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Review of Essential System Services in the Northern Territory's Regulated Electricity Systems

1. Introduction

Jacana Energy (Jacana) welcomes the opportunity to comment on the future design of Essential System Services (ESS)¹ in the NT. The development of ESS is important to the future evolution of electricity markets in the NT and to address the growing challenge of managing more intermittent renewable generation.

Jacana particularly welcomes consideration of the services that can be provided, development of a competitive ESS market and compensation received by ESS providers. In other markets in Australia, ESS is increasingly being provided through competitive markets and alternative technologies (e.g. synchronous condensers, standalone batteries, co-located renewables and batteries, and even standalone renewable facilities) are being used to provide these services. Relying on markets to procure and dispatch ESS is likely to result in the least cost mix of technologies being deployed to provide many of these services.

In our previous submission on the "Northern Territory Electricity Market Consultation Draft Functional Specification" (29 March 2019), Jacana Energy had considered that reform proposals should aim to achieve the following objectives:

1. a more efficient electricity market;
2. greater transparency of cost allocation; and
3. a level playing field for new entrants.

The unbundling and creation of competitive ESS markets is an important element in achieving these objectives.

2. Review Framework

Jacana Energy supports the intent to make the ESS design consistent with the National Electricity Objective (NEO).

Key to achieving the NEO is that services are comprehensive and include all participants that demand or supply these services. The concern here is that most wholesale market design frameworks have typically ignored the role of the customer in causing the increased demand for ancillary services (e.g. peak solar PV output can result in minimum generation levels being violated

¹ Referred to as Ancillary Services in the NEM and other jurisdictions.

and system frequency deviations), as well as ability to increase the supply of ancillary services (e.g. battery storage can be dispatched so as to provide frequency regulation and contingency control services. While each household or business is typically too small to participate in wholesale energy and ancillary service markets, if aggregated and controlled, these premises could actively participate in both wholesale energy and ancillary service markets.

The NT has an opportunity to consider the role of distributed generation (DG), i.e. behind the meter technologies such as rooftop PV and battery storage, in ESS market design before DG penetration reaches saturation or begins to significantly impact grid stability in the regulated systems in the Territory.

In other markets, such as the Wholesale Electricity Market (WEM) in Western Australia, the impacts of more than 1GW of rooftop solar is only now being better understood and managed. This delayed response has had negative impacts on the wholesale market and for incumbent generators as result. For examples, the daily cycle of shutting down generation during peak solar output and then re-starting generation in the afternoon/evening is increasing the wear and tear on large-scale generating facilities (e.g. coal and gas), and in many instances, these generation facilities are not being compensated for these additional costs.

Consequently, Jacana Energy recommends that the Design Development Team (DDT) consider the role that distributed generation might play in providing ESS services in the future, particularly in regional grids where they can have a material impact on grid stability at much lower levels of solar PV penetration.

In addition, if DG is creating the need for increases in the amount, type and/or cost of ancillary services, then prices for these services need to be paid by customers (via retailers), which is consistent with the “user-pays” principle.

Jacana Energy is currently playing a significant role in the two-year Future Grid trial in Alice Springs, which is receiving funding from ARENA. The trial is designed to understand grid stability and the true value that exists across the whole electricity supply chain. Jacana Energy’s customers will participate in the provision of EES services to the grid with their solar and battery assets aggregated and utilised as a virtual power plant.

3. Categorisation and Definition of Services

Jacana Energy is supportive of a regulatory framework which requires the System Controller to develop and publish detailed specifications for each ESS category.

As part of this definition process, the role of network support services and the responsibility for their provision needs to be clearly defined. Jacana Energy has previously highlighted the fact that the Katherine Power Station, operated by Territory Generation, currently provides network support services. Consequently, costs associated with this station are currently paid for directly by customers through retail energy prices (which reflect wholesale energy purchase costs), rather than the network operator recovering these costs via the regulated asset base and associated network access charges. Under the current arrangements, there is no incentive for the network operator to consider how the costs of providing network support services could be reduced.

Jacana Energy recommends that minimum specifications for each category are aligned to either the National Electricity Market (NEM) or the WEM and are prescribed via a regulatory mechanism independent from the System Controller.

Jacana Energy also agrees that there does need to be some flexibility for the System Controller to procure other less-defined services as required, given the transition to renewables will evolve rapidly in the Territory given the good payback on investment for behind the meter solar PV and battery technologies², and the NT Government's 50 per cent renewable target by 2030; the latter will increase the installation of large-scale renewable energy facilities.

As an example, this requirement for flexibility could allow for other types of demand management services as well as establishing a process for behind the meter distributed generation to be called upon as an ESS supplier provided certain requirements can be met. The payback on distributed generation is likely to be reduced and uptake increased if provision is made for these types of assets to provide ESS services.

4. Service Requirements

In broad terms, the key objectives of ESS is to enable the electricity system to operate within defined technical limits, even if there is generator, network or customer outage (i.e. energy system is "secure"). Frequency and voltage control standards are focused on providing energy security.

This is different to energy reliability which aims to ensure sufficient generation, demand-side and network capacity to supply customers with the energy that they demand with a high degree of confidence. Typically reliability measures are implemented through energy or capacity market settings (e.g. minimum and maximum spot energy prices, reserve capacity targets etc.).

There are inter-relationships between the operations of energy and capacity markets and ESS provision which need to be taken into account in the design of ESS.

For example, a shorter dispatch interval in the energy market (i.e. increasing the frequency with which dispatch instructions are issued to generators) will allow energy market participants to adjust dispatch positions more swiftly to reflect physical facility limitations (e.g. minimum loading). If dispatch instructions are issued more frequently, the ability of the energy market to match supply to fluctuating demand is improved, which would lessen the requirement for frequency regulation services – that is the matching of supply and demand within the trading interval.

A move to co-optimisation of energy and ancillary services would also have an impact on the design of ESS.

It is our understanding that system standards are required to ensure that energy security is maintained in regulated networks in DKIS. Service standards are defined to enable market participants to contribute in helping to meet these system standards (e.g. 25 MW of generation must be held back as spinning reserve). This includes requirements for frequency regulation control and contingency control. Both system and service standards are required.

In relation to whether ESS standards should be applied as a regulatory instrument or in a System Controller instrument, it is our preference that the ESS standards should be established separately from System Control. ESS standards should be established by a separate organisation that considers the trade-offs between ESS costs and energy security. Once set, System Control should then be responsible for ensuring that the standards are met and made accountable when deviations in technical performance arise. These deviations could arise from the non-performance of ESS

² Simple payback on investment for rooftop solar PV in the NT is around 5 years, whereas the payback on investment for solar and battery systems combined is around 10 to 12 years.

suppliers (e.g. generators) and the network operator, or due to the failure of System Control to follow procedures.

In the WEM, the independent economic regulator, Economic Regulation Authority (ERA) undertakes reviews of ESS standards and regulations, as well as the cost of providing these services. The Utilities Commission in the NT could also undertake this independent assessment role, with appropriate resourcing.

To facilitate some level of consistency across jurisdictions Jacana Energy recommends that the Design Development Team consider an approach to system and service standards that builds on current Australian experience that aligns with either the WEM or NEM. This allows for consistency across regulatory frameworks and encourages industry participants and experienced industry players to move between jurisdictions, and maintain a level of knowledge that is consistent. This helps to reduce entry barriers and increase competition in electricity markets.

5. Service Provision Framework

Based on Australian experience it appears that particular types of ESS that are more suitable for spot market provision than others.

Frequency regulation and contingency control services in the NEM (i.e. Frequency Control Ancillary Services or FCAS) are provided via spot markets – 2 markets for regulation and 6 markets for contingency. However, Network Support and Control Ancillary Services and System Restart Ancillary Services are procured by the Australian Energy Market Operator under competitive contracts (i.e. competitive tendering arrangements).

In the WEM, only Load Following Ancillary Service (LFAS), which is equivalent to FCAS regulation in the NEM, is procured in spot markets, but all other ESS have been provided by a Government owned generator (default provider). However, the Energy Transformation Taskforce in WA has recommended that all frequency control services (i.e. LFAS, spinning reserve and load rejection reserve services) “will be acquired through a real-time market, supported by a supplementary mechanism that is triggered as required to ensure reliability and mitigate market power.”³

This indicates that frequency control services are better provided by formalised spot markets, whereas other services (e.g. system restart) are better acquired through competitive tender arrangements.

The development of spot markets in the NEM and WEM for frequency control services has been facilitated by the fact that there are competitive generators in each market. The level of competition is likely to increase in these markets as large-scale battery storage systems, demand side management aggregators (mainly frequency up services) and even renewable generators (mainly frequency down services) enter these markets.

Competition with TGEN for the provision of frequency control services will increase gradually overtime with the retirement of TGEN units and increased investment in energy storage, renewable generation and conventional generation not owned or controlled by TGEN.

This will also be the case with the provision of network support services, voltage support, inertia and system restart services. TGEN may be the only supplier in particular circumstances (e.g. system restart services in regulated networks) and in these cases, TGEN would be contracted by System

³ Energy Transformation Taskforce, Frequency Control Essential System Services: Acquisition, Cost Recovery and Governance, Information paper, August 2019, p.11.

Control or an NT Market Operator, but with oversight from an economic regulator to ensure that the service is being provided at an efficient cost level.

6. Administered Pricing Arrangements and Market Power Mitigation

Even if spot markets are established for frequency control services in regulated systems in the NT and competitive procurement markets are established for other ESSs, it is likely that TGEN will have market power in the medium term (next 5 years) and will require the development of administered pricing and/or market power mitigation measures.

TGEN's likely market power in the provision of these services should not be used as an argument for maintaining monopoly service provision arrangements. As outlined above, ancillary services can be delivered via market mechanisms. Default supplier service provision arrangements can remain in place, especially if spot market or competitive procurement arrangements (e.g. system restart services) are not successful in procuring alternative suppliers of these ancillary services.

7. Administered pricing arrangements and market power mitigation

By providing a clear definition of ESS with the costs of these services unbundled so that network users (i.e. large customers, retailers and generators) can understand the costs and develop strategies to minimise the costs incurred is an important first step in reducing future ESS costs. Enabling the competitive provision of these services is an important second step to ensure that ESS costs are efficiently delivered in the longer term. Having default supplier arrangements in place (i.e. TGEN) will ensure that services are delivered efficiently (i.e. regulated price) if there are limited alternative suppliers of services for a particular service category or in a particular regulated network.

In Jacana Energy's view, the changes to the provision of ESS in the regulated systems in the NT should include the following:

- **Frequency regulation and contingency control services** in the DKIS should be provided by competitive spot markets, similar to the NEM design, or in line with current changes in the WEM.

In other regulated systems (i.e. Tennant Creek and Alice Springs), competitive tendering arrangements should be put in place for the procurement of frequency regulation and contingency control services, with default service provision arrangements (i.e. supply by TGEN). Cost benchmarks should be established for the default service provider based on an independent assessment of the efficient costs of delivery from existing facilities. These cost benchmarks should be provided in advance of the competitive procurement process to enable bidders to understand the price that they would need to offer to be successful in the tender process.

- **The Rate of Change of Frequency Control Service (RoCoF)**, a service to restrict the rate of change of frequency in the first few hundred milliseconds after a contingency event (e.g. failure of a generator), has not been implemented in the NEM or the WEM in the past because there was sufficient inertia provided by large synchronous generation units to limit RoCoF.

As the amount of non-synchronous generation connected in regulated systems in the NT continues to increase, lower levels of inertia will become more commonplace and this poses a risk that RoCoF will increase to unsafe levels.

While some level of RoCoF control could be implemented by making adjustments to the operation of synchronous generation units owned by TGEN or by installing synchronous

condensers with high inertia, this would be difficult to do in conjunction with energy market and frequency control dispatch processes.

Strategies for limiting RoCoF include limiting the dispatch of large generation units and constraining synchronous generation following a contingency event. Some form of compensation would need to be made to these generators for not being able to be dispatched to provide energy and/or ancillary services. Some form of “constrained off” payments may need to be made to these generators for not being able to earn revenue from the energy or frequency control markets. Similarly, some generators may need to be “constrained on” to improve inertia following a contingency. A constrained off/on payment system has been in place in the WEM to help manage system security due to contingency events and could be considered for regulated systems in the NT to limit RoCoF (or alternatively increase inertia in the regulated systems).

- Where possible, competitive procurement processes should be put in place for other ancillary services. This could include the provision of the following: **network control services** (substitute for network investment), **voltage support** and **system restart services**. These competitive tendering arrangements should also include default service provision arrangements (i.e. supply by TGEN). As outlined previously, cost benchmarks should be established for the default service provider based on an independent assessment of the efficient costs of delivery from existing facilities. These cost benchmarks should be provided in advance of the competitive procurement process to enable bidders to understand the price that they would need to offer to be successful in the tender process.

8. Cost Allocation and Settlement

As outlined in the previous section, ESS need to be clearly defined and costs allocated to each service category so that network users can adequately respond to the price signals provided for each service type. For example, loads and renewable generators pay for frequency regulation services in the WEM on the basis that they cause significant deviations in frequency due to load and generation variability. Generators typically pay for frequency contingency control services since the requirement is typically caused by generator outages (i.e. frequency contingency up service).

If faced with sufficient price signals, loads and renewable generators may invest in energy storage to reduce variations in demand or generation, while generators may invest more in maintenance to avoid frequent plant outages and the liability for frequency contingency control services.

Jacana Energy supports moving towards a ‘causer pays’ model and that the price of unbundled ESS are cost-reflective in the short term. Given a portion of ESS costs are usually fixed, the fixed-cost component should be reflected when passing through these costs to customers. As such, Jacana Energy would prefer ESS charges to be passed through via a combination of fixed and variable charges. For example, voltage control costs (mainly fixed) would be passed through via fixed charges, while frequency regulation costs would typically be passed through on a variable cost basis.


9. Other Issues

As outlined previously, the governance for the definition and provision of ESS needs to be independent of System Control and the Market Operator. In other jurisdictions, economic regulators take carriage for the definition, provision and regulation of ancillary services, even if provided via competitive markets. The Utilities Commission, adequately resourced, could play a pivotal role in ensuring that ESS is delivered efficiently via competitive spot markets and competitive tendering with default service provision arrangements. An economic regulator is better placed to define both

system (and service) standards that reflect the trade-offs between system security and costs of meeting that system standard.

Please contact me if you require any further clarifications on our submission.

Yours Sincerely

A handwritten signature in black ink, appearing to read 'G. Draper', written in a cursive style.

Grant Draper
Acting Chief Executive Officer
Jacana Energy