

CSIRO ENERGY

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Ref: Comments on [SA Power Networks' regulatory proposal](#)

Mr Warwick Anderson
General Manager, Networks Finance and Reporting
Australian Energy Regulator
GPO Box 3131
Canberra ACT 2601

Dear Mr Anderson,

I am writing to express CSIRO's support for SA Power Network's (SAPN) proposal to manage low voltage (LV) hosting capacity through dynamic limits as described in their 2020-2025 Regulatory Proposal.

CSIRO is Australia's national science and research agency, and our group focuses on helping Australia's electricity industry best navigate the energy system transformation and integrate renewable energy in the lowest cost and most reliable ways. Among other activities, we created the Future Grid Forum and the Electricity Network Transformation Roadmap, we helped develop and write the AS4777 inverter standards, and we are currently developing a national LV feeder taxonomy with SAPN and several other distribution network service providers in Australia. We support SAPN's proposal because it is timely and provides a relatively low-cost, equitable and transparent way to integrate the large amount of customer solar energy and other customer energy resources¹ that are on SAPN's network.

SAPN's investment in new capability to monitor and communicate dynamic limits on their LV network is required during the 2020-25 period because, based on the 2018 AEMO Electricity Statement of Opportunities, South Australia is forecast to experience negative state level demand in the early to mid-2020s.² This forecast does not rely on assumptions of fast adoption of additional rooftop solar: it occurs by 2026 in the lowest rooftop solar adoption case or in 2023 or 2024 in the other cases examined. Given these forecasts, we expect that changes to customer loads will continue to increase daily demand swings to the point that existing static 5kW/customer export constraint will create over voltages before 2025.

By increasing visibility of the LV network and monitoring rooftop solar generation in real time, SAPN will help lower the cost of managing its network during negative state load conditions. In negative demand circumstances the electricity system requires on-going operation of standby centralised generation that is ready to meet demand when it returns. In other words, to deal with rooftop solar output declining due to increased cloud cover (or another reason), other generation must be kept operating to ensure customer demand is met. Without sufficient LV visibility, including monitoring of rooftop solar generation, contingency arrangements will have to be overly conservative to avoid risks of system instability. That is, too much standby centralised generation will be contracted for too long, thereby increasing costs for consumers.

¹ We use the term "customer energy resources" to include rooftop solar, small-scale batteries, demand responsive loads, and electric vehicles, which others describe as "distributed energy resources" or DER. Given that the overwhelming majority of these devices are purchased by customers to help meet and manage their own energy needs, we believe "customer energy resources" is a more appropriate term.

² https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/NEM_ESOO/2018/2018-Electricity-Statement-of-Opportunities.pdf

In addition, SAPN's proposal provides an equitable way of treating consumers while achieving efficient use of the LV distribution systems. We support the application of 4777 standards, however those standards are not a panacea for managing a LV system with high penetrations of customer energy resources. One issue with them is that over-voltage protection settings across the network are likely to be inconsistent -- in older inverters (installed under 4777:2005), we have seen installers override over-voltage settings. Furthermore, consumers experience different voltages depending on where they are connected within the network; customers close to transformers are much more likely to have inverters trip than customers at the end of the same line, even if they produce exactly the same amount of solar at the exact same times and their consumption patterns are likewise identical. Using dynamic capacity limits as SAPN proposes can address over-voltage more equitably across consumers.

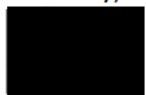
We also support SAPN's proposal because it provides a pathway to providing consumers with transparent information on their local network's hosting capacity, which can help them and their representatives make the best choices for how to manage their energy resources and needs. Without greater LV visibility, SAPN will be unable to provide consumers with the information needed to make the best decisions about their energy production and usage. Providing transparent data about the LV system can provide much greater predictability of achievable energy output for new distributed energy resources and underpin new markets for energy storage and "virtual power plants," while helping better manage the overall energy system for all customers -- including those without dynamic energy resources.

Finally, we note that the use of a reduced static generation export limit will result in customers experiencing very different conditions depending on both *when* and *where* they are connected. Static export capacities to 10kW were previously offered, now reduced to 5kW, and 'zero export' are being considered -- even though there is still sufficient network capacity *most* of the time. Dynamic network limits can help unlock this otherwise unused capacity, increasing utilisation of existing infrastructure, while the enhanced monitoring gained with the proposed approach will provide consumers transparency of available capacity.

In short, the proposed approach of using dynamic limits to manage LV hosting capacity is a necessary development in efficiently operating high penetration customer energy resource states on the NEM for stability at modest cost, while increasing customer equity, improving transparency and supporting the continued development of markets for customers to access. We encourage SAPN to continue to improve utilisation of LV network capacity through measures such as provided in this proposal.

If you have any questions about our comments, feel free to contact me.

Sincerely,



Brian Spak

Leader -- Grids and Renewable Integration

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