

**Planet Ark Power**  
**Submission**  
**to**  
**South Australia**  
**Department of Energy & Mining**  
**Consultation on Regulatory Changes**  
**for Smarter Homes**

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**CONTACT DETAILS**

**Richard Romanowski**  
Executive Director  
E: [richard@planetarkpower.com](mailto:richard@planetarkpower.com)  
P: 0412 151 601

**Stephen Robertson**  
Director Stakeholder Relations & Strategy  
E: [stephen.r@planetarkpower.com](mailto:stephen.r@planetarkpower.com)  
P: 0447 068 569

## 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 efficiencies.

Our microgrid systems enable businesses to access the benefits from the uninterrupted export of 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 domestic and international markets.

In 2019, we celebrated the launch of our unique, innovative technology platform, eleXsys®, at the World Energy Congress.

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

## Introduction

Planet Ark Power appreciates the opportunity to respond to the SA Department of Energy & Mining's five consultation papers on proposed Regulatory Changes for Smarter Homes in South Australia. Rather than respond to each consultation paper, our submission articulates our views and recommendations on particular issues raised across all five papers.

These consultation papers have been released as a result of the receipt of a technical report from AEMO confirming that, to their knowledge, South Australia is the first gigawatt scale power system in the world to approach zero operational demand due to demand now being met by increasing DER such as rooftop solar.

These consultation papers also follow AEMO's recent Renewable Integration Study (RIS) – Stage 1 Report which is considering what measures need to be taken to maintain system security in a future National Electricity Market (NEM) with a high share of renewable resources.

Planet Ark Power's submission to the Department of Energy and Mining's five consultation papers complement the response we recently submitted to AEMO's RIS – Stage 1 Report.

This submission also highlights the implications from the practical application of many of the observations and recommendations contained in this submission as part of the IKEA eleXsys® Microgrid project. This project, now underway with both the financial support from the SA Govt's Grid-Scale Renewable Energy Technology Fund and the cooperation of SAPN will create, to the best of our knowledge, Australia's largest grid-connected microgrid at IKEA's Adelaide retail outlet.

The IKEA eleXsys® Microgrid is a real world (and local) demonstration how technology solutions will continue to emerge that enable existing networks to host significantly more DER without expensive infrastructure upgrades - while also ensuring challenges such as voltage and frequency instability can be managed dynamically without negatively impacting on the quality of the electricity supply to consumers.

The challenge for network operators and regulators is to find the right balance between putting in place appropriate regulatory and operational rules and requirements whilst not stifling or suffocating the application of new technology-based solutions. These innovative, solutions, when applied following appropriate evidenced-based testing, can provide significant support to energy networks and encourage consumers to embrace cheaper solar energy and battery storage solutions (DPV/DER) unencumbered, equitably and safely.

These solutions offer alternatives to regulators and network operators adopting default positions that disconnect customers' DPV/DER systems during times of network stress. This submission highlights that technology-based alternatives are available that enable and support network transition to a cleaner, affordable DER future.

## Recommendations

### Recommendation 1.

It is recommended that the timeframe for implementing the proposed amendments to the Electricity (General) Regulations 2012 be extended to allow for more considered and deeper evaluation of the impact of such changes on the DER sector.

### Recommendation 2

That the SA Department of Energy and Mining consider new and emerging market solutions to network instability from increasing DER before introducing mandatory standards that may not be necessary where other solution are available

### Recommendation 3

That the SA Department of Energy and Mining meet with Planet Ark Power to be briefed on our perspectives and solutions including the IKEA eleXsys® Microgrid and its broader application and opportunities across the South Australian energy network before the Technical Regulator issues any final guidelines.

## Context of Planet Ark Power's Response

Planet Ark Power's business philosophy is to enable **all** customers to have the option to adopt cheaper, optimised solar electricity and battery storage solutions (DPV/DER) - unencumbered and equitably.

We believe, all customers (C&I and residential) should be able to benefit from cheaper DPV/DER electricity supply solutions without the risk of their systems being curtailed, other than in a network emergency situation. This philosophy underpins a customer's DPV/DER investment case and avoids situations of "system payback surprises" when unexpected constraints and/or interruptions occur without their knowledge or approval.

When considering any electricity market/rule change, the impact on customers' must be front and centre. Additionally, a customer's involvement and interest in day to day energy management should **not** be an underlying assumption as most are predominately agnostic regarding their electricity supply, preferring a "set and forget" approach with simple, understandable, fair pricing options for the security and reliability of their power supply.

Whilst we agree that the electricity system does need to be well managed through a safe transition to a renewable energy future, it should not do so by penalising existing DPV/DER customers, nor adversely impacting the investment case for new DPV/DER systems. This would be counterintuitive and in conflict with the achieving of our national and state based renewable energy targets – either real or implied.

We believe that there are a number of preferred, alternative market initiatives to enable the safe transition to a renewable energy future, that should be considered **before** disconnecting any customer's DPV/DER system and which should only be considered as a last resort in a system security emergency.

The following are our responses on each of the consultation papers.

## **1. Consultation on the Proposed Disconnection and Reconnection Requirements for Distributed Solar Generating Plants in South Australia**

Planet Ark Power supports the approach of customers only being curtailed or disconnected during extreme, abnormal system conditions or events (“back stop”).

Whilst we agree that the system does require a defined “minimum net demand” to operate and run the electricity network safely and securely, we also believe that there are several market initiatives need to be considered before constraint/disconnection and that can be implemented and work collectively to overcome the concerns identified in this document.

These are:

- Tariff changes to encourage more consumption during solar producing hours, which in-turn may encourage businesses to scale due to cheaper electricity prices;
- Promote all commercial solar installations to include battery storage and provide a market value stream to encourage excess solar generation to be stored and used in the evenings;
- Introduce an incentive in the market for battery storage to provide base capacity during solar hours;
- Accelerating the scheduled timing of all controlled loads so that they can be used as a solar soak;
- Enabling customers to island from the distribution network during these events so that they are not penalised from consuming energy from their retailer.

We agree with the principles of the registered agent’s role and the support of a technology neutral solution.

We are interested in applying our technology solution, eleXsys® in becoming an agent, as eleXsys® can receive a signal from a DNSP’s DMS/DERMS and remotely control multiple DPV systems whilst simultaneously managing power quality on the power system, removing the need to disconnect or constrain customers due to voltage disturbances and network voltage management. Our IKEA eleXsys® Microgrid project in Adelaide demonstrates the capabilities of eleXsys® at a large customer site that also supports the SAPN power network.

We would welcome further information on the registered agent authorisation process, commercial incentives, and technical standard before universal agreement of this proposal can take place, especially with future proposals of AS4777 emerging.

We also look forward to having the opportunity to engage further with the SA Government Department of Energy and Mining to discuss our perspectives and ideas before the Technical Regulator issues any guidelines.

We are concerned that if these matters are not considered carefully prior to implementation, the outcome would be to disincentivise customers to install new DPV/DER systems risking local jobs of DPV/DER system providers and installers, and also unfairly impacting existing customers who have already made significant investments into DPV/DER systems.

It also needs to be made clear for customers how the management, installation and funding of the proposed inverter controls are implemented. Previous customer programs such as demand management initiatives or smart meters, would have captured learnings on how to engage customers, coordinate installations and reward customers for their participation. We would advise leveraging those learnings before commencing these processes and would stress that these issues are complex, difficult and should not be underestimated.

Therefore, in considering the above matters, the implementation of this new requirement by September 2020 appears premature and we suggest that more time is needed to ensure a proper consultation process.

## **2. Consultation on the Proposed Export Limit Requirements for Distributed Solar Generating Plants in South Australia**

Planet Ark Power acknowledges the challenges in operating the power system due to the increased penetration of distributed solar generation.

However, we hold the view that there are market solutions to avoid the disconnection of customers due to voltage disturbance, network voltage management and managing minimum levels of demand (see our comments to Consultation Paper – Proposed Disconnection and Reconnection Requirements for Distributed Solar Generating Plants).

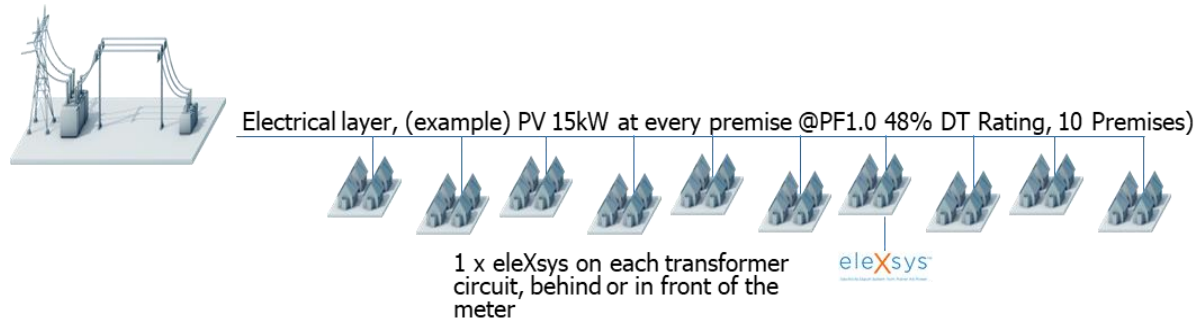
Residential and commercial-industrial customers should have the choice to take up solar generation and our view is that there are market solutions available (such as eleXsys®) that must be considered before customer disconnection. We do, however, support the approach of customers only being curtailed or disconnected during extreme, abnormal system conditions or events (“back stop”).

The recent launch of the wholesale demand response market (WDRM) could be extended for curtailing solar generation, which would leverage the same payment mechanisms, processes and procedures. The WDRM/future two-sided market should also enable residential customers to participate as it would provide the broader distribution network coverage that DNSP’s are searching for.

The introduction of dynamic limits and the transparency proposed, is generally a step in the right direction in supporting the increase in power network solar generation hosting capacity. We agree that increasing a power network’s hosting capacity is preferred to costly power system, equipment and infrastructure investments flowing through to increased electricity prices for **all** customers. Our eleXsys® technology solution is connected at a customer’s premises behind the meter thereby avoiding the need for these costly equipment and infrastructure upgrades.

We are currently collaborating with both SAPN and Energy Queensland to develop applications of eleXsys® for installation on DNSP networks to manage multiple residential customers’ solar generation systems while maintaining power network stability. We estimate that a period of 6 months of focused LV network trials of eleXsys® would be sufficient to enable DNSP’s to confirm the preferred operating model for eleXsys® at least cost for customers. In short, it is leveraging the technology capabilities currently available for commercial customers.

Desktop power factory modelling has confirmed that this is feasible and is supported by an independent analysis by Aurecon. It is now a matter of moving to live trials to enable DNSP's to authorise the use of eleXsys® on their networks, to confirm eleXsys®' functionality and to provide network visibility of embedded solar generation systems and the opportunity to explore mass control of solar PV systems connected behind the meter.



The above diagram illustrates that with a single eleXsys® unit installed on a distribution transformer LV circuit, it enables **all** customers to connect larger solar volumes whilst maintaining voltages within 6% for **all** customers on that same network. It does so equitably, so that customers at the end of the power network are not disadvantaged by being disconnected more often than customers nearer the transformer (as is currently the case through the application of AS4777.2).

Increasing the hosting capacity of a power network to host more renewable energy is Planet Ark Power's key purpose and it is why we have invested over 5 years of research and development in developing our eleXsys® technology solution.

eleXsys® provides an opportunity for a power network to host **100%** solar generation by managing voltage disturbances and maintaining voltage within statutory limits to avoid customer constraint and disconnection.

**Consequently, we do not believe it is necessary to require every new solar generating plant to be capable of being export limited by receiving signals remotely to constrain or switch off a customers' solar generation system.**

There are market solutions that are market ready that should be tested, such as our eleXsys® technology solution, before any decision is made to introduce new technology standards for solar generating plant that limits or stifles the ongoing development of innovative solutions to the challenges currently faced from ongoing investment in DPV/DER.

We would be concerned that such a change will potentially increase the costs of solar generation systems, reduce the economics of investment (through more curtailment, switching off) leading to disincentives to invest in clean, renewable solar generation and risk impacting local jobs in the solar industry sector.

### 3. Consultation on the Proposed New Low Voltage Ride-Through Requirements for Smart Inverters in South Australia

Planet Ark Power understands the concerns of AEMO and the need for inverters to be able to withstand system disturbances to maintain system security.

We maintain the philosophy that customers (residential and C&I) should only be curtailed or disconnected during extreme, abnormal system conditions or events (“back stop”).

We agree that there needs to be a technology standard to ensure that quality inverters are installed capable of withstanding system disturbances to maintain system security.

We expect that the auditing processes of DNSP’s in connecting new solar generating systems effectively police the quality of solar and inverter installations prior to commissioning.

Having stated the above, we can offer DNSP’s a technology solution, in eleXsys®, capable of safely and dynamically riding through low voltage power system disturbances. This single device would provide power flow conditioning every second of every day using the artificial intelligence (AI) capabilities on the eleXsys edge device:

- Voltage regulation
- Load and voltage balancing
- Harmonic suppression (remove degradation of transformer assets)
- Network monitoring
- Reactive power control
- Power factor correction
- Power conditioning
- Minimum and peak demand support

eleXsys® provides an opportunity for a power network to host **100%** solar generation by managing voltage disturbances and maintaining voltage within statutory limits to avoid customer constraint and disconnection. It can do so for all generation and load scenarios on an LV system within the thermal capacity of the power network.

Consequently, Planet Ark Power welcomes further discussions on how a broader application of our eleXsys® technology (beyond C&I, behind the meter solutions) could be applied to power networks to reduce the risk of large scale solar disconnections due to power system disturbances.

We suggest that implementing a new technical standard via amending the Electricity (General) Regulations 2012 from September 2020 is perhaps too soon to allow for a considered and deep evaluation of the impact of such a change on the DER sector.

We are also concerned that such a change will potentially increase the costs of solar generation systems, reduce the attractiveness of investment (more complexity for the customer to understand) leading to a disincentive to invest in clean, renewable solar generation and risk impacting local jobs in the solar industry sector.

#### **4. Consultation on the Proposed Smart Meter Minimum Technical Standards in South Australia**

We believe that using smart meters to control solar inverters will face several issues, mainly being:

- convincing all the meter data and meter providers to introduce new interfaces so support the signals required for inverter control will be very challenging



- enabling AEMO to have access to all the meter data company systems will also be complex, likely incur additional costs and is potentially challenging technically; and
- the costs to connect the solar inverter could double; as the technician installing the modbus control unit will not be able to connect the wires to the meter elements unless they are a qualified by the meter provider company, thus doubling the labour costs due to needing two people to attend site.

The proposal we would like to discuss further would provide AEMO and SAPN access via our Energy Management System for all the inverters that it manages. This would be provided in a seamless, secure manner which we can modify for any additional AEMO and SAPN requirements.

We welcome the opportunity to further discuss our technology solution, eleXsys®, and how it can be applied to address the concerns of regulators and network operators.

## 5. Consultation on Proposed Tariffs to Incentivise Energy Use in Low Demand Periods in South Australia

Our responses to the previous consultation papers sufficiently expresses our views on the use of tariffs. In summary, we support the use of tariffs to encourage energy use (additional load) during solar producing hours to address the minimum net demand issues, as South Australia transitions to a 100% renewable energy future.

### The 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 \$6.7m project has been supported by the South Australian Government (\$1.95m) sourced from the Grid Scale Renewable Technology Fund.
- The Project showcases the capability of Planet Ark Power's unique and internationally awarded eleXsys® technology platform that allows the export of surplus energy into the grid without causing network voltage instability and without the need for network equipment or infrastructure upgrades.
- eleXsys® will be integrated with a DERMS providing network real time visibility to the SAPN
- It is Planet Ark Power's intention that this will be the 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.
- 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 will enjoy an estimated 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 its investment arm, 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 reductions in the cost of commercial-scale batteries, future grid-connected microgrids similar in scale to the IKEA eleXsys® microgrid are now a reality without the need for on-going government financial support.

## Summary

The IKEA eleXsys® Microgrid is a practical demonstration of how commercial-scale DPV/DER solutions can be connected to electricity grids without causing voltage instability and therefore need not be curtailed by network operators (unless in an emergency). This project also demonstrates that technology solutions are now available that can provide grid firming services that also increase the capacity of existing network infrastructure to accept and distribute multiple times more DER without the need for expensive equipment upgrades that drive up energy costs for consumers.

**These solutions are as relevant to the residential sector as they are to commercial and industrial property applications.**

The emergence of market-sourced technology solutions such as eleXsys® should be considered and understood prior to the implementation of new regulatory responses that may/will have unintended consequences of stifling new innovative solutions that can support the ongoing growth of the renewable energy industry sector, generate new, skilled jobs and transition to a cleaner energy future.