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ARENA submission to the Post-2025 Market Design Review Consultation

Thank you for the opportunity to provide input into the Energy Security Board's post-2025 market design initiative through the current consultation and the various working group processes we have been involved in. This submission responds to issues raised in the ESB Options Paper drawing on information and insights from projects funded by ARENA as they relate to integrating distributed energy resources and enabling greater demand side participation.

Enabling greater demand side participation

A recent projection from the Department of Industry, Science, Energy and Resources has rooftop solar reaching a nominal capacity of 31.6 GW nationally by the end of 2025¹ (i.e. theoretically comparable output to NEM peak demand). The global momentum for electrification of transport and heating loads is building rapidly, as is interest in the role the demand side can play in the energy transition.

Market studies both in Australia and internationally suggest that significant costs in the energy transition could be associated with short to medium term energy storage required to balance low-cost variable renewable energy generation. There are however opportunities to reduce these costs through demand-side flexibility. To quantify these opportunities in the first instance, ARENA has, in close collaboration with the ESB and the market bodies, commissioned market modelling based on the capacity expansion modelling approach used in the AEMO Integrated System Plan (the '**Load Flex Study**'). The results are expected to be released in mid 2021 and will explore how greater demand-side participation can contribute to system cost reductions under a number of 'states of the world' (SotW):

- SotW 1: ISP central case with some updated parameters

¹ [Australia's Emissions Projections 2020 report](#)

- SotW 2: SotW 1 + accelerated EV uptake
- SotW 3: SotW 2 + electrification of key thermal processes
- SotW 4: SotW 3 + higher penetration of VRE based on the ISP 'step-change' scenario
- SotW 5: SotW 4 + hydrogen export industry development

The modelling considers savings in the form of avoided generation capex and opex which manifest as reduced wholesale market prices for market customers. Initial results indicate the scale of the opportunity is large. The analysis is based on an assessment of net economic benefits from greater demand-side participation. ARENA is currently considering how we can provide support for demand-side opportunities in a variety of sectors. This includes demonstration projects and studies, as well as accelerating current market reform efforts.

Of central importance is ensuring market participation requirements provide **flexibility and clear incentives for new retail and aggregator commercial models** that can take advantage of emerging sources of load flexibility as a physical hedge against energy spot market volatility. Moreover, it is important that these resources are fully valued in any future physical retailer reliability obligation. This will enable customers (and the market as a whole) to better utilise lower cost variable generation thereby bringing down electricity costs for all customers. *Trader-services, flexible trading relationships* and *voluntary demand-side scheduling* can all contribute to this outcome and ARENA is supportive of the ESB progressing these new arrangements. A formal rule change request by the ESB would allow the AEMC to commence work on these reforms in earnest.

Further benefits, not currently being modelled by ARENA, relate to improving utilisation of distribution networks. A more flexible demand side will reduce network capex as well as volumetric charges for distribution network customers. It is not yet clear to ARENA that distribution networks will need to provide **real-time pricing or economic allocation of network hosting capacity** to achieve efficient levels of demand side participation. Moves towards these kinds of solutions in the near term may suffer from high implementation costs and/or challenges with regard to community and industry acceptance.

A simpler approach (potentially as a transitional step) would be to make use of a combination of **cost-reflective network tariffs** and **dynamic operating envelopes (DOEs)**² that are already under development to support power system security at the distribution level. These two mechanisms are key priorities that have been identified by industry and consumer groups collaborating via the Distributed Energy Integration Program (DEIP)³. DOEs are already being developed by SAPN and Energy Queensland. They have been identified by industry and consumer groups as infrastructure that could more efficiently support 'back stop' requirements canvassed in the ESB's paper, compared to device level constraints (e.g. in South Australia) that do not provide efficient signals for demand flexibility. Given their relatively low cost, potential for consensus and wide range of potential applications, the ESB should actively consider DOEs as part of its solution set. This would allow for a convergence on a practical

² Rather than static exports of energy from demand side assets, most often solar PV, DOEs allow flexible export limits based on the dynamic capacity of the distribution grid at a given time.

³ <https://arena.gov.au/knowledge-innovation/distributed-energy-integration-program/>

outcome that already has wide-spread buy-in across industry and demonstrate some progress by the ESB on the issue of DER integration.

An emerging model for DOE implementation is for **envelopes to be allocated at the connection point-level** (as opposed to being allocated to individual devices as is being done in South Australia). This will provide flexibility for aggregators to co-optimize behind-the-meter (BTM) resources across different value streams and make the best use of network hosting capacity. However, this will also require coordination of BTM resources, such as rooftop solar PV systems, electric vehicles, and other appliances and equipment. There is a need to demonstrate effective coordination across multiple BTM devices, including from different original equipment manufacturers through Customer Energy Management Systems (CEMS) and consider how consumer interests can best be protected with regard to interoperability vs. 'platform lock-in'. ARENA is commissioning an initial scoping study under the DEIP DOE workstream to explore these issues, including in relation to applicable customer protections under national electricity retail law or consumer law more broadly.

Support for trials and studies

As offered in our response to the ESB's post-2025 consultation paper, ARENA is able to work with the ESB and DEIP, to consider the funding of priority trials and studies identified through the post-2025 market design review process. Our collaboration on the Load Flex Study and DOEs (under DEIP) is a good example of industry collaboration on areas of shared interest.

About ARENA

The Australian Renewable Energy Agency (ARENA) was established in 2012 by the Australian Government. ARENA's function and objectives are set out in the *Australian Renewable Energy Agency Act 2011*.

ARENA provides financial assistance to support innovation and the commercialisation of clean energy, including low, zero and negative emission technologies by helping to overcome technical and commercial barriers. A key part of ARENA's role is to collect, store and disseminate knowledge gained from the projects and activities it supports for use by the wider industry and Australia's energy market institutions.

Please contact Carl Tidemann (Carl.Tidemann@arena.gov.au) if you would like to discuss any aspect of ARENA's submission.

Yours sincerely

Darren Miller

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