

Friday, 21 October 2016

John Pierce  
Chairman  
Australian Energy Market Commission  
Lodged Electronically

Dear Mr Pierce,

**RE: EPR0053 System Security Market Frameworks Review, Consultation Paper Submission**

The Clean Energy Council (CEC) is the peak body for the clean energy industry in Australia. We represent and work with hundreds of leading businesses operating in solar, wind, energy efficiency, hydro, bioenergy, energy storage, geothermal and marine along with more than 4,000 solar installers. We are committed to accelerating the transformation of Australia's energy system to one that is smarter and cleaner.

The CEC supports the work that both the Australian Energy Market Operator (AEMO) and the Australian Energy Market Commission (Commission) in this and related work streams. Our view is that the long term focus of energy market reform has lacked vision and recognition of the obvious and even legislated changes that are and will continue to occur in the power system.

Despite a perception that the technical characteristics of the electricity system has "changed very little over time"<sup>1</sup> obvious drivers of change exist and have been overlooked. For example:

- The legislated Renewable Energy Target has now been in place for nearly seven years and is specifically designed to drive new and diverse technologies into the market;
- Consumer interest and uptake in solar PV (and increasingly energy storage) has been evident and growing for nearly a decade; and

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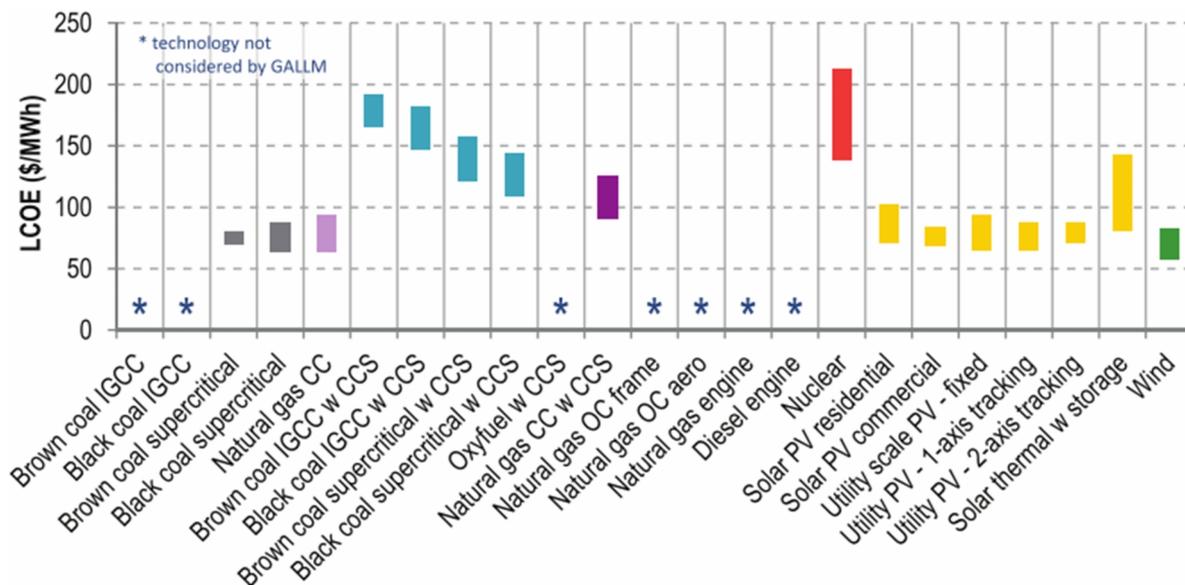
<sup>1</sup> Consultation Paper, p. 9.

- The need to reduce emissions from the electricity sector has been evident for many years.

In addition to these evident changes the age of the existing ‘conventional’ generation fleet alone is sufficient to indicate significant change in generation assets in the coming decade.

Recent analysis by CO2CRC in conjunction with CSIRO found that significant cost reductions are expected in renewable energy technologies in the coming years (Figure 1). Despite this being the most “in-depth” study of the cost of energy generation technologies<sup>2</sup> at the time of publication (November 2015) the report’s predicted 2030 costs have already been superseded by experience in committed renewable energy projects.

**Figure 1: LCOE costs for 2030 as estimated by CO2CRC in November 2015. Experience has found 2016 costs for large scale wind and solar in these ranges.**



Some examples of more recent costs can be seen in through projects like Coonooer Bridge Wind Farm (\$81.70 / MWh), Hornsdale Wind Farm Stage 2 (\$77 / MWh) and large scale solar projects successfully achieving dramatic cost reductions. Concurrently, the risks associated with investments in new high emissions ‘conventional’ generation technologies have precluded investments of this kind for the foreseeable future.

These factors all clearly indicate that investments in new generation will be made in renewable energy as this will present the lowest cost form of generation investment while

<sup>2</sup> CO2CRC, *Australian Power Generation Technology Report*, November 2015, p. i.

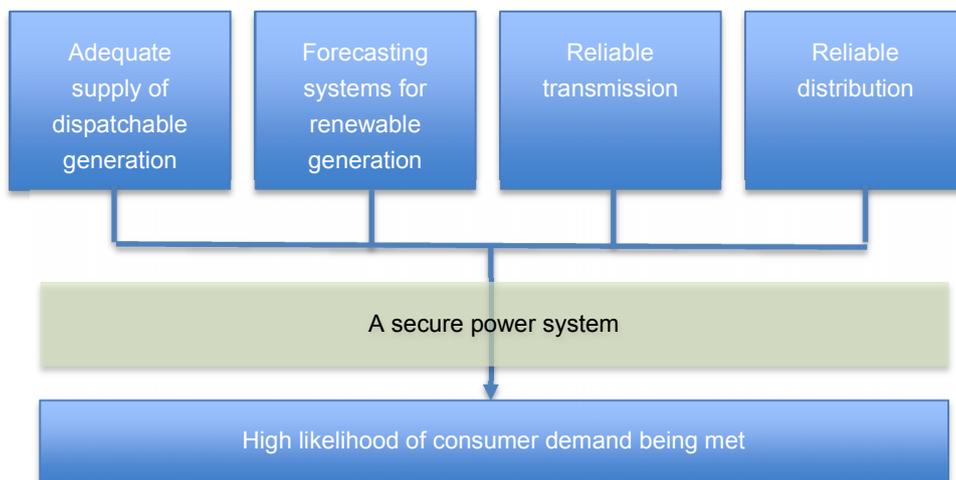
conforming to Australia’s stated emissions reductions goals. With this in mind, and in regard to the National Electricity Objective the Commission’s role in this review is to ensure that the market settings enable these future investments, rather than promoting a market that relies on technologies that are rapidly being superseded.

With this in mind the CEC highlights that where renewable energy technologies have not provided services to the market, such as inertia or fault currents (at the same levels as synchronous machines) this does not reflect a technological failing. The reality is that market frameworks have neither expected nor promoted this outcome, not that these technologies are “unable to” assist in this regard as suggested in the Consultation Paper<sup>3</sup>.

Given that generation investment and planning is carried out by commercial investments, it is unrealistic to assume that every generation technology should deliver the same outcomes. In practice no technology delivers a perfect solution.

A mix of technologies will deliver the needs of the current and future power system. Given this it is important that the Commission recognise that diverse technologies are already delivering secure and reliable customer demand. The CEC highlights this by correcting of Figure 2.1 from the Consultation Paper<sup>4</sup> to demonstrating how renewable generators are already integrated in the NEM (Figure 2).

**Figure 2: Correction of Figure 2.1 demonstrating the current implementation of forecasting systems for renewable generators.**



<sup>3</sup> Consultation Paper, p. 9.

<sup>4</sup> Consultation Paper, p. 8.

Given this context it is clear that the review's principles highlight the need to take a forward-looking strategic view that enables a technology transition in the energy market.

In the first instance the principle on technology neutrality and regulatory frameworks contradicts the basis for this review. If the regulatory frameworks were indeed 'technology neutral' as described then the integration of a diversified generation mix should not require such attention. This is clearly not the case.

As highlighted by the Commission, the basis for this review is that different technologies deliver different outcomes. This would not have occurred if the regulatory frameworks accounted for these differences. The CEC argues that, despite clear technological trends, it is an over-reliance on 'conventional' generation technologies by the regulatory frameworks that is the main driver for this review.

The premise that the regulatory frameworks are technology neutrality is a clearly flawed. The principle on technology neutrality has to recognise that the current approach is not neutral. In order for the AEMC to act to act in the long term interests of consumers the regulatory frameworks must be forward-looking and recognise that technological change is inevitable. The goal of this review should be to create a framework to enable a low and even zero emissions electricity system. To achieve this outcome consistently with market objectives will require that all technologies that contribute to the power system are encouraged to do so in a way that also contributes to system security.

The following sections provide our responses to the Commission's direct questions. Please contact the undersigned for any queries regarding this submission.

Sincerely,



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**Question 1: Do you consider that the issues outlined above cover the matters that need to be considered going forward in managing changes in system frequency?**

Despite the rule change requests being focussed on power system inertia the Consultation Paper appears to broadly consider FCAS in conjunction. It is important that these matters are considered separately.

On one hand FCAS is the market mechanism that makes adjustments to the supply-demand balance to keep frequency within the Frequency Operating Standards. Although FCAS is not a component of this review it is important that the Commission understands that the scheme is poorly designed. For example, gross errors in the wind energy forecasting system are being fed into NEMDE and appear as a need for increased regulation FCAS. In another case a significant error in the AWEFS system was left unaddressed for over four years increasing the perceived need for FCAS for the duration. Additionally the causer-pays arrangements for FCAS are largely non-reflective of generator performance.

If the Commission is reviewing the FCAS regime these matters must be addressed. If not then this review should remain focussed on rates of change of frequency (ROCOF) and system strength.

With regards to the treatment of inertia the Commission should be aware that this is determined by a combination of the rotating masses of generators *and* the physical stability constraints applied to the system at any given time. In this regard AEMO does have the capability to manage ROCOF and already does so through specific constraint equations.

**Question 2: What do you consider to be the issues associated with low power system strength?**

The CEC is not convinced this issue is well understood and strongly disagrees with the Commission's characterisation of renewable energy technology in this regard. More specifically, the Commission's claim that *only* synchronous generators provide fault current is simply untrue. While the fault current provided by large scale renewable generators is lower, it is incorrect to say it does not make a contribution. Small scale renewable energy and storage systems can provide fault current, but are generally required to disconnect immediately via safety settings demanded by the local Distribution Network Service Provider.

While AEMO has outlined some of the potential issues associated with low system strength, these are not well understood and appear to be largely associated with the safe operation of the electricity network. The Commission should also be considering the stability of conventional generation in low strength environments.

Although fault levels are an outcome of generator connections, the materiality of the impact of low fault levels on generators does not appear to have an impact beyond that generator's compliance with its performance standards.

Conversely, the safe operation of the network is clearly a need beyond the connection and operation of generation. And, given that the operation of the shared network is to provide safe, secure and reliable supply to customers the management of low fault currents should be a consideration for Network Service Providers (NSP), not generators.

***Question 3: Do you consider it beneficial to set a standard for RoCoF? What format should this standard take and what factors should be taken into account when setting the standard? Who should set it? Would the establishment of a new standard trigger significant additional costs to comply?***

Setting a system standard for ROCOF must account for a range of factors including:

- Protection settings on embedded generation and across the network.
- The ROCOF withstand capability of older conventional generation (inverter connected generation has a high withstand capability).
- Potential costs and market impacts (from inter-regional trade for example) from limiting ROCOF to a tight standard, and
- The potential implication for investment in new generation technologies going forward.

It does not appear to be necessary to set a standard beyond that already expected. Currently AEMO applies a ROCOF constraint at 1 Hz/s for South Australia when there is a credible risk of separation from Victoria. The South Australian government has directed AEMO to keep ROCOF within 3 Hz/s during normal operation. However, the establishment of tight ROCOF standards would likely have significant ramifications for the operation of the power system and lead to sub-optimal market outcomes so should be avoided if unnecessary.

Such a standard cannot be set in isolation. It needs to account for the performance of under frequency load shedding, and would require a detailed understanding of the ROCOF withstand capability of generators connected before 2008. The Reliability Panel should have a significant role in setting the standard.

***Do you consider there to be a role for maintaining system strength? Who should be responsible for undertaking this role or how should the responsibility be determined?***

See previous response. System strength is largely a safe network operation issue that should be managed by NSPs at the appropriate points in their networks.

***Question 4: What roles do you consider services such as inertia and fast frequency response should play in maintaining system security in the NEM? How else could RoCoF be managed?***

The technological shift of occurring across the electricity sector means that the market can no longer rely heavily on a single solution. In order to achieve a forward looking electricity system that accounts for the long-term interests of consumers the Commission must position the market rules appropriately to ensure that technologies such as fast frequency response or synthetic inertia from wind turbines are contributing to power system security. This can only be achieved through the appropriate specification of standards that focus on the problem, not a solution. For example, standards must specify responses to rates of change of frequency, not simply inertia.

***Question 5: Do you consider it beneficial to establish new mechanisms for the procurement of additional systems security services?***

***What form of mechanism do you consider to be preferable and which services should the mechanism be targeted at?***

The CEC expects that the most effective means to ensure capability to respond to high rates of change of frequency would be to procure this service from generators, storage, load or anything else that can provide the desired response.

Cooptimising this service with dispatch is the most desirable outcome. However, it is important to ensure that such approaches encourage both large and small participants to take part. Further, the ability of potential providers of this service to withstand ROCOF above the system standard must be demonstrated in order to participate.

***Question 6: What form of cost recovery do you consider to be preferable in the design of a mechanism to procure additional system security services?***

***Should the cost recovery mechanism be designed to create stronger incentives to provide the required services?***

A well designed causer-pays scheme would be the most appropriate means to charge for additional system security services. However, such a scheme would need to address issues and inefficiencies that exist in the current approach used in causer-pays for FCAS services.

A causer-pays model must be suitable to allow participants to manage risk and support efficient investments.