AGL Energy Limited
ABN: 74 115 061 375

Level 22, 101 Miller St
North Sydney NSW 2060

Locked Bag 1837
St Leonards NSW 2065

T: 02 9921 2999
F: 02 9921 2552
agl.com.au

Sunday, 6 November 2016

Clare Greenwood
Forecasting
Australian Energy Market Operator
GPO Box 2008
Melbourne VIC 3001

Submitted electronically to Op.forecasting@aemo.com.au

Dear Ms Greenwood,

RE: Draft Report and Determination: Energy Conversion Model Guidelines

AGL welcomes the opportunity to comment on the proposed Draft Report and Determination on the Wind and Solar Energy Conversion Model Guidelines (Draft Report).

AGL is a significant energy retailer in Australia with over 3.7 million electricity and gas customers. AGL has a diverse power generation portfolio of over 10,500MW including base, peaking and intermediate generation plants, spread across traditional thermal generation as well as renewable sources including hydro, wind, solar, landfill gas and biomass.

AGL supports AEMO's third stage consultation in recognition of substantial discussions on various issues raised in second stage consultation, particularly on the determination not to include Optional Possible Power in the the revision of ECM. AGL acknowledges that there were key issues relating to Possible Power that might not have been apparent during AEMO's deliberation of second stage consultation. AGL understands that further information and clarifications provided to AEMO since had suggested the inclusion of "Estimated Power" in the ECM should be re-considered.

AGL supports the inclusion of Estimated Power in the ECM for the following reasons:

- It has the pontential to improve the accuracy in setting the dispatch targets that will closely align with near-real time operating conditions at the wind and solar farms;
- Higher accuracy in estimates is essential in minimising the risk of scheduling and FCAS errors resulting in a more efficient dispatch and market outcome;
- Over time, it has the potential to enable the wind and solar farms to participate in FCAS market.

AGL provides the following response to questions related to Estimated Power

1) AGL would support the name "Estimated Power". AGL understands that there are other current names used specifically by various operators or manufacturers for different purposes, which may encompass elements relevant to Estimate Power. It is important that the new signal name must not share with any existing names to ensure clarity and precise interpretation by all participants. In addition, the intention of the signal is to essentially provide AEMO the most likely output a wind or solar plant can produce based on the near-real time available information from the operation at the site. That is, it is not strictly a forecast in the usual meaning of the word, but an estimate of the physical and operational ability of the plant to send out generation to the grid. Such an estimate is already provided by a schedule generator as dispatch "availability" based on relatively predictable fuel source and energy conversion production process.
2) AGL considers the limit that may be imposed by the connection asset (by definition, behind the connection point) should be separated from Estimated Power. The limit imposed by Connection Asset would be provided to AEMO through the proposed "Local Limit" in this consultation. This distinction is important as Estimated Power respresents what the plant (ie the turbines, the control systems, electrical equipment and devices etc) can deliver to the connection point via the electrical equipment (connection assets) that connects the plant to the connection point. In other words, conceptually, the plant is the generation equipment and the connection assets is the

transmission equipment that deliver the plant's estimated output to the connection point. The Estimated Power is an estimate of the output from the generation equipment.

3) AGL would support the one signal approach. As discussed in item 2 above, the Estimated Power allows AEMO to know with reasonable certainty what the generation plant can produce at the end of the 5 minute dispatch interval. By combining this estimate and the Local Limit SCADA signal (which represents limits that may be imposed by the balance of the entire wind farm facilities up to the connection point/interface with the grid), AEMO will be able to decide what the dispatch targets should be, taking into account any other limits external to the wind that may be imposed by the networks and market.
4) AGL is of the view that if the Estimated Power is adopted, it should not be necessary to use the the ramp rate to determine the ramp up or down of power over the 5 minutes dispatch interval. The intention is that when the Estimated Power is determined, it will take into account various state of each turbine so that any potential increase or decrease of output that would be known to the control system. These changes woud take into account all the units that are capable of producing power and the time it will take each turbine to produce those power (that is, those generating and paused. The power control system would have access to data for each turbine on known delays, brake program, re-set or start up times etc that will impact on the rate at which a turbine will be able to generate the power. AGL consider that this in-depth knowledge of the behaviour of turbine would be more robust and reliable in estimating the potential power output than a single ramp rate applied across the entire cluster of turbines at the site.
5) AGL considers the level of details to be appropriate. In particular, the intended primary value associated with what the generation plant is able to produce is appropriate and not overly prescriptive. However, AGL considers the following changes to be necessary:
    a. Replace "forecast" with "estimate". While "forecast" could be taken to be a form of "estimate", AGL is concerned that it can be associated with a predictive quality that may be associated with a high degree of statistical variability. AGL considers that Estimated Power would be computed through established wind, electrical and mechanical engineering principles grounded on mathematical algorithms of how much electricity each turbine and group of turbines is able to produce and be transmitted to the connection point. This calculation process produces a physical quantity that can be executed with a reasonable level of accuracy over a short duration subject to a given scope of variables. AGL considers "estimate" to be a better representation of the quantiy than "forecast" as the quantity can be calculated based on robust physical principles.
    b. Remove "connection assets". Please refer to AGL's response to item 2. As a way of further explanation, connection assets usually consist of private transmission line(s) and transformer(s)/switch yard(s) that serve to transmit the electricity from the generation plant to a jointly defined interface with the grid that constitutes the connection point.
    c. Insert "at the connection point" after "active power". This is important as the "connection point" is a critical point of reference in AEMO settlement, metering regulations, connection agreement with the networks, and the AEMO power system and security modelling. It is also important in delineating factors that the generator would consider in calculating the Estimated Power and those that are that are in the domain of the networks.
    d. Proposed changes to the first paragraph of the definition is thus:

        SCADA Estimated Power is the Generator's estimate in MW of active power at the connection point at the end of the next dispatch interval, subject to only technical factors affecting operation of its generation.

6) AGL welcomes AEMO's approach in implementation that involves validation on the accuracy of Estimated Power and exploring the possible issues and solutions to ensure an effective set up and usage of Estimated Power as intended.
7) AGL supports the notion that if Estimated Power is provided that specifically takes into account the effect of extreme wind cut out conditions, it is unlikely that the Extreme Wind Cut Out count as requested in this consultation would add any further value. AGL notes that while it may be possible in a long run to expand and include prediction of the wind conditions over the next 5 minutes, it would initially be focussed on the instantaneous wind condition (speed and direction), which could include the extreme wind cut out factors.

Please contact Kong Min Yep on 03 8633 6988 or kyep@agl.com.au if there are any issues raised with regards to AGL's submission.

Yours sincerely,

Kong Min Yep
Wholesale Electricity Advisor