AESO Discussion Paper – Short-Term Wind Integration
Stakeholder Comment Matrix

Section	Subsection	Stakeholder Response
4.0 Policy Coherence	**<u>Wind Integration Principles</u>** 1. Any potential suite of wind integration tools must ensure the safe and reliable operation of the system. 2. Market solutions are preferable to administrative solutions. 3. The energy market merit order is primarily a tool for balancing energy requirements on the system. 4. All generation should be treated fairly while recognizing their unique characteristics. 5. Ancillary services are a tool to protect the system from events that cannot be reasonably controlled. The draft principles are intended to outline a preliminary view on the interpretation of FEOC as it relates to the interaction between wind generation, the energy market and ancillary services. This relationship must be explored in order to develop a long-term wind integration plan that is grounded in policy and consistent with the current market design.	The issue appears to be ACE mitigation rather than an issue that is caused by wind. Wind appears to contribute at most to 25% of the ACE issues that were indicated by the simulator. Therefore the section 4.0 should be rephrased to discuss ACE as an issue rather than the paradigm that Wind Integration is the issue. Item 1.0 In general, any suite of tools used to mitigate ACE issues must ensure the safe and reliable operation of the system. This should not be stated as wind integration specifically. Item 5 indicates that AS is used to protect the system from events that cannot be reasonably controlled. There is no mention of what is reasonable and from whose perspective is it reasonable. It is unclear if the AESO has tuned the forecasting model to focus on events that create ACE issues, without this clarity, it is difficult to comment specifically on the paper. Unfortunately during the forecasting pilot, the forecasters were not specifically asked to tune their models on any one particular issue. I recommend that if wind ramping creates some of these issues, then perhaps the forecasting could be tuned to these issues specifically.

6.0 Short-Term Integration Tools	**6.1 Energy Market Merit Order** Stakeholder feedback on using the EMMO to integrate wind generation is requested with the following key points: • At what point is over-dispatching the merit order for ramp rate unacceptable from a FEOC perspective? • If the need to over-dispatch EMMO can be anticipated prior to real-time, should tools such as incremental ancillary services and/or WPM be used in place of over dispatching EMMO? • In the long-term, should new ancillary services be developed that will reduce the instances of over dispatching EMMO for ramp rate both for wind and for other reasons?	In other markets the concept of over-dispatching is completed outside the merit order so that there is little impact on the pricing and associated volatility. It is unfortunate that the market design in Alberta has resulted in a merit order that is so dramatic, with a significant portion of the merit order as zero bidders, and the remainder at significantly higher pricing. Has there been any thought to potential alternative market design parameters that would provide a more gradual merit order? As indicated previously, without tuning the forecasting model to focus on ACE causing events from wind power, it is difficult to know how much could be forecasted and potentially avoid the use of over-dispatching EMMO. It is interesting that the use of EMMO is not being contested in the use of ACE events that are not generated by wind power, and the focus appears to be only on EMMO usage for wind power ACE events. How does this match with the principles of FEOC? Again, the issue is ACE events, rather than wind power ramping. EMMO should be used transparently for any ACE causes, and there should not be discrimination between wind caused versus other causes. It is often difficult in the moment to determine which events were wind caused rather than from other causes. It is unfortunate that wind power management is being considered as being used in all ACE events, but EMMO is only being considered for non-wind events. Again how does this match with the principles of FEOC?

	6.2 Operating Reserve
	
	Regulating Reserve
	
	• Is it appropriate and FEOC to procure RR day-ahead when the wind forecast suggests they will be required to mitigate wind volatility?
	• How should the volume, if any, of incremental active regulating reserve be determined?
	    o Based on the volume required to accommodate forecast wind energy?
	    o Based on a tradeoff between the cost of incremental reserve and the value of lost wind production?
	    o Based on the volume required to reliably integrate wind without planning to rely on tools such as over dispatching the EMMO?
	• Should standby RR be activated in near-real time to manage the system over and above current RR levels?
	    o Activating standby reserve would need to be done prior to an actual problem because moving reserve from standby to active make a situation worse as the unit activated alters its generation to provide the service.
	    o Is it appropriate and FEOC to activate standby RR near real-time (T-2 or even T-30min) when the near real time wind forecast and system
		If a generator of any kind forecasts that there may be fuel volatility, RR is acquired on a day ahead basis. Why would this be any different for wind power? Again, if the wind power forecast is tuned to specifically target these events, then this will provide improved forecast of RR requirements.
		
		RR should be determined based on the potential for ACE issues, rather than for wind specific issues.
		
		Unfortunately the paper does not review the costs (duration, time of day, season, and frequency) of these events so that a study comparing the alternative of AS versus EMMO could be completed. Perhaps a high EMMO for short duration, short frequency in low power pool price timeframes is more palatable than significant purchases of RR ahead of time. The report does not provide any basis for this comparison. Additional information is required for stakeholders to provide feedback.
		
		As with any ACE situation, RR should be used as required, when EMMO no longer has any potential to mitigate the situation.
		
		In addition, the simulation does not appear to be able to accurately predict the ACE events for the base year 2008. This is concerning since the simulation is predicting 50% more events than actual. If the simulation model is overpedicting, perhaps the number of ACE events in the three scenarios are also overpredicted. Efforts should be made to ensure that the simulation is accurate within tolerance. Currently this does not appear to be so.
		
		Again, the forecasting pilot did not focus on any one particular event. Fine tuning the forecasting tool to specifically anticipate ramping events will provide a more effective basis for determining the levels of RR required and the potential to activate standby RR.

	conditions suggest they will be required to mitigate wind volatility? • In the long-term, should regulating reserve be split into a load following product and an AGC product?	

	6.2 Operating Reserve
	
	<u>Contingency Reserve</u>
	
	• Should the AESO use mandatory active contingency reserve to manage unexpected decreases in wind generation if allowed by NWPP?
	• Should the AESO carry incremental active contingency reserve to insure against decreases in wind generation?
	    o This reserve could be tailored for specific hours when wind is forecast to ramp down and load forecast to ramp up, for example.
	    o The alternative is likely to fully dispatch EMMO for ramp rate requirements when wind energy unexpectedly declines.
	    o This is consistent with the use of contingency reserve to replace lost generation from other resources.
	• Should standby contingency reserve be activated in near-real time to manage the system, i.e. the system would carry more than the minimum
		It is unfortunate that the NW power pool currently does not use contingency reserves for wind speed drop off. This restriction does not comply with FEOC. This potential usage of contingency reserves was identified as a potential solution in 2005 as part of the variability studies from several stakeholders. The AESO should lead the development of contingency reserves as usage for wind power since this complies with its principles of FEOC. Currently the AESO has taken a passive approach and is waiting for leadership from NW power pool.
		
		Again, the accuracy of the forecasting is dependent on the forecasting model being tuned to the specific event. Until this is completed it is difficult to determine the potential issue that the AESO is trying to resolve. It is possible that the number of ACE events could be dramatically reduced with a significant improvement of the forecasting.
		
		The current forecaster WEPROG currently provides a probabilistic forecast. Can this be used to determine the appropriate level of RR that are purchased on a day ahead basis.
		
		The principle of FEOC should be used to help guide the answers to the questions in this section.

	active contingency reserve in some hours to manage wind variability? o Reserve would need to be activated prior to an actual problem. o The accuracy of the wind forecast inside T - 2 or even T - 30 minutes will determine the likelihood of activating standby reserve only when required. • Should unexpected decreases in wind generation be treated equivalently to other generation contingencies, i.e. the system carries sufficient contingency reserve to manage unexpected loss of generation?	
	6.3 Wind Power Management • Under what conditions is it appropriate to use WPM? o In advance of conditions that might place the system at risk? For example, if wind is at a high level and expected to ramp down concurrently with the morning load ramp up, should WPM be used proactively or should a solution such as activating standby contingency reserve be used? o When the wind ramp is not forecast? This implies the AESO purchase sufficient ancillary services to accommodate forecast ramps. o When the wind ramps up more rapidly	WPM should be used as a measure of last resort. Again, the forecast will only be as good as the events it is focused on forecasting. A forecast that is optimized to deliver on average error, will not perform well with forecasting ramping events. The stakeholders have not been informed as to what events the forecasting model is focusing on. Until this information is available, this is difficult to provide feedback. Wind power management that is completed across the board may not improve the situation overall. Should significant ramping come from one specific area, WPM in another area that has negative covariance will simply exacerbate the issue. Regional WPM should be used to reduce the frequency and duration of potential over-dispatch scenarios. In addition, given that wind power has the ability to be disbatched down (although not up), wind power should be paid for being dispatched down since there is a potential cost saving for AS or RR dispatch.

<table>
<tr>
<td></td>
<td>
<li style="list-style-type:none">
<li style="list-style-type:none">than the EMMO can accommodate without over dispatching?

This allows wind production to increase only as fast as the EMMO can ramp down and implies that incremental ancillary services will not be purchased to accommodate potential wind ramp up events.
Under supply surplus conditions?
Should the AESO establish a WPM market solution or is pro-rata appropriate?
How would a WPM market interact with the solution for supply surplus and/or congestion management?
Would participation be limited to wind facilities and how would costs be allocated?
In the long-term, should the AESO develop an ancillary service that accommodates wind ramps up by reducing production from in merit generators and/or wind facilities themselves?
Is this an appropriate cost for load to bear since wind can manage this operational challenge through a WPM protocol?
</td>
<td>Again this could be a solution for ACE events, rather than wind integration issues.</td>
</tr>
<tr>
<td></td>
<td>
6.4 Wind Power Forecast
Should the system be able to accommodate forecast wind generation?
Purchase sufficient reserve to accommodate forecast wind
</td>
<td>Within Alberta there are a significant number of large final emitters that are regulated under the Alberta Government Specified Gas Emitters Regulation and are dependent on the generation of offsets from wind power in Alberta. Wind power management will reduce the ability of these facility to be under compliance and</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td>
generation.
The alternative is to rely on more WPM and /or over dispatching EMMO.
Should the wind power forecast for individual facilities (or the aggregate wind forecast) resemble a must offer must comply obligation in the long-term?
If the forecast creates obligations for wind facilities, does it also create obligations for the system to absorb the forecast without using WPM?
</td>
<td>drive up the cost of compliance. As such, WPM should be used as a measure of last resort, after expending all other efforts.</td>
</tr>
<tr>
<td></td>
<td>
6.5 Summary of Integration Options

<u>Short-Term Requirements</u>

Determine the volume, mix and procurement strategy for incremental ancillary services as wind capacity increases
Develop a process to implement WPM
Develop guidelines on the use of WPM in real time or near real time

</td>
<td>
Short term

Calibrate the simulation model to accurately predict events in 2008. Each event should be matched to determine if the simulation model is acceptable. This should be done on a transparent manner and invite the wind power stakeholders into the analysis.
Re do the simulation to determine the total number of ACE events.
Categorize the events to understand the patterns of events, time of day, duration, frequency, time of year.
Complete a commercial analysis of the impact of EMMO usage, RR and the loss of compliance alternatives for LFE regulated under AB SGER.
Publish the results and seek further input.
Focus forecasting models to predict ramp events and others that are troublesome that could potentially cause ACE issues.
Complete a forensic analysis of the other causes (75% of incidents) of ACE events and potential solutions for all ACE events.

Without a credible simulation model, the steps identified in 6.5 are
</td>
</tr>
</table>

		premature.
	6.5 Summary of Integration Options **<u>Potential Long-Term Direction</u>** 1. Mitigate wind power primarily through the use of centrally procured ancillary services o Minimal use of WPM o No must offer must comply obligation for wind o A ramping service would be developed 2. Mixed solution o WPM used to mitigate wind ramp up events o Reserve to mitigate wind ramp down events o A ramping service may be developed o Could entail a form of must offer must comply obligation for wind generators particularly to control ramp ups 3. Create similar obligations for wind generators as exist for other generators o Wind power forecast could be part of a must offer must comply obligation o Could require wind to be firm at T – 2 o Wind firming service developed either	

	by the market or by AESO	