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Kulvinder Bhambra
Manager, ESG Data and Analytics
Liberty Algonquin Business Services
345 Davis Rd., Suite 100
Oakville, ON L6J 2X1

August 17, 2020

Dear Kulvinder:

Re: GHG Verification Report for Algonquin Power & Utilities Corp 2019 Scope 1 and 2 Emissions Inventory

Our Verification Report for Algonquin Power & Utilities Corp 2019 Emissions Inventory, specifically the 2020 Sustainability Report Appendix – Environmental metrics table and associated subscripts is attached. The report documents the results of the verification that took place during the period June 26, 2020 – August 14, 2020.

We value the ongoing working relationship that we have with APUC, and appreciate the assistance provided to the verification team by Company staff during the verification process.

If you have any questions regarding the results of the verification please call me at the phone number listed below.

Yours truly,

Thomas E. Darling, P.Eng
Lead Verifier
KPMG Performance Registrar
(905) 523-2201

Enc: GHG Verification Report for Algonquin Power & Utilities Corp 2019 Scope 1 and 2 Emissions Inventory



GHG Verification Report for Algonquin Power & Utilities Corp 2019 Scope 1 and 2 Emissions Inventory

August 17, 2020

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A. Verification Body Details

Name:	KPMG Performance Registrar Inc.
Address:	777 Dunsmuir Street PO Box 10426 Vancouver BC V7Y 1K3
Contact information:	Phone: 604 691 3088 Fax: 604 691 3031
Accreditation Agency:	American National Standards Institute
Accreditation ID:	#0746
Status of Accreditation:	In good standing

B. Client Information

Client Name:	Algonquin Power & Utilities Corp
Client Representative:	Kulvinder Bhambra, Manager, ESG Data and Analytics

C. Verification Details

Verification Standard:	ISO 14064 Part 3:2006
Verification Criteria:	The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard, Revised Edition as applicable to the reporting of organizational inventory for Scope 1 and Scope 2 emission sources.
Level of Assurance:	Limited
Verification scope:	<p>The scope of the verification is the Scope 1 and Scope 2 emissions for Algonquin Power & Utilities Corp for calendar year 2019</p> <p>Facility or project boundaries: Algonquin Power & Utilities Corp and their North American facilities in the following locations:</p> <ul style="list-style-type: none">• Head office: Oakville, Ontario• Coal: Missouri• Hydroelectric: Quebec, Maine, Alberta, Ontario, New Brunswick• Electric Utility: California, Missouri• Wind: New Brunswick, Michigan, Illinois, Saskatchewan, Minnesota, Pennsylvania, Texas, Manitoba, Missouri• Electric and Gas Utility: New Hampshire• Solar: California, Ontario, Maryland• Gas Utility: Georgia, Massachusetts, Missouri, Illinois, Iowa• Natural Gas: California, Connecticut, Missouri, Kansas• Water and Wastewater Utility: California, Arizona, Texas, Arkansas, Missouri, Iowa, Illinois <p>GHG sources, sinks and or reservoirs: The following sinks, sources and reservoirs are within scope:</p>

	<ul style="list-style-type: none"> • Scope 1 stationary combustion • Scope 1 Fugitive Emissions (NG distribution) • Scope 1 mobile combustion • Scope 1 Fugitive emissions (CH₄ & N₂O waste water) • Scope 1 Fugitive Emissions (SF₆) • Scope 2 Transmission and Distribution losses • Scope 2 purchased electricity <p>Physical infrastructure, activities, technologies and processes of the organization: The following activities are within scope:</p> <ul style="list-style-type: none"> • Power Generation (coal, natural gas, wind, solar, hydroelectric) • Utility (water, wastewater, gas, electrical). <p>Types of GHGs: The following greenhouse gases are within scope:</p> <ul style="list-style-type: none"> • CO₂, CH₄, N₂O and SF₆ 						
Verification date(s):	<p>Initial familiarization: June 26, 2020</p> <p>Verification planning and document review: June 29 – August 10, 2020</p> <p>Remote Verification Asbury: July 21, 2020</p> <p>Remote Verification Windsor Locks: August 4, 2020</p> <p>Verification Completion and Reporting: August 10 – August 14, 2020</p>						
Algonquin Power & Utilities Corp GHG Assertion for the period from January 1- December 31, 2019	<table> <tr> <td>Total Scope 1 Emissions</td> <td>2,749,976 tonnes CO₂e</td> </tr> <tr> <td>Total Scope 2 Emissions</td> <td>42,830 tonnes CO₂e¹</td> </tr> <tr> <td>GHG Assertion</td> <td>2,792,806 tonnes CO₂e²</td> </tr> </table> <p>Notes:</p> <p>¹ Location based and market based Scope 2 emissions are the same in the case of Algonquin Power & Utilities Corp.</p> <p>² Consolidated using the operational control method.</p>	Total Scope 1 Emissions	2,749,976 tonnes CO ₂ e	Total Scope 2 Emissions	42,830 tonnes CO ₂ e ¹	GHG Assertion	2,792,806 tonnes CO ₂ e ²
Total Scope 1 Emissions	2,749,976 tonnes CO ₂ e						
Total Scope 2 Emissions	42,830 tonnes CO ₂ e ¹						
GHG Assertion	2,792,806 tonnes CO ₂ e ²						
Materiality	5% of total Scope 1 and Scope 2 emissions						
Verification procedures:	<p>The main elements of our examination were:</p> <ul style="list-style-type: none"> • Review of the GHG methodology manual and comparison to the GHG protocol and publicly available emission factors and Global Warming Potentials • Comparison of the calculations in the GHG calculator to the documented methodology. • GHG data collector and calculator preparer (Delphi) interviews to understand the process of preparing and checking consolidated emissions. • Conduct of two remote site visits to gain an understanding of data completeness and data flow to the GHG calculator. 						



	<ul style="list-style-type: none"> • Recalculation of GHG emissions from raw data on a sample basis. • Gaining an understanding of the approach to calibration of measurement equipment. • Interviews with Algonquin Power & Utilities Corp staff to understand checks over selection of reporting boundaries, completeness of emission sources and treatment of negligible emission sources. • Comparison of reported data to underlying GHG calculations. • Comparison of methodology disclosures against GHG protocol requirements. <p>The extent of evidence gathering procedures performed in a limited assurance engagement is less than that for a reasonable assurance engagement, and therefore a lower level of assurance is obtained.</p>
<p>Inherent limitations in our report</p>	<p>Greenhouse gas and energy use data are subject to inherent limitations. A number of different measurement techniques may be utilized in accordance with the requirements of the verification criteria which may vary in precision and /or outcome, resulting in different greenhouse gas emissions estimates.</p>
<p>Multi-site sampling</p>	<p>The inventory consists of 86 individual sites, KPMG selected two sites for remote site visits. The sites selected were the Empire Asbury coal fired power plant and the Windsor Locks Thermal facility.</p> <p>Asbury: The Asbury site reported 32.4% of total emissions and is part of the Empire group which consists of 7 sites and 91.4% of total emissions. Asbury was selected from the Empire sites due to its large contribution to overall emissions, because it was the only coal fired power plant in the Liberty Algonquin inventory in 2019 and because the data collection methodology at Asbury matches the methodologies at the other Empire sites. Further, because there is a single Environmental, Health and Safety officer that covers all of the Empire sites, the remote site visit at Asbury allowed KPMG to perform an in-depth review of transmission losses and the SF6 inventory review process, for which Empire is the only reporting site in the inventory.</p> <p>Windsor Locks: The Windsor Locks site reported 3.2% of total emissions and was selected because it was the largest single site outside of the Empire group of facilities. Further, the data collection methodology at Windsor Locks differs from Empire as Empire emissions are collected using direct measurement and CEMs units whereas natural gas emissions at Windsor Locks are</p>

	calculated by measuring natural gas volume consumed in stationary combustion.
Verification team:	Lead verifier: Tom Darling, P.Eng, Senior Manager Verification team member: Patrick MacKinnon, P.Eng, Specialist Verification team member: Hilda Garza-Villarreal, P.Eng, Senior Consultant Verifier in training: Jocelyn Li, CPA, Senior Consultant Technical Reviewer: Chris Ridley-Thomas, CPA, CA, EP(EMSLA)
Report distribution:	Algonquin Power & Utilities Corp
Confidentiality requirements:	Except as required by law, a legal or judicial process, a professional duty and the requirements of our accreditation, KPMG, will treat as strictly confidential any information which comes into the possession of its officers, directors, employees or agents in the course of conducting the verification of Liberty Utilities and Algonquin Power's Greenhouse Gas assertion.
Use of the Verification Mark:	Not applicable

D. Verification Findings

Control Environment

A limited assurance engagement does not contemplate certain verification procedures such as performing tests of internal control over reporting to evaluate design and implementation or test operating effectiveness. Hence, no opinion is provided on the effectiveness of internal controls.

Within this context the control environment consists of the following elements:

- Stationary combustion: direct emissions measurement by calibrated instruments with automated data transmission to reporting templates. Reporting is reviewed internally and by regulators.
- Mobile combustion: data collection performed at sites and reported to third party for review. Consolidated consumption is reviewed by 3rd party and management.

- Fugitive emissions: input data collected at sites and reported to third party for consolidation and review. Consolidated input data is reviewed by 3rd party and management.
- Electricity consumption: consumption is based on 3rd party invoices. Data is consolidated and reviewed by 3rd party, final consolidated review is performed by management.
- Electricity T&D Losses: purchased electricity is determined from financial records which are reviewed by management prior to collection by 3rd party.
- All data is collected individually by sites and delivered to the report preparer annually. The data is reviewed and compared to data from previous years for the same site and to similar sites within the inventory for the year under review. Investigation is performed on significant outliers.

KPMG did not place any reliance on the control environment and instead performed substantive testing to review the accuracy of the inventory.

GHG Calculation methods and assumptions

Stationary Combustion: CO₂ emissions are based upon direct measurement from calibrated meters, 3rd party invoices and in one case, internally calibrated meters. CH₄ and N₂O emissions are based upon conversion factors at standard conditions from measured volumes. EPA and Environment Canada emission factors are used dependent on the jurisdiction of the emission source.

Mobile Combustion: fuel volumes are multiplied by Environment Canada mobile emission factors which are more comprehensive for CH₄ and N₂O and more conservative than EPA factors.

Fugitive Emissions: natural gas transport emissions are based upon the length, type and material of transmission pipe, the EPA required calculation methodology and EPA emission factors. Wastewater fugitive emissions are based upon the number of people served by the wastewater facility and the EPA methodology for calculating CH₄ and N₂O fugitive emissions from wastewater treatment. EPA sourced emission factors are also used. There are no wastewater facilities in Canada. SF₆ fugitive emissions are based upon EPA SF₆ inventory data reporting requirements. Fugitive emission sources in Canada use the EPA methodology to maintain consistency throughout the inventory.

Electricity Consumption: Electricity consumption is determined by 3rd party invoices. Scope 2 emissions calculations are performed using electricity grid emission factors for the province/state of consumption, sourced from Environment Canada or EPA.

Electricity T&D Losses: Purchased electricity per state is sourced from financial records and multiplied by a transmission and distribution loss factor which is determined from grid data available from the US department of energy. There are no T&D losses reported for Canada.

Variations from the Protocol

No variations from the GHG Protocol were observed

GHG Assertion

Our assessment of the GHG assertion identified the following unadjusted nonconformities:

1. The methodology used considers fugitive emissions from coal piles to be negligible, however, fugitive emissions from coal piles were estimated to be 4,782 tCO₂e, 0.17% of reported emissions. The source is not negligible as it is twice as large as the combined emissions from the Hydroelectric Power, Wind Power, Solar Power and Office source categories.
2. Canadian Emission Factors for mobile combustion were used at US locations. This resulted in an overstatement of emissions by 338 tCO₂e, 0.012% of reported emissions.
3. A cutoff error in electricity consumption at the Windsor Locks facility resulted in an overstatement of emissions by 18 tCO₂e, 0.0007% of reported emissions.
4. Although there are no mobile emissions reported, a small source of mobile emissions was noted during the remote site visit to the Windsor Locks facility. Estimation of potentially incomplete mobile emissions across the inventory resulted in a potential understatement of 2,287 tCO₂e, 0.08% of reported emissions reported.
5. Five wastewater sites do not have the data required to determine fugitive emissions. Estimation of emissions using electricity consumed at those sites as a proxy resulted in a potential understatement of 967 tCO₂e, 0.03% of reported emissions.
6. Electricity consumption used for the calculation of scope 2 emissions at the Odell Wind Site was understated and did not match 3rd party invoices. This resulted in an understatement of 2.5 tCO₂e, 0.0001% of reported emissions.
7. Data transmission errors from the Massachusetts site resulted in under reporting site stationary combustion emissions by 453 tCO₂e, 0.02% of reported emissions.
8. Three Canadian sites did not provide sufficient data to make a determination on SF₆ fugitive emissions. The potential understatement of emissions is estimated at 31 tCO₂e, 0.001% of reported emissions.
9. One meter at the Massachusetts site was found to have exceeded its required calibration period by 5 years. Based on observed drift from calibration data, the potential overstatement of emissions is estimated at 8 tCO₂e, 0.0003% of reported emissions.

Algonquin Power & Utilities Corp management determined that the identified nonconformities were both individually and cumulatively immaterial to the emissions report, being 0.292% of the reported emissions. We concur with management's determination.



Opportunities for improvement

Without qualifying our verification statement the following opportunities for improvement were identified during the audit:

1. The methodology manual does not currently describe all sources considered to be out of scope. Fugitive emissions from HFCs and flaring emissions from natural gas distribution are not considered in the inventory although they are both regulated sources in the jurisdictions in which Liberty and Algonquin operate. The combined materiality of these sources is estimated to be immaterial and 0.12% of the total inventory .
2. The methodology manual is not updated annually to match the GHG calculator. Emission factors documented in the methodology manual do not currently match those used in the GHG calculator because the GHG calculator is updated annually, whereas the manual is updated less frequently.



E. Verification Statement

To Algonquin Power & Utilities Corp,

We have been engaged by Algonquin Power & Utilities Corp (the Company) to examine the Company's assertion for corporate scope 1 and 2 greenhouse gas (GHG) emissions of 2,792,806 tonnes of CO₂ equivalent for the period from January 1, 2019 to December 31, 2019.

The Company is responsible for the preparation and presentation of the scope 1 and 2 greenhouse gas emissions. Our responsibility is to express a conclusion as to whether anything has come to our attention to suggest that the greenhouse gas assertion is not presented fairly in accordance with the Greenhouse Gas Protocol Corporate Accounting and Reporting Standard, Revised Edition (The GHG Protocol).

Our duties in relation to this report are owed solely to Algonquin Power & Utilities Corp. Accordingly, we do not accept any responsibility for any loss occasioned to any third party acting or refraining from action as a result of this report.

We completed our examination in accordance with *ISO 14064-Part 3:2006 Specification with guidance for the validation and verification of greenhouse gas assertions*. As such, we planned and performed our work in order to provide limited, rather than absolute assurance with respect to the greenhouse gas assertion. Our examination criteria were based on the GHG protocol. We believe our work provides a reasonable basis for our conclusion.

Based on our examination, nothing has come to our attention that causes us to believe that the greenhouse gas assertion for corporate scope 1 and 2 GHG emissions is not presented fairly in all material respects in accordance with the GHG Protocol.

Greenhouse gas and energy use data are subject to inherent limitations. A number of different measurement techniques may be utilized in accordance with the requirements of the GHG Protocol which may vary in precision and /or outcome, resulting in different greenhouse gas emissions estimates.

KPMG PRI

KPMG Performance Registrar Inc.
Vancouver BC
August 17, 2020