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Via Email

Laura Letourneau
Director, Market Services
Alberta Electric System Operator
2500, 330 - 5th Ave SW
Calgary, AB T2P 0L4

Dear Ms. Letourneau:

Re: Market and Operational Framework for Wind Integration in Alberta

Thank you for providing ENMAX the opportunity to comment on the discussion paper *Market and Operational Framework for Wind Integration in Alberta* (“the framework paper”), and the accompanying stakeholder presentation of March 26, 2007. We are encouraged by the AESO’s commitment to removal of the 900 MW threshold and examination of potential mitigation measures.

Removal of the 900 MW threshold on wind facility interconnection requires the consideration of many significant and highly uncertain variables. Uncertainty with respect to wind facilities includes whether and where proposed wind facilities will be built, the extent to which forecasting will be effective, the unknown extent of geographic diversity between sites, the size and location of general load growth, and the size and location of dispatchable generation investment, to name a few. Given these significant uncertainties, ENMAX remains unclear as to the ‘order of magnitude’ or potential cost of the wind facility ramping and power management issues and to what extent the various mitigating measures will need to be employed. It is our view that the wind forecasting work that has been commissioned will help in understanding the potential magnitude of the wind issues faced, and to what degree potential mitigation measures will impact existing wind facilities, the energy and ancillary services (“AS”) markets, loads and potential wind investments.

Notwithstanding this considerable uncertainty, ENMAX would like to make preliminary comments on the geographic diversity and mitigation measures presented in the framework paper.

Geographic Diversity

ENMAX would strongly encourage the AESO to thoroughly study the benefits of geographic diversity in parallel to the wind forecasting study. A more fulsome understanding of the impact and benefits of geographic diversity may enable the development of policies designed to maximize these benefits. As indicated in the framework paper: “distributing wind power facilities geographically can help reduce aggregate wind power variability and ramping impact on the system.”¹ Therefore, appropriately designed policies that, to the extent possible, promote geographic diversity, may act as a

¹ *Market and Operational Framework for Wind Integration in Alberta*, March 7, 2007, page 6.

full or partial substitute for relying on other mitigating measures that may have secondary impacts on the energy and AS markets and which may impose considerable risk or costs on existing facilities and load customers. In addition, determination of the impact of geographic diversity is a necessary precursor before any conclusions can be drawn regarding the requirement of mitigation measures such as regulating reserves or load/supply following.

Such a study would not be difficult to complete as developers have already shared wind measurement and facility output data for the forecasting study; similarly, a consultant could be engaged to determine geographic diversity statistics for those facilities that are existing, under construction and also in late stages of development.

ENMAX supports efforts to allow investors and the market to make decisions about the type, location and timing of investments. ENMAX would add, however, that appropriate information and signals need to be accessible by potential investors in order that they make rational investment decisions and value geographic diversity from both a system and investor perspective. For instance, the wind forecasting study and a parallel geographic diversity study may suggest that a particular area is problematic because of high wind correlations between potential sites. To the extent that this area is potentially subject to power management or ramp limiting as a function of the installed capacity, then this information needs to be available to potential investors and developers in order to inform their investment decisions. ENMAX believes that it is important for both industry participants and the AESO to rationally examine potential geographic diversity benefits in order to maximize wind interconnection while minimizing the impact of mitigating measures. Geographic diversity information would greatly aid both the wind developers and the AESO, who with differing goals, are working to solve this shared issue.

Wind Power Forecasting

ENMAX is supportive of efforts to study the efficacy of wind forecasting. If wind forecasting appears promising, ENMAX believes that the logical starting point for the industry would be to centralize the wind forecasting through the AESO. Centralizing wind forecasting will help to ensure that the forecasting methodologies that are developed meet the needs of the system controller in balancing the integrated electric system. Centralized forecasting would also ensure the development of standardization and consistency. As the industry gains experience with wind forecasting methodologies, the centralized forecasting model could then be reviewed to determine if another approach would better suit both the AESO and participant needs.

Whether centralized or not, ENMAX believes that the AESO and industry must be realistic in their views of forecasting. Weather forecasting contains a great degree of uncertainty. Therefore forecasting standards or requirements must be considered on a 'best-efforts' basis as the details of accuracy, error tolerance and time windows of forecasting will undoubtedly provide challenges.

Additional Regulating Reserves

While ENMAX acknowledges that some incremental regulating reserves may be necessary to accommodate wind facility variation, ENMAX would encourage the AESO to study the impact of increased regulating reserves on the wholesale energy market, particularly on the price signal and volatility prior to committing to increasing volumes of regulating reserves.

Supply / Load Following Service

Until completion of both the wind forecasting study and geographic diversity study, it is difficult to ascertain the extent to which the Alberta system may need a supply-load following (“SLF”) service to counterbalance wind variability or ramping. ENMAX does note, however, that the same concerns relating to the impact on the pool price and volatility arise from employing SLF service as would arise from increasing the volume of regulating reserves.

Power Management and Ramp-Rate Limiting

Power management and ramp-rate limiting are of concern to ENMAX. Wind facilities generally have low capacity factors. As such, the economics of these investments require capturing generation opportunities when the wind is blowing. Curtailing or otherwise limiting the ability of a facility to ramp up could have a significant impact on wind project economics. While potential investors may take this mitigating measure into account quantitatively when making an investment decision, existing facilities have already made irreversible investment decisions and committed capital under a framework that contemplated power limiting only during abnormal operating conditions rather than under normal operating conditions. The AESO’s Wind Power Facilities Technical Requirements notes that: “Most of the time the AIES operates normally and with no constraints on wind power facilities. On occasions, transmission outage(s) or abnormal operating conditions can occur that require electrical disconnection or partial curtailment of a wind power facility”² ENMAX is of the view that power management or ramp-rate limiting should only be employed as an absolute last-resort measure and would view it as unacceptable if transmission outages or abnormal operating conditions did not exist at the time of the curtailment.

Conclusions

There remains a great deal of uncertainty relating to the magnitude of the need for and impact of the mitigation measures proposed in the framework paper. ENMAX suggests a cautious approach until the wind forecasting study and geographic diversity study are completed. ENMAX also believes that it is paramount that the operational framework balances the interests of existing wind investments, potential wind investments, load customers, the energy market and the AS market, in order to optimize interconnection of wind facilities while minimizing mitigation costs.

Sincerely,

Originally signed by

Christopher Joy
Manager, Regulatory Affairs
ENMAX Corporation

² AESO, *Wind Power Facility Technical Requirements, Revision 0*. November 15, 2004. page 17.