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Tuesday, 31 January 2017

Con Carellas
Principal Advisor
Essential Services Commission of South Australian (ESCOSA)
Lodged Electronically: escosa@escosa.sa.gov.au

Dear Mr Carellas,

RE: Inquiry into licensing arrangements under the Electricity Act 1996 for inverter-connected generators

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 power system is currently undergoing significant change. Technology price trends, state government ambitions and legislated obligations will continue to influence its composition and operating characteristics for years to come. For example:

- The legislated Renewable Energy Target is specifically designed to drive new renewable energy generation into the market, South Australia's high quality resources make it a highly attractive state for investment in renewable energy;
- Consumer interest and uptake in solar PV (and increasingly energy storage) has been evident and growing for nearly a decade, South Australian homes and businesses will continue to lead the way; and
- The need to reduce emissions from the electricity sector has been evident for many years and the South Australian government has a clear ambition to achieve net zero emissions by 2050.

These factors mean that renewable energy will remain the predominant focus for generation investment in South Australia. The CEC appreciates the need to ensure the sustainability of the power system during this time of significant change.

Given the remarkable events of in the state over the past 18 months and the various dynamics influencing both market price and system security outcomes, we strongly recommend that a measured and cautious approach is necessary when reconsidering these licence conditions.

We agree that it may be necessary to retain or even expand elements of the licence conditions if this enables continue growth of renewable energy in the state. However, a measured and evidence-based approach is required to design and implement the right solutions for the circumstances faced by the state's power system. Insufficient evidence has been provided to date to support the status quo or any change. This review should not make any recommendations until such evidence is completed and made publicly available.

The CEC understands that ESCOSA has elected to focus on its primary objective to "*protect the long-term interests of South Australian consumers with respect to the price, quality and reliability of essential services*"[1]. However, we also encourage ESCOSA to expressly consider this alongside its second-limb objectives set out in clauses 6(b)(iii), (v) and (vii) of the Essential Service Commission Act[2]. Specifically, the licence conditions are expected to meet the long-term interests of consumers while delivering an efficient, competitive electricity market and being consistent with other jurisdictions (remaining technology neutral for example).

In order to achieve this balance the CEC recommends that the Commission clearly sets out goals for this review to:

- Deliver a forward-looking sustainable electricity market during this time of rapid technological change;
- Enable continued strong investment in renewable energy in South Australia;
- Focus on power system security outcomes, rather than prescriptive conditions;
- Ensure that the South Australian energy system is resilient to technological change at both the market participant and consumer ends of the electricity market, and;
- Take a long-term view of the South Australian electricity market as a global leader in electricity markets that integrate the capability to operate on a zero-emissions basis.

Further, the CEC expects that the Licence Conditions are grounded in sound evidence and are robustly demonstrated to deliver a sustainable electricity market that meets the above objectives.

The remainder of this submission initially sets out the CEC's views about the present standards, and then provides a summary of our responses to the consultation questions set out in the issues paper.

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[1] Issues Paper, page 5.
[2] https://www.legislation.sa.gov.au/LZ/C/A/ESSENTIAL%20SERVICES%20COMMISSION%20ACT%202002.aspx

Please contact the undersigned for any queries regarding this submission.

Sincerely,

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1 AEMO advice to ESCOSA

The CEC understands that AEMO's preliminary advice on this matter has concluded that the current standards do not create a barrier to entry so therefore should be retained. In addition, that

> "*AEMO is of the preliminary view that there may be value in including additional requirements relating to: frequency control; the rate of change of frequency, and system strength.*
>
> *AEMO is also of the preliminary view there may be a case for extending the licence conditions to other technologies such as photovoltaic, battery storage and synchronous generation.*
>
> *AEMO further noted that wind and other inverter-connected (or non-synchronous) electricity generators be required to provide active power control similar to the requirement in international jurisdictions.*"[3]

Given this we would highlight that where renewable energy technologies have not provided services to the market, such as inertia or fault current (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 market participants are incapable of assisting in this regard.

The CEC is quite concerned about the lack of analysis that underpins AEMO's advice. The advice appears to be solely based on the premise that the current requirements are delivering the right response to maintain power system security, simply because they are already in place. ESCOSA should be aware that this assertion is flawed. As explained in the box below the findings in the original analysis undertaken by NEMMCO did not support the implementation of the wind farm licence conditions as they currently stand.

NEMMCO's 2005 power system studies

In determining the ongoing need for the licence conditions in 2010 ESCOSA cited NEMMCO's (AEMO's) 'extensive studies' undertaken in 2005 that demonstrated their need[4]. It is worth revisiting these studies[5] to appreciate how they related to the advice provided to ESCOSA in both 2005 and 2009.

The studies modelled additional wind generation added to the South Australian region operating in a fixed power factor mode (unity) and modelled with the capability to operate

[3] Issues Paper, p. 16.
[4] ESCOSA, Licence Conditions for Wind Generators Final Decision, May 2010, p. 2 & 18.
[5] NEMMCO, Assessment of Potential Security Risks due to High Levels of Wind Generation in South Australia – Summary of DigSILENT Studies, December 2005.

through extreme fault conditions. To look at system security risks the studies modelled the implausible case of maximum load in South Australia coincident to maximum wind generation and maximum imports from Victoria. This scenario revealed that voltage collapse occurred in Adelaide when the Torrens Island B generator tripped off suddenly in the model.

The studies found that reactive power and fault ride through capability located in distributed locations, such as where wind farms tend to be, would have no discernible impact on the voltage collapse at Adelaide. Because the location of the wind farms is electrically distant to the load in Adelaide the reactive power and fault ride through capability of generators at these locations could not provide meaningful support to prevent the voltage collapse. It went on to state that the same would be true for synchronous generators connected at these locations[6].

The studies showed that there was no clear relationship between the voltage collapse and reactive power and fault ride through capabilities of the wind farms. Rather it found that this extreme event could only be resolved by placing the reactive support on the 275 kV transmission back bone close to Adelaide.

In conclusion these studies recommended that Network Support Control Ancillary Services be used to contract for reactive support where it was needed on the 275 kV transmission system close to Adelaide[7]. This conclusion and recommendation is inconsistent with the advice on which ESCOSA made their determinations in both 2005 and 2009.

No other studies have been released on this matter and the system security issue (voltage collapse on the 275 kV transmission back bone) remains unresolved.

The CEC and our members can appreciate that special conditions may be demonstrated to be needed this may be acceptable. We would note however that AEMO's current role in assessing generator performance during the connection process already allows for specific conditions that manage power system security risks to be tailored for individual generators and captured in their generator performance standards.

Creating stringent generator performance requirements in the absence of robust analysis and demonstration creates risk in compliance costs for affected market participants and increases the risk for investments in the market generally. We would therefore urge AEMO and ESCOSA to undertake a comprehensive reassessment of the South Australian power system in regards to this issue before proceeding with any recommendations on this matter. Some factors that need to be considered in the further analysis include solar PV deployed and the retirement of Northern Power Station.

[6] ibid, p. 9.
[7] ibid, p. 29.

2 Assessment of the current licence conditions

The following sections provide an assessment of the current licence conditions and provide a case for the detailed re-examination of the key aspects of them in order to bring them in line with ESCOSA's objectives.

2.1 Reactive power capability

The Licence Condition for reactive power capability is a requirement to deliver reactive power at ±0.395 times rated power (pro-rata to output) under all local conditions with at least half of this from dynamically variable reactive plant while allowing voltage control and reactive power control functions.

To be clear this requirement is for a capability to push voltage further down when it's already at minimum acceptable levels, and push voltage further up when it's already at maximum acceptable levels. This is a capability that will never be used. Simply assuming that this full operating range produces an efficient outcome because some generators can readily achieve it (or because it is consistent with an automatic access standard) is incompatible with the efficient investment principles expected by ESCOSA's objectives.

This requirement was apparently based on an assertion that generators would always negotiate their reactive power capability down to the minimum access standard (no capability)[8]. It is entirely unclear how this can be the case. AEMO has powers under its advisory functions (NER Clause 5.3.4A) to promote a negotiated standard that does not adversely affect power system security or other customers. Generators have no power to overrule AEMO on these matters. No evidence has been provided that the outcome of a negotiated standard will default to zero reactive capability.

In practice a range of reactive power capability is always negotiated for a negotiated access standard and AEMO will generally play a role in these negotiations. However, capability above a reasonable level (such as required by the licence conditions) is not typically an outcome because operating in this way could be detrimental to the network, system security and other customers.

The CEC recommends that the current reactive power requirements be revised to ensure that they are delivering efficient investment outcomes. This would at least include reactive power capability that is pro-rata to generator output at any point in time and dependent on the voltage at the connection point.

[8] ESIPC, Draft Statement of Principles: Wind Farm Licensing, Assessment of Submissions, September 2005, p. 6.

2.2 Fault ride through

The initial 2005 Licence Conditions were based on advice provided by ESIPC at that time[9] and expected that wind farms needed to operate for 175 milliseconds during single-phase or two-phase to ground faults.

The NER's automatic access standard changed in 2007[10], setting this maximum bar at operation of up to 430 milliseconds at zero volts through a far more stringent three-phase fault event.

ESCOSA's 2008-10 review of the Licence Conditions clearly noted the intent of the fault ride through requirement was to operate through the initial and less onerous conditions[11] (i.e. not the revised automatic access standards). However, in July 2009 ESIPC provided contradictory advice to suggest that the Licence Conditions had always intended to apply three-phase faults so the automatic access standard had to be applied[12]. This Implies that the initial advice and the plain-language interpretation of both the Licence Conditions and the NER's previous automatic access standard as written was in fact incorrect.

The Licence Conditions for fault ride through were subsequently amended based on this advice. They now require that wind farms comply with the NER's far more onerous automatic access standard requiring operation through zero volts during the most stringent (three-phase) faults for a period up to 430 milliseconds[13].

No supporting evidence for this requirement has been provided. Indeed NEMMCO's studies from 2005 modelled this capability and found that it had no discernible impact on the voltage collapse issue the identified in the model[14]. While some of the modelled wind farms did trip off in this, scenario the modelling report concluded that the assessment was inadequate to draw conclusions from and contradicted findings from other studies. As a result more work was needed to draw any conclusions on performance for local impacts such as fault ride through[15].

No further research has been made available that demonstrates the need for or benefits of riding through three phase faults in this way. The CEC therefore expects that this requirement is reviewed in light of modern understanding of wind and other generation and load equipment as it interacts with the power system and the specific circumstance in South

[9] ESCoSA, Statement of Principles: Wind Farm Licensing, September 2005, p. 42-43.
[10] AEMC, National Electricity Amendment (Technical Standards for Wind and other Generator Connections) Rule 2007, Rule Determination, March 2007.
[11] ESCoSA, Wind Generating Licensing, Draft Proposals, December 2008, p. 18.
[12] ESCoSA, Wind Generating Licensing, Draft Decision, June 2009, p. 45.
[13] The CEC recognises that 430 ms is the longest time and generally transmission protection acts faster than this, resulting in times of around 120 ms.
[14] NEMMCO, Assessment of Potential Security Risks due to High Levels of Wind Generation in South Australia – Summary of DigSILENT Studies, December 2005, p. 9.
[15] Ibid, p. 22.

Australia. This assessment should seek to identify the actual need for fault ride through capability while creating a framework that applies to all generating technologies.

2.3 5 MW Threshold

Small generators around the 5-15 MW range would generally only be economic where they can be embedded within the medium voltage distribution network. These locations are by nature electrically distant from the transmission backbone. As a result the scope for reactive power or fault ride-through capability of these units at those locations, in aggregate or alone, is unlikely to have any material impact on the transmission system (as was one of NEMMCO's findings in 2005[16]). Further, as these generators generally connect to weaker high impedance networks the scale of investment needed to comply with the Licence Conditions would be significantly higher for these projects.

The advice that ESIPC provided in regards to this matter was qualitative and based on an expectation of 'aggregated impacts' being material because small wind farms would site close to large wind farms, and that project developers might split a large project up into multiple smaller connection points to avoid meeting the Licence Conditions[17].

These arguments are not founded on available information or common economic drivers behind project development that are now evident from experience. First, a connection to the transmission backbone (electrically close) to a large project would come at an insurmountable cost for a small project making this outcome implausible.

Second, the economies of scale achieved with one large connection would deter any project developer from splitting a project into smaller parts to avoid the Licence Conditions. Registration, administrative requirements and managing risk across multiple connections and connection processes would also deter splitting a project in this way.

In practice the capital costs for a connection to a distribution network for a smaller project can make up a far larger proportion of the total project costs when compared to a transmission-connected large project. The Licence Conditions can increase these costs for smaller projects because compliance requires an increased capability due to the weaker nature of these areas of the network. The subsequent barrier to entry is inconsistent with ESCOSA's objectives and should be reviewed.

We urge a reconsideration of the 5 MW threshold given that medium-voltage-connected embedded generation presents a very low contribution to issues purportedly being resolved by the current Licence Conditions. A focus on connection point voltages at or above 66 kV would deliver more justifiable outcomes and address the barrier to entry.

[16] Ibid, p. 14.
[17] ESCoSA, Wind Generating Licensing, Final Decision, May 2010, p. 34.

The CEC notes that AEMO's preliminary advice refers to the increased possibility of three phase faults in the distribution network. This should not be taken to imply that a three phase fault in a sub-66kV distribution network would have an impact on power system security. A fault occurring in the distribution network below 66 kV would be contained to that part of the network by the local protection scheme, and not propagate into the transmission system. Focussing the Licence Conditions on connection point voltages at or above 66 kV would deliver more support to the transmission backbone (where NEMMCO's studies identified it to be needed[18]), make the Licence Conditions comparable to project scales and potential threats to system security and remove the barrier to entry for small generators created by the current conditions. This approach would better achieve ESCOSA's objectives.

3 Assessment of potential additional Licence Conditions

The CEC understands that ESCOSA would consider additional requirements where this is necessary, which is understandable given the evident outcomes from a price and energy security perspective in the state over the last 18 months. AEMO has flagged the following potential inclusions for consideration:

- Frequency control;
- Rates of change of frequency, and;
- System strength.

The CEC reminds ESCOSA of the evident lack of technical analysis needed to underpin any recommendations at this point and provides our views on these matters below.

3.1 Frequency control

ESCOSA should be aware that modern large scale wind and solar installations are generally building in the capability to respond to frequency market signals. However, these capabilities are not enabled because the market is not providing a sufficient signal to do so with certainty.

Until recently Frequency Control Ancillary Services (FCAS) prices have not been high enough to warrant participation in the market by new entrant renewable generators. In addition, recent high price events are apparently transient in nature and dependent on AEMO's reclassification of the Heywood Interconnect as a credible contingency. Although there have been a high number of these reclassifications due to transmission works they are expected to decline in frequency.

If anything the recent FCAS price events have demonstrated that the scale of available FCAS services is not relevant when the market is limited to a few participants. Increased competition should be encouraged.

[18] NEMMCO, Assessment of Potential Security Risks due to High Levels of Wind Generation in South Australia – Summary of DigSILENT Studies, December 2005, p. 14.

Retrofitting frequency control (active power control) capability to existing wind farms is an expensive exercise. Given uncertainty about the market opportunities, uncertainty about high prices coinciding with wind availability, ownership structures of wind farms and thermal generators and a history of very low FCAS prices, such investment is unlikely to come forward.

The CEC also highlights that the FCAS market is plagued with a range of other issues including:

- A 'causer pays' regime which is not reflective of actual performance. Even if the generator is not operating it would be subject to these costs, despite clearly making no contribution to FCAS requirements at that point in time (currently under review by AEMO[19]).
- Errors in the Australian Wind Energy Forecasting System that have penalised wind farms and deterred participation (currently a matter under dispute between wind participants and AEMO).
- A highly complex Market Ancillary Services Specification that was specifically designed for thermal generation, rather than asynchronous generation (currently under review by AEMO[20]).
- Market participation barriers created by the linkage between energy sales and ancillary services (AEMC rule change is complete and commences in July 2017[21]).

It is worth noting that many of these issues are under review with AEMO and the AEMC and once revised and implemented will enhance competition in ancillary services across the NEM. Given this it would be premature for ESCOSA to intervene with requirements for market participation. Where there may be market failures or inefficiencies these would be better managed through related systemic reforms led by AEMO and/or the AEMC.

3.2 Rates of Change of Frequency (and Emergency Schemes)

The CEC notes that the current redesign of the Under Frequency Load Shedding Scheme (UFLS) and design and implementation of an Over Frequency Generator Shedding Scheme (OFGS) is currently active and should be sufficient to resolve AEMO's concerns about emergency control schemes.

The CEC believes that ESCOSA's characterisation of inverter systems as being 'conservative'[22] is largely unfounded in relation to non-registered generation. These systems

[19] https://www.aemo.com.au/Stakeholder-Consultation/Consultations/Causer-Pays-Procedure-Consultation---Factors-For-Asynchronous-Operation

[20] https://www.aemo.com.au/Stakeholder-Consultation/Consultations/Amendment-Of-The-Market-Ancillary-Service-Specification

[21] http://www.aemc.gov.au/getattachment/68cb8114-113d-4d96-91dc-5cb4b0f9e0ae/Final-determination.aspx

are required to meet the AS 4777 standard for operating frequency ranges. A testing and compliance regime is in place for this standard. AEMO has undertaken an assessment of the risks in relation to this and has identified that it is "*unlikely that a mass disconnection of small-scale PV generation would occur during frequency disturbances*[23]". In other words these systems pose no significant threat to power system security. Indeed specifically in the case of South Australia the study found that UFLS would trip before the inverters trip on under frequency[24].

Future and more recent small-scale inverter installations are required to meet a more advanced revision of the AS 4777 standard which requires operation with droop control characteristics to support the system during frequency deviations[25].

Clearly the extraordinary events of September 28 2016 highlighted the importance of visibility of the operating characteristics of all generation. The CEC understands the repeat trip shut-down settings that triggered in the wind turbines during the catastrophic storm event are now being managed.

Given these factors, it is not clear how ESCOSA has identified that protection settings for inverter-based generators are more conservative than for other generators and requests that evidence be provided to support this view.

The CEC is also concerned with the strong focus on inverter-based generation in regards to this matter yet the visibility of system security weaknesses relates to all forms of generation.

In particular we highlight the unexpected and detrimental performance of Northern and Pelican Point Power Stations in South Australia during synchronous separation events in 2004 and 2005[26], and lack of visibility of the rate of change of frequency withstand capability of thermal generation commissioned prior to 2007[27] (the NER did not contain a rate of change of frequency performance standard prior to 2007).

Recent changes in the Irish electricity grid required that comprehensive testing be undertaken to understand the limitations of synchronous generation in that market. These studies concluded that high rates of change of frequency caused 'pole-slipping' for some gas generators and could lead to both costly damage to these machines[28] and grid instability.

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[22] Issues Paper, p. 14.
[23] AEMO, Response of Existing Inverters to Frequency Disturbances, April 2016, p. 4.
[24] Ibid.
[25] AEMO, *Preliminary Response to ESCOSA*, September 2016, p. 5.
[26] National Electricity Code Administrator, Report into power system incident on 14 March 2005 in South Australia, 2005.
[27] AEMC, System Security Market Frameworks Review Interim Report, December 2016, p. 18.
[28] AEMO, International Review of Frequency Control Adaptation, page 29, October 2016.

The CEC also highlights the performance of synchronous generation during the separation event of November 1 2015[29] and the black-start process following the storm on September 28 2016.

In addition, as was seen during the November 1 2015 event there are cases where market signals (in energy and ancillary services markets) can create disincentives for operation that supports a secure system. For example, synchronous generator governor settings may be set efficiently in this regard.

The CEC recommends that a comprehensive review and testing regime investigate all matters in relation to high rates of change of frequency prior to progressing with any specific standards or requirements for withstanding extreme events. Any subsequent requirements must be applied to all generation technologies as extreme events require the system as a whole to work together to limit the impacts and assist in recovery.

3.3 System strength

While system strength has been highlighted as an issue in regards to the changing nature of generation the diverse range of impacts and issues in relation to system strength make it more complex than the generator Licence Conditions are expected to deal with. We note that AEMO has highlighted some issues in their preliminary advice in relation to the connection of new generation, however system strength issues also stem from the decommissioning of existing generation (for example the closure of Northern Power Station would have had a significant effect on fault levels).

An additional consideration is the proliferation of residential and commercial scale solar and storage. Impacts on system strength from this additional generation are not captured in any connection requirements.

The locational nature of this issue also makes it challenging to address, for example while unstable generator operation may be experienced in weaker systems it may only be the performance of those local generators that is affected. In this case any issues may be resolved in the development of their performance standards. Even if this is addressed it may not resolve or manage the fault level requirements that ensure the safe operation of the network's protection equipment.

The CEC's view is that system strength is broadly influenced by the changing nature of generation, consumption and consumer expectations. It is a system-wide (and even societal) issue that generator performance standards would not necessarily address. The safe operation of network protection equipment should be the primary driver for ensuring adequate system strength. While individual generators may be required to address locational connection issues to meet their performance standards, they are accountable for their performance through AEMO's compliance regime. Conversely NSPs are responsible for the

[29] *AER, Report into market ancillary service prices above $5000, February 2016, p. 8-9.*

safe operation of their networks and should therefore take responsibility for the availability of sufficient system to ensure the safety of the community. This should occur through direct investment in equipment or network support agreements with third parties under the relevant regulatory investment test.

4 CEC responses the Commission's questions

In addition to the discussion in the above sections we provide a response to each of the questions posed by the issues paper below.

Question 1: Should the Commission continue to require the existing special conditions?

The current conditions were not well supported by the available evidence. However, should a strong evidence base be provided for some form of special conditions to be retained this should be the case. On this basis the CEC believes that this question cannot be answered in the absence of a clearly published and strong justification from AEMO's analysis that can support a need consistently with ESCOSA's objectives.

The current requirements for reactive power and fault ride through are in excess of any expectations and capability of synchronous generators connected in South Australia. The CEC's view is that penalising one technology over another in this way is inconsistent with ESCOSA's efficient and competitive market objectives. System security is a system-wide phenomenon and such conditions should therefore apply to all generation technologies if they are needed.

Question 2: Should those Licence Conditions be varied?

While it may be the case that some generators are able to meet the Licence Conditions there is a need to ensure any additional capability called for by the conditions is justified and that they do not created unnecessary barriers to entry. At present neither AEMO nor ESCOSA has provided sufficient evidence to support the current format for the standards. Specific changes that should be considered include:

- Reforming the approach to the Licence Conditions to apply to all generation technologies (consistently with the ESCOSA's objective of regulatory consistency).

- Revising the registration threshold to apply to registered generation connected at voltages of 66 kV and above as this would scale generation projects and any support achieved by the Licence Conditions appropriately with their capability to meaningfully support the state's transmission backbone (consistently with ESCOSA's objective to facilitate entry into the market for small generators in this case).

- Revising the reactive power requirements to ensure that they are delivering efficient investment outcomes and not requiring unreasonable performance. This would at least include reactive power capability that is pro-rata to generator output at any point in time

and not expected to push connection point voltages outside of the normal operating range (consistent with ESCOSA's objectives for efficient regulation).

- Revising the fault-ride through requirements once AEMO has published analysis confirming these or some other requirements are justified (consistent with ESCOSA's objectives for efficient regulation).

The CEC urges caution in progressing new generator-specific requirements for frequency control given the significant changes underway in ancillary service markets. These changes should play out before any new amendments are considered.

The management of rates of change of frequency is a system-wide issue for which generation-technology-specific solutions are not appropriate. A comprehensive understanding of all generation technologies under these conditions is required and the CEC recommends a focus on synchronous generators in this regard.

The role of network service providers in maintaining sufficient system strength should be investigated from a safety perspective. Case-by-case assessment of locational requirements for generator performance should reveal the needs for enhancement of system strength where this may be required to meet generator performance standards. The latter solution does not require intervention by ESCOSA as the NER's compliance regime already applies.

Question 3: Should Licence Conditions be made to apply both to prospective and existing licensees?

No justification has been provided to apply retrospective Licence Conditions to existing generators. The common practice of applying such requirements to new entrants should prevail unless demonstrated otherwise.

Despite this there is likely to be a need to properly understand issues such as the performance of synchronous generators under high rates of change of frequency, in which case retrospective obligations to demonstrate performance would be essential. Similar obligations have recently been established by Eirgrid in Ireland and should be considered for the South Australian case.

Further, if retrospective changes are considered they must be measured and considered in light of compliance costs.

Question 4: Should generation licence holders be required to upgrade or refurbish plant and equipment to meet the Licence Conditions of the day?

No, unless performance is demonstrated to not be, or no longer be, consistent with that negotiated at the time of connection. Alternatively, if the performance of registered generators has been shown to have a detrimental effect on the secure operation of the power system there is not a clear case for perpetual revision of connection standards.

Despite this the philosophical nature of the changes to the electricity market may require new expectations to be placed on those that are best placed to manage issues and this may not be generators. For example, the CEC's view is that managing system strength provides a social good by ensuring a safely operating network, in which case network service providers should be accountable for ensuring sufficient strength.

Question 5: Do you have any comments on AEMO's preliminary report?

AEMO's advice has not been supported by transparent and robust engineering analysis. The CEC expects that no decisions are made in relation to the revision of the Licence Conditions until such analysis is completed and made publicly available.

Other comments in response to AEMO's considerations are made throughout this submission.

Question 6: Are there any other matters relevant to the inquiry that the Commission should consider?

The CEC recognises the intent for these connection standards to be transitional. There is much activity in this area at present and the changes are occurring faster than ever in the market. The CEC recommends that any Licence Conditions implemented subsequent to this review should undergo an annual review or 'request for comment' process to ensure they remain relevant to the changing system conditions.