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Australian Renewable
Energy Agency

ARENA

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ARENA submission to CoGaTI Access and Charging Review

ARENA is supportive of the AEMC's approach to reforming access and charging regimes for generators. Reforms in this area are essential to create a supportive environment for investors, thereby facilitating a lowest cost mix of transmission and generation investment in the transition to renewables.

In summary, ARENA considers that:

- The current rate of change in Australia's generation mix is unprecedented in recent historical terms and it is revealing significant limitations in current transmission investment frameworks. There remains an untapped opportunity for strategic 'generation enabling' investments to unlock low cost renewable resources above and beyond the current 'generation-trailing' investment pattern.
- Longer-term strategic investments in transmission capacity, in the current policy environment, are beyond the risk appetite for normal commercial investment. ARENA is considering commissioning proof-of-concept studies which could help de-risk investment by identifying innovative infrastructure, technology and commercial solutions to support the development of Renewable Energy Zones on a least-cost basis.
- Large and rapid changes in Marginal Loss Factors (MLFs) are creating substantial revenue uncertainties for developers which threatens to slow investment in new low-cost generation. ARENA considers this issue needs to be viewed through the lens of transmission access and charging and innovative approaches need to be considered which could more appropriately allocate the cost of increased system losses to parties responsible for creating any increase in losses.
- Any dynamic regional pricing regime should not discriminate between load types (whether they relate to battery charging or other purposes) as suggested by the AEMC.

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 renewable energy and enabling 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.

Renewable Energy Zones

The current circumstances of the power system are markedly different to those in which the National Electricity Market (NEM) was created. At its establishment, the NEM consisted of infrastructure that was inherited from state-owned and run monopoly network businesses. Generation was centred around a relatively small number of point-source fossil fuel resources and the system was configured to facilitate power flows to load centres.

The type and location of transmission and generation infrastructure reflected the most economic technologies at the time and investment decisions, made by government entities, were informed by a range of social, economic and industry development policy objectives. Importantly, transmission was built out to reflect the distribution of natural energy resources that were economically competitive at the time, and to specifically enable new generation to be developed (call this 'generation-enabling' investment).

The NEM faces a substantial period of redevelopment and so it is appropriate that a range of approaches to the optimisation of generation and transmission investment be considered. Over the next 20 years, around 14,000 MW of coal generation (~33% of current generating capacity) is expected to be replaced predominantly by a mix of 70,000 MW of large-scale variable and dispatchable renewable energy generation and energy storage.¹ At the same time, energy demand will become more dynamic, driven by solar resource variability and the autonomous operation of distributed energy resources such as electric vehicles, household batteries and demand response. These changes are rapid and large by historical standards and result in substantially higher revenue uncertainty and risk for investors in long-term transmission infrastructure. Prospective revenues are also sensitive to a range of Commonwealth, state and territory climate change policies and programs as well as rapid shifts in MLFs (discussed separately below).

AEMO's Integrated System Plan (ISP) identifies a need to increase the capability of the transmission system, to reduce congestion and provide generators, existing and new, with cost-effective access to markets. A number of Renewable Energy Zones (REZs) are identified with varying access to existing transmission network capacity. The *Early Implementation of ISP*

¹ [https://www.aemo.com.au/\[...\]/Integrated-System-Plan-2018_final.pdf](https://www.aemo.com.au/[...]/Integrated-System-Plan-2018_final.pdf)

Priority Projects and related rule changes will streamline the implementation of priority projects that are aimed at addressing current and emerging issues.

Otherwise, the development of the transmission system remains subject to individual transmission businesses demonstrating net benefits through the RIT-T process. ARENA has observed that, in the current policy environment, this tends to favour incremental 'generation-trailing' investments where the business case is based on relieving existing constraints and associated loss of consumer access to low-cost generation rather than building transmission strategically to enable new generation. The Scale Efficient Network Extension (SENE) framework has not addressed this problem. By way of example, in 2016 the ARENA-funded TransGrid New England REHub project concluded that the current SENE framework has not achieved the objective of facilitating multiple generator connections. TransGrid reported that *'in the absence of a clear framework for commercial development, there is no incentive for a commercial party to pay for a SENE study.'*²

ARENA is considering studies which could help de-risk investment by identifying infrastructure, technology and commercial solutions to support the development of renewable energy zones on a least-cost basis, while ensuring an appropriate sharing of risk between generators, transmission businesses and energy customers. Such approaches might include private shared asset arrangements which will be reliant on the establishment of firmer access arrangements which are under consideration through the CoGaTI review. Feedback from developers that ARENA works with indicate such arrangements could help unlock new investment by significantly reducing investor risk and associated costs of capital.

ARENA understands that the implementation of a firmer access regime has been slated for as late as 2023, to take advantage of the outcomes of pricing reform (which can help value network congestion). ARENA considers that any delay in resolving the above issues will impact investment in the interim and all efforts should be made to implement appropriate reforms, and provide a clear direction to investors, at an early opportunity. As firmer access would be optional, if introduced earlier, investors could take advantage of pricing information as it arises, rather than the AEMC needing to forecast how long it will take before pricing information becomes actionable.

Taking account of losses

Market operations aim to optimise generator dispatch within a range of system security constraints and parameters. This includes a consideration of MLFs which are applied as an adjustment to a generator's bid price. This ensures system electrical losses are minimised in dispatch and provides an important locational price signal to investors. ARENA notes that application of MLFs are the subject of a separate (pending) rule change process, however we also believe that the issue of MLFs has relevance to the AEMC's consideration of changes to access and pricing regimes for generators. For example, electrical conductance under normal operating conditions (the inverse quantity of resistance) may be able to be considered (and valued) as a limited resource and could be, at least in principle, subject to a form of firmer access right for generators.

² https://arena.gov.au/assets/2017/05/Renewable-Hub_Knowledge-Report_Final-1.pdf

MLFs change as a result of the interaction of a range of factors that are complex, opaque and difficult to isolate. One obvious and material factor is the increase in generation output in a given part of the network, relative to load. For example, increases in generation in a remote part of the network mean that more power needs to travel further to reach a customer, resulting in greater losses. Losses also increase as higher current on the line increases electrical resistance (losses = I^2R). As this is square function, an increase in current travelling through a conductor has a much greater than proportional, impact on losses. Losses are also subject to time-of-day factors such as the coincidence of generation and load and ambient temperature.

The current open access framework and MLF methodology allocates the cost of increased losses to all generators in that part of the network averaged over time, rather than to the causer of the incremental increase in losses. This constitutes a negative externality to the investment calculus for a prospective generator (and the operational calculus for an existing generator) as they do not bear the full cost of the increase in losses they are creating. Conversely, if a generator was to construct a local energy storage system or other load which could reduce system losses, the investment calculus would realise the full extent of that benefit as the reduction in MLF would accrue to all parties in that part of the network (a positive externality).

Potential approaches to address this might include partial grandfathering of MLFs for existing generators, optional firm access to include an assumed loss factor, dynamic loss factors, as well as greater flexibility in market registration processes to allow for batteries and loads to be developed 'behind- the-meter' rather than being separately registered, as is being explored by AEMO under its Emerging Generation and Energy Storage work program.

ARENA is not in a position to quantify the benefits or comment on the technical complexity of alternative solutions. We do however consider that such issues and options should be considered as part of, or alongside, the current review of transmission access and pricing regimes.

Dynamic regional pricing

In its consultation paper, the AEMC states:

Dynamic regional pricing - "When exporting electricity to the grid, it appears appropriate that, like a generator, storage should receive the dynamic regional price. When importing electricity from the grid, it may also be appropriate that storage devices pay the dynamic regional price, unlike market customers. As with generators, this will provide signals to storage devices that reflects the short-run costs of using the network, for both imports and exports."

ARENA's experience indicates that such technology-specific treatment of generation and load, while potentially pragmatic in the first instance, is unlikely to be sustainable in the medium term. Over the course of the next decade, market participant energy systems will become significantly more diverse and sophisticated, incorporating greater behind-the-meter flexibility including demand response, embedded generation and energy storage (of varying types). For example Bloomberg has forecast that industrial solar deployments will outstrip residential installations by the mid 2020s, with over 30,000 MW of installed behind-the-meter industrial solar generating

capacity by 2050.³ It is possible that declining costs may see behind-the-meter battery storage, and other forms of flexible load, follow a similar path.

Under these conditions, differential price allocation based on technology configuration will be increasingly difficult to sustain, and administrative arrangements will become increasingly burdensome and restrictive for participants. This seems unlikely to support efficient development of the electricity market.

In this context, ARENA considers that the value of a participant's interaction with the energy market should be based only on the value of the services transacted and be technology neutral. This will encourage innovative, lowest-cost market responses that are most aligned to the needs of consumers in the long term. ARENA agrees with the proposition that, where a constraint arises, it makes sense that the constrained energy be offered to local customers (either in front of or behind-the-meter) at a lower price than the energy supplied to the broader market through the constraint. The low local price should be discoverable and realisable by all market customers local to that constrained area.

Please contact Jon Sibley, Principal Policy Advisor, (jon.sibley@arena.gov.au) if you would like to discuss any aspect of ARENA's submission.

Yours sincerely

Darren Miller

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³ Bloomberg New Energy Outlook, 2018