APPLICATION FOR APPROVAL OF THE CHARACTERISTICS OF THE WIND POWER INTEGRATION SERVICE AND THE ASSESSMENT GRID IN VIEW OF ACQUIRING WIND POWER INTEGRATION SERVICES

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1. BACKGROUND

In 2003, the Government of Québec adopted a regulation by Order-in-Council aimed at acquiring blocks of wind energy by the Distributor for a quantity of 1,000 MW. In accordance with the regulation, in 2003 the Distributor launched a call for tenders (A/O 2003-02) that led to the awarding of eight (8) contracts for a total installed capacity of 900 MW. The regulation also stipulated that the energy should include a "*guarantee of hydroelectric power installed in Québec in the form of a balancing agreement*[1]*."* A five-year wind power integration agreement was then signed with Hydro-Québec Production ("Power Producer") and approved by the Régie.[2]

In 2005, and then in 2009, after the government adopted new regulations aimed at acquiring blocks of wind energy[3], two other calls for tenders (A/O 2005-03 and 2009-02) for blocks of wind energy were launched by the Distributor in view of acquiring 2,000 MW and 500 MW, respectively. These blocks of energy, in accordance with the regulations, must include a "*balancing service and supplementary capacity in the form of a wind energy integration agreement*[4]." The wind power integration agreement signed in 2005 is currently applied to the deliveries arising from the new calls for tenders.[5]

In 2011, the Distributor proposed the implementation of the General Balancing Agreement ("GBA") aimed at replacing the above wind integration agreement. As the GBA had not been approved by the Régie, the Distributor launched a call for qualifications in April 2012 aimed at preselecting interested bidders for a call for tenders for the acquisition of wind power integration services.

[1] *Regulation respecting wind energy and biomass energy,* Order-in-Council 352-2003.
[2] Decision D-2006-27 part of File R-3573-2005.
[3] *Regulation respecting the second block of wind energy,* Order-in-Council 926-2005; *Regulation respecting a 250-MW block of wind energy from Aboriginal projects,* Order-in-Council 1043-2008 and *Regulation respecting a 250-MW block of wind energy from community projects,* Order-in-Council 1045-2008.
[4] Idem.
[5] Decision D-2012-144 and Exhibit B-0036 part of File R-3799-2012.

In the fall of 2012, following a request to cancel the call for qualifications[6] and the Régie's rejection of the motion to dismiss this request[7], the Distributor cancelled the call for tenders that was under way. In accordance with the Régie's comments in the decision[8], the distributor is submitting to the Régie a request for approval covering the following:

- Characteristics of the target wind power integration service;
- The call for tenders procedure in view of the acquisition of a wind power integration service;
- The bid submission assessment grid.

2. CHARACTERISTICS OF THE TARGET PRODUCT

2.1. Total wind power integration requirements

The Distributor's total requirements with respect to wind power integration services are established based on the total contract capacity of the wind farms in commercial operation, which is 1,505 MW as of May 31, 2013. This capacity should total 2,208 MW on January 1, 2014 and reach 3,139 MW at the end of 2015. The monthly expected contract capacity of the wind farms in commercial operation are shown in Appendix A. Moreover, these requirements may increase based on the new blocks of wind energy that the government may determine by regulation.

2.2. Term of the contracts

The Distributor would like to obtain integration services over a five-year period. The Distributor could accept contracts with a three-year term provided that another supplier agrees to take over for the remaining years at the end of the contract.

[6] File R-3806-2012, *Demande d'annulation de l'appel de qualification (QA/O 2012-01) en prévision d'un appel d'offres pour l'acquisition de services d'intégration éolienne*.
[7] Decision D-2012-142.
[8] Idem, paragraph 104.

2.3. Operation of the service

The integration service sought by the Distributor is made up of a wind power balancing service combined with additional capacity in order to strengthen the deliveries of energy during the winter, i.e. starting on December 1 in one year and ending on March 31 of the following year ("Winter Period").

The wind power integration service sought by the Distributor is described as follows:

(i) The supplier shall absorb the variable wind power generation in real time, up to a quantity that will be determined in its bid, with said quantity representing the "contract quantity."

(ii) The supplier shall return at all times a quantity of electricity that corresponds to 35% of the contract capacity.

(iii) During the Winter Period, the energy returns described in (ii) include a capacity guarantee, with additional penalties applying if the delivered quantity is less than the supplier's commitment.

Each integration service supplier is responsible for mobilizing a load capable of absorbing the wind power generation that is not required to return to the Distributor the deliveries guaranteed by the integration service (35% of the contract quantity).

An hourly forecast of the wind power generation will be sent to suppliers of the wind power integration service so that they can plan their generation. This forecast, based on the timeframe covered by the wind generation forecast, will cover at least 48 hours and will be updated every hour.

2.4. Division of the service among several suppliers

Each bidder retained following the call for tenders will be required to supply part of the total requirements described in Section 2.1. The quantity allotted to a supplier will represent the contract quantity the supplier has proposed in its bid and will be reproduced in the contract that the supplier will sign with the Distributor. The Distributor shall ensure that the requirements are entirely covered by a wind power integration service.

In the event that several bidders were to be selected, the wind power integration service shall be supplied at all times based on the total wind power generation in commercial operation. The fluctuations in wind power generation would thus be spread out among the suppliers of the integration service based on the allotted contract quantities.

2.5. Scheduling of supplier's resources

The supplier of the wind power integration service shall subject its generation to the Automatic Generation Control (AGC), or subject its generation and possibly load to the scheduling instructions transmitted every minute by Hydro-Québec TransÉnergie's (the "Transmission Provider") System Control Centre ("SCC").

2.6. Basis of remuneration for the wind power integration service

Bidders shall be asked to submit a price per megawatthour that applies to returns of energy (corresponding to 35% of the contract quantity). They may also submit a price applicable to the differences between the forecast wind power generation and the actual wind power generation.

Lastly, given the uncertainties associated with the actual annual volumes of wind power generation, the difference, either positive or negative, between the actual wind power generation and the returns of contract energy shall involve a compensation between the Distributor and the service supplier.

3. JUSTIFICATION OF TARGET PRODUCT

3.1. Real-time balancing service

3.1.1. Justification of real-time wind power balancing service

The regulations on the blocks of wind power adopted by the government (the "Regulations"[9]) make the implementation of a wind power integration service mandatory. This requirement first stems from the need for balanced supply and demand in real time on the transmission system. In fact, real-time fluctuations of wind power generation must be offset by other in-service resources to ensure a continuous balance between generation and the load and thus make sure that network frequency is maintained at 60 Hz[10]. The balancing of wind power generation is part of the Distributor's obligation to supply the ancillary services required to continuously ensure the security and reliability of the transmission system.[11]

3.1.2. Transmission System Provider's requirements with respect to the integration service

For the reasons mentioned in the previous section, the wind power integration service must make resources available at all times so that they quickly offset the frequency variations induced on the transmission system by fluctuations in wind power generation. The facilities used to supply the service are generally subject to the Automatic Generation Control (AGC). The service currently supplied by the Power Producer under the wind power integration agreement is supplied with this type of facility and ensures the balance between the generation and load at all times.

Moreover, the requirements established by the Transmission System Provider take into account the following characteristics expected by the Distributor in view of the delivery of the integration service:

[9] The regulations on blocks of energy under Orders-in-Council 352-2003, 926-2005, 1043-2008 and 1045-2008.
[10] This is necessary to comply with Standard BAL-001 by the North American Electric Reliability Corporation (NERC), which the Transmission Provider is subject to. For a definition of the standard, see: www.nerc.com/files/BAL-001-0a.pdf
[11] See section 3.4.

- One or more suppliers may be responsible for balancing wind power generation;
- The service must be accessible to producers that are or are not subject to AGC;
- The implementation of the new service must allow all impacts from wind power generation to be absorbed such that the suppliers of ancillary services associated with native-load is not affected by wind power generation;
- Regardless of the supplier or its facilities, all must contribute over a time step that ensures an equivalent level of service.

Given the preceding, the Transmission Provider requires that integration service suppliers have a load and quantity of generation that can be adjusted to absorb or compensate for variations in wind power generation at all times. In this regard, a supplier's generation must be subject either to an instruction issued every minute by the Transmission Provider's SCC or to the Automatic Generation Control (AGC). Furthermore, if the supplier's load is within the Québec balancing area, the supplier can also use the latter to comply with the instructions issued by the SCC.

Any instruction issued by the SCC must be carried out within one minute after being received by the supplier. The Distributor shall implement a mechanism for handling any divergences on the part of a supplier with respect to the instructions.

In addition, suppliers must have the means of receiving SCC instructions and of transmitting information in real time on the generation and the load subject to the scheduling instructions. The exchange of data must take place based on protocols that comply with the reliability standards.

The details of the Transmission Providers requirements are provided in Appendix B.

3.2. Predetermined and guaranteed energy returns

As the Distributor is responsible for the supply of its local load, it must ensure that it meets energy and power requirements over both the very short and the longer term. In this respect, returns of energy that are established ahead of time and are guaranteed allow the Distributor to meet its obligations with respect to the security and reliability of its supply.

In addition, predetermined and guaranteed energy returns prevent the Distributor from having to use resources that could become inadequate as a result of the variability of wind power generation, for all planning timeframes.

Returns of energy, established at 35% of the installed wind power capacity, ensure that the Distributor shall have an annual volume of energy that corresponds to the contracts signed with the wind power suppliers, and thus the anticipated wind power generation.

3.3. Capacity guarantee

During the Winter Period, the energy deliveries must include a capacity guarantee in accordance with the requirements in the Regulations[12].

The capacity guarantee includes a portion of additional capacity, i.e. 5% of the installed wind power capacity, which corresponds to the difference between the guaranteed energy returns in the winter (35% of the wind power generation in commercial operation) and the capacity contribution specific to wind power generation, which corresponds to 30% of the installed wind power capacity. This contribution corresponds to the one used as part of the assessments of the reliability of the Québec balancing zone, approved by the NPCC.

The capacity guarantee established in this manner conforms to Decision D-2011-193, which stipulates that "*the capacity guarantee or, as the case may be, the additional capacity, required by the Orders-in-Council is limited to the amount of capacity required solely for balancing or wind power integration purposes.*"[13]

3.4. Supply of ancillary services

The wind power integration service, which allows deliveries that fluctuate from minute to minute and that are associated with major uncertainties to be balanced, implicitly provides the ancillary services required for the integration of wind power generation.

Hence, the target wind power integration service shall ensure, just like the agreement that is currently in force, that all the impacts from the integration of wind power

[12] See section 1.
[13] Paragraph 139, D-2011-193 of File R-3775-2011.

generation, including impacts on ancillary services, be handled by the suppliers of said services. In this respect, the Distributor notes that under Hydro-Québec's *Open Access Transmission Tariff*, it "*shall provide, or have provided by its Delivering Parties, the Ancillary Services […] required to ensure at all times Transmission System security and reliability.*"[14] These services ensure the balance between supply and demand, limit frequency variations on the network, and offset the differences associated with wind power generation forecasts.

Given the Québec regulatory framework, the impacts of wind power generation cannot be managed under the same agreements as those used for the ancillary services related to heritage electricity. As the Distributor indicated in relation to File R-3799-2012:

> *"The services described in [*the Agreement regarding the services that are required and generally recognized to ensure the security and reliability of the heritage supply of electricity*] are strictly associated with the supply of heritage electricity and cannot be used for any other purposes. […]*
>
> *Hence, the ancillary services covered by this agreement do not allow the impact of wind power generation on transmission system security and reliability to be managed.*
>
> *Moreover, the provisions related to wind power integration are specifically found in the [Regulations] as they aim to meet the needs for these types of services, which are not covered by other agreements. In addition, in Decision D-2008-133, the Régie recognized that without a wind power integration agreement, "the acquisition of ancillary services would still be required for network management purposes."*[15] (note omitted)

The proposed wind power integration service is the only service that allows the Distributor to cover all the impacts of wind power generation, while ensuring the reliability and security of the transmission system.

[14] Schedule 8 of Hydro-Québec's *Open Access Transmission Tariff*.
[15] Section 1.1.2 of Exhibit HQD-1, Document 1 in File R-3799-2012.

3.5. Inseparability of the required services

In accordance with the Regulations, the wind power integration service is a whole which, although consisting of various aspects, cannot be separated into different services. Hence, the wind power integration makes available the balancing service required to continuously offset the unpredictable fluctuations of wind power generation. Moreover, the acquisition of a balancing service on an hourly basis would still require the acquisition of an intra-hour service to cover variances within a given hour.

Furthermore, the capacity guarantee associated with the wind power integration service is directly linked to the need to strengthen the deliveries of electricity from wind turbines. The acquisition of an additional capacity service associated with the wind power integration service would guarantee that the returns of energy could not be interrupted during the peak load.

Lastly, the capacity guarantee part of the wind power integration service shall conform to what is stipulated in the Regulations:

> "*The block [of wind energy] is subject to a guarantee of hydroelectric power […] in the form of a balancing agreement*[16]*."*

and

> "*The block [of wind energy] is subject to a balancing service and supplementary capacity in the form of a wind energy integration agreement […]*[17]."

Furthermore, in Decision D-2011-193, the Régie noted that:

> *"[…] under the Orders-in-Council, the balancing service and additional capacity (or capacity guarantee, as the case may be), cannot be separated. This arises from the terms of […] the Orders-in-Council […]*[18]*."*

Dividing the wind energy integration service into separate services has no practical basis, does not support the reliability of the Distributor's electricity supply, and is in breach of regulatory provisions.

[16] *Confer note 1*.
[17] *Confer note 3*.
[18] Paragraph 138 of the justification for Decision D-2011-193 part of File R-3775-2011.

4. APPLICATION OF THE CALL FOR TENDERS PROCEDURE

The qualification process conducted in 2012 allowed the Distributor to determine the interest and capacity of the various suppliers to deliver the wind power integration service. It also enabled the Distributor to assess the level of competition for the supply of this type of service in Québec. The results revealed that at most two or three suppliers are able to compete for a very small portion of the target quantities, whereas only one supplier was qualified to provide the integration service for all the target quantities. In addition, the latter supplier was the only one who agreed to revise its contract quantities based on the Distributor's growth in requirements arising from the commissioning of new wind farms. This supplier could also take over from a third party only offering the service over a period of three years. The Distributor stresses that this situation could have an impact on the outcome of a call for tenders.

In the context of the launch of a call for tenders, the Distributor will apply the rules of the *Call for Tenders and Contract Award Procedure* that was adopted and approved by the Régie.

Furthermore, the qualification stage will not be included in the process involved by the present application for approval. Any interested suppliers may respond to the call for tenders, whether they have taken part in Call for Qualifications QA/O 2012-01 or not. The withdrawal of this stage would allow the Distributor to reduce the time required to implement the new wind energy integration agreements.

5. CRITERIA USED FOR THE BID SELECTION PROCESS

Section 74.1 of the *Act Respecting the Régie de l'énergie* stipulates that contracts shall be awarded on the basis of the lowest price for the requested quantities and conditions. These conditions are of two types: one, they define the products that are part of the call for tenders, and two, they serve to establish the minimum requirements that bidders will have to meet so that the Distributor can provide a reliable supply of electricity in Québec.

The Distributor shall assess the bids received for the wind power integration service based on a three-stage selection process, in accordance with the *Call for Tenders and Contract Award Procedure* approved by the Régie.

During an initial stage of the bid assessment process, the following minimum requirements must be met:

- In accordance with the Regulations, the wind power integration service must come from generating units located in Québec, connected synchronously to Hydro-Québec's integrated transmission system and inside the Québec balancing area.
- The bidder or its affiliates must have experience in the operation of at least one electrical generating unit on a commercial basis.
- The bidder must meet the Transmission Provider's technical requirements stipulated in the call for tenders.
- The bidder must meet the Distributor's requirements regarding financial strength.

In the second stage, bids shall be assessed only on the basis of the monetary criterion, meaning the prices submitted for the wind power integration service based on the basis of remuneration defined in Section 2.6. In fact, the non-monetary criteria retained as part of the application for approval of the *2005-2014 Supply Plan* for the assessment of bids related to long-term calls for tenders are not applicable in the present case for the reasons indicated below.

The criteria of sustainable development, bidder's experience and project feasibility are designed to be applied as part of the implementation of new generating facilities. However, the lead times required for implementing the service do not allow the construction of a new generating facility designed for wind energy balancing. As the service can only be provided with existing facilities, the issues related to the risk and feasibility of future projects are not found here. Furthermore, the Distributor's requirements in relation to the financial strength criterion are taken into account in the first assessment stage, while flexibility is at the very core of the requested service.

The third stage, i.e. the assessment of bid combinations selected during the second stage, will be applied as needed, in accordance with the existing procedure, based on the monetary criterion.

6. COMPARISON WITH INTEGRATION SERVICES ELSEWHERE IN NORTH AMERICA

The Distributor contracted the Brattle Group to survey the wind integration practices in the other North American control areas.[19]

The results reveal that the lack of an organized market for short-term energy and ancillary services transactions distinguishes Québec from most of the jurisdictions in the United States. Furthermore, the few surveyed cases of wind power integration services are limited to the services required to manage intra-hourly variations in generation and maintain frequency control. None of the services surveyed covers the impacts of wind power generation beyond a one-hour timeframe.

In addition, the expert that was contracted has indicated that the Distributor, given its load serving entity function and given that it does not own any generation resources, must acquire a wind energy integration service with a scope that extends well beyond the intra-hourly services implemented in the U.S. The expert also mentioned that the service required by the Distributor must include a capacity guarantee as well as the delivery of the various ancillary services.

Québec's unique regulatory context, in particular with respect to the supply of heritage electricity and the regulations on blocks of wind energy, was reiterated by the expert, who confirmed the need for the Distributor to acquire a wind power integration agreement that is separate from the ancillary services associated with heritage electricity.

7. CONCLUSION

The variable and unpredictable nature of wind power generation makes it necessary, for purposes of power system reliability and security, that the Distributor acquire a balancing service to integrate all the installed wind power capacity.

To this end, the Distributor needs to know the quantities of wind power generation that are available over the very short term as well as over the longer term, and to do so, it requires predetermined and guaranteed energy returns. The wind power generation

[19] See the testimony of Philip Q. Hanser in Exhibit HQD-1, Document 2.

service as defined in this application for approval meets the Distributor's needs and will enable it to comply with the Transmission Provider's requirements in terms of wind power integration.

The proposed integration service ensures that all the impacts from wind power generation are managed and transmission system reliability is maintained. This service will play an increasingly important role in a context where the Distributor's quantities of wind power generation may increase.

APPENDIX A

DISTRIBUTOR'S REQUIREMENTS IN TERMS OF WIND POWER INTEGRATION SERVICES

QUANTITY OF INSTALLED WIND ENERGY IN COMMERCIAL OPERATION AND UNDER CONTRACT WITH HYDRO-QUÉBEC DISTRIBUTION

AS EXPECTED MAY 31, 2013

Month	Installed capacity
January 2014	2208 MW
February 2014	2208 MW
March 2014	2208 MW
April 2014	2208 MW
May 2014	2208 MW
June 2014	2208 MW
July 2014	2208 MW
August 2014	2208 MW
September 2014	2208 MW
October 2014	2208 MW
November 2014	2208 MW
December 2014	2693 MW
January 2015	2693 MW
February 2015	2693 MW
March 2015	2693 MW
April 2015	2693 MW
May 2015	2693 MW
June 2015	2693 MW
July 2015	2693 MW
August 2015	2693 MW
September 2015	2693 MW
October 2015	2693 MW
November 2015	2693 MW
December 2015 to December 2018	3139 MW

In addition to the existing contractual agreements at May 31, 2013, the Distributor may revise the quantities of wind energy generation upward to take into account the agreements arising from potential new calls for tenders or wind power purchase programs following blocks of energy determined by the government. These new agreements may take effect during the term of the contract(s) associated with the wind energy integration service.

The quantities of wind power generation could also be revised downward if, for instance, there were delays in the commissioning of the wind farms.

APPENDIX B

TRANSMISSION PROVIDER'S CRITERIA AND REQUIREMENTS FOR THE SUPPLY OF THE WIND POWER INTEGRATION SERVICE

Hydro-Québec TransÉnergie

Criteria and requirements for the supply of the wind power integration service

1- Description of the service required by the Distributor

- Our understanding of the sought-after service is as follows:
  - The service must be available to generators that are or are not subject to Automatic Generation Control (AGC).
  - The implementation of the new service must allow all impacts from wind power generation to be absorbed, such that the supply of the ancillary services associated with native-load is not affected by wind power generation.
  - One or more suppliers could be responsible for balancing wind power generation.
  - Regardless of the supplier or its facilities, all must contribute over a time step that ensures an equivalent level of service.

2- Transmission Provider's requirements for providing the integration service

Reminder of the Transmission Provider's obligations

- Ensure transmission system reliability in accordance with the standards approved by the Régie de l'énergie.
- Maintain generation/load balancing at all times on the system.
- Ensure compliance with its Open Access Transmission Tariff.

Requirements

- The supplier must have a firm delivery commitment within the Québec balancing area or at an interconnection point between the Québec balancing area and neighboring balancing areas (*supplier's load*).
- Wind power generation balancing must be done through an adjustment of the supplier's generation delivered within the Québec balancing area. The supplier's generation is then subject to the instructions of the Transmission Provider's System Control Centre (SCC).
- If the *supplier's load* is within the Québec balancing area, the supplier may also balance wind power generation by adjusting this load based on the scheduling instructions sent by the SCC.
- The quantity of generation resources or the quantity of the *supplier's load* made available to the Transmission Provider must be sufficient to offset or absorb variable wind power generation and thus provide the returns of energy requested by the Distributor at all times. To this end, each supplier must make available to the Transmission Provider a variation range whose magnitude will depend on the *contract quantity*.
- The scheduling instructions issued by the SCC to each supplier shall be established based on actual wind power generation and the supplier's commitment with respect to

the returns of energy. If the actual wind power generation is greater than the returns of energy required by the Distributor, the scheduling instructions shall indicate the quantity of wind power generation to be absorbed by a load. In the opposite case, the scheduling instructions shall indicate the quantity of additional generation required to guarantee the constancy of the returns of energy.

- The SCC's scheduling instructions are refreshed each minute.
- Any instructions issued by the SCC must be carried out within one minute after they have been received.

3- Exchange of information between the Transmission Provider and the supplier

- The following information is sent to each supplier every minute:
  - Total wind power generation;
  - In the case of suppliers not subject to AGC, the scheduling instructions issued by the SCC, which shall conform to the provisions of Section 2.
- At least once every minute, each supplier shall make available to the Transmission Provider the quantity of generation and load subject to the SCC's scheduling instructions.
- The exchange of information between the SCC and each integration service supplier as required under the two previous paragraphs must be done electronically (no human intervention).[1]
  - For suppliers not subject to AGC, the ICCP protocol must be used for real-time exchanges.[2]
  - In addition, the telecommunications link and server must be redundant.[3]
- When the *supplier's load* is located at an interconnection point between the Québec balancing area and neighboring balancing areas, the supplier must inform the Transmission Provider of any changes related to said load.
  - Such loads must be constant within a given hour, but may vary from hour to hour.
  - Forecasts for the next day's loads (24 hours) must be provided no later than noon in the form of an hourly schedule.

4- Monitoring of supplier's performance

- The Transmission Provider must be capable of metering the actual deliveries at the HQT delivery point on its system.[4]
- The SCC scheduling instructions must be followed with a level of precision of 5% for schedules of 20 MW and more, and up to 1 MW for schedules above 20 MW.

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1. Reference: Reliability Standard COM-001-1.1
2. Reference: Reliability Standards COM-001-1.1 and IRO-002-2
3. Reference: Reliability Standards COM-001-1.1 and IRO-002-2
4. Reference: Reliability Standards BAL-006-2 and IRO-002-2

- To ensure transmission system reliability and balancing, the Distributor shall implement a mechanism for handling any divergences with respect to SCC instructions. This mechanism shall include penalties for any non-compliance with minute-by-minute instructions as well as for total hourly values.

5- Regulatory requirements

- The selected supplier shall:
  - Comply with the Transmission Provider's Open Access Transmission Tariff;
  - Comply with the relevant standards and the reliability framework in force in Québec.