but using very conservative parameters, savings start at \$50m for Queensland alone.

Benefits of stand-alone energy systems: Reliability and safety

This is not only an issue of network cost and prices. It also relates to safety and reliability. Many areas in which microgrids and IPS 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.

Long lines through the bush may also result in an increased risk of bushfires. The use of microgrids and IPS in these areas may increase reliability and reduce bushfire risk.

The combination of financial savings and potential for improved reliability and safety make it urgent to consider how best to support and regulate microgrids and IPS.

Current barriers to the use of microgrids/IPS

Currently there are barriers in the National Framework, as well as jurisdictional regulations, that restrict NEM-connected customers from being supplied by microgrids/IPS.

Key barriers created by the current framework include:

- the National Framework not addressing these types of supply;
- state laws regarding consumer protections, reliability and other key issues not being comprehensive or consistent; and
- a lack of formal arrangements for transferring from the National Framework to alternative, state-based frameworks (even where state frameworks exist).

These barriers will be discussed further in the latter part of this section.

Case study: Western Power rule change request

The Commission recently received a rule change request from Western Power proposing amendments to the National Electricity Rules (NER) to allow DNSPs to supply customers with IPS instead of undertaking network replacement expenditure. The Commission has not yet commenced this rule change process.

It may be possible to bring some elements of stand-alone systems under the National Framework through changes to the NER, such as those proposed by Western Power. However, it would be more effective to address microgrid/IPS issues through a package of reforms to the relevant parts of the National Framework and jurisdictional legislation.

Current barrier 1: National Framework does not address microgrids and IPS

Definitions are centered on connection to the NEM

The National Electricity Law (NEL) and the NER were designed on the understanding that generators, transmission systems and distribution systems are connected to each other, forming the NEM. Key definitions reflecting this approach include:

- **Interconnected national electricity system (NEL)** – refers to interconnected systems as defined in NER
- **National Electricity Objective (NEL)** – refers to interconnected systems
- **Distribution system (NER)** – refers to connected systems
- **Transmission system (NER)** – refers to connected systems
- **National grid (NER)** – refers to connected systems

Implications

The definitions above have implications on how the National Framework is applied in relation to microgrids/IPS.

The NEL and NER would not apply to microgrids or IPS unless definitions were amended.

The National Energy Retail Law (NERL) and National Energy Retail Rules (NERR) would also not apply to microgrids and IPS as they adopt some definitions from the NEL and NER, including “distribution system.”

Impact of state laws on the coverage of microgrids or IPS in the NEL and NER

Some jurisdictions, through state legislation, have extended the coverage of parts of the NEL and the NER to nominated systems that are not connected to the national system.

In Queensland, there is an option in the NEL for states to nominate specified systems to which certain parts of the NER will apply, despite a lack of connection. Only Queensland has used this option so far, in relation to certain microgrids operated by Ergon Energy. However, this provision relates only to connection services, retail support obligations and credit support obligations. Also, it may be cumbersome to amend state regulations every time a new microgrid is sought to be included.

The Northern Territory's NEL Application Act covers three non-connected distribution networks. The NT has made amendments to the definition of ‘distribution system’ and introduced a new term ‘local distribution system’ to ensure the NEL applies to the three largest networks in the NT electricity system, but not to remote microgrids.

Impact of state laws on the coverage of microgrids or IPS in the NERL and NERR

The adopting legislation for the NERL in NSW, South Australia and Tasmania specifies that the NERL applies only in relation to the sale of electricity “to customers whose premises are connected, or are to be connected, to the interconnected national electricity system within the meaning of the NEL.” Therefore, in those states the NERL and NERR would not apply to the sale of electricity to customers of microgrids or IPS.

In Queensland, the National Energy Consumer Framework (NECF) would apply to microgrids and IPS as the adopting legislation does not limit the application of the NERL.

In Victoria, the provisions equivalent to the NERL – the Victorian Energy Retail Code – do not appear to have this limitation, and would apply to customers of microgrids.

Current barrier 2: Incomplete coverage and inconsistencies in state laws

Current state approaches to the regulation of microgrids/IPS vary based on geographical and historical factors. Some states have relatively comprehensive systems in place, and others do not.

Most states have licensing and exemption regimes, under which a microgrid operator could apply for generation, distribution and retail licenses or exemptions, or in some cases an integrated license or exemption. License conditions and the conditions for exemptions vary from state to state.

Pricing provisions also vary. Some states have uniform pricing that would apply to microgrid customers as well as NEM customers. In other states it is unclear whether any pricing provisions would apply to microgrid customers.

All states have safety provisions, but in many cases the application of the provisions depends on whether the electrical installation is connected to the NEM, or whether the operator is licensed or exempt.

Only Queensland clearly sets out reliability standards for microgrids (although other states may include reliability standards in license conditions).

Even within a state, not all microgrids are treated in the same way. Some (e.g. Lord Howe Island in NSW) have their own legislation; others are regulated only by general laws.

Note: These comments are drawn from a detailed internal research report we have prepared on state laws applying to microgrids. We can provide a copy on request.

Current barrier 3: No linking or transitional arrangements – Kangaroo Island example

States do not have regulatory measures in place to address transitions from NEM to microgrids.

There are gaps in legislation in all states relating to asset ownership and the rights of generators and distributors if their assets are islanded as part of a microgrid, consumer protections, as well as consumer rights in relation to reconnection into the NEM.

At present, these are live issues in the Kangaroo Island regulatory investment test for distribution (RIT-D).

SA Power Networks has recently sought proposals to address the projected distribution network limitation on Kangaroo Island, seeking non-network options as an alternative to replacing the existing submarine cable supplying Kangaroo Island (as its life expectancy of 30 years approaches). Several parties have proposed that one option that should be considered is the island running as a microgrid.

The possible transition of Kangaroo Island to a microgrid also raises hypothetical questions in relation to compensation for other asset owners who relied on connection to the NEM for their previous investment decisions. For example, local generators might lose income from providing ancillary services and electricity to the NEM, if the area becomes a microgrid. Retailers may also lose customers, if the distributor becomes an integrated monopoly provider to the microgrid.

Furthermore, changing to a microgrid would result in a shift from the NERL consumer protections to the local SA consumer protections. Customers may not understand the implications, and there are no consent provisions.

3. What principles should guide our thinking?

Why are principles needed?

As highlighted in the consultation paper, there is likely to be significant variation of scale, scope and service providers involved in the provision of electricity services through microgrids and IPS. This is because these systems may range from IPS, to microgrids with as few as two customers, to microgrids with thousands of customers.

Under such circumstances, where regulation is required, a principle-based approach is likely to be necessary. This approach provides the regulator the flexibility to determine both the type of economic regulation (if any) and the regulations that apply, with reference to standing principles.

Which principles should be applied for economic regulation?

The existing objectives and principles in the NEL for NEM connected customers provide a basis on which principles for the economic regulation of microgrids and IPS could be developed.

This could include the National Electricity Objective as the overarching objective, and also some of the key subordinate principles within the NEL. These are set out below.

National Electricity Objective (NEO)

The NEO is to:

“promote efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity with respect to (a) price, quality, safety, reliability, and security of supply of electricity; and (b) the reliability, safety and security of the national electricity system.”

Subordinate principles

Form of regulation factors. These provide principles for determining what type of economic regulation is necessary for each type of service. We provide examples of how similar principles could apply to all services related to microgrids and IPS on page 14.

Revenue and pricing principles. These provide guidance for the economic regulation of natural monopoly service providers. These could form the basis for economic regulation of monopoly service providers that are providing services for microgrids and IPS that are classified as monopoly services.

The AER’s exemptions framework and ESCOSA’s license framework. These provide the flexibility for those regulators to determine arrangements to suit the full spectrum of embedded networks and microgrids.

Consumer protections

The Commission’s submission to the consumer protections consultation paper provides our views regarding consumer protections for customers whose electricity supply is not provided through the interconnected system. In that submission, the Commission notes that:

- A coordinated approach to consumer protections is needed for all new forms of electricity supply and new energy products and services. Consumer protections for stand-alone energy systems should therefore not be developed in isolation.
- Many of the issues relating to stand-alone energy systems will be the same as or similar to issues arising under NEM-connected supply models, but stand-alone energy systems will also raise some additional issues.

Safety and reliability

Safety and reliability for microgrid and IPS customers can continue to be addressed in state legislation and under state licensing arrangements.

However, while state arrangements can continue to govern these areas, a degree of harmonisation between states would potentially allow for increased competition by reducing barriers to some providers competing across jurisdictions.

4. What are the key questions that need to be addressed?

The consultation paper sets out a range of questions in relation to the regulation of stand-alone energy systems. It raises issues relating to a range of scenarios, business models, scale and scope of service provision, existing supply models, and drivers for change.

This submission does not seek to answer each question or provide a comprehensive regulatory framework. Rather, it suggests principles and existing processes which could form a basis for developing regulatory frameworks to address each question.

This submission breaks the issues down into three key questions.

Key questions

1. How should a regulatory framework that allows for the selection of the supply model be designed? What framework would apply to:
 - Network service providers (NSPs) making such choices?
 - Customers and communities making such choices?
 - Third parties (eg developers) making such choices?
2. What regulatory framework applies to each supply model?
 - What form of regulation applies to generation, network and retail service provision?
 - What specific regulation applies within each form of regulation?
3. What transitional measures are required to allow for smooth changes from one model to another?
 - Is customer consent required?
 - How are current asset values and entitlements dealt with for generators, NSPs and retailers?

Choosing a supply model: Network-driven microgrid or IPS

Some elements of the NEL and NER may be useful

Many elements of the NEL and NER regarding selecting the method of efficient supply of electricity services could be readily extended to include microgrids and IPS as electricity supply models.

For example, NSPs are currently required to undertake a regulatory investment test (RIT) if they are proposing to invest money above a materiality threshold. The RITs require NSPs to undertake cost-benefit tests of each solution to address the need driving the investment. Under the RIT, if microgrids and IPS were brought within the NEL and NER, an NSP could assess the full benefits and costs of microgrids and IPS compared to the available interconnected system solutions.

Other core elements of the network planning framework could also provide opportunities for the efficient uptake of microgrids and IPS. For example, through the regulatory determination process and annual planning reports NSPs publish considerable information which allows for scrutiny and for other parties to suggest lower cost options.

Other issues to be considered

- The RITs, annual planning reports and the AER's assessment powers would need to be extended to include a wider range of costs and benefits. For example, how valuable is access to choice of retail supplier in the NEM? What are the costs to generators within an area that becomes a microgrid and therefore loses access to the wholesale market?
- There is currently a rule change request before the Commission proposing to extend the RIT to replacement expenditure. If made, this change would likely facilitate microgrids and IPS being selected as they often become the lowest cost supply model when network assets in fringe of grid areas are due for replacement.
- While NSPs may necessarily be involved in the assessment of the efficient supply model, this does not mean that they would be the supplier of either a microgrid or IPS. For example, once a supply model is selected, these systems, or some of the services provided by them, may be able to be opened up to contestable service provision.

Choosing a supply model: Community or consumer driven microgrid or IPS

IPS – brownfield or greenfield

The Commission supports the position in the consultation paper that where a customer chooses to disconnect from the interconnected system and purchase an IPS there is unlikely to be a need for economic regulation.

Similarly, if a new customer chooses to be supplied from an IPS rather than being connected to the interconnected system there is unlikely to be a need for economic regulation.

The Commission's submission to the consumer protections issues paper highlights that there may still be a need for some specific consumer protections in these circumstances.

Microgrid – brownfield or greenfield

As a principle, similar to individual customers choosing to be supplied via an IPS, communities or groups of customers should be able to select to be supplied through microgrids instead of through the interconnected system.

Choosing a supply model: Third party driven microgrids

When neither the consumer nor the network operator is choosing the supply model

In the case of a greenfield microgrid, the party making the decision whether to connect to the interconnected system or run a microgrid may be the developer of the area. Alternatively, the owner or operator of an existing embedded network (e.g. a shopping centre) may choose to disconnect from the interconnected system to run as a microgrid.

This raises a number of issues because these third parties' interests may not align with consumers' interests and third parties are not subject to the same incentive frameworks as NSPs. For example:

- The developer may not want to pay the cost of connecting to the interconnected system even if over the long run the cost of standard NEM supply would be substantially lower than the cost of operating a microgrid.
- The developer may see a microgrid as a source of additional revenue through being the monopoly long term provider of electricity services or selling this role to another party.

Potential principles

The misalignment of interests between third party suppliers and consumers may necessitate consideration of requirements on third parties prior to creating microgrids. For example:

- Brownfields microgrids – Consideration should be given to whether the third party may need to gain explicit informed consent of all of the existing customers before connection to the NEM is removed.
- Greenfields microgrids – The third party may need to inform consumers considering joining the microgrid of the conditions of electricity supply (i.e. no access to competitive retail markets).

Regulatory frameworks for each supply model: Using the existing framework in the NEL and NER

In determining regulatory frameworks for microgrids and IPS, the processes and principles in the NEL and NER that apply to similar decisions for distribution network services for NEM connected customers are a useful reference.

Such a framework would not result in all stand-alone energy systems receiving full revenue or price regulation. Rather, the framework would allow the regulator to assess the services being provided to consumers and determine the appropriate form (if any) of economic regulation for each stand-alone energy system.

Process

The process for the economic regulation of DNSP's network services occurs through two stages.

1. Classification of services

Through the framework and approach process the AER analyses and classifies the distribution services to be provided in the upcoming regulatory period by the DNSP.

The AER has four different classifications available to it, each of which results in fundamentally different forms of economic regulation.

Importantly, the available options include the full spectrum of economic regulation, from none, to a negotiating framework to full revenue/price regulation.

2. Revenue determination

Once services are classified and the form of economic regulation has been determined, the AER implements economic regulation through specific regulations in the distribution determination process.

For services classified as direct control services this involves determining revenues or price levels for the services over the regulatory control period.

Principles

The NEL sets out guiding principles for determining both the form of economic regulation and the specific regulation of each service. For example:

- The form of regulation factors in the NEL provide guidance to the AER in undertaking its service classification approach.
- The revenue and pricing principles guide the Commission's development of rules for the specific regulation of distribution services by the AER.

Regulatory frameworks for each supply model: Other frameworks

There are several other existing regulatory frameworks which may prove useful in developing regulatory frameworks for microgrids and IPS. For example:

- The AER regulates embedded network service providers through its network and retail exemption frameworks.
- ESCOSA regulates microgrid providers through its generation, network and retail licensing frameworks.

These frameworks are particularly relevant to the regulation of microgrids and IPS because they share many of the same characteristics. For example, the frameworks need to accommodate regulation of the full supply chain, from generation through to retail services. They also need to provide for regulation of many different service providers, business models and scales of operation.

Under these frameworks the regulators are given high level principles to guide their approach but are then able to determine the specific processes, form of regulation and regulations that will apply to service providers in each case.

ESCOSA framework: An example

In considering an electricity license application (generation, network or retail), ESCOSA must have as its primary objective the protection of the long term interests of consumers with respect to the price, quality and reliability of electricity supply. ESCOSA is also required to have regard to the need to:

- promote competitive and fair market conduct;
- prevent misuse of monopoly or market power;
- facilitate entry into relevant markets;
- promote economic efficiency;
- ensure consumers benefit from competition and efficiency;
- facilitate maintenance of the financial viability of regulated industries and the incentive for long-term investment; and
- promote consistency in regulation with other jurisdictions.

Transitional arrangements

There are likely to be many transitional issues in moving between different supply models which need to be addressed. While it is not possible to cover each of these issues in this submission, we consider two issues are of most significance:

- Community and consumer engagement and acceptance
- Treatment of existing assets, rights and entitlements

Community and consumer engagement and acceptance

In scenarios where the change to a microgrid or IPS is not driven by the community or consumer, the most significant issue is whether community or consumer consent is required to make a change and the arrangements for engaging with the community or consumer about making such a change.

For example, should an NSP have the right to supply a consumer with electricity via an IPS instead of through the interconnected network (without needing to obtain consent) if the reliability is similar or better and the costs are significantly lower?

How are existing assets, rights and entitlements treated?

There are several issues regarding the treatment of existing assets, rights and entitlements that should be considered, including the following:

- *NSPs*: How are NSPs' regulated asset bases treated when the form of supply changes the provision of network services?
- *Retail customers*: How are retailers' contracts with customers treated when the customers cease to be NEM connected?
- *Wholesale arrangements*: How are generators' assets treated if they are no longer able to bid into the wholesale market because their generator is now within a microgrid?