PLANET ARK Power

Cleaner energy. Lower cost.

SUBMISSION

AEMO RENEWABLE INTEGRATION REPORT

STAGE 1

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eleXsys® Enabling Smart Grids

Recognized as
global energy transition pioneers
WORLD ENERGY COUNCIL Start Up Energy Transition Award Winner 2019

Who is Planet Ark Power?

Planet Ark Power is a leading Australian renewable energy company focused on providing comprehensive clean energy solutions that help businesses and organisations significantly reduce electricity costs and build a sustainable energy future. Our expertly engineered systems reduce businesses' grid-supplied energy and demand charges, replacing them with clean solar power, battery storage, microgrid technology and improved efficiency. Our microgrid systems enable businesses to access the benefits of exporting energy to the grid, receive revenue streams from frequency response and support network operators to improve network performance and enable a balanced transition to connecting more embedded renewable energy resources.

At our heart, we're an innovative engineering company with a remarkable depth of knowledge and experience in energy and solar power. Our team of electrical and software engineers has decades of experience in the energy industry. We take a holistic approach to energy management, focusing on the commercial and industrial sectors, educational and health organisations and government facilities.

Planet Ark Power was founded to deliver large-scale, commercial rooftop solar installations to create a cleaner, greener distributed energy future. We do this by transforming the economics of commercial rooftop solar with our technology solutions that overcome network connection/voltage concerns that have to date led to restrictions regulating zero-export of excess power.

eleXsys® was developed in collaboration with our R&D partners at Griffith and Central Queensland Universities and with the support of the Queensland Government's 'Advance Queensland - Ignite Ideas' Fund, contributing to the development and commercialisation of eleXsys® and its release to the international market. In 2019, we celebrated the launch of our revolutionary technology platform, eleXsys®, at the World Energy Congress.

Planet Ark Power is also a founding participant in the RACE for 2030 CRC consortium.

Introduction

Planet Ark Power appreciates the opportunity to respond to AEMO's Stage 1 Renewable Integration Study (RIS) Report. This report has been released at a critical time for Australia's energy DNSPs as continuing increases in DER across all networks are challenging operators to ensure safe, reliable and uninterrupted energy supplies to all consumers, while transitioning to a cleaner energy future.

For the purpose of this submission, we have deliberately embraced the term 'prosumer' to describe those energy consumers that have an interest in, and the capabilities to produce, surplus clean energy for dispatch/export into adjacent low voltage networks.

Our customer base to date is focused on the commercial and industrial (C&I) market sector, and we recognize our responsibility to also offer solutions to those responsible for ensuring the design and operation of electricity grids. Therefore, the approach we have embraced is to ensure that our technology solutions offer support to both our customers and to the networks our renewable energy customer solutions connect to.

That is why we are seeking an ongoing dialogue and consultation with AEMO as part of our response to its Stage 1 RIS Report and beyond. We also seek strategic opportunities to collaborate with AEMO, AEMC and DNSPs to demonstrate the suite of solutions our eleXsys® technology provides for the C&I and residential market sectors, and the power networks we connect our systems to.

Recommendations

Planet Ark Power is keen to identify areas of collaboration with AEMO, AEMC and DNSPs to demonstrate the suite of services of eleXsys® for both the C&I and residential market sectors.

- Planet Ark Power's technology innovation – eleXsys® enables prosumers to benefit from cheaper solar PV/storage solutions without the need for curtailment, except in emergency situations (i.e. power outages, load shedding etc.).
- eleXsys® provides an opportunity for DNSPs to ensure equitable access for all prosumers which has been a criticism of the AS4777 application in that it introduces inequities due to the curtailment approaches adopted.
- eleXsys® therefore offers a cost-effective market solution to switching multiple residential solar/battery inverter systems and can interface with network control (only one eleXsys® device per 11kV feeder is required).

Planet Ark Power would welcome opportunities to:-

- Introduce eleXsys® capabilities to the AEMO community by collaborating with AEMO and DNSPs through finalisation of RIS-1 and scoping RIS-2 including agreeing on a communications protocol that enables the receipt of an immediate signal from a DNSP network control system in the event of a system emergency event.
- Discuss with AEMO and DNSPs how we can offer "network control" services through eleXsys® to control multiple DPV inverters in the event of a system emergency.
- Outline eleXsys® specifications to demonstrate how it can meet power system security standards and how we currently work with DNSPs and EPC contractors to ensure quality DPV installations.
- Contribute to the development of any DPV generation shedding capabilities discussions and/or technical requirements deemed necessary to support the electricity system transition to renewables through to 2025 during extreme, abnormal system conditions (''back stop").
- Discuss how eleXsys® could provide a service to control a large number of DPV devices where it may be possible to utilise Planet Ark Power as an aggregator to simplify the communications and number of devices requiring emergency control for

load shedding, interoperability, communications, information protocols and cybersecurity.

- Present our IKEA eleXsys® Microgrid project and the suite of applications/services provided by eleXsys® to project stakeholders.

Expanding Prosumer Choice in a Rapidly Developing DER Marketplace

Planet Ark Power aims for all energy prosumers to have the option to embrace cheaper solar distributed photovoltaics/distributed energy resources (DPV/DER) unencumbered, unless in a network emergency.

Prosumers can benefit from DPV/DER without the risk of curtailment other than in network emergency situations – underpinning the DPV/DER investment case with no payback extensions when unexpected constraints/interruptions occur that result in a loss in revenues.

Prosumer involvement in day to day energy management should not be an assumption as they are predominantly agnostic. Typically, they look for set and forget options, wanting fair pricing for their power security-reliability – but don't all want active involvement. This is leading prosumers to pursue behind-the-meter investments to reduce energy bills, while at the same time reducing their dependence on the grid. In large numbers this creates the potential for large participant spill events.

To engage prosumers and gain their support for additional layers of complexity, the messages, technology offerings, tariffs, and market mechanisms need to be simple, provide a sense of control and demonstrate real value to customers.

It is suggested that if AEMO want to maintain large participation rates, these attributes of a product or offer need to be a part of the solution and may not necessarily include additional technology layers. If these attributes are not provided, then consumers are more likely to invest in further behind-the-meter assets (such as battery storage) to further reduce their dependence on distribution networks and increase the potential for large participant spill events.

We contend that consumers are increasingly demanding equitable access to renewables, however network topologies typically see consumers at the end of feeders or low voltage (LV) circuits being adversely affected in several ways:

- Prosumers are being required to provide reactive power (var) support to the network to smooth the voltage gradients along the feeder, even though there is currently no mechanism for them to be rewarded. For prosumers located towards the end of a feeder, their feed in tariff (FiT) revenue for total solar production is lower than prosumers with the same solar capacity at the start of the feeder , as they provide more of the network var support, which is inequitable and not yet fully understood by customers.

- If prosumers with local generation and storage are looking to participate in the future 'two-sided market' then equal access mechanisms must be ensured to provide a level playing field. This is also critical for C&I prosumers who have a greater level of capability to respond to the market.

Planet Ark Power's proven and commercially available eleXsys® technology overcomes these issues for all prosumers, providing greater DER hosting capabilities whilst ensuring network stability.

Whilst the focus of the Stage 1 RIS is one of introducing new layers of integration for PV and wind with AEMO and DNSPs, we suggest that there are other factors that need to be considered to help overcome the issues outlined in the report. For example:

- Leverage National Grid market concepts from the UK that have introduced 12 new market signals such as capacity needs for batteries to support the national electricity system - employing both short and long duration storage.
- Change tariff structures to encourage additional load during solar producing hours.
- Re-adjust load control schedules to align with solar production and act as a solar soak; and
- Enable customers to island in times of network emergencies, to provide self-sufficiency and value whilst meeting grid needs.

It is of interest that as a consequence of COVID-19, increased loads during solar hours are being experienced as more customers are working from home - however this should not provide comfort to the market. Instead, should this new-way of working continue, we believe it will accelerate the further take-up of renewables to reduce domestic energy costs for home-working, residential customers – increasing the risk of large participant spill events.

Offering a Collaborative Approach to working with DNSP-TNSP-AEMO

Responding to each of the actions included in Appendix A to the RIS.

Performance of DPV Fleet

Network Stability – bulk system disturbance requirements and autonomous grid support capability (Actions 3.1 & 3.2):

- Our aim is to demonstrate how our eleXsys® *technology* innovation, applied at customers premises and/or on power networks, can achieve 100% renewable generation at the distribution level whilst maintaining network stability. We believe our technology innovation provides an opportunity for DNSPs to provide equitable access for all prosumers which has been a criticism of the AS4777 application in that it introduces inequities due to the curtailment approaches adopted

- eleXsys® enables all prosumers to benefit from cheaper solar PV/storage solutions without the need for curtailment, except in emergency situations (i.e. power outages, load shedding etc.)
- eleXsys® is capable of riding through a system disturbance event (frequency-voltage) and capable of receiving "on-off" signals in the event of a system emergency (e.g. load shedding). eleXsys® is a 3 phase 4 wire device capable of balancing each phase and can send signals to to a portfolio of connected devices, such as other inverters on a distribution feeder.
- eleXsys® therefore offers a market solution to switching multiple residential solar/battery inverter systems and can interface with network control (only one eleXsys® device per LV network is required).
- eleXsys®, and its application has been independently supported by Aurecon and has been accepted for connection to two DNSP networks – in Queensland and South Australia
- Planet Ark Power is currently collaborating with Energy Queensland to further demonstrate the capabilities of eleXsys® applied to the LV network under pilot study and digital network trials
- We would therefore appreciate the opportunity to introduce eleXsys® capabilities by collaborating with AEMO and other DNSPs through finalisation of RIS-1 and scoping RIS-2 including agreeing on a communications protocol that enables the receipt of an immediate signal from a DNSP network control system in the event of a system emergency event

We would also like to discuss with DNSP's-AEMO how we may offer a "network control" service through eleXsys® to control multiple DPV inverters in the event of a system emergency.

Governance and Compliance

Ensure power system security and improve the technical and network connection compliance of DPV systems (Action 3.3)

- Planet Ark Power supports the setting of minimum DER technical standards to enable a successful renewable energy transition and also to the improving of compliance with technical performance standards. However, the standards need to provide equity and meet the prosumer challenges mentioned earlier.
- We welcome the opportunity of being involved in the setting of such standards and enhanced compliance regimes as RIS-1 is finalised and RIS-2 scoped.
- eleXsys® is a high specification, quality and adaptable dSTATCOM device. We would be pleased to outline its specifications to demonstrate how it can meet power system security standards and how we currently work with DNSPs and EPC contractors to ensure quality DPV installations.

Active Management Capability & Real Time Visibility

System dispatchability is decreasing due to the lack of visibility of DPV creating risks to network operation during the transition to renewables (Actions 3.4 and 3.5)

- Planet Ark Power supports prosumers only being curtailed during extreme, abnormal system conditions or events ("back stop").
- We provide islanding capability using grid-forming capabilities within eleXsys®, to provide customers with self-sufficiency during these events. These upstream transmission and distribution events are detected on the neutral in our device to automatically enact islanding.
- The principle we support is that customers' investments should not be put at risk by frequent curtailment that negatively impact on returns-on-investment and also not to introduce increased risk through the introduction of new rules/regulations that reduces the attractiveness of investing in cheaper, clean renewable electricity (DPV-DER).
- We welcome the opportunity of contributing to the discussions in the development of any DPV generation shedding capabilities and/or technical requirements deemed necessary to support the electricity system transition to renewables through to 2025 during extreme, abnormal system conditions (''back stop").
- We would appreciate the opportunity to discuss how eleXsys® could provide a service to control a large number of DPV devices where it may be possible to utilise Planet Ark Power as an aggregator to simplify the communications and number of devices requiring emergency control for load shedding, interoperability, communications, information protocols and cybersecurity.
- Planet Ark Power's projects include C&I solar (SME and large customers), *Microgrids* – solar PV and batteries (large C&I customers) together with standalone batteries. eleXsys® also has the ability to control solar PV and battery storage/load to support the shifting and increasing of demand during high DPV generation periods. We would welcome the opportunity to discuss how eleXsys® can provide real time visibility of commercial scale (>100kW) systems.

Our Flagship Project – IKEA eleXsys® Microgrid

- Planet Ark Power's flagship project- the IKEA eleXsys® Microgrid, currently under construction, involves the installation of 1.2MW rooftop solar array supported by a 3.4MWh battery at IKEA's retail outlet in Adelaide.
- The $6.6m project has been supported by the South Australian Government ($1.95m) sourced from the Grid Scale Technology Fund. The Project showcases the capability of Planet Ark Power's unique and internationally awarded eleXsys® technology platform that allows the export of energy into the grid without causing network voltage instability and without the need for network infrastructure upgrades.

- eleXsys® is to be integrated with a DERMS providing network real time visibility to SAPN
- It is our intention that this will be our standard for larger DPV and battery storage microgrid installations.
- The IKEA eleXsys® Microgrid will represent one of, if not, the largest single-site, grid connected Virtual Power Plants (VPP) in Australia.
- Planet Ark Power eleXsys® has solved the problem of DER curtailment by networks by managing network stability from behind-the-meter, guaranteeing the export of surplus clean energy and allowing much larger rooftop solar systems to be installed across commercial buildings with large rooftops. Without Planet Ark Power's unique solution, the IKEA eleXsys® Microgrid project would not be economically viable. eleXsys® enables investors to be certain of future revenue streams with the capacity to manage export and stay within the required voltage levels set by the local network operator - SAPN.
- The 1.2MW rooftop solar system will generate 1.4MWh (est.) of clean energy per annum. It is estimated 84% of energy will be consumed on-site by IKEA via a power purchase agreement with the remaining solar generation stored in the batteries for export into the local SAPN grid. IKEA enjoy a 30% reduction in energy costs, making *eleXsys®* solar power cheaper than grid power. The battery-stored energy will be sold daily to the grid to support peak demand across the SAPN grid.
- By managing voltage and guaranteeing export of surplus energy, eleXsys® provides consistent, forecastable revenue and savings over the 20-year project life.
- The IKEA eleXsys® Microgrid Project will be owned by one of Australia's largest superannuation funds through their investment vehicle, Epic Energy. Revenue generated by this project will provide positive returns for their investors over the 20-year operating term.
- By guaranteeing the ability to export energy without curtailment, Planet Ark Power's eleXsys® reduces financial risk, provides bankability and creates a brand-new asset class: eleXsys® Microgrids which are Urban Rooftop Solar Farms + VPP Batteries.
- Whilst the IKEA eleXsys® Microgrid project received generous financial support from the South Australian Government, as a result of ongoing decreases in the cost of commercial-scale batteries, the replication of IKEA-like microgrids without government subsidy is now a reality.

Conclusion

Under current arrangements, DER curtailment will only impede the transition of Australia's energy networks to a cleaner energy future. It is understandable that network operators must prioritise the safety and security of electricity infrastructure and services to provide all consumers with a consistent, reliable product. However current responses to increasing DER is resulting in higher electricity prices due to the ongoing investment in energy infrastructure upgrades to enable more DER primarily from the residential sector, to be exported into local networks.

Planet Ark Power offers a cheaper alternative by dynamically managing network stability (eg voltages) and increasing the renewable energy hosting capacity of existing network infrastructure to host much more DER than network operators currently allow. By working collaboratively with DNSPs, we are confident that more sustainable, market based innovative alternatives can be introduced to support network operators and their owners as well as AEMO, ESB and AER respond to the range of stakeholders that are looking for opportunities to invest in more clean DER and help meet our carbon emission reduction targets.

As a founding participant in the RACE for 2030 CRC, Planet Ark Power is strategically placed to offer AEMO and DNSPs rigorous, evidenced-based analysis with support from a number of respected university partners to demonstrate the capabilities of eleXsys® to meet the challenges arising from Australia's embrace of increasing renewable DER connecting to our power networks.