



Mr John Pierce
Australian Energy Market Commission
Level 6, 201 Elizabeth Street
Sydney NSW 2000
Lodged via www.aemc.gov.au

Tuesday, 12 December 2017

Dear Mr Pierce,

RE: Frequency Control Frameworks Review Issues Paper (ref EPR0059)

ENGIE appreciates the opportunity to comment on the Australian Energy Market Commission (AEMC) Frequency Control Frameworks Review issues paper (Issues Paper).

ENGIE supports the AEMC in conducting this self-initiated review, as there are a number of frequency control issues currently under consideration within various forums, and it would therefore be beneficial to draw these together to the extent that this is practical.

ENGIE broadly supports the objective of the review, which is to recommend the combination of changes that are necessary to provide a secure power system at the lowest cost to consumers. ENGIE would temper this somewhat with the caution that changes should only be recommended where there is a clearly defined problem that needs to be addressed in order to maintain a secure power system.

Adequacy of current frequency control arrangements

ENGIE notes that the issues paper intends to consider whether the existing frequency control ancillary service (FCAS) market arrangements remain fit for purpose, or whether they need to be changed in some manner. ENGIE agrees that if it does become evident that the existing FCAS arrangements are no longer suitable, then consideration should be given to appropriate modifications. Before the current FCAS arrangements are significantly changed however, the AEMC should ensure that this is the most appropriate course of action. In addition to the suitability of the current FCAS arrangements, the AEMC should also consider whether the existing arrangements need to be complimented with additional services.

To emphasise the above point, the AEMC review may establish that the performance of power system frequency control is currently deficient in some manner, and could then conclude that the existing FCAS arrangements are no



longer appropriate. However, it may be more correct to conclude that the existing FCAS arrangements are still performing their function as intended, but that the power system frequency is now exhibiting new characteristics that require additional services to be adequately managed.

Need to include forecast improvement options

The Issues Paper identifies 'daily ramping requirements' as being due to changes in non-dispatchable output as the sun rises and sets, i.e. solar PV variation. The Issues Paper also identifies 'rapid ramping requirements' as being due to sudden changes in non-dispatchable sources due to weather changes, and demand due to changes in home battery and energy management systems.

The discussion on ramping acknowledges that the growth in non-dispatchable capacity will lead to larger changes within the five-minute dispatch interval, which need to be accommodated by scheduled plant and FCAS providers. If the Australian Energy Market Operator (AEMO) are able to better predict the output of the non-dispatchable capacity from one five-minute period to the next, then a greater proportion of the change in non-dispatchable capacity can be incorporated into the five minute dispatch process, leaving a smaller proportion to be "mopped up" by the FCAS providers.

The need to improve AEMO's five-minute forecasting process has been highlighted by the University of Wollongong which has stated that "The current AEMO neural network model is limited in its capability, and should not be considered suitable to accurately perform dispatch demand forecast without considering more modern approaches"¹

It seems appropriate that as well as efforts to improve the quality of the frequency control arrangements, effort should also be applied to reducing the dependence on frequency control in the first place. One important contribution towards such an effort would be to improve the quality of the five-minute forecast of demand, wind generation, solar generation and other non-scheduled generation.

Many factors contributing to frequency performance

The issues paper notes that in recent years, it has been observed that the power system frequency has been less tightly held to 50 Hz under normal operation conditions, and that this deterioration has been attributed to a decline in generator governor response. The factors that are contributing to this deterioration in frequency control during normal operating conditions is a matter under detailed investigation by the AEMO Ancillary Services Technical Advisory Group (ASTAG). Whilst it is true that some individual commentators have nominated a reduction in generator governor response as the cause of this deterioration, others (including ENGIE) have noted that there are likely to be a number of contributing factors.

For example, one factor that is likely to be contributing to the deterioration in frequency control is the reduction in inherent load relief that has occurred due to the reduced number of synchronous motors that make up the overall power system demand. Synchronous motors consume less power as the system frequency falls, and thus provide

¹ M. Hagenbuchner and A.C. Tsoi. Evaluation of Neural Networks Models for Australian Energy Market Operators Five Minute Electricity Demand Forecasting. Submission to Australian Energy Market Commission, 13 December 2016.



a natural stabilising effect on frequency. This stabilising effect is however, reducing with the decline in the number of these types of motors.

Another contributing effect, which has been commented on widely, is the reduced power system inertia due to the reduced number of synchronous generators (and motors) on the power system. Another contributing factor is the performance of AEMO's Automatic Generator Control (AGC), which is a complex control mechanism that is being closely examined by the ASTAG. Yet another factor that has been identified is the interaction between the Basslink frequency controller and AEMO's AGC system. Again, this is a matter under investigation by the ASTAG.

As summarised above, a full understanding of the reasons for the observed deterioration in power system frequency control under normal conditions can only be achieved through a thorough investigation of all potential contributing factors, and is unlikely to be due to any one cause alone. ENGIE strongly encourages the AEMC to avoid ascribing the cause to generator governors, or any other single issue, until the detailed investigations of the ASTAG are complete, along with the results of the AEMC review.

Markets rather than mandating

In addition to suggesting reduction in generator governor action as the cause of deterioration in normal frequency control, some commentators, including the Finkel Panel's *Independent review into the future security of the national electricity market*, have suggested consideration of the option that all synchronous generators be *required* to provide a certain level of governor response. ENGIE is strongly opposed to any consideration of mandating frequency action from any technology class, whether synchronous generators or other. As well as being in violation of the technology neutrality principle that underpins the National Electricity Market (NEM), such an approach would lead to inefficiencies, as it would not encourage other technologies to contribute to a solution.

If it were confirmed that the management of power system frequency needs to be improved, rather than mandating that a certain technology class must deliver a solution, a far better approach would be to define the service that is deficient, and then provide a commercial incentive for any viable technology to contribute to the provision of that service. This will ensure that the most efficient outcome possible is achieved as it will attract a number of potential service providers, and through competition, will deliver a lower cost. It also leaves the door open to potential new technologies that may emerge into the future that may also be able to contribute.

Market complexity

Some commentators have observed that there are already eight frequency control products, and have suggested that introducing yet even more frequency control products will introduce unnecessary complexity. ENGIE does not support these views. Any new arrangement to manage power system frequency, whether it is a new fast frequency control service, arrangements for inertia, mandating governor response, changes to AGC, or others, inevitable involve a need to define what is proposed, develop new rules and definitions, establish a compliance mechanism and importantly, arrangements to allocate the costs (who pays?).

Whilst it might seem attractive to some commentators to simply mandate a service obligation onto some party or other, such an approach does not avoid the need to work through the matters outlined above, and does not avoid the costs. It does result however, in far less transparency and does not encourage new entrants into the market.



Therefore, whilst ENGIE does acknowledge that these matters of power system frequency control are complex, we should not fall into the trap of thinking that by mandating delivery from one group of participants that we are somehow avoiding the complexity and cost. In fact, it is likely to increase both complexity and cost, but do so in a less transparent manner.

ENGIE notes that some commentators complained at the time that the FCAS markets were introduced in 2001 that they were unnecessarily complex. These comments overlooked the fact however, that the complexity was inherent in the need to control power system frequency. Trying to gloss over the complexity by imposing mandatory obligations reduces transparency and therefore, does not encourage a competitive response.

Primary frequency control

The term "Primary Frequency Control" is being used increasingly as part of recent discussions on power system frequency performance in the NEM. Although this term has common use in various international technical documents, it has not been a common term up until recently in the context of the NEM and is not used at all in either the national electricity rules or the national electricity law.

The term is often used to refer to generator governor response, as evidenced by paragraph two on page iv of the Issues Paper executive summary. ENGIE is concerned that the introduction of this phrase within the context of the NEM is tending to encourage a technology specific focus on generator governors, which is at odds with the important NEM principle of technology neutrality.

ENGIE is strongly of the view that any changes to frequency control arrangements should preserve the markets based approach, which is underpinned by a principle of technology neutrality. In other words, any technology that is capable of meeting the defined requirements of an FCAS service should be eligible to participate. Falling back on historical terms such as primary frequency control is inconsistent with the principles of technology neutral markets.

ENGIE trusts that the comments provided in this response are of assistance to the AEMC in its deliberations. Should you wish to discuss any aspects of this submission, please do not hesitate to contact me on, telephone, 03 9617 8331.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Chris Deague". The signature is fluid and cursive, with a prominent initial "C".

Chris Deague
Wholesale Regulations Manager