Alberta Utilities Commission

In the Matter of the Need for the

Grizzly Bear Creek Wind Power Plant Connection

And in the matter of the *Electric Utilities Act*, S.A. 2003, c. E-5.1, the *Alberta Utilities Commission Act*, S.A. 2007, c. A-37.2, the *Hydro and Electric Energy Act*, R.S.A. 2000, c. H-16, the Regulations made thereunder, and Alberta Utilities Commission Rule 007

Application of the Alberta Electric System Operator for Approval of the Grizzly Bear Creek Wind Power Plant Connection Needs Identification Document

PART A - APPLICATION

1 Introduction

1.1 Application – Pursuant to Section 34(1)(c) of the *Electric Utilities Act* (Act), and in accordance with further provisions set out in legislation,[1] the Alberta Electric System Operator (AESO) applies to the Alberta Utilities Commission (Commission) for approval of the *Grizzly Bear Creek Wind Power Plant Connection Needs Identification Document* (Application).

1.2 Application Overview – E.ON Climate & Renewables Canada Ltd. (E.ON) has requested system access service to connect a wind aggregated generating facility named the E.ON Grizzly Bear Creek Wind Power Plant[2] (the Facility) to be located near the Town of Vermilion (AESO Planning Area 13, Lloydminster). The Facility has an expected in-service date of Q4 2017. E.ON's request includes a Rate STS, *Supply Transmission Service*, contract capacity of 120 MW and a Rate DTS, *Demand Transmission Service*, contract capacity of 1.5 MW for new system access service. E.ON's request can be met by adding the Steele 2016S substation with a 144 kV circuit breaker, adding a 144 kV circuit to connect the Steele 2016S substation to the 144 kV transmission line 7L65 in a T-tap configuration, and connecting the Steele 2016S substation to the Facility; and by modifying the approved Vincent 2019S substation connection,[3] including adding a second 144 kV circuit and two 144 kV circuit breakers to convert the approved T-tap to an in-and-out configuration (the "Proposed Transmission Development", as further described in Section 2.2). The scheduled in-service date for the Proposed Transmission Development is December 31, 2017.

[1] The Alberta Utilities Commission Act, S.A. 2007, c. A-37.2, the Hydro and Electric Energy Act, R.S.A. 2000, c. H-16, the Transmission Regulation, AR 86/2007 and Alberta Utilities Commission Rule 007, all as amended.

[2] The *Grizzly Bear Creek Wind Power Project* was originally approved by the Commission on May 19, 2016 in Decision 3329-D01-2016 and issued Power Plant Approval No. 3329-D03-2016.

[3] The *Vincent 2019S Substation Needs Identification Document* was originally approved by the Commission on April 26, 2016 in Decision 21166-D01-2016 and issued NID Approval No. 21166-D02-2016.

This Application describes the need to respond to E.ON's request for system access service. Having followed the AESO Connection Process,[4] the AESO has determined that the Proposed Transmission Development provides a reasonable opportunity for the market participant to exchange electricity. The Proposed Transmission Development is consistent with the AESO's long-term plans for the Central Region, which includes the Proposed Transmission Development area. The AESO, in accordance with its responsibility to respond to requests for system access service, submits this Application to the Commission for approval.[5,6]

1.3 AESO Directions to the TFO – During the AESO Connection Process, the AESO issued various directions to ATCO Electric Ltd. (ATCO), as the legal owner of transmission facilities (TFO), including direction to assist the AESO in preparing this Application.[7]

[4] For information purposes, refer to note iv of Part C of this Application for more information on the AESO's Connection Process.

[5] For information purposes, some of the legislative provisions relating to the AESO's planning duties and duty to provide system access service are referenced in notes i and ii of Part C of this Application.

[6] Note v of Part C of this Application describes the Application scope in more detail.

[7] The directions are described in more detail in the following sections of this Application and in Part C, note vi.

2 Need Overview and Proposed Transmission Development

2.1 Duty to Provide Transmission System Access Service – The AESO, pursuant to its responsibilities under Section 29 of the Act, must provide system access service on the transmission system in a manner that gives all market participants (in this case, E.ON), a reasonable opportunity to exchange electric energy.

E.ON has requested system access service on the transmission system, thereby establishing the need for this Application. Through the AESO Connection Process, the AESO, E.ON, and the TFO have collaborated to determine the characteristics of the Proposed Transmission Development and to assess the impacts that the Proposed Transmission Development and the associated load and generation would have on the transmission system. The AESO has issued directions to the TFO to prepare a Facility Proposal[8] to meet E.ON's request.

2.2 Proposed Transmission Development – The Proposed Transmission Development involves connecting the Facility to the transmission system and modifying the Vincent 2019S substation connection configuration, including the following elements:

1. Add a new switching station, to be designated Steele 2016S substation, with a 144 kV circuit breaker and connect the Steele 2016S substation to the Facility;[9]
2. Connect the Steele 2016S substation to the existing 144 kV transmission line 7L65 through a 144 kV circuit using a T-tap configuration;
3. Convert the Vincent 2019S substation connection from a T-tap to an in-and-out configuration to the existing 144 kV transmission line 7L65 by adding a new 144 kV circuit and two 144 kV circuit breakers;[10] and

[8] Also referred to as facility application, or FA, under Commission Rule 007.

[9] The details regarding the connection between the Facility and the Steele 2016S substation will be addressed in the FA.

[10] Current AESO practice is to limit new taps on transmission lines to one, for the sake of reliability to new and existing customers. This is consistent with the current Section 502.3 of the ISO Rules, *Interconnected*

4. Modify, alter, add or remove equipment, including switchgear, and any operational, protection, control and telecommunication devices required to undertake the work as planned, and ensure proper integration with the transmission system.[11]

2.3 Proposed Transmission Development Cost Estimates – The AESO directed the TFO to prepare a cost estimate for the Proposed Transmission Development. The TFO estimated the in-service cost of the Proposed Transmission Development, described in Section 2.2, to be approximately $26 million.[12] In accordance with the ISO tariff, the AESO has determined that there are no system-related costs associated with the Proposed Transmission Development.

2.4 Transmission Development Alternatives – In addition to the Proposed Transmission Development, the following transmission development alternatives were identified:

1. **Connect the Facility to the existing 144 kV transmission line 7L129 using an in-and-out configuration** – This alternative involves connecting the Steele 2016S substation to both the Facility and to the 144 kV transmission line 7L129 using an in-and-out configuration. Constraints could arise under system normal conditions for this alternative with a generation output of greater than 55 MW

Electric System Protection Requirements. Therefore, the Vincent 2019S substation connection will need to be converted from a T-tap to an in-and-out configuration.

[11] Details and configuration of equipment required for the Proposed Transmission Development, including substation single-line diagrams, are more specifically described in the AESO's Functional Specification included in the TFO's Facility Proposal. Also, further details will be determined as detailed engineering progresses and market participant's operating requirements are finalized. Routing and/or siting of transmission facilities do not form part of this Application and are addressed in the TFO's Facility Proposal. The new 144 kV circuit is currently estimated to have a length of approximately 20 kilometres. This is subject to change as routing and/or siting is finalized by the TFO. Line numbering and substation names provided here are for ease of reference and are subject to change as engineering and design progresses. Market participant facilities that may subsequently be connected to the Proposed Transmission Development are the responsibility of the market participant and are not included in the Application.

[12] The cost is in nominal dollars using a base year of 2015 with escalation considered. Further details of this cost estimate can be found in Appendix B, with an approximate accuracy level of +20%/-10%.

from the Facility, which is lower than E.ON's requested Rate STS. At a result, this alternative was ruled out.

2. **Connecting the Facility to a rebuilt 144 kV transmission line 7L129 using an in-and-out configuration** – This alternative involves rebuilding the 144 kV transmission line 7L129 to a higher capacity and connecting the Steele 2016S substation to both the Facility and to the rebuilt 144 kV transmission line 7L129 using an in-and-out configuration. Approximately 40 km of additional 144 kV circuit would be required for this alternative. Therefore, it was ruled out because of increased transmission development compared to the Proposed Transmission Development.

3. **Connecting the Facility to the Buffalo Creek 526S substation using a radial configuration** – This alternative involves connecting the Steele 2016S substation to both the Facility and to the Buffalo Creek 526S substation using a radial configuration. Constraints could arise under system normal conditions for this alternative with any generation output from the Facility. At a result, this alternative was ruled out.

The Proposed Transmission Development was selected as the preferred transmission alternative and forms the basis of the cost estimates and connection assessment described herein.

2.5 Connection Assessment – Power flow, transient stability, and short circuit analyses were conducted to assess the impact that the Proposed Transmission Development and the associated load and generation would have on the transmission system.[13] Power flow and short circuit analyses were conducted prior to and following connection of the Facility and transient stability analysis was performed following connection of the Facility.

[13] The connection assessment is included as Appendix A.

The pre-connection assessment identified numerous system performance issues. Under certain Category B conditions, thermal criteria violations were observed. Real time operational practices and planned RASs identified for previously approved applications[14,15] can be used to mitigate the pre-connection system performance issues.

The post-connection assessment identified some of the same system performance issues that were identified in the pre-connection assessment as well as additional system performance issues. Under Category B conditions, only one of the thermal criteria violations that were observed in the pre-connection assessment was intensified. Two new thermal criteria violations were also observed in the post-connection assessment under certain Category B contingencies. Real time operational practices and existing and planned RASs can be used to mitigate most of the post-connection system performance issues. However, mitigation of the observed thermal criteria violations on the 144 kV transmission line 7L65 is dependent on the line restoration for the 144 kV transmission line 7L65 and removal of its current transformer (CT) limits.

2.6 AESO Forecast and Transmission System Plans – The AESO's corporate forecast for the region is consistent with the load and generation associated with the Proposed Transmission Development.[16] The AESO's corporate forecasts are used by the AESO to assess the adequacy of the regional transmission system and as a basis for identifying the need for transmission system expansion or enhancement. Therefore, the need associated with the Proposed Transmission Development is consistent with the AESO's long-term plans for the region.

2.7 Transmission Dependencies – As discussed in Section 2.5, the Proposed Transmission Development is dependent on the restoration of the 144 kV transmission line 7L65. Restoring the line's capacity and removing its CT limits will mitigate the

[14] *Suncor Hand Hills Wind Energy Connection Needs Identification Document*, as originally approved by AUC Decision 2482-D01-2015 and Approval 2482-D03-2015; and,

[15] *BluEarth Hand Hills Wind Energy Connection Needs Identification Document*, as originally approved by AUC Decision 2482-D01-2015 and Approval 2482-D02-2015.

[16] Section 5 of the *AESO 2016 Long-term Outlook* discusses the Central Region, which includes the Proposed Transmission Development area.

observed thermal criteria violations. Restoring 7L65 is part of the TFO capital maintenance and is outside the scope of the Project. The TFO has advised that this restoration will occur as a capital maintenance project that is expected to be in service by Q3 2017, which is before the Project's energization.

The Proposed Transmission Development is not dependent on any plans of the AESO to expand or enhance the transmission system.

2.8 AESO Participant Involvement Program – The AESO directed the TFO to assist the AESO in conducting a participant involvement program (PIP). Between December 2015 and May 2016, the TFO and the AESO used various methods to notify stakeholders, including occupants, residents, landowners, government bodies, agencies and stakeholder groups in the area where the AESO has reasonably determined that transmission facilities could be installed to implement the Proposed Transmission Development. Additionally, the AESO notified the public in the area where transmission facilities could be installed to implement the Proposed Transmission Development, of its intention to file this Application with the Commission for approval. No concerns or objections have been raised regarding the need for the Proposed Transmission Development.[17]

2.9 Information Regarding Rule 007, Section 6.2.2, NID23 (3) – The AESO has been advised that the TFO's Facility Proposal addresses the requirements of Commission Rule 007, Section 6.2.2, NID23 (3).[18] In consideration of that fact, and as the filing of the Application is combined with the TFO's Facility Proposal, the AESO has not undertaken a separate assessment of the sort contemplated in Commission Rule 007, Section 6.2.2, NID23(3).

2.10 Confirmation Date – In the event that the proposed facilities are not in-service by June 30, 2018, which is six months following the scheduled in-service date of December 31, 2017, the AESO will inform the Commission in writing if the need to

[17] Further information regarding the AESO's PIP for this Application is included in Appendix C.

[18] Please refer to the letter included as Appendix D of this Application.

expand or enhance the transmission system described in this Application continues, and if the technical solution described in this Application approval continues to be the AESO's preferred technical solution.[19]

2.11 Approval is in the Public Interest – Having regard to the following:

- the transmission planning duties of the AESO as described in Sections 29, 33 and 34 of the Act;
- the request for system access service;
- the connection assessment;
- information obtained from AESO PIP Activities; and
- the AESO's long-term transmission system plans;

it is the conclusion of the AESO that the Proposed Transmission Development provides a reasonable opportunity for the market participant to exchange electricity. In consideration of these factors, the AESO submits that approval of this Application is in the public interest.

[19] A detailed project schedule, which includes potential limitations or constraints as contemplated in Commission Rule 007, NID25(2), can be found in the TFO's Facility Proposal.

3 Request to Combine this Application with the Facility Proposal for Consideration in a Single Process

3.1 Pursuant to Subsection 35(1) of the Act, the AESO has directed the TFO to prepare a Facility Proposal to meet the need identified. The AESO understands that the TFO's Facility Proposal will be filed shortly.[20] The AESO requests, and expects the TFO will request, that this Application be combined with the Facility Proposal for consideration by the Commission in a single process. This request is consistent with Section 15.4 of the *Hydro and Electric Energy Act* and Section 6 of Commission Rule 007.

3.2 While it is believed that this Application and the Facility Proposal will be materially consistent, the AESO respectfully requests that in its consideration of both, the Commission be mindful of the fact that the documents have been prepared separately and for different purposes. The purpose of this Application is to obtain approval of the need to respond to the market participant's request for system access service and provide a preliminary description of the manner proposed to meet that need. In contrast, the Facility Proposal will contain more detailed engineering and designs for the Proposed Transmission Development and seek approval for the construction and operation of specific facilities.

[20] The AESO understands that the TFO intends to file a Facility Proposal relating to this Application to be titled *Grizzly Bear Transmission Project.*

4 Relief Requested

4.1 The AESO submits that its assessment of the need to meet the market participant's request for transmission system access service is technically complete and that approval is in the public interest.

4.2 In the event that the proposed facilities are not in-service by June 30, 2018, which is six months following the scheduled in-service date of December 31, 2017, the AESO will inform the Commission in writing if the need to expand or enhance the transmission system described in this Application continues, and if the technical solution described in this Application approval continues to be the AESO's preferred technical solution.

4.3 For the reasons set out herein, and pursuant to Section 34 of the Act, the AESO requests that the Commission approve this Application, including issuing an approval of the need to respond to the market participant's request for system access service, and to connect the Facility to the transmission system and modify the Vincent 2019S substation connection, including the following:

A. Add a new switching station, to be designated Steele 2016S substation, with a 144 kV circuit breaker and connect the Steele 2016S substation to the Facility;

B. Connect the Steele 2016S substation to the existing 144 kV transmission line 7L65 through a 144 kV circuit using a T-tap configuration;

C. Convert the Vincent 2019S substation connection from a T-tap to an in-and-out configuration to the existing 144 kV transmission line 7L65 by adding a new 144 kV circuit and two 144 kV circuit breakers; and

D. Modify, alter, add or remove equipment, including switchgear, and any operational, protection, control and telecommunication devices required to undertake the work as planned and ensure proper integration with the transmission system.

All of which is respectfully submitted this 27th day of May 2016.

Alberta Electric System Operator

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Warren Clendining
Manager, Transmission Regulation Projects

PART B – APPLICATION APPENDICES

The following appended documents support the Application (Part A).

APPENDIX A **Connection Assessment –** Appendix A contains the *Connection Engineering Study Report for Filing – E. ON Grizzly Bear Creek Wind Power Plant Facility Connection* that assesses the transmission system performance prior to and following the connection of the Proposed Transmission Development.

APPENDIX B **TFO Capital Cost Estimates –** Appendix B contains detailed cost estimates corresponding to the Proposed Transmission Development. These estimates have been prepared by the TFO at the direction of the AESO, to an approximate accuracy level of +20%/-10%, which exceeds the accuracy required by Commission Rule 007, NID24.

APPENDIX C **AESO PIP –** Appendix C contains a summary of the PIP activities conducted, in accordance with requirement NID27 and Appendix A2 of Commission Rule 007, regarding the need to respond to the market participant's request for system access service. Copies of the relevant materials distributed during the PIP are attached for reference.

APPENDIX D **Information Regarding Rule 007, Section 6.2.2, NID23(3) –** Appendix D contains a letter provided by the TFO confirming that the requirements of Commission Rule 007, NID23(3) will be addressed within the TFO's Facility Proposal.

APPENDIX E **AESO Transmission Planning Criteria – Basis and Assumptions –** The AESO has revised the *Transmission Reliability Criteria, Part II Transmission System Planning Criteria,* Version 0, dated March 11, 2005 primarily to remove criteria that are now included in the Transmission Planning (TPL) Standards.[21] Appendix E contains the *Transmission Planning Criteria – Basis and Assumptions,* Version 1, which includes the applicable thermal and voltage limits in support of the TPL

[21] TPL Standards are included in the current Alberta Reliability Standards.

standards. Planning studies that are included in this Application meet the relevant performance requirements of the specified TPL standards.

PART C – REFERENCES

i. **AESO Planning Duties and Responsibilities –** Certain aspects of AESO duties and responsibilities with respect to planning the transmission system are described in the Act. For example, Section 17, Subsections (g), (h), (i), and (j), describe the general planning duties of the AESO.[22] Section 33 of the Act states that the AESO "must forecast the needs of Alberta and develop plans for the transmission system to provide efficient, reliable, and non-discriminatory system access service and the timely implementation of required transmission system expansions and enhancements." Where, as in this case, the market participant (refer to note ii below) is requesting system access service, and the request requires or may require the expansion or enhancement of the capability of the transmission system, the AESO must prepare and submit for Commission approval, as per Section 34(1)(c), a needs identification document that describes the need to respond to requests for system access service, including the assessments undertaken by the AESO regarding the manner proposed to address that need. Other aspects of the AESO's transmission planning duties and responsibilities are set out in Sections 8, 10, 11, and 15 of the *Transmission Regulation*.

ii. **Duty to Provide Transmission System Access –** Section 29 of the Act states that the AESO "must provide system access service on the transmission system in a manner that gives all market participants wishing to exchange electric energy and ancillary services a reasonable opportunity to do so."

iii. **AESO Planning Criteria –** The AESO is required to plan a transmission system that satisfies applicable reliability standards. Transmission Planning (TPL) standards are included in the Alberta Reliability Standards, and are generally described at: http://www.aeso.ca/rulesprocedures/17006.html.[23]

In addition, the AESO's *Transmission Planning Criteria – Basis and Assumptions* is included in Appendix E.

iv. **AESO Connection Process** – For information purposes, the AESO Connection Process, which changes from time to time, is generally described at: http://www.aeso.ca/connect[24]

[22] The legislation and regulations refer to the Independent System Operator or ISO. "AESO" and "Alberta Electric System Operator" are the registered trade names of the Independent System Operator.

[23] This link is provided for ease of reference and does not form part of this Application.

[24] This link is provided for ease of reference and does not form part of this Application.

v. **Application for Approval of the Need to Respond to a Request for System Access Service –** This Application is directed solely to the question of the need to respond to a request for system access service, as more fully described in the Act and the *Transmission Regulation*. This Application does not seek approval of those aspects of transmission development that are managed and executed separately from the needs identification document approval process. Other aspects of the AESO's responsibilities regarding transmission development are managed under the appropriate processes, including the ISO rules, Alberta Reliability Standards and the ISO tariff, which are also subject to specific regulatory approvals. While the Application or its supporting appendices may refer to other processes or information from time to time, the inclusion of this information is for context and reference only**.**

   Any reference within the Application to market participants or other parties and/or the facilities they may own and operate or may wish to own and operate, does not constitute an application for approval of such facilities. The responsibility for seeking such regulatory or other approval remains the responsibility of the market participants or other parties.

vi. **Directions to the TFO –** Pursuant to Subsection 35(1) of the Act, the AESO has directed the TFO, in whose service territories the need is located, to prepare a Facility Proposal to meet the need identified. The Facility Proposal is also submitted to the Commission for approval. The TFO has also been directed by the AESO under Section 39 of the Act to prepare a proposal to provide services to address the need for the Proposed Transmission Development. The AESO has also directed the TFO, pursuant to Section 39 of the Act and Section 14 of the *Transmission Regulation*, to assist in the preparation of the AESO's Application.

vii. **Capital Cost Estimates –** The provision of capital costs estimates in the Application is for the purposes of relative comparison and context only. The AESO's responsibilities in respect of project cost reporting are described in the *Transmission Regulation*, including Section 25, and ISO Rule 9.1.