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MELBOURNE

VIC 3000

ENERGY SECURITY BOARD

**info@esb.org.au**

19 October 2020

Dear Sir/ Madam,

**Reach Solar energy – Response to P2025 Market Design Consultation Paper**

Reach Solar energy (”**Reach**”) is very pleased to provide its response to the findings described in the discussion paper prepared by the Energy Security Board (“**ESB”**) titled “Post 2025 Market Design Consultation Paper” dated September 2020.

The ESB paper describes the issues well, and collates the findings/ outlook for a number of key matters some of which ongoing and others are new.

This submission by Reach does not seek to answer all of the questions and options posed by the ESB but it has focused on a number of specific issues.

By way of background, the intent of Reach is to develop large-scale solar photovoltaic (PV) and distribution connected energy storage. Reach management (see www.reachsolarenergy.com.au) have a proven track record with operations, development and raising large-scale capital for both energy and infrastructure projects in South Australia, other States in Australia and internationally. Reach raised $500m of project finance for Bungala One and Two (2 x 110MWac solar PV in SA) in mid 2017, and is developing 450MW as a first stage of a 900MW solar PV site in NSW, and distribution-connected batteries.

A detailed response is provided for each of the Market Design initiatives but in summary:

1. Its an exciting time in the electricity sector with an array of new technologies and consumer-led changes and a backdrop of coal-fired generation exiting over the next 10 to 20 years (currently producing some 60% of electricity supply).   
     
   Zero-inertia microgrids have been in operation for decades[[1]](#footnote-1), which demonstrates that inertia is not needed to operate an AC power system. Reliance on inertia is the result of the legacy use of synchronous generators. This is important because it arguably represents the long-term outlook for electricity systems and in turn affects a number of initiatives mentioned in the ESB paper.
2. A **decentralised capacity market** is favoured (as defined by ESB). The ESB paper does not however mention the experience from Western Australia with a capacity style market and/ or other energy markets including UK and ERCOT in USA. All energy markets are having to deal with the transition.   
     
   The market design will need to attract low cost capital and stimulate competition and innovation to achieve least cost to consumers. It will also need to address the fact that the NEM has arguably stopped functioning in a number of nodes including Tasmania and South Australia i.e. there is virtually no trading, and therefore illiquid;
3. Reach management consider a **competitive process** and the selection of one or more coal-fired power plants would provide a foundation for a **smooth transition**. It allows both the power plant (to close), and new market participants, to plan for a known programme;
4. Processes for transmission funding/ build, and grid connection are **not working well or fast enough**. The main transmission infrastructure in the “actionable” ISP is still ongoing in terms of process with planning and the Australian Energy Regulator. Multiple renewable energy projects have been built in designated renewable energy zones and then find they cannot connect on schedule and/ or evacuate full power. This has compounded concerns surrounding the variability of marginal loss factors;   
     
   In some cases it is because the Project (and its contractors) have not fulfilled its obligations to connect but there are grey areas and a number of EPC contractors have either stepped-back from doing renewable projects in Australia, or gone bankrupt. Detailed comments have been provided by Reach and its technical advisors to improve the situation (these can be provided to the ESB if required);
5. V**ery few retailers (4 or so) are creditworthy in the NEM**. This affects the ability to provide credible offtake and the cost of finance;
6. The introduction of inverter-based renewable resources does decrease the amount of inertia available in the grid system, but its fast-acting response (and getting faster) **dampens the rate of change of frequency** and this combined with the change mentioned above, is likely to reduce the amount of inertia actually needed;
7. Reach continues to **not support the “do no harm”** principle by the AEMC. It was intuitively always flawed policy and continues to provide sub-optimal and increased costs[[2]](#footnote-2) which are ultimately baked into the tariff. System strength should be provided by the TNSP – a “centrally coordinated approach” - but in a modular and incremental manner because the needs of the grid system are expected to be less than what is envisaged today
8. DER connected resources including utility scale battery storage can provide more services if it was permitted and incentivised to do this including Regulation FCAS, fast frequency response (sub 6 seconds), inertia and black start capability. This technology is here today not 3 to 5 years time as suggested by the ESB paper;
9. Reach continues to **not support** the AEMC proposal detailed in the Coordination of Generation and Transmission Investment (COGATI). Please refer to the Reach response to the AEMC dated 8 August 2019; and
10. Please refer to the Reach submission dated 8 September 2020 regarding comments on Interim REZ(s).

I hope this is of interest to the ESB and please do not hesitate to contact me if you have any questions on the same (0416 490 393).

Yours sincerely,



Tony Concannon

CEO

Enclosure: detailed response to ESB consultation paper

**MARKET DESIGN INITIATIVE A**

**RESOURCE ADEQUACY MECHANISMS**

The successful new-build of renewables from 2015 to 2020 was spurred on by long planned emission reduction regulation (namely the LRET scheme established in 2001) as retailers contracted new renewable power plant to meet the LRET of 33,000 GWh per annum (reduced in 2015 from 41,000 GWh pa).

Because the LRET obligation is now achieved it means the new market design will need to **attract additional capital** for two to three times the MW capacity installed for LRET. To achieve this, the market needs to incentivise competition, stimulate innovation, and permit commercial return investors and lenders for what are long-term capital intensive assets.

For a number of reasons mentioned in the ESB paper, the **replacement will not be one for one** i.e. 1MWh of coal-fired production today will not need to be replaced by 1 MWh of new generation in the future. It will be solved in the future by a more complicated combination of renewable energy, distributed energy resources and demand-side management (both with two-way flow), energy storage (including electric vehicles), sophisticated aggregation and customer-led technologies, improved energy efficiency, and a much faster responding telemetry and communications system for the grid system.

Reach favour a **decentralised capacity market**. It should however be noted that but for 4 or so main retailers the balance retailers are **not investment grade** which (at best) is likely to increase the cost of capital.

The ESB paper did not mention the experience gleaned from other energy markets including Western Australia and/ or the UK capacity market (introduced in 2018). Reach suggest this is done.

The ESB mention RERT is a “backstop” but it is proving useful for voluntary despatchable demand during high risk periods. This should ideally be part of one market design to avoid distortion affecting forward market prices.

Turning to the current NEM, two NEM nodes namely Tasmania and South Australia continue to have **very illiquid trading** (i.e. all but stopped) which means contract positions are not easy to be put in place or unwound. There has also been a reliance on Government-led offtake but its demand is finite (its **own demand) and largely exhausted** now in most NEM States; the balance MWh requires meeting the needs of business and residential customers. The new market design will need to address both matters.

**MARKET DESIGN INITIATIVE B**

**AGEING THERMAL GENERATION STRATEGY**

15GW of coal-fired power plant is due to exit the NEM over the next 20 years but using GW understates the challenge. Using a load factor of 60% to 90% then 15GW generates circa 80 TWh to 120 TWh of electricity per annum. Using a load factor of 30% to 40% for solar PV and wind generation, then represents a **new-build programme of 30GW to 53GW** (which is in line with the latest AEMO ISP).

Reach considers the current notice period for closure of coal-fired power plant is adequate.

The decline in wholesale prices shown in Figure 13 was due to a decline in commodity prices (oil, and thermal coal), LRET-led new-build renewable generation, State-driven renewables programmes, and the impact of COVID on demand in 2020.

Low wholesale prices usually cause maintenance to be descoped and/ or deferred. This is turn causes an **increase in forced outage rate and increased care is required to ensure safe working**. It’s a familiar cycle in the NEM (and other energy markets), and the pattern will also include power plant which has reached a point where it is no longer economic to fix.

Annual provisions for post-closure power station site rehabilitation can be material (read hundreds of $ millions). If the closure date is brought forward then the near-term provision costs will increase.

The Rudd and Gillard Governments both considered a **voluntary closure programme** of brown-coal fired power plants (the most CO2 intensive at the time). It was a competitive process but both Governments abandoned the process.

Reach management consider a **competitive process** and the selection of one or more power plants would enable a **smooth transition with a firm exit programme**. It allows both the power plant (to close), and new market participants, to plan for a known programme. This would avoid the step-change in the NEM which was evidenced when 1700MW Hazelwood and 750MW Northern power stations retired (albeit after providing the required notice to regulators and State Governments).

The EU Pollution Standard set a long-term target (some 20 years) for tightening of emissions and code for the exit of coal. With this emission target in place, the UK, Germany, Italy, Belgium, have seen massive market investment into renewable and gas-fired generation as well as demand-side management, energy storage and other customer-led technologies. Markets can work.

**MARKET DESIGN INITIATIVE C**

**ESSENTIAL SYSTEM SERVICES**

The Government-funded National Renewable Energy Laboratory (NREL) published a paper in May 2020 titled “*Inertia and the Power Grid: A Guide Without the Spin*” (copy attached).

“*Zero-inertia microgrids have been in operation for decades, which demonstrates that inertia is not needed to operate an AC power system. Reliance on inertia is the result of the legacy use of synchronous generators*.” This is important because it arguably represents the long-term outlook for electricity systems and in turn affects a number of initiatives mentioned in the ESB paper.

The introduction of inverter-based renewable resources does decrease the amount of inertia available in the grid system, but its fast-acting response (and getting faster) dampens the rate of change of frequency and this combined with the change mentioned above, is likely to materially reduce the amount of inertia actually needed.

DER connected utility scale battery storage can provide more services if it was permitted and incentivised to do this including Regulation FCAS, fast frequency response (sub 6 seconds), inertia and black start capability.

**MARKET DESIGN INITIATIVE D**

**SCHEDULING AND DAY-AHEAD MECHANISMS**

The use of a Unit Commitment for Security application is supported in-principle to assist with grid operations but its use should be carefully considered to ensure it does not prevent participants from benefiting from scarcity pricing or other services.

A day-ahead process provides a promise of more certainty for grid operations but this will arguably be quickly outpaced by an increasingly more granular market i.e 5 minute settlement in October 2021 and the multiple solutions which are envisaged and articulated in the ESB paper. Increasingly automated processes (including the use of artificial intelligence) are the expected way forward.

**MARKET DESIGN INITIATIVE E**

**TWO-SIDED MARKETS**

The last paragraph on page 90 is possible. System strength should be provided by the TNSP – a “centrally coordinated approach” - but in a modular and incremental manner because the stability needs of the grid system are expected to be less than what is envisaged today.

DER connected utility scale battery storage can provide more services if it was permitted and incentivised to do this including Regulation FCAS, fast frequency response (sub 6 seconds), inertia and black start capability. Telemetry and communication standards are correctly flagged in the ESB paper but manageable with a “light touch” by DNSP’s.

Reach consider the Intermediate and long-term term initiatives mentioned on page 93 and 94 are able to be provided by some DER technologies today not in 3 to 5 years time e.g. use of sub 5 MW battery energy storage systems including cutting-edge inverter technology.

Renewable energy is not at “zero cost” (pg 88). Costs include O&M, insurance, land, compliance, and asset management.

**MARKET DESIGN INITIATIVE F**

**VALUING DEMAND FLEXIBILITY AND INTEGRATING DER**

Repeat of comments on E above.

**MARKET DESIGN INITIATIVE G**

**TRANSMISSION ACCESS AND CO-ORDINATION OF GENERATION AND TRANSMISSION**

The NEM transmission system was designed to transmit electricity from where the brown and black coal reserves, gas and hydro-electric resources, are located (predominately Snowy mountains and Tasmania). The best renewable energy sources are not always located where the coal, gas and hydro-electric resources are.

The Integrated System Plan provides a very good blueprint for the whole sector.

The **grid connection process**, and approval process for transmission needs to be improved. It is causing material delay (months or years) and commercial distress for multiple new projects. Reach has shared its views (and its technical advisors) to AEMO and others before. In summary:

1. Provide **equal focus** on grid stability and line thermal limits and include headroom for grid stability. Design a grid system sufficiently robust enough for today and future needs;
2. Adopt **new technologies** to manage voltage (and current) oscillations including active dampening systems such as that which Sandia National Laboratories provide for the management of the Western North American grid system;
3. Model plant performance (PSCAD/PSSE) during the application phase to ensure generating plant is within the defined envelope in present and **future** network conditions (per ISP guideline);
4. The grid system should have **sufficient headroom** so as when the generators are “tuned” during commissioning (using ranges defined in their agreed generator performance standard “GPS”) they continue to have a stable grid system to connect to during commissioning and throughout the asset life. If this is not done there is a real risk of repeated modelling, modifying the GPS and commissioning: this will adversely affect bank and investor confidence;
5. At commissioning implement a ***softer* ‘practical completion’** sign-off by AEMO during R2 testing with a “punch-list”, a 2 year monitoring period, aligned with the EPC defects liability term, and subsequently final completion signoff. This approach is in line with international practice;
6. Maintain **open access regime** to maintain the benefits recently described in the Grattan Institute report dated October 2019; and
7. **Avoid sequentially ‘queuing’** projects. Connection sequencing has not been the main cause of issues unfolding today and having a “single thread” connection approach is not a sensible medium to long-term solution. Delay can be caused by multiple factors and AEMO will be left having to pick “winners” and face a backlash when they do not complete (for whatever reason); and

Australia is not alone in improving the lead-time and integration of renewables and other systems into the grid system. It is suggested the ESB review what is being done in other energy markets including UK and USA.

**System Strength**

Reach continues to **not support the “do no harm”** principle by the AEMC. It was intuitively always flawed policy and continues to provide sub-optimal and increased costs[[3]](#footnote-3) which are ultimately baked into the tariff. System strength should be provided by the TNSP – a “centrally coordinated approach” - but in a modular and incremental manner because the needs of the grid system are expected to be less than what is envisaged today.

**COGATI**

Reach continues to **not support** the AEMC proposal detailed in the Coordination of Generation and Transmission Investment (COGATI). Please refer to the Reach response to the AEMC dated 8 August 2019

The time required for transmission approval is too long and are materially greater than RRO and RERT notice periods (planning, AER processes, and build programme). This is causing frustration at multiple projects.

**INTERIM REZ**

Please refer to our submission to the ESB dated 8 September 2020.

End

1. Government-owned National Renewable Energy Laboratory paper dated May 2020. Titled “*Inertia and the Power Grid: A Guide Without the Spin*”. [↑](#footnote-ref-1)
2. GHD Consulting, “Managing system strength during the transition to renewables” published by ARENA dated May 2020 [↑](#footnote-ref-2)
3. GHD Consulting, “Managing system strength during the transition to renewables” published by ARENA dated May 2020 [↑](#footnote-ref-3)