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Ms J.J Shaw, MLA
Chair, Economics and Industry
Standing Committee
Parliament House
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Dear Ms Shaw

Submission to Inquiry into Electricity Microgrids and SPS in Western Australia

Please find below Sunrise Energy Group's submission to the Inquiry into electricity microgrids and SPS in Western Australia.

Microgrids

Microgrids is a frequently used term. As a business, we use the term Microgrid where it is:

1. A series of connected electricity loads via a network
2. A network or network component that has a clearly defined boundary, most typically in the form of an electrical connection point or points
3. The existence of some controls which have the ability to control generation and consumption of power within the microgrid (these controls can be used occasionally right through to constantly)
4. Purpose – A microgrid needs to exist for a reason

Microgrids will typically have distributed generation (located within the microgrid) and most likely will have energy storage now or in the future.

We believe there are 4 types of Microgrids emerging in Western Australia. These are described below along with our views on their potential for broad adoption and application in Western Australia.

1. *Isolated Networks*

Isolated Networks have existed for many years in WA. Horizon Power currently has around 40 isolated systems it maintains. These are Microgrids, and exist to supply reliable and cost effective electricity to all customers connected to the isolated network.

Historically as these networks have been supported by one source of generation (typically diesel or gas) there was little to be gained from introducing controls around consumption. The aim was around running the generation as optimally as possible.

But with the ability to now cost effectively add different sources of generation, and in particular solar PV, then there is a far greater opportunity to reduce costs by changing consumption behaviour. Solar PV, properly sized and configured for an isolated network, along with some battery storage, and retaining the existing diesel generation capability, will be more cost effective than just diesel alone. And these Microgrids, if they can change their consumption behaviour and introduce energy efficiency measures (in particular around the night time load), could achieve levels of renewable generation that exceed 70% of their total consumption profile. The more remote the location, the greater the financial savings, as diesel transportation is reduced, along with the frequency of maintenance visits and extend the life of the existing diesel generators substantially.

Depending on the size and location of the isolated network, wind turbines can also be a viable generation source and the generation diversification is essential in off grid systems to minimise overall costs.

The renewable solutions for isolated networks currently with gas generation are not as financially attractive today, especially if this is gas via a pipeline. However, the cost of solar PV and battery storage will continue to fall and at some point these solutions will be economic.

In many regards these isolated networks are the easiest ones to advance, and Horizon Power are certainly making progress. Given Horizon Power is the retailer, network provider and generator (or purchases generation output via long term agreements) then it is able to proceed with projects with no material barriers to overcome.

But these isolated networks are limited in nature. They certainly can provide good “test” environments for technology solutions and help prove the remote concept for other large off grid loads such as mines, but the tyranny of distance makes them less appealing and commercially challenging as test environments. And in the context of a broader global application are a niche solution as they are not a “network within a network” where the greatest potential exists globally.

2. *Emergency Microgrids*

Emergency Microgrids are a new concept in WA, although the existence of diesel generators in Ravensthorpe for a few years now was the earliest deployment.

These Microgrids are only operational in certain circumstances. Those circumstances revolve around loss of connection to the main network. The current examples include Perenjori, where the town has a large battery that provides power to the town if the town loses connection to the main network. Kalbarri has also been recently announced and will operate on a similar basis.

These Emergency Microgrids are installed by the Network Provider. Their purpose is to address poor reliability for the customers in these locations, typically on radial networks. The driver is the performance standards set in the regulatory arrangements for the Network Provider.

In our opinion, the number of microgrids that solely exist for Emergency purposes will be quite small. The cost of energy storage solely for this purpose is very high. The existence of energy storage as part of a Community Energy Microgrid, where the purpose for the microgrid is far more than just for emergencies, in our opinion, will see the Network Providers working with Community Energy Microgrids to include an emergency capability. So Emergency Microgrids can be considered transitionary in nature in a move towards Community Energy Microgrids.

3. *Community Energy Microgrids*

The term Community Energy has emerged over the last few years. The concept is around a community seeking to do something collectively in energy for a community purpose or purposes. These purposes can be wide ranging but the most common ones include:

- Generating renewable power cost effectively for the whole community (socially fair, not just for those who can afford their own system)
- Creating economic investment in renewable projects in their community (local economic stimulation)
- Being more self sufficient from an energy perspective, less reliant on the main network
- Having a high level of renewable generation and consumption across the community, to market the community as a “green” community typically for tourism purposes
- Becoming a “net exporter” of energy (typically renewable energy) from the community

Often communities are not just solving for a single purpose. In WA there are a number of Community Energy projects being pursued, and no 2 appear to be the same, although they all have increased renewable generation in the community as a core element.

The other characteristic that is common around these Community Energy projects, both in WA and across Australia, is they are predominantly rural communities.

In our opinion, Community Energy Microgrids have enormous relevance and value for WA. The sense of community in most rural towns in WA is strong. The need for local economic stimulation in these locations is critical for their long term survival. Many of these towns rely on tourism and agriculture as core drivers in the local economy, so a “green” outcome is also highly desirable.

And on the flip side, Western Power has an aging network that it needs to reconfigure over time. The majority of this reconfiguration is in the rural communities, as it evolves to a modular network configuration.

There are, though, barriers that currently prevent Community Energy from progressing. First and foremost, all customers in a rural community will be serviced by an electricity retailer (most likely Synergy). Synergy as a Government Trading Enterprise is driven by its vision and purpose. This results in Synergy procuring the most cost effective power to supply its customers across a system, it does not consider the needs of individual

communities. So a Community Energy model needs a Community Retailer who exists to achieve the vision and purpose of the community.

Having all of the customers as a single buying group is a positive step, but the load needs to be "combined" otherwise the market rules and network rules effectively ignore that the load and the generation are located next to each other. In our opinion, this is best addressed by converting the community loads from individual NMIs, in to a single master NMI, with all the existing NMIs being "sub meters" on an embedded network. This change will allow "community sized" generation such as a small solar farm, to be built and connected to the embedded network and all the members of the community benefitting directly from it. Residential customers pay around 30 cents KWh for their power. Large commercial customers (which this embedded network and Community Energy Provider would become) pay less than this, depending on load size and profile this can be as low as 12 cents KWh. This financial savings opportunity is the catalyst for economic stimulation. This will include "community sized" generation as the first wave, but will also most likely include new technologies around load control and shedding, generation diversification and energy storage. It will also include "community specific" pricing incentives, depending on the load and generation profile. These pricing incentives can create economic stimulation by introducing new demand in to the community to use "cheap" power. At a simple level this could be "free electric vehicle charging stations" at certain times to encourage increased visitation, right through to intensive farming using electricity for irrigation and pumping water to storage when "cheap".

These Community Energy Microgrids generate economic and employment opportunities for the local communities from:

- The design, engineering and construction of the distributed generation and storage solutions
- Ongoing asset operations of these solutions

Over time, we would expect that there will also be more local delivery of the embedded network services along with development and adoption of more innovative technology solutions. These solutions will enable load control/shedding and demand side management, along with improved load and generation forecasting and predictive modelling and control.

We would also expect to see additional customer engagement solutions that incentivise customers to change their short term consumption behaviour. And with the growing adoption of both stationary and mobile energy storage (a secondary use for an electric vehicle) the role of technology in these microgrids to influence customer behaviour will only grow.

The role of economic regulation is to act as competition in a monopoly environment where it does not exist. Solutions that can deliver a better commercial outcome for all customers are not going to fail any regulatory test, they will instead, once proven, bring about a change in economic regulation so they can easily occur.

Community Energy if broadly adopted potentially could cover up to 10% of customers on the SWIS. It is a concept that is limited in its application but could generate substantial value across the SWIS.

In our opinion, this is also the type of microgrid where IP, skills, technology and the like can be developed and commercialised for sale outside of WA and Australia. In the SWIS there is a great range of community sizes and locations that provide a wide range of use cases. From Albany in the south where the solar radiance is comparable to Europe, up to Kalbarri in the north where the solar radiance is more like the Middle East. And from a small community such as Lake King and Lake Grace, through to a large, mainly industrial community such as Kalgoorlie.

There is a broader opportunity around the concept of an Eco Town. This extends some of the concepts in an electricity microgrid in to other utilities such as water, waste water and gas, as well as a broader sustainability solution which can include more self sufficiency from fresh produce along with waste recycling. Eco Towns have a growing focus in developing countries, so the focus for WA should be around a potential leadership position in established towns in developed economies.

4. *Precinct Energy*

Precinct Energy is a smaller version of Community Energy. The Precinct component is typically due to shared infrastructure around a physical location. Examples of Precincts include Industrial Estates, Retirement Villages, Shopping Malls, and Large mixed used apartment blocks.

Precinct Energy is different from Community Energy in 3 ways:

- There is a homogenous set of loads
- The location is typically small geographically
- The primary focus is on lowering the cost of electricity collectively

Precinct Energy could well become the norm for all new developments, both residential and commercial, where the developer controls the development. For example, Landcorp are running a process to select the Microgrid Operator for the new Industrial Park to be built at Nambeelup.

Precinct Energy is straight forward to apply when it is a greenfield development. It is more complex to retrospectively apply this to a Precinct already established in the network. But there are significant advantages for the Network Provider in some instances in supporting this retrospective change. In areas where population growth and electricity demand has outstripped the existing infrastructure's ability to meet this demand, then Network Providers could work with parties to convert some of the area to a Precinct Energy solution with conditions focused on solving the network constraint, as a more cost effective alternative to investing in additional network infrastructure, especially when this occurs only at peak times.

For example, the current problems Western Power faces in Mandurah, could be alleviated in part through establishing some Precinct Energy solutions in the load area where in the hot summer evenings the Precinct collectively reduces the power drawn from the network, through a combination of self generation, load control/shedding and battery storage.

Given that many places in the world are adopting an "infill" strategy in their urban development planning, there is only likely to be more strain placed on established networks, creating a growing demand for Precinct Energy solutions that can work collectively to change consumption behaviour and avoid further investment in network

capacity. With the increasing adoption of electric vehicles, this will only become more advantageous to both the Precinct users and the Network Provider.

Whilst many will advocate for the adoption of these types of consumer solutions to be adopted holistically across an electricity system, it is the interplay between a microgrid and the network Provider that allows the specific network locational issues to be addressed in a more cost effective manner than a standard network augmentation. So it is the “and” conversation, broad adoption of these consumer solutions across the system and the adoption of microgrids within the network where there is an economic purpose for a coordinated and orchestrated solution.

Enables and Barriers for Microgrid Development

Western Australia has a very different market to the NEM. We have predominantly one retailer, one network provider and one market and system operator across the SWIS, with Horizon Power playing all 3 roles in isolated networks.

Conceptually it will therefore be easier and quicker to introduce change in to WA than in the NEM. But history has shown in other industries undergoing transformation that the large incumbent industry players do not introduce the new business models and solutions, rather it is the domain of small innovative organisations. This is not an ownership thing, the private sector incumbents are as unsuccessful (in some cases even more unsuccessful) at introducing these industry changes as Government owned entities. The nature of large organisations introduces heavy governance, constrained thinking and focus, unconscious bias and current business preservation. Many of these traits are human not organisational and there is no simple solution to them.

So our best enablers are potentially also our greatest barriers. In our opinion, the sensible pathway is one that looks to engage and involve the incumbent players (Synergy, Western Power, AEMO and Horizon Power) and to utilise the characteristics of small innovate organisations, with an acute focus on the solution and outcome, nimble structures and processes, an agile orientation and specialist capabilities.

In our opinion, we would also discourage the move to full retail contestability. There has been bilateral support of the Uniform Tariff Policy for many years, and there is no current plans by either side of politics to change this. The adoption of residential roof top solar in many regards has seen a shift from this policy, as 25% of households now enjoy cheaper power than the remaining 75% of households. Unfortunately, it is those that can afford to or are capable of investing in residential rooftop solar who have benefited, leaving those who can least afford to do anything with the additional network bill that has been avoided by the 25%. Full retail contestability, in our opinion, is only going to expand the divide between those that can and those that cannot. And this will be further accentuated in rural communities, which will not be the focus on retailers, who inevitably will pursue the “low hanging fruit” predominantly in the metropolitan area.

Microgrids on the other hand will introduce competition in to the parts of the network where it is most needed. Competition not in the form of a different retailer, but in the form of different solutions that will drive down the total cost of electricity supply – generation, network, retail and market costs collectively. Implemented correctly, this could allow the current subsidy within a microgrid to be “exposed” and then over time

reduced and hopefully eliminated. That will reduce power bills for everyone else who currently contributes to these areas through the Uniform Tariff arrangements.

We would also recommend the acceleration of the move to constrained access. In fact, we would suggest that once a microgrid is established that the unconstrained access rules do not apply to the embedded network. Currently too much power resides with the developer who is first in the queue, who can "project bank" for as long as they want. Western Power's ability to deviate from this is very limited, and it is using rules typically designed for centralised generation on the transmission system, to progress distributed generation applications on the distribution system. In our opinion, the retailer responsible for the Community or Precinct Microgrid ultimately has the power to choose what project can connect, as they will be the purchaser of the output. It becomes a very simple connection model. We accept that accelerating the adoption of constrained access may not be practical, so an interim model for Microgrids may be the most sensible solution in order to facilitate their adoption earlier than 2022.

Most importantly, we will need to bring the impacted communities on the microgrids journey. As a society we have reached the point where the abilities of technology are no longer the constraint on adoption, rather it is society's ability to adopt the capabilities of technology. We need to do the right things and we need to do them in the right way.

Stand Alone Power Systems

Stand Alone Power Systems (SPS) have existed for decades. In fact, most farms prior to the rural electrification programs in the 1970s and 1980s ran on an SPS.

There are many SPS operating today. They can range from a small wind turbine to power an irrigation pump, a small solar/battery/diesel solution to power a hobby farmhouse, right up to a 20 MW diesel power station to power a remote mine.

SPS are back on the agenda because the cost, performance and sustainability of renewable technology based SPS solutions are more economic than maintaining an electricity network connection. This is not a unique Western Australian issue, in fact it will be an issue in most developed economies, especially those who invested in overhead electricity networks in the 1960s through to the 1980s.

The opportunity in Western Australia is both significant and timely. Western Power has recently published some confronting statistics. 53% of Western Power's overhead distribution network serves just 3% of its customers. With an overhead distribution network containing approximately 68,000km of conductor and 775,000 poles, 53% of this supporting just 3% of its 1.1 million customers equates to 1.1Km of conductor and 12 poles on average per customer. This is not a network Western Australia can afford to replace with another network. We have to find a more economic solution than a network. With the current age of Western Power's network, the migration to a more economic solution needs to occur over the next 10 to 15 years.

We agree with Western Power that the most economically viable alternative today is deploying SPS solutions on a customer by customer basis for many of these 33,000 customers. In fact some customers connecting to the network for the first time in rural

locations are now choosing to adopt an SPS instead of connecting to the network because it is more cost effective.

For us the debate needs to move away from the what, SPS appears to be the only viable solution, and move toward the how. We commend Western Power for undertaking the trials in Ravensthorpe and for the recently announced 60 SPS units to be deployed in 2019. These are important steps in the journey towards broad adoption as an alternative to a network.

In our opinion, though, SPS should not be an asset that is on the State of Western Australia's balance sheet. The Government should look at a number of options that sees the investment in these assets occur in the private sector, including the establishment of an entire industry that can exist in Western Australia to design, build, install, operate and maintain them. This industry can support the full spectrum of SPS cases including:

- replacements for Western Power network customers,
- replacements for Horizon Power network customers,
- replacements for existing SPS customers using predominantly diesel, and
- new SPS customers who are building assets that need electricity for the first time in rural WA.

The Government will need to decide what the best mechanism is to honor the principles of the Uniform Tariff Policy for these SPS customers without constraining the solution to include a consumption meter. In our opinion there are a number of ways this can be addressed to provide fairness and transparency for both existing and new customers.

The private sector industries that could emerge to support these solutions can be categorised into 3 areas:

1. *Component sourcing and development*

If sourcing an SPS today, it is more than likely that all of the components for these units will be sourced from overseas manufacturers. For some components, such as solar panels, that is likely to remain the case. But for other components there is a case for locally based component development to occur.

The most obvious one would be lithium ion battery manufacturing. Currently a large proportion of the lithium raw materials used in batteries is mined in WA. With the commitment to down stream processing to lithium concentrate by both Tianqi and Albermarle (joint owners of the Talison Lithium Mine in Greenbushes), we are already part way there to battery manufacturing. If there was a sufficient constant demand for battery storage in the local domestic market, that could be sufficient to see some manufacturing move on shore, along with the cabinets, frames and associated equipment.

Some of the other components if built in volume could also be economically capable of being built domestically, if the volumes are sufficient. Examples could include the containers that house the equipment, or the ground mounted frames to hold the solar panels.

2. *Technology Solutions*

There is a huge potential to adopt smart technology to improve the performance and customer experience from an SPS. Just like your mobile phone does, an SPS could tell you when you reach certain remaining battery charge levels, and like your phone can prompt you to move to an energy saving configuration. But with some of the smart forecasting technologies already available, an SPS could reliably predict when it will need back up power from a diesel generator, or what consumption reduction needs to occur to avoid diesel back up. And it is possible using Artificial Intelligence technologies to learn consumption patterns, the SPS turns on the air conditioning itself before you are home, or switches off lights when there is no activity for a set period.

Western Australia has access to word class universities, technology facilities and people who could develop and commercialise these and other technologies specific to SPS. If Western Australia were to become an early adopter of SPS in significant enough volumes, we believe it could attract this technology innovation in to WA. This has the potential for export, especially if done in partnership with some of the large battery solution providers.

3. *Field installation, operations and maintenance*

There is always going to be a local field services industry when SPS is adopted anywhere at scale. For WA though, the opportunity is to make it not just a WA based industry but to move it right in to the rural communities. In our opinion, if these SPS units are designed properly, the technical skills needed to install and operate these units will be quite low, allowing much of this work to be sourced from the local community.

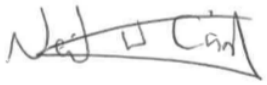
Again if WA were an early adopter at scale, then the installation and operational practices developed and established in WA from an IP perspective, could be exported to other locations, creating opportunities for Western Australians to work in other locations as SPS is adopted globally over time.

Enablers and Barriers for SPS Development

The enablers and barriers are very similar for SPS as they are for Microgrids. WA is well placed to take the lead in SPS nationally, but we believe it needs to bring together the strengths of the large incumbent organisations with the strengths of the small innovative nimble organisations to achieve real success. This is particularly the case if you want to create a large SPS industry with local manufacturing and SPS technology and IP that can be exported out of WA rather than just a domestic SPS deployment capability. Properly organised, this could be a new national and global industry led by WA based organisations.

We thank you for taking the time to read our views on Microgrids and SPS and the opportunities for WA. We would be delighted to discuss our thoughts and ideas with the committee in more detail. Should you need to contact us please email Neil Canby, Executive Director, Sunrise Energy Group at neil.canby@sunriseenergygroup.com.au.

Yours Sincerely



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