

# Stakeholder Engagement SE-57

## IESO Response to Written Comments on Embedded Generation Discussion Paper



On December 13, 2008, the IESO posted the draft Embedded Generation Discussion Paper. Stakeholders were requested to send written comments by February 7, 2008.

Six written comments were received, as summarized below along with the IESO comments.

### **Bluewater Power Generation**

Thank you for the opportunity to provide feedback on the Embedded Generation discussion paper. The feedback is being provided by Bluewater Power Generation (BwPG) which is an affiliate to Bluewater Power Distribution (the LDC).

In regards to Recommendation #1, BwPG agrees that Real Time visibility of embedded generation would help facilitate the reliability of the electrical system in Ontario. BwPG would support and participate in an inexpensive method of providing this information to the IESO. BwPG feels this requirement should be limited to projects above 500 kW and/or with high speed internet connectivity. BwPG feels that the IESO should make this information available to the host LDC if requested.

In regards to Recommendation #2, BwPG is concerned that this decision may have already been decided upon given that System Impact Assessment Application Form-1536 has been revised and appears to be a requirement for all new generation. If this is not the case, BwPG is interested in seeking further input as to the trigger levels and participant obligations. BwPG feels trigger levels need to be triggered using dynamic modeling and location specific data. Furthermore, BwPG feels that the IESO needs to investigate using a "Direct Output Down" option in addition to possibly a "Constrained Off" option.

In regards to Recommendation #3, BwPG is in general agreement that performance standards should be reviewed in order to maintain reliability when there is a net injection of embedded generation into the transmission grid. However BwPG strongly feels that the resulting costs should be "socialized" Provincially and the overall value of the injection must undergo a cost-benefit analysis with "Constrained Off" as the alternative.

### **IESO Response**

Recommendation 1 – This issue was discussed at the Stakeholder Engagement meeting on January 31, 2008. The threshold for providing telemetry has not been determined. It was agreed that it would be beneficial to coordinate the threshold with LDC requirements.

Recommendation 2 – The levels for a System Impact Assessment are still under review. The levels presented at the Stakeholder Engagement meeting were suggestions by the IESO for discussion purposes. These requirements can be discussed further at the next meeting or webcast. The IESO SIA

application form was revised to meet a recommendation made in the Agency Review Arnett Report not to include additional obligation on generators. The revised form combines the SIA application and the Customer Impact Assessment application into the same format. The IESO would welcome BwPG input and further discussions for trigger levels.

Recommendation 3 – Hearings to review the practices of cost allocation are currently active at the Ontario Energy Board.

### **Enersource Hydro Mississauga**

Thank you for the opportunity to comment on the above named IESO discussion paper.

Enersource Hydro Mississauga Inc. has two questions in this matter:

1. Is the IESO uniquely suited to acquiring information and monitoring embedded generator's operations or could another market participant serve in this capacity?
2. What are the IESO's visibility requirements?

The first question is raised to encourage consideration of the role that other market participants, other than the IESO, such as aggregators, could play a role; for example, an aggregator could facilitate the provision of information to the IESO in an appropriate form. The second question is raised in order to better understand the need for, and materiality of, 'visibility'; for example, it is not clear whether the IESO requires 'visibility' of embedded generators at the point of their output is injected into the grid, or that the IESO's need for 'visibility' is confined to a material amount (eg., relative to the IESO's forecast error).

### **IESO Response**

1. Assuming all market rules developed for provision of telemetering of embedded generation were being adhered to, the acquisition of telemetry could be from another party and provided to the IESO in an appropriate form. As with the provision of all telemetry, the responsibility to provide the telemetry within the market rules would continue to be the accountability of the responsible market participant. The IESO proposes that host LDCs and wholesale connected customers would provide telemetry to the IESO.
2. This issue was discussed at the Stakeholder Engagement meeting on January 31, 2008. The threshold for providing telemetry has not been determined. It was agreed that it would be beneficial to coordinate the threshold with LDC requirements. The IESO also indicated the telemetry requirements would be no more onerous than the host LDC may require for the operation of their distribution system.

## Ontario Power Generation

OPG appreciates the opportunity to provide comments on the IESO's Embedded Generation Discussion Paper dated December 13, 2007. As a company that owns and operates a significant portfolio of electricity generation plants that are connected directly to the distribution network, we have a particular interest in this consultation. OPG has reviewed the discussion paper and offers the following general and specific comments.

### General Comments

OPG supports the IESO's goal to better integrate embedded generation into the reliable and efficient operation of the IESO controlled grid (ICG). The IESO's discussion paper provides a good summary of the current requirements and the potential ICG issues relating to embedded generation. In general, OPG wishes to frame its comments within the context of facilitating both the operation of existing embedded facilities and the commissioning of new embedded generator projects. Accordingly, OPG suggests that additional evidence is needed to justify any changes related to the provision of real time data and/or new performance measures for embedded generators. Additional evaluations should also be done to establish a sound technical and economic foundation for any changes. Once this foundation is established, cost allocations should be based on the principle that the costs follow the benefits (i.e. in general, the beneficiary should be responsible for associated costs).

Anecdotally, it is assumed that, as more and more small embedded generation is installed (without the telemetry associated with larger units), the probability of reliability concerns may increase. However, some rigour must be brought to bear on this hypothesis so that unnecessary impediments to new generation sources are not unnecessarily imposed. One must not deal with the potential reliability concern associated with telemetry, protections and monitoring equipment while ignoring the reliability concern associated with creating a disincentive to new generation.

### Specific Comments

With regard to the first recommendation in the discussion paper, OPG agrees that increased telemetry requirements could increase the visibility of embedded generation. However, OPG is not convinced that there is sufficient evidence to conclude that this will be a critical issue as new embedded generation comes online. Supporting evidence is needed to show that real time data is needed.

With regard to the discussion paper's reference on page 8 relating to a LDC's ability to request real time data from embedded generators, OPG believes that clarification is needed from the OEB since there appears to be some ambiguity in Section 9 of Appendix F2 of the Distribution System Code. The heading in Appendix F2, Section 9 refers to the requirements for facilities of 10 MW and higher, but the text is referring to facilities rated at greater than 250 kVA. OPG recommends that the IESO seek clarification at the OEB on the intent of Section 9 of Appendix F2.

On the second recommendation, OPG agrees that the IESO should work with stakeholders to review the Connection Assessment and Approval process to determine if a trigger level for a system impact

assessment is needed due to the aggregate installed embedded generation. OPG is of the view that any changes that result from this review should only apply on a prospective basis and not be retroactive.

With regard to the third recommendation, OPG sees the potential benefits in reviewing the performance standards for LDC's in the areas of power factor requirements, reactive power control requirements and dynamic reactive power compensation requirements. Reviewing the LDC's requirements would assist the IESO in operating a reliable and efficient ICG. However, OPG has concerns with modifying performance standards for existing embedded generators. Embedded generation standards and provisions have been reviewed by the OEB as part of the Distribution System Code and have been shown to be appropriate and effective. Adding additional constraining standards could be contrary to the existing Code, could deter new generation by adding additional costs and could impact the financial viability of existing facilities.

## **IESO Response**

### General Comments

The IESO is planning to complete a study on the impact of known embedded generation on the IESO-controlled grid. The parameters of the study need to be determined before it can be completed.

Hearings to review the practices of cost allocation are currently active at the Ontario Energy Board.

The IESO agrees that the provision of telemetry should not provide a disincentive for new generation.

### Specific Comments

Recommendation 1 - This issue was discussed at the Stakeholder Engagement meeting on January 31, 2008. The threshold for providing telemetry has not been determined. It was agreed that it would be beneficial to coordinate the threshold with LDC requirements. The IESO also indicated the telemetry requirements would be no more onerous than the host LDC may require for the operation of their distribution system. Clarification on Section 9 of Appendix F2 of the Distribution code will be provided at the next meeting or webcast. Gordon Ryckman from the Ontario Energy Board will confirm.

Recommendation 2 – The levels for a System Impact Assessment are still under review. The levels presented at the Stakeholder Engagement meeting were suggestions by the IESO for discussion purposes. The view that changes to the requirements for a System Impact Assessment should apply only on a prospective basis and not on a retroactive basis can be discussed at the next meeting or webcast.

Recommendation 3 – These comments will be considered when reviewing the performance standards and any possible changes that may be required.

## Suez Renewable Energy North America

Ventus Energy Lakehead Windpower LP (“Ventus”), a subsidiary of SUEZ Renewable Energy North America, would like to provide the following comments on Stakeholder Engagement SE-57 - Embedded Generation Discussion Paper (the “Discussion Paper”).

Ventus is actively engaged in becoming a significant provider and operator of embedded generation facilities in Ontario. In 2004 Ventus initiated development of its Lakehead wind projects in the Thunder Bay area. Since that time Ventus has invested significant resources in taking the necessary steps to establish the facility, including conducting or participating in wind assessments, connection applications/studies, an environmental assessment, a transmission connection application/study and system impact and customer impact assessments.

As mentioned in the Discussion Paper, projects such as this can make a significant contribution to the security of Ontario’s energy supply, and can assist in achieving the Government’s objectives for a clean and renewable energy supply.

One issue that has arisen involves the connection of embedded generating facilities to the IESO-controlled grid. In some cases, including our proposed Lakehead facility, the total proposed generation capacity will exceed the power requirements of the area supplied by the transformer station to which the generation capacity will be connected. In that case, there can be expected to be reverse power flow through the station, with a consequent net injection (back feed) into the transmission system. Neither the Transmission System Code nor the Distribution System Code addresses reverse power flows.

We understand Hydro One’s policy relating to reverse power flows to be as follows: (1) The reverse power flow from the low voltage side to the high voltage side through any of its transformers should not exceed 60% of the rating of the transformer; and (2) For the purpose of determining the maximum generation that can be connected to the distribution system, it should be assumed that one transformer is out of service.

The second part of this policy in effect limits the maximum generation on the distribution system to 30% of the combined capacity of the two transformers. Therefore, under normal operating conditions, with two transformers in service, the maximum reverse flow through each transformer will only be 30% of its rating.

Ventus feels that this policy does not enable the benefit of embedded generation facilities to be fully realized. Ventus has proposed to Hydro One and the Ontario Energy Board that the maximum embedded generation allowed be determined with all transformers in service, provided the generation developer agrees to limit the wind turbine operation output if and when the station transformers are out of service. This could be accomplished by a slight modification to the substation’s protection and control scheme. This is in principle similar to the protection schemes currently being relied upon by Hydro One to prevent islanding.

In appropriate circumstances generation developers may be prepared to pay some or all of the costs of the additional protection and control systems necessary for this approach.

### **Recommendation**

In order to allow consideration of these and other modifications that would facilitate the development of embedded generation while maintaining the safety and reliability of Hydro One's transformers, Ventus suggests that the following be added as an additional item at the end of Recommendation 2 in the Discussion Paper:

- Provision for obligations on the transmitter to review and make any appropriate changes to its facility designs and operational procedures in order to maximize the connection feasibility of embedded generation facilities, while maintaining reliability and efficiency of the transmission system, and taking into account opportunities to pass on the costs of such changes to generator developers.

### **IESO Response**

The IESO agrees that the reliable incorporation of embedded generators benefits all involved parties including transmitters, customers and developers. However, it is the obligation and duty of the asset owners to protect their equipment and establish appropriate operating ratings. To maintain system reliability the IESO operates the equipment in accordance with ratings provided by equipment owners. For example allowing large and highly variable reversed power flows over the transformers will result in additional wear and tear on the ULTC. Also for high reversed flow when one transformer is o/s a large portion of the embedded generation will have to be disconnected.

### **Tom Adams**

I am seeking your advice on the appropriate time to raise an issue of concern. As Ontario moves more towards wind generation in 10 MW and smaller corporate units, I want to know what production data will be available to observe the actual performance of these units. The existing per farm data for the above 20 MW farms has proven to be very helpful, and building on that good data release standard would be helpful.

### **IESO Response**

The IESO agrees that publishing embedded generation data would be beneficial. If the IESO receives the data via telemetry, it can be included as an aggregate number in the one of the existing IESO reports. The granularity of the information published will be determined by the amount of telemetry received.

## Hydro One

Thank you for the opportunity to comment on the IESO's Embedded Generation (EG) Discussion Paper (SE-57). As you are aware, Hydro One has been working closely with the IESO, OPA, OEB along with MOE and stakeholders regarding the necessary requirements for embedded generation with respect their connection on the distribution system and the impacts on its transmission system.

We are encouraged by the IESO's recognition these smaller projects, when connected to the distribution system, can make a significant aggregate contribution to the reliable operation of the transmission and distribution system and also to the achievement of the government's objectives for a clean and renewable energy supply in the future.

Hydro One agrees with many of the recommendations and in particular that there should be an objective based trigger for a system impact assessment due to the potential injection into the transmission system from aggregate installed embedded generation at a transmission station. We also agree that allocation of study costs should also be addressed within the relevant Codes.

Our specific comments are as follows:

1. Hydro One submits that the timelines assigned in this process to seek stakeholder comments on the concepts in the consultation paper may be adequate. However, to develop Market Rules Amendments and/or trigger of relevant changes to the Distribution System Code (DSC), we believe the timelines are too short for all the issues to be discussed and developed. For example, performance standards needs to be developed and/or reviewed for embedded generation and the host facility need to be clearly delineated with respect to whether they are appropriately included in the Market Rules or the Distribution and/or Transmission System Codes, and it will also be necessary to ensure that there are no gaps or conflicting requirements.
2. The Distribution System is primarily governed through the Distribution System Code and is not part of the *IESO-controlled grid*. Hence, Hydro One suggests that stakeholders and in particular Local Distribution Companies (LDC) should be fully engaged because many of the requirements would trigger amendment to the DSC. In many cases, much of the information would be available through the LDCs.
3. The process and timelines should include establishment of a Working Group or Task Force made up of relevant experts from the stakeholders to develop new rules and requirements before initiating/suggesting changes to the Market Rules, Distribution System Code and/or the Transmission System Code. These must be consistent with OEB processes to amend the DSC or TSC.

4. Hydro One agrees with the three principles, namely a) Reliability, b) Visibility and c) Standards for the successful integration of increased embedded generation in Ontario. However, we believe that IESO's discussion paper should clarify that adequate visibility of EG, its associated protections and controls is also important to the Transmitter and the LDC to manage and operate their system and distribution business. In this regard, we agree that one model that could work would be for the LDC to provide the appropriate information to the IESO.
5. Modelling Data - Hydro One is concerned that only limited amount of data is currently provided and/or required from embedded generation greater than 10 MW and/or why it is not practical to expect appropriate model data from small generators under 10 MW. We believe that as the aggregate amount of generation increases, it will become more and more important to adequately model the impacts of this generation to ensure reliability. In recent years, there had been significant developments and discussions with respect to the proper modelling of equipment to assess the grid response. As you are aware, there have also been ongoing discussions at the NPCC level on the need to collect the modelling data and properly model units under 10MW to assess reliable operation of the IESO controlled grid, hence it is important that requirements for modelling data for units/plants under 10MW should be considered at this time.
6. Telemetry – As stated earlier, telemetry, protection and control requirements are equally important for transmitters and the LDCS to operate their system in a safe, secure and reliable manner. These requirements should be collectively developed with adequate input from stakeholders and may be appropriate as part of the DSC.

Finally, as you are aware location of EG may have negative impact on system losses. We suggest that, given the importance of managing losses to ensure energy efficiency, studies conducted by OPA and the IESO should consider to identify impact(s) on system losses and make appropriate requirements on EG within OPA procurements, Market Rules or the DSC to effectively manage losses.

### **IESO Response**

1. The stakeholder engagement timelines are based on the requirements to make changes to Market Rules and Market Manuals.
2. The IESO agrees that some requirements may trigger changes to the Distribution System Code and encourage Local Distribution Companies to remain engaged in the stakeholder engagement process for this initiative.
3. The IESO welcomes comments from stakeholders and will make the determination of the need for a working group or task force in consultation with stakeholders and based on the comments received on the Discussion Paper.

4. As with the provision of all telemetry, the responsibility to provide the telemetry within the market rules would continue to be the accountability of the responsible market participant. The IESO proposes that host LDCs and wholesale connected customers would provide telemetry to the IESO. It was agreed at the January 31, 2008 meeting that it would be beneficial to coordinate the threshold with LDC requirements. The IESO also indicated the telemetry requirements would be no more onerous than the host LDC may require for the operation of their distribution system.
5. The IESO shares your concern regarding the availability of appropriate modelling data for embedded generation facilities that are smaller than 10 MW and of diverse technologies. The lack of modelling data becomes more critical with the increase in level of penetration of embedded generation and their effect on the system reliability. In the last couple of years some progress has been made in the modelling of various wind generation technologies and models and data are available. Typical models for Vestas, GE and ENERCON units are available, although they have not been completely validated. We appreciate the importance of proper modelling data for embedded units smaller than 10 MW and therefore use the available models and data in our assessments. The IESO is considering requiring modelling data from the connection applicants where typical data is not available.
6. The IESO agrees that the telemetry, protection and control requirements are important for transmitters and local distribution companies to operate their systems in a safe, secure and reliable manner. The threshold for providing telemetry has not been determined. It was agreed at the January 31, 2008 meeting that it would be beneficial to coordinate the threshold with LDC requirements. The IESO also indicated the telemetry requirements would be no more onerous than the host LDC may require for the operation of their distribution system.
7. Studies performed by Hydro One demonstrated that the distribution losses increase significantly as more and more embedded generation connect to the distribution system and start injecting power into the transmission system. The results of these studies have been presented by Hydro One in a number of forums and the issue is recognized by the IESO. The IESO agrees that this aspect should be carefully considered in the economics and structure of the contracts and captured in the procurement processes.