Power Advisory LLC
55 University Ave., Suite 600
Toronto, Ontario
M5J 2H7

January 17, 2011

Mr. Darren Finkbeiner
Independent Electricity System Operator
655 Bay Street, Suite 410
Toronto, Ontario
M5G 2K4

RE: Comments on Draft IESO Renewable Integration Design Principles

Power Advisory LLC represents a consortium (the "Consortium") of the following renewable energy generation developers: International Power Canada, Inc.; NextEra Energy Canada ULC; Pattern Renewable Holdings Canada ULC; and Samsung Renewable Energy Inc.

International Power Canada Inc. ("IPC") is a renewable power developer, owner and operator with wind and solar projects at different development stages throughout Canada. The company presently operates 80 MW of wind power projects in Ontario, with an additional 75 MW currently in construction in Ontario and 99 MW slated for construction in British Columbia. IPC was the developer of the 99 MW Erie Shores Wind Farm, managing all development aspects through to commissioning. IPC is a subsidiary of International Power PLC, a leading independent electricity generating company with assets in 21 countries and 34,408 MW gross (20,949 MW net) in operation and 4,502 MW gross (1,393 MW net) under construction.

NextEra Energy Canada ULC ("NextEra Canada") is an indirect wholly-owned subsidiary of NextEra Energy Resources, LLC ("NextEra Energy Resources"). NextEra Energy Resources owns and operates approximately one hundred electrical generating facilities producing nearly 19,000 net MW in twenty-six U.S. states and three provinces in Canada. NextEra Energy Resources is the number one producer of wind power in North America and operates the two largest solar facilities in the world. NextEra Energy Resources has approximately 8,200 MW of wind power in operation, 220 MW of which is in Canada. More than ninety-five percent (95%) of NextEra Energy Resources' electrical generation is derived from clean and/or renewable sources including wind, solar, nuclear, natural gas and hydroelectric power. NextEra Energy Resources has also built approximately 500 miles of high-voltage transmission lines to connect its wind projects to the grid. In Ontario, NextEra Canada currently has two wind projects totaling 150 MW that have been awarded contracts and six wind projects totaling 470 MW awaiting contracts under the province's Feed-in Tariff Program.

Pattern Renewable Holdings Canada ULC is a member company of Pattern Energy Group ("Pattern"). Pattern Energy Group LP is an independent, fully integrated energy company that develops, constructs, owns and operates renewable energy and transmission assets in the United

States, Canada and Latin America. With a long history in wind energy, Pattern's highly-experienced team of scientists, engineers, construction experts, and legal and financial professionals have developed, financed and placed into operation more than 2,000 MW of wind power. With offices in San Francisco, San Diego, Houston, New York and Toronto, Pattern currently has 384.4 MW of wind energy in operation in the U.S., 138 MW under construction in southern Manitoba and Pattern's development pipeline exceeds 4,000 MW of renewable energy projects and includes multiple transmission projects.

Samsung Renewable Energy Inc. ("SRE") is a subsidiary company of Samsung C&T Corporation. Samsung C&T Corporation was founded in 1938 and is the origin of SAMSUNG GROUP which has been the driving force behind the astonishing growth of the Korean economy. Since its nomination was the first-ever General Trading Company in Korea in 1975, Samsung C&T has been conducting complex trading and investment operations. With the merger of Samsung E&C in December 1995, Samsung C&T has now also balanced the two branches of Engineering & Construction Group and Trading & Investment. Samsung C&T has more than 7,000 employees in over 100 overseas offices in 45 countries and recorded 10,876 billion won (KRW). Samsung C&T designates energy as a core business area, cooperating with business partners to engage in various businesses, such as the securing and supplying of energy sources and operation of power plants. In an effort to prepare and respond to intensifying global warming, it actively engages in business in new and renewable energies such as wind and solar power, bio-fuel as well as water and environment business all over the world.

On December 9, 2010, the IESO released draft Renewable Integration Design Principles. The proposed draft Principles will provide the foundation for integrating renewable generation into the IESO-Administered Markets.

The IESO discussed the proposed draft Principles with stakeholders on December 16, 2010 and again on January 11, 2011.

The Consortium supports the IESO's leadership towards addressing successful integration of renewable generation and thanks the IESO for requesting comments from stakeholders. Listed below are the Consortium's principal comments on the draft Principles. In addition to the Consortium's comments, individual developers within the Consortium may submit separate comments to the IESO and/or the OPA.

Overview Section

- The Principles will form the basis for future market rule changes in order to best ensure successful integration of renewable generation resources in the IESO-Administered Markets. What is the schedule and timeline for proposed rule changes to be brought forward to the IESO Technical Panel for approval?

- The IESO should bring forward all proposed rule changes within a single integrated package rather than through separate packages. Stakeholders can more effectively evaluate both the potential impacts of the proposed rule changes and how each specific rule change relates to other proposed rule changes. Evaluation of how to effectively integrate renewable generation resources in the IESO-Administered Markets can best be done in the context of

evaluation of all proposed rule changes and may not be optimally done if proposed rule changes are brought forward to the Technical Panel at different times. Further, a single package of proposed rule changes provides greater clarity (rather than multiple packages being developed at different times) so as to limit issues with the development of applicable renewable generation projects. The exception to this is if there is a discrete rule change with clear benefits to wind generation integration; in such a case, the overall regulatory review should not delay implementing a discrete rule change that aids wind generation integration.

Forecasting Section

Principle 1: The IESO will implement a centralized forecast for wind resources directly connected to the IESO-Controlled Grid and for wind resources with an installed capacity of 5 MW or greater connected to a distribution system. Centralized forecasting will be expanded to include other variable resources such as solar as their aggregate installed capacity becomes material.

- For purposes of the proposed centralized forecast for energy generated from wind resources, why has a 5 MW lower threshold been proposed for inclusion of affected generation? The Consortium supports IESO centralized forecasts but wishes to better understand to what extend the IESO will forecast generation output for distribution-connection generation facilities.

- Considering approximately 1,000 MW of ground-mount solar PV generation projects are under OPA contracts, with most projects sized at 10 MW, why are these resources not being addressed through some central forecasting tools at this time? This point applies for other draft Principles. If IESO centralized forecasts for energy output from solar PV generation is not developed in parallel to centralized forecasts for energy output from wind generation, what is the potential timeline for the IESO to develop such forecasts?

- Has the IESO sourced potential forecasting tools? The IESO should convey what forecasting tools are used in other jurisdictions in order to facilitate appropriate consultation and feedback from stakeholders.

- The goal of forecasting output from wind generation is to forecast the energy or power, not the wind speed, and this requires understanding of the relationship between the power output and weather patterns, with additional local meteorological data being potentially interesting but of minor value for advanced power forecasting methods. Accordingly, while wind generators should provide certain data to the forecast developer (i.e., the IESO), in order to help produce more accurate forecasts, meteorological forecasting providers need not impose unnecessary costs on wind generators by requiring unnecessarily detailed data (e.g., multiple met towers, data from each turbine or from a string of turbines).

- Wind generators should also be permitted to continue producing and using their own forecasts based on the data they obtain and their chosen methodologies. A generator may believe it can produce a more accurate, site-specific forecast than the centralized forecast, and may wish to use this forecast to schedule its energy output.

Principle 2: A real-time forecast will provide the information to allow for renewable dispatch and OPA contract settlement.

- This principle implies that forecasts will lead to schedules applicable to variable energy generators. Will schedules based on forecasts be used in any way to settle variable generation (either within the IESO-Administered Markets and/or applicable OPA contracts)? To the extent that schedules based on forecasts are used for settlement purposes within the IESO-Administered Markets and/or OPA contracts, any such schedules should nevertheless be secondary to actual energy production so that the result is no lost revenue to the applicable generation facilities. Therefore, the Consortium proposes additional language to this principle stating that, "A real-time forecast will provide the information to allow for schedules and renewable dispatch, and OPA contract settlement will not result in lost revenue for applicable generators."

- Within other wholesale electricity markets, how are variable generators being dispatched (i.e., forecasts, scheduled production, etc.) and on what frequency (e.g., hourly, 15-minute intervals, 5-minute intervals, etc.)? The IESO should provide a comparison of variable generation dispatch from other jurisdictions.

- Energy from wind generation inevitably has some inherent variability from its forecasted schedule that is based not on the operation of the generator itself, but on the implicit nature of the weather. Intra-hour scheduling would help increase efficient integration of generation because weather characteristics tend to change less over the coming minutes as compared with the future hours. Shorter scheduling intervals would also accommodate anticipated changes in load, and help manage and lower overall system costs by reducing the amount of reserves that must be procured. This interval should reflect technical capabilities, not mere custom or prior practice.

Principle 3: The costs paid to the centralized forecast service providers will be treated as procured service charges and will be recovered from consumers through existing procurement market recovery mechanisms.

- The Consortium supports this principle.

Visibility Section

Principle 4: All wind based resources subject to the centralized forecast will provide static plant information and data. Solar or other variable generation requirements will be developed as these resources are incorporated into centralized forecasting.

- The IESO should provide a detailed listing of similar data and informational requirements required by other ISOs/RTOs and applicable jurisdictions.

- Does the IESO plan to request real-time SCADA access? If so, the Consortium is concerned why the IESO needs this data and what the data will be used for.

Principle 5: All wind based resources subject to centralized forecasting will provide dynamic data (real-time telemetry). Solar and other variable generation requirements will be developed as these resources are incorporated into centralized forecasting.

- The IESO should provide a summary of the dynamic data that variable generators are obligated to provide ISOs/RTOs in other jurisdictions. To avoid overly burdensome requirements, there should be a threshold of materiality in the data that must be submitted to the forecast provider (i.e., IESO) (e.g., with respect to turbine outage size or duration).

- The proposed generator obligation to report data from independent meteorological towers located "such that turbines are within 5 km of a measurement point" is unnecessary and costly. The data from such a measurement point is only a proxy for that of actual production (i.e., where the generation facility will be physically located) and adds the development costs of wind generation projects. In addition, for projects that are sufficiently advanced in achieving their Renewable Energy Approval (REA), or have achieved their REA, this new requirement will be problematic and will frustrate the REA process.

- Principles 4 and 5 can be combined for simplification.

Principle 6: All meteorological data and forecasts will be publically available.

- Forecasts should be public, but meteorological data should not be identified to a specific generation facility. Individual generation facilities may have issue with real-time facility-specific disclosure, as this is confidential commercial data regarding the power production of a given facility.

Dispatch Section

Principle 7: Actively dispatch all variable resources connected to the IESO-Controlled Grid on a five-minute economic bases.

- Are other jurisdictions dispatching variable generation on a 5-minute security constrained dispatch? If not, what are they doing and why? Organized markets in the U.S. are generally moving towards such more frequent dispatch, as it correlates closer with the forecasted production of wind generators.

- What analysis has the IESO done comparing dispatch intervals (e.g., hourly versus other intervals, e.g., 15-minute, 5-minute, etc.)?

- The IESO and stakeholders need clarity on what is meant by "economic basis". Clarity with this point is also extremely important concerning Principle 10 and the potential

establishment of different offer price floors that will ultimately determine the dispatch order of generation facilities.

- In general, frequent dispatch intervals should help promote wind generation. However, it's too early in this process to propose any dispatch interval, as not enough information and analysis has been conveyed to stakeholders. Therefore, the Consortium requests Principle 7 to be, "Actively dispatch all variable resources connected to the IESO-Controlled Grid in an economic manner in accordance with the real-time needs of the power system", or something similar, and the IESO should not make any decisions at this time on a scheduling/dispatch interval.

Principle 8: Variable generators should operate within a compliance deadband when ambient conditions offer sufficient fuel.

- How will the deadband be determined? Will the deadband be static?

- What compliance measures (e.g., penalties, sanctions) will be applied? How will they be developed?

- There should not be penalties or charges for exceeding any kind of "compliance deadband" provided that the wind generator follows the schedule based on the centralized forecast.

Principle 9: Variable generators will be entitled to Congestion Management Settlement Credit (CMSC) payments.

- Variable generators subject to dispatch instructions must be entitled to CMSC payments – both constrained-on and constrained-off payments (i.e., compensation for curtailment).

- The Consortium requests that in accordance with IESO Market Rule changes, the OPA shall clarify any potential changes to applicable OPA contracts in a timely manner in order to create consistency for operational, dispatch and settlement purposes, among other changes and purposes.

Principle 10: The IESO may establish various floor prices for offers from baseload generators, i.e., wind, must-run hydro and nuclear, to ensure efficient dispatches during periods of local and/or global surplus baseload generation (SBG) events.

- How will the different offer price floors per baseload resource be determined? What criteria will be used to effectively establish order of baseload generation dispatch?

- Will different offer price floors be applicable depending on the location of baseload generation relative to local area demand and applicable local area generation resources (both baseload and non-baseload generation)?

- In order to better understand and analyze what the offer price floors for different generation facilities may be, the IESO should provide information and analysis on local and global congestion and curtailment of energy output from applicable generation facilities.

- More clarity is required from the OPA concerning the interpretation of applicable contract provisions regarding impacts to "Supplier Economics" relating to changes to IESO Market Rules. For this particular principle, the effect of establishing different offer floor prices will essentially rank the order to which baseload generation facilities are dispatched. As a result, this may significantly impact the frequency to which variable generation facilities are scheduled to produce energy which will have implications for lost revenue under OPA contracts.

- The different offer price floors to be applied to different baseload generation classes of facilities (e.g., solar PV, wind, nuclear, must-run hydro) must be distinct and largely negative in order to avoid 'clustering' and provide for discreet dispatch 'blocks' in order to incentivize generation bidding behavior that will result in a economically predictable dispatch (e.g., if resource A has the lowest offer price floor then resource B should not be able to be dispatched ahead of resource A where distinct and largely negatively priced blocks of generation offers will help facilitate this result as opposed to negatively priced blocks that are relatively close in offer price).

- Lost revenue associated with these types of curtailments should be fully reimbursable to renewable generators; otherwise, inflexibility of other types of generation resources that cannot be as easily curtailed harms wind generation, and flexibility of wind generation is not compensated.

Principle 11: Directly connected variable resources (or embedded resources that are market participants) will be eligible to participate in Operating Reserve and ancillary markets where technically feasible. (Such integration will be considered on a cost benefit basis and is not likely to be addressed in the near term).

- Are other jurisdictions permitting variable generation to participate in ancillary service markets? If so, which ones and what are the applicable rules (including revenues and settlement)? Can the IESO provide a summary of what's being done in other jurisdictions? This should be a next-generation issue. There aren't any significant ancillary service markets in which wind generators participate in the US, and it would be a distraction to focus on those issues at the outset in Ontario.

Closing Comments

Once again, the Consortium supports the IESO's leadership towards addressing successful integration of renewable generation and thanks the IESO for requesting comments from stakeholders.

In addition to the comments presented above, please consider the following points.

First, in order to understand the practices in other jurisdictions so as to help develop solutions for the Ontario market, the Consortium requests that the IESO provide stakeholders with research involving a benchmark from at least the U.S. jurisdictions for the following key elements regarding the integration of variable generation (similar benchmarking exercises have been done in the U.S., therefore obtaining such information should be non-onerous):

- ISO/RTO forecast methodologies;
- Generator static and dynamic data requirements to be submitted to the ISO/RTO;
- Generator offer/bid requirements and rules;
- ISO/RTO dispatch and pricing rules;
- ISO/RTO scheduling and dispatch compliance rules; and
- ISO/RTO settlement rules.

Second, present Ontario Government policies ultimately support and encourage the development of variable generation. Therefore, any changes to the Market Rules should not frustrate achievement of this Government policy. In order to ensure that these policy objectives are met, the IESO and the OPA should reach out to key stakeholders that typically do not participate in IESO consultation processes in order to increase their understanding of the issues and solutions. In particular, the lenders should be made aware and educated on the issues, solutions and direction to facilitate successful development and integration of variable generation. Ultimately, generation projects will not be developed without appropriate financing.

Finally, stakeholders will need a better understanding of how the OPA contracts may be amended in accordance with amendments to Market Rules and become comfortable that any amendments to OPA contracts are consistent with the Market Rules and are made in a timely manner. Therefore, as warranted, the OPA should plan to discuss applicable contract amendments as amendments to Market Rules are brought forward for stakeholder consultation.

Sincerely,

Jason Chee-Aloy
Managing Director
Power Advisory LLC

cc: Barbara Ellard, Ontario Power Authority
stakeholder.engagement@ieso.ca
Colin Edwards, Pattern Renewable Energy Holdings ULC
JT Lee, Samsung Renewable Energy Inc.
David Timm, International Power Canada Inc.
Jennifer Tuck, NextEra Energy Resources Canada ULC