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.	1. It is the AESO's duty according to the *EUA* s. 16 to operate the system in a "fair, safe, reliable and economic" manner as well as run an " efficient and openly competitive market". A variety of tools, rather than a single solution, would provide for the best protection of system stability. 2. As Alberta's electricity framework is designed as an "Energy Only Market" any solution but market solutions under normal operating conditions would have to lead into a policy discussion and are counterproductive. 3. The merit order is and should continue to be the primary mechanisms for balancing energy requirements on the system. However, as it works today, it lacks some incremental functionality demonstrated in other market environments that could further enhance its effectiveness. 4. We agree, all generation has to be treated fairly, and recognized for their unique characteristics. 5. Ancillary services are the core tool, but need to be one part of a comprehensive portfolio of solutions for balancing the system at all times. The long term wind integration plan not only needs to address the physical aspects of the market, but also needs to reflect the inherent value transfer associated with wind production. There is a fundamental association between those who bear the vast majority of the costs associated with integration and the value that is brought to the price duration curve from wind resources.

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: 1. At what point is over-dispatching the merit order for ramp rate unacceptable from a FEOC perspective? 2. 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?	Energy dispatch is already the market tool used for handling variation. It is the most economical way to cover a majority of the transient ramps. The power pool will be able to see when an up or down ramp is approaching through the use of wind graphs and adjust for it, in advance. Better predictability in the wind energy forecasts due to improvements in the wind level forecasts will result in increasing confidence in the usefulness of EMMO and reduced market volatility. An overriding consideration must be that wind energy resources be able to comply with controllable up-ramp rate caps (instead of using a merit order) that will necessarily control the up-transient to match the responsiveness and capacity of the ancillary services. However, only extreme transients would be expected to result in an actually constrained up-ramp rate. If the EMMO is implemented for wind energy resources, it must include all wind energy sources, and not exempt small wind energy sources to ensure it does not result in "an uneven playing field." 1. It is likely that if a situation is deemed contrary to FEOC principles by one customer class, it is to the detriment of another. Handled and calculated properly through the analysis of comprehensive data sets, it is likely that nearly every instance when this practice could be deemed contrary to FEOC principles could be avoided. 2. If the need can be ascertained prior to real time, incremental products and dispatching techniques should be used in place of an inefficient use of EMMO. Handled properly this would eliminate the need to even consider WPM. 3. NaturEner would encourage the AESO to develop Ancillary products and procure those, with the clear purpose to balance the the system in a comprehensive manner.. NaturEner also suggests

	3. 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?	including dynamic and intra hour products to further eliminate the need for WPM.
	6.2 Operating Reserve **<u>Regulating Reserve</u>** 1. Is it appropriate and FEOC to procure RR day-ahead when the wind forecast suggests they will be required to mitigate wind volatility?	1. The primary objective of the wind integration plan is to provide as much diversity, flexibility, and responsiveness into the market as is possible. Active Regulating Reserve should be optimized and as efficiently deployed as possible. If doing this DA proves to be more efficient, it should be done. Proper portfolio forecasting should demonstrate levels that should be procured DA. To minimize the need of these day-ahead transactions, NaturEner supports the standardized production forecasting tool to be implemented across the Province to maintain quality and consistency in generation forecasting. The collection and distribution of the forecast data does need to respect the proprietary nature of the information. The AESO should look to create incentives for wind to be as precise as possible with their individual forecasting efforts.

	2. How should the volume, if any, of incremental active regulating reserve be determined? a. Based on the volume required to accommodate forecast wind energy? b. Based on a tradeoff between the cost of incremental reserve and the value of lost wind production? c. Based on the volume required to reliably integrate wind without planning to rely on tools such as over dispatching the EMMO?	2. Today's marketplace provides a number of very good examples of comprehensive solutions to the integration of wind. The AESO needs to align its market and dispatching methodology to leverage these practices within the Alberta system. A portfolio of dynamic and intra hour products, deployment of reserve pools, better forecasting and diversity tools, as well as the proper acquisition and deployment of traditional reserve products provides for a much more efficient and effective management of balancing needs . a. Taking into account the above, done properly, the full potential output of properly forecasted generation can be accommodated. b. Again by taking a more comprehensive approach to the balancing portfolio this 'trade off' scenario can likely be mitigated, however, if considering this approach the AESO needs to be respectful of the comprehensive value of the lost production for all facilities. c. There is the potential to mitigate this exposure through the use of some dynamic products as well as more comprehensive and accurate forecasting.

	3. Should standby RR be activated in near-real time to manage the system over and above current RR levels? a. 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. b. 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 conditions suggest they will be required to mitigate wind volatility? 4. In the long-term, should regulating reserve be split into a load following product and an AGC product?	3. Please see the comment above concerning day-ahead RR. measures, in the longer-term, such as Dynamic Scheduling System, Intra-Hour Scheduling, reducing the two-hour scheduling requirement, etc. should be considered to mitigate the cost of the reserves needed to alleviate ramping issues. NaturEner believes that the AESO needs to continue its efforts to better align the AIES with surrounding jurisdictions to leverage the inherent reliability and operational benefit. 4. In the long-term, NaturEner supports the deployment of a holistic portfolio of reserve tools. This can be inclusive of the use of both load following and AGC products. NaturEner has as a wind-only Balancing Authority and continue to successfully integrate our wind production without the inherent benefits of a larger 'system' approach, which is available to the AESO.
	6.2 Operating Reserve **<u>Contingency Reserve</u>** 1. Should the AESO use mandatory active contingency reserve to manage unexpected decreases in wind generation if allowed by NWPP?	1. AESO should continue to pursue the possibility of using active Contingency Reserve as pursued by the Northwest Power Pool. NaturEner anticipates that the use of active Contingency Reserves for wind energy transient events from the NWPP will be implemented in 2010. NaturEner fully endorses and encourages AESO to continue to pursue the possibility of using active Contingency Reserves. By first using the available active Contingency Reserves within the AIES and then using those

	2. Should the AESO carry incremental active contingency reserve to insure against decreases in wind generation? a. This reserve could be tailored for specific hours when wind is forecast to ramp down and load forecast to ramp up, for example. b. The alternative is likely to fully dispatch EMMO for ramp rate requirements when wind energy unexpectedly declines. c. This is consistent with the use of contingency reserve to replace lost generation from other resources. 3. Should standby contingency reserve be activated in near-real time to manage the system, i.e. the system would carry more than the minimum active contingency reserve in some hours to manage wind variability? a. Reserve would need to be activated prior to an actual problem. b. 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. 4. 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?	shared with the Northwest Power Pool, mitigation of transient wind energy ramp events can be effectively realized. However, active Regulating Reserve and other measures (EMMO) should be effective during normal operations, with the active Contingency Reserves only being needed for the worst case conditions. 2. See above. 3. No, once available, AESO can share reserves from the NWPP's Reserve Sharing Group. AESO should employ their own reserves first and then receive the remainder to cover an event, from the NWPP. 4. Yes, however as a function of the forecasting that has been done.

	6.3 Wind Power Management 1. Under what conditions is it appropriate to use WPM? a. In advance of conditions that might place the system at risk? i. 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? b. When the wind ramp is not forecast? i. This implies the AESO purchase sufficient ancillary services to accommodate forecast ramps.	WPM should essentially be a "last resort". Due to the natural characteristics of wind and its associated value to the market, it should always first be augmented by EMMO and then by ancillary services (such as contingency reserves) whenever possible. WPM (mandated curtailment) should only be utilized in the event of severe system instability (ramp-up beyond EMMO ability and in excess of available reserves and dispatch resources). Ideally this should be less than 1% of the total. For instance, Bonneville Power Authority, with a 20% wind penetration level, is using curtailment as a form of WPM less than 0.5% of the time. WPM should be used as a tool of last resort because it will be prohibitively expensive to plan for and cover all contingencies for the system. Reserve sharing with NWPP, when available, should be considered first. When EMMO is inappropriate and all reserves are deployed, WPM can be an effective tool, but one that has to be used as a last resort. Ultimately, a market solution that rewards performance will tend to reduce the price, improve efficiencies, and motivate creative solutions because wind energy facilities will naturally want to keep generating as much as possible for as long as possible.

	2. When the wind ramps up more rapidly than the EMMO can accommodate without over dispatching? 3. 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. 4. Under supply surplus conditions? • Should the AESO establish a WPM market solution or is pro-rata appropriate? o How would a WPM market interact with the solution for supply surplus and/or congestion management? o 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? o Is this an appropriate cost for load to bear since wind can manage this operational challenge through a WPM protocol?	

	6.4 Wind Power Forecast
	• Should the system be able to accommodate forecast wind generation?
	  o Purchase sufficient reserve to accommodate forecast wind generation.
	  o 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?
	  o If the forecast creates obligations for wind facilities, does it also create obligations for the system to absorb the forecast without using WPM?
		• Yes, the system needs to be able to accommodate forecast wind generation. If reserves are purchased to account for every contingency cost can be prohibitively high to the system, and thus other tools need to be deployed to manage these cost.. As NaturEner has described above, there are tools today that can be used to accommodate a high degree of penetration of wind into the supply stack.
		• As forecasting by definition will never be exact NaturEner does not believe in a must offer must comply obligation, but thinks that incentives could be created for developers to better manage and provide this level of data

	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	• As stated above, incremental ancillary services are not the only approach that should be considered for efficiently integrating wind. • The process for implementing a WPM should be clearly defined as a "last-case" scenario. • NaturEner does not support the adoption of a WPM scheme that is deployed in advance of all other, more efficient methods, in advance as it is not a market based solution, and therefore should only be used as a last option..

	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	1. Long term, the AESO needs to consider more than just a centrally procured ancillary service. There are significant efficiencies to be gained by exploring all options. a. Planning to avoid any use of WPM, without adequate compensation, should be the long-term direction of the AESO. There is no long-term solution with a WPM protocol. WPM must be acknowledged as a "last-case scenario". b. This cannot work without a fundamental shift in dispatching and market clearing processes as they are today. c. This is could be a key component of the portfolio of options. The AESO needs to continue its efforts to eliminate seams between its system and neighboring jurisdictions. This effort needs to be inclusive of facilitating the types of transactions and dispatching methodologies that other system operators are proving to be successful means of integrating wind. o Any use of WPM, without adequate compensation, should be the long-term direction of the AESO. The AESO needs to focus on changes that are the most efficient and transparent, not necessarily the easiest to implement. Due to the economics of wind developments as well as the low capacity factors, power management schemes are a very unproductive approach to mitigating integration issues. NaturEner has found there are a wide variety of better market based solutions to integrate wind.

	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	2. Please see comment above on forecasting. 3 The least preferred alternative. The long-term direction must acknowledge that wind generation has certain inherent characteristics that distinguish it from traditional sources. a. There could be an incremental benefit for creating incentives for wind developers to better forecast their own production. b. As an experienced operator of a wind only Balancing authority, it is clear to NaturEner that this is a very inefficient exercise when done without the benefit of geographic diversity and the inherent efficiencies that are gained by a more comprehensive system wide approach. c. As just stated, this approach is most effective and economically efficient when done on a system wide basis while deploying all known effective tools for the exercise.
