

# **Oldman 2 Wind Farm Offset Project Report**

**Period: 1<sup>st</sup> September 2014 to 31<sup>st</sup>  
December 2014**

**Oldman 2 Wind Farm Ltd.  
March 2015**

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# 1. Project Scope and Site Description

## 1.1. Introduction

Oldman 2 Wind Farm Ltd. (the “Project Owner”) will own and operate the Oldman 2 Wind Farm (the “Project”) located in the Municipal District of Pincher Creek, province of Alberta. As specified herein, the Project is eligible for offsets under the Specified Gas Emitter Regulation (“SGER”). The offset requirements are defined in the Technical Guidance for Offset Project Developers, Version 4.0, February 2013 (“Guidance Document”).

|  |   |
|--|---|
| Project Title:                         | Oldman 2 Wind Farm  |
| Project Purpose and Objective(s):      | The purpose of the Project is to reduce indirect GHG emissions related to the generation of electricity in the province of Alberta through the displacement of grid electricity with renewable, wind powered electricity generation.  |
| Project Start Date:                    | Commissioning of the wind turbines commenced on 16 <sup>th</sup> July 2014  |
| Credit Start Date:                     | September 1 <sup>st</sup> , 2014  |
| Credit Duration Period:                | The initial credit duration period is, as defined by the Guidance Document, 8 years with a possible extension of 5 years. The initial credit duration of the Project is September 1 <sup>st</sup> , 2014 to August 31 <sup>st</sup> , 2022.   |
| Expected Lifetime of the Project:      | 20 Years  |
| Actual Emission Reductions 2014:       | The actual emission reductions for the Project’s operation for the period September 1 <sup>st</sup> to December 31 <sup>st</sup> 2014 is 37180 tonnes of CO <sub>2</sub> e.   |
| Applicable Quantification Protocol(s): | Quantification Protocol for Wind-Powered Electricity Generation, Version 1, March 2008 (“Quantification Protocol”)  |
| Protocol Justification:                | <p>The Project is located in Alberta, generates electricity from wind, and connects to the Alberta Integrated Electricity System.</p> <p>The Project also meets all applicability requirements stated in the Quantification Protocol. Specifically:</p> <ol style="list-style-type: none"> <li>1. Metering of net electricity generation occurs at a point downstream of generation at the point of interconnection with the electricity grid and the Project does not include any storage;</li> <li>2. Emission reductions are quantified based on actual measurements and monitoring;</li> <li>3. Wind powered electrical generation is not a business-as-usual activity in Alberta.</li> </ol> |
| Other Environmental Attributes:        | Currently the Owner plans to exclusively register the Project offsets under the Alberta Emissions Offset Registry. However, the Project is eligible to create Renewable Energy Certificates (RECs) and the project may be registered in the Western Renewable   |

|   |  |
|---|--|
|   | <p>Energy Generation Information System (WREGIS) at some point in the future, or alternatively the Owner may decide to set aside some RECs for retirement. Any generation associated with RECs which are sold, transferred or retired from the Project will be quantified and their associated volume deducted from the calculation of Electricity Generation emission reductions to ensure that there is no double counting of emission reductions.</p>   |
| <p>Legal Land Description of the Project and/or Other Unique Site Descriptions:</p> | <p>The Project is located on 1,700 acres of farmland in southwest Alberta. The Oldman 2 Wind Farm is located approximately 10km north east of the Town of Pincher Creek, Alberta. The Project is located within the Municipal District of Pincher Creek No. 9 on the following land parcels: NE14-7-29-4, NW14-7-29-4, SW14-7-29-4, NE15-7-29-4, NW15-7-29-4, SE21-7-29-4, NE21-7-29-4, SW22-7-29-4, SW22-7-29-4, SW26-7-29-4, SE27-7-29-4, SW27-7-29-4</p> <p>Latitude: 49° 34' 59.494"<br/>Longitude: 113° 50' 31.319"</p>   |
| <p>Ownership:</p>   | <p>The Project is 100% owned by Oldman 2 Wind Farm Ltd. Ownership in Oldman 2 Wind farm Ltd. is 100% held by IKEA Properties Limited. IKEA will own and control all of the environmental benefits from the Project through Oldman 2 Wind Farm Ltd. Environmental benefits are not transferred under any landowner agreements and are also not transferred when the energy is provided to the Alberta Power Pool.</p>   |
| <p>Reporting and Verification Details:</p>  | <p>The Project will be verified by, Stantec Consulting Ltd., an independent third party before any of the offsets are submitted to the Alberta Emissions Offset Registry. The verifier will inspect the relevant project documentation and data to ensure accuracy of Owner's data management system, visit the project site and review information with the site staff. The verifier will meet the requirements outlined in the Guidance Document while adhering to ISO 14064 Part 3 – Greenhouse gasses: Specification with guidance for the validation and verification of greenhouse gas assertions.</p> |
| <p>Project Activity:</p>  | <p>The Project is located in Alberta and is a result of actions taken after January 1, 2002. The Project is not required by law and is beyond business-as-usual practice. The project is real, demonstrable, quantifiable, and verifiable, as demonstrated in this Plan. The Project has clearly established ownership and control.</p> <p>The Project is not currently registered under any other offset schemes and the quantification approach ensures that any environmental attributes that are utilized outside of the SGER program will be properly accounted for and deducted such that</p>          |

|   | they are only counted once for compliance purposes.   |  |      |   |      |        |      |        |      |        |      |        |      |        |      |        |      |        |      |       |
|---|---|--|------|---|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|-------|
| Wind Farm Management:                       | Mainstream Renewable Power is contracted by Oldman 2 Wind Farm Ltd to provide management services for Oldman 2 Wind Farm. Mainstream Renewable Power has subcontracted the on-site management of the wind farm to EDF Renewable Energy Services. EDF Renewable Services has a manager at site who manages the day to day operation of the wind farm. This manager uses one of the three vehicles used for operation and maintenance of the site. Oldman 2 Wind Farm Ltd has also contracted Siemens to provide maintenance services for the wind turbines. Siemens has two vehicles at site that are used for maintenance of the wind farm. |  |      |   |      |        |      |        |      |        |      |        |      |        |      |        |      |        |      |       |
| Future Estimated Annual Emission Reduction: | <table border="1"> <thead> <tr> <th>Year</th> <th>Estimated annual emission reduction<br/>tCO<sub>2</sub>e</th> </tr> </thead> <tbody> <tr> <td>2015</td> <td>107120</td> </tr> <tr> <td>2016</td> <td>107120</td> </tr> <tr> <td>2017</td> <td>107120</td> </tr> <tr> <td>2018</td> <td>107120</td> </tr> <tr> <td>2019</td> <td>107120</td> </tr> <tr> <td>2020</td> <td>107120</td> </tr> <tr> <td>2021</td> <td>107120</td> </tr> <tr> <td>2022</td> <td>71316</td> </tr> </tbody> </table> <p>Based on 0.65t CO<sub>2</sub>e / MWh intensity</p>   |  | Year | Estimated annual emission reduction<br>tCO <sub>2</sub> e | 2015 | 107120 | 2016 | 107120 | 2017 | 107120 | 2018 | 107120 | 2019 | 107120 | 2020 | 107120 | 2021 | 107120 | 2022 | 71316 |
| Year  | Estimated annual emission reduction<br>tCO <sub>2</sub> e   |  |      |   |      |        |      |        |      |        |      |        |      |        |      |        |      |        |      |       |
| 2015  | 107120  |  |      |   |      |        |      |        |      |        |      |        |      |        |      |        |      |        |      |       |
| 2016  | 107120  |  |      |   |      |        |      |        |      |        |      |        |      |        |      |        |      |        |      |       |
| 2017  | 107120  |  |      |   |      |        |      |        |      |        |      |        |      |        |      |        |      |        |      |       |
| 2018  | 107120  |  |      |   |      |        |      |        |      |        |      |        |      |        |      |        |      |        |      |       |
| 2019  | 107120  |  |      |   |      |        |      |        |      |        |      |        |      |        |      |        |      |        |      |       |
| 2020  | 107120  |  |      |   |      |        |      |        |      |        |      |        |      |        |      |        |      |        |      |       |
| 2021  | 107120  |  |      |   |      |        |      |        |      |        |      |        |      |        |      |        |      |        |      |       |
| 2022  | 71316   |  |      |   |      |        |      |        |      |        |      |        |      |        |      |        |      |        |      |       |

## 2. Project Contact Information

|  |   |
|--|---|
| Project Developer Contact Information:       | <p>Mainstream Renewable Power (Operator of Oldman 2)<br/> Patrick Maguire<br/> Head of Generation Operations<br/> Address: Arena Hse, Arena Rd, Sandyford, Dublin 18, Ireland<br/> Phone: +1 353 1 290 2067<br/> Fax: +353 1 294 2390<br/> Email: <a href="mailto:patrick.maguire@mainstreamrp.com">patrick.maguire@mainstreamrp.com</a><br/> Web: <a href="http://www.mainstreamrp.com">www.mainstreamrp.com</a></p>       |
| Other Project Developer Contact Information: | <p>IKEA Services BV<br/> John Harris<br/> Technical Manager, Corporate Finance and Tax<br/> Tel. +31 (0)71 56 57 193<br/> Mobile +31 (0)6 83 444 863<br/> Email: <a href="mailto:John.Harris@ikea.com">John.Harris@ikea.com</a></p> <p>IKEA Canada<br/> Charles Symons<br/> Finance Manager<br/> Tel: +1 (905) 637-9440 extension 6351<br/> Email: <a href="mailto:charles.symons@ikea.com">charles.symons@ikea.com</a></p> |
| Verification Organisation:                   | <p>Stantec Consulting Ltd<br/> Daniel Hegg<br/> Regional Technical Leader - Climate &amp; GHG Services<br/> Senior Sustainability Specialist<br/> Phone: (250) 217-9729<br/> Cell: (250) 514-4970<br/> Fax: (250) 382-0514<br/> <a href="mailto:Daniel.Hegg@stantec.com">Daniel.Hegg@stantec.com</a></p>  |

### 3. Project Description

Oldman 2 Wind Farm is a wind farm electricity generating project located in the Municipal District of Pincher Creek, Alberta. The project consists of the following infrastructure:

- A permanent 100m meteorological tower powered from the electrical collection system.
- 20 Siemens SWT 2.3-101 wind turbines with a capacity of 2.3 MW each (46MW total)
- Turbines have a blade length of 49m and a cylindrical steel tower height of 80m
- Asynchronous generators connected to power conversion systems to allow generator operation at variable speed, while supplying constant voltage and frequency to a 34.5/138 kV step-up transformer
- An underground and overhead 34.5kV electrical collection system that feeds into the Windy Point 112S substation which then feeds into the 138kV AIES transmission system
- Revenue Metering as required by AESO at the high voltage side of the step-up transformer (AESO point of interconnection). The AESO meter will be sealed, tagged, and calibrated in compliance with Measurements Canada.

The purpose of the Project is to reduce indirect GHG emissions related to the generation of electricity in the province of Alberta through the displacement of grid electricity with renewable, wind-powered electricity generation.

The Project is located across 1,700 acres of farmland in southwest Alberta. The Oldman 2 Wind Farm is located approximately 10km north east of the Town of Pincher Creek, Alberta. The Project is located within the Municipal District of Pincher Creek No. 9 on the following land parcels: NE14-7-29-4, NW14-7-29-4, SW14-7-29-4, NE15-7-29-4, NW15-7-29-4, SE21-7-29-4, NE21-7-29-4, SW22-7-29-4, SW22-7-29-4, SW26-7-29-4, SE27-7-29-4, SW27-7-29-4

Latitude: 49° 34' 59.494"

Longitude: 113° 50' 31.319"

The wind turbine locations are:

| Turbine | UTM E  | UTM N   |
|---------|--------|---------|
| T1      | 292333 | 5495363 |
| T2      | 292392 | 5495100 |
| T3      | 292778 | 5495852 |
| T4      | 293133 | 5494606 |
| T5      | 293154 | 5494366 |
| T6      | 293210 | 5496290 |
| T7      | 293216 | 5496622 |
| T8      | 293283 | 5494148 |
| T9      | 293704 | 5493977 |
| T10     | 293885 | 5494583 |
| T11     | 293803 | 5494844 |
| T12     | 293813 | 5495134 |

|     |        |         |
|-----|--------|---------|
| T13 | 293824 | 5494348 |
| T14 | 293948 | 5496325 |
| T15 | 293920 | 5496516 |
| T16 | 294557 | 5496281 |
| T17 | 295195 | 5496531 |
| T18 | 295116 | 5496224 |
| T19 | 295553 | 5494212 |
| T20 | 295580 | 5493827 |

## 4. Project Implementation and Variances

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This is the first Project Report for Oldman 2 Wind Farm covering the period from the Credit Start Date, 1<sup>st</sup> September 2014, to the 31<sup>st</sup> December 2014. The first Project Plan was submitted on 10<sup>th</sup> January 2014. The Project Plan was updated on 5<sup>th</sup> March 2015 to reflect some changes to the project. The changes between the original Project Plan and the updated Project Plan were as follows:

- The Credit Start Date changed from 15<sup>th</sup> August 2014 to the 1<sup>st</sup> September 2014. This was due to the construction of the project being delayed.
- To add the Project off-site O&M building as an emissions source for facility operations. It was decided to lease and O&M building in Pincher Creek for the Project. This needed to be included as an emissions source for facility operations.
- Update project contact details as some of the personnel managing the project had changed.
- Update the Global Warming Potentials (GWP) for CH<sub>4</sub> and N<sub>2</sub>O to reflect the latest guidance from ESRD. CH<sub>4</sub> changed from 21 to 25, N<sub>2</sub>O changed from 310 to 298.
- Changed the emission factors for gasoline vehicles from Heavy Duty Gasoline Vehicles (HDGV) to Light Duty Gasoline Trucks (LDGT). At the time of writing the original Project Plan it was unclear what type of vehicles would be used for operation of the plant and an assumption was made that it would be HDGVs. The actual vehicles used are Ford F150 trucks which are classified as LDGTs.
- Update the conversion factor for Natural Gas to convert GJ to m<sup>3</sup> from 27 to 26.8 as per the latest guidance from Alberta Energy [http://www.energy.gov.ab.ca/about\\_us/1132.asp](http://www.energy.gov.ab.ca/about_us/1132.asp).
- Added an annual breakdown of the estimated emission reductions.
- Added a description of the management organisation for the wind farm.



## 5. Greenhouse Gas Calculations

Quantification of the emission reductions generated by the Project will be conducted using the Quantification Protocol. The following three equations serve as the basis for calculating the emission reductions from the Project, using the emission profiles of the baseline and project conditions.

$$\text{Emission Reduction} = \text{Emissions}_{\text{Baseline}} - \text{Emissions}_{\text{Project}}$$

$$\text{Emissions}_{\text{Baseline}} = \text{Emissions}_{\text{B1 Electricity Generation}}$$

$$\text{Emissions}_{\text{Project}} = \text{Emissions}_{\text{P1 Facility Operation}} + \text{Emissions}_{\text{P3 Fuel Extraction \& Processing}}$$

Individual equations to calculate the emissions from each SSR are provided in the Quantification Protocol and reproduced here. Project specific formulae along with the details of the parameters, including emission factors utilized are provided in the following sections.

No flexibility mechanisms were used.

### 5.1. Emissions<sub>Baseline</sub> (B1 Electricity Generation)

The relevant greenhouse gases applicable to this SSR are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O), as represented by equivalent carbon dioxide (CO<sub>2e</sub>). The general equation for this SSR, as presented in the Quantification Protocol and with additional provision for REC accounting, is:

$$\text{Emissions}_{\text{B1}} = (\text{Electricity} - \text{REC}) * \text{EF}_{\text{Electricity}}$$

Where:

| Protocol Parameter / Variable | Project Specific Data  | Measurement Specification or Estimation Justification   |
|-------------------------------|--|---|
| Electricity                   | Net electricity generation data from AESO settlement statements and historic generation reports in MWh.                | Direct metering. Net transfer of electricity to the grid. Continuous data (15 min intervals) collected from AESO metering and settlement statements where production is net of any consumption when the project is producing power. |
| REC                           | The amount of electricity associated with RECs that have been sold, transferred or retired outside of the SGER in MWh. | The Project will keep detailed records of any RECs contracted from the project to ensure that no double counting occurs.  |
| EF <sub>Electricity</sub>     | 0.65 t CO <sub>2e</sub> / MWh  | GHG Emission Factor for Electricity Generation. Grid displacement factor sourced from the Alberta Environmental technical Guidance for Offset protocol  |

|   |
|---|
| Developers (January 2011, Version 1.0). |
|---|

## 5.2. Emissions Facility Operations (P1 Facility Operations)

The relevant greenhouse gases applicable to this SSR are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O), as represented by equivalent carbon dioxide (CO<sub>2e</sub>). The general equation for this SSR, as presented in the Quantification Protocol, is:

$$\text{Emissions}_{P1} = (\sum (\text{VolFuel}_i * \text{Fuel}_i \text{EF}_{\text{CO}_2}) + \sum (\text{VolFuel}_i * \text{Fuel}_i \text{EF}_{\text{CH}_4}) * 25 + \sum (\text{VolFuel}_i * \text{Fuel}_i \text{EF}_{\text{N}_2\text{O}}) * 298) / 1,000,000 \text{ g / tonne} + \sum (\text{Electricity}_{\text{Consumed}} * \text{EF}_{\text{Electricity Consumption}})$$

Where:

| Protocol Parameter / Variable      | Project Specific Data  | Measurement Specification or Estimation Justification   |
|------------------------------------|--|---|
| Electricity <sub>Consumed</sub>    | Net electricity consumption data from AESO settlement statements and historic generation reports in MWh for wind farm consumption.<br>Net electricity consumption data from Epcor bills for the O&M building | Direct metering. Wind Farm - This is comprised of the load which is net-from-grid electricity consumed by the facility at times when on-site generation is insufficient to supply on-site electricity requirements. Continuous data (15 min intervals) collected from AESO metering and settlement statements.<br>O&M Building – A meter at the O&M building records electricity consumption of the building. The supplier, Epcor, sends monthly statements showing consumption of electricity at the building.   |
| EF <sub>Electricity Consumed</sub> | 0.88 t CO <sub>2e</sub> / MWh  | GHG Emission Factor for Electricity Consumption. AESRD – 2008 Electricity Intensity factors, National Inventory Report, <a href="http://www.ec.gc.ca/ges-ghg">http://www.ec.gc.ca/ges-ghg</a>   |
| VolFuel <sub>i</sub>               | Volume of fossil fuel consumed on site, either gasoline or diesel in L, or Natural Gas in GJ   | Owner will maintain an activity log for the site which includes gasoline and diesel fuel use, vehicle type and mileage related to the Project as discussed in Section 7. A meter at the O&M building records consumption of natural gas at the building. The supplier, Altgas Utilities, sends monthly statements of gas consumption which the Owner will maintain as a record. The natural gas bills do not match the exact calendar month period, the total amount on each bill has been pro-rated to calculate the volume usage for each month during the report period. |

|   |  |   |
|---|--|---|
| Fuel <sub>i</sub> EF <sub>CO2</sub>                       | 2,289g CO <sub>2</sub> / L               | Gasoline. Canada National Inventory Report 1990 to 2012 Part 2 Table A8–11 Emission Factors for Energy Mobile Combustion Sources. Light-duty Gasoline Trucks (LDGTs) Tier 2                         |
| Fuel <sub>i</sub> EF <sub>CH4</sub>                       | 0.14g CH <sub>4</sub> / L                |   |
| Fuel <sub>i</sub> EF <sub>N2O</sub>                       | 0.022g N <sub>2</sub> O / L              |   |
| Fuel <sub>i</sub> EF <sub>CO2</sub>                       | 1,918g CO <sub>2</sub> / m <sup>3</sup>  | Natural Gas. Canada National Inventory Report 1990 to 2012 Part 2 Table A8-1 and A8-2 Emissions Factors for Natural Gas; Alberta, Residential, Construction, Commercial/Institutional, Agriculture. |
| Fuel <sub>i</sub> EF <sub>CH4</sub>                       | 0.037g CH <sub>4</sub> / m <sup>3</sup>  |   |
| Fuel <sub>i</sub> EF <sub>N2O</sub>                       | 0.035g N <sub>2</sub> O / m <sup>3</sup> |   |
| Conversion factor for natural gas (GJ to m <sup>3</sup> ) | 26.8 m <sup>3</sup> /GJ                  | Alberta Energy – Energy Measurements <a href="http://www.energy.gov.ab.ca/about_us/1132.asp">http://www.energy.gov.ab.ca/about_us/1132.asp</a>  |

### 5.3. Emissions Fuel Extraction & Processing (P3 Fuel Extraction & Processing)

The relevant greenhouse gases applicable to this SSR are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O), as represented by equivalent carbon dioxide (CO<sub>2</sub>e). The general equation for this SSR, as presented in the Quantification Protocol, is:

$$\text{Emissions}_{P3} = (\sum (\text{VolFuel}_i * \text{Fuel}_i\text{EF}_{\text{CO}_2}) + \sum (\text{VolFuel}_i * \text{Fuel}_i\text{EF}_{\text{CH}_4}) * 25 + \sum (\text{VolFuel}_i * \text{Fuel}_i\text{EF}_{\text{N}_2\text{O}}) * 298) / 1,000,000 \text{ g / tonne}$$

Where:

| Protocol Parameter / Variable       | Project Specific Data   | Measurement Specification or Estimation Justification   |
|-------------------------------------|---|---|
| VolFuel <sub>i</sub>                | Volume of fossil fuel consumed on site, either gasoline or diesel in L, or Natural Gas in GJ. | Owner will maintain an activity log for the site which includes gasoline and diesel fuel use and mileage related to the Project as discussed in Section 7. A meter at the O&M building records consumption of natural gas at the building. The supplier, Altgas Utilities, sends monthly statements of gas consumption which the Owner will maintain as a record. |
| Fuel <sub>i</sub> EF <sub>CO2</sub> | 138g CO <sub>2</sub> / L  | Emission factors for Gasoline or Diesel production, as listed in the Quantification Protocol.   |
| Fuel <sub>i</sub> EF <sub>CH4</sub> | 10.9g CH <sub>4</sub> / L   |   |
| Fuel <sub>i</sub> EF <sub>N2O</sub> | 0.004g N <sub>2</sub> O / L   |   |
| Fuel <sub>i</sub> EF <sub>CO2</sub> | 43g CO <sub>2</sub> / m <sup>3</sup>  | Natural Gas Emission Factors for  |

|   |  |   |
|---|--|---|
| Fuel <sub>i</sub> EF <sub>CH4</sub>                       | 2.3g CH <sub>4</sub> /m <sup>3</sup>   | extraction as listed in the Quantification Protocol.  |
| Fuel <sub>i</sub> EF <sub>N2O</sub>                       | 0.004g N <sub>2</sub> O/m <sup>3</sup> |   |
| Fuel <sub>i</sub> EF <sub>CO2</sub>                       | 90g CO <sub>2</sub> / m <sup>3</sup>   | Natural Gas Emission Factors for processing as listed in the Quantification Protocol.   |
| Fuel <sub>i</sub> EF <sub>CH4</sub>                       | 0.3g CH <sub>4</sub> /m <sup>3</sup>   |   |
| Fuel <sub>i</sub> EF <sub>N2O</sub>                       | 0.003g N <sub>2</sub> O/m <sup>3</sup> |   |
| Conversion factor for natural gas (GJ to m <sup>3</sup> ) | 26.8 m <sup>3</sup> /GJ                | Alberta Energy – Energy Measurements<br><a href="http://www.energy.gov.ab.ca/about_us/1132.asp">http://www.energy.gov.ab.ca/about_us/1132.asp</a> |

## 6. Greenhouse Gas Assertion

Oldman 2 Wind Farm

Greenhouse Gas Assertion Statement

Year 2014  
 Period September 1st 2014 to 31st December 2014

|  |   | CO2<br>(tCO2e) | CH4<br>(tCO2e) | N2O<br>(tCO2e) | Total<br>(tCO2e) |
|--|---|----------------|----------------|----------------|------------------|
| Total Baseline   | B1 Electricity Generation                         | 37,320.67      | -              | -              | 37,320.67        |
| Total Project Emissions                                | P1 Facility Operations - Electricity Consumption  | 130.32         |                |                | 130.32           |
|  | P1 Facility Operations - Fossil Fuels Consumption | 8.82           | 0.01           | 0.03           | 8.86             |
|  | P3 Fuel Processing & Extraction                   | 0.55           | 0.87           | 0.01           | 1.42             |
| Net Emission Reductions.<br>2014 -Sept 1st to Dec 31st |   |                |                |                | 37,180           |

## 7. Project Developer Signature

I am a duly authorized corporate officer of the project developer mentioned above and have personally examined and am familiar with the information submitted in this offset project report including the accompanying greenhouse gas assertion on which it is based. Based upon reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, I hereby warrant that the submitted information is true, accurate and complete to the best of my knowledge and belief, and that all matters affecting the validity of the emission reduction claim or the protocol(s) upon which it is based have been fully disclosed. I understand that any false statement made in the submitted information may result in de-registration of credits and may be punishable as a criminal offence in accordance with provincial or federal statutes.

The project developer has executed this offset project report as of the 16 day of MARCH, 2015.

Oldman 2 Wind Farm

Oldman 2 Wind Farm Ltd

Signature: J.R.B. Harris

Date: 16 March 2015

Name: J. R. B. Harris

Title: President for Oldman 2 Wind Farm Ltd.

Signature: [Signature]

Date: 16 March 2015

Name: F. E. VAN MEEREN

Title: BOARD MEMBER

Oldman 2 Wind Farm – Offset Project Plan

## **Appendix A**

Full Results and Calculations

## Full Results

Year 2014  
 Period September 1st 2014 to 31st December 2014

|  |   | CO2<br>(tCO2e) | CH4<br>(tCO2e) | N2O<br>(tCO2e) | Total<br>(tCO2e) |
|--|---|----------------|----------------|----------------|------------------|
| Total Baseline   | B1 Electricity Generation                         | 37,320.67      | -              | -              | 37,320.67        |
| Total Project Emissions                                | P1 Facility Operations - Electricity Consumption  | 130.32         |                |                | 130.32           |
|  | P1 Facility Operations - Fossil Fuels Consumption | 8.82           | 0.01           | 0.03           | 8.86             |
|  | P3 Fuel Processing & Extraction                   | 0.55           | 0.87           | 0.01           | 1.42             |
| Net Emission Reductions.<br>2014 -Sept 1st to Dec 31st |   |                |                |                | 37,180           |



## B1 Electricity Generation

| Month                      | Production MWh | Conversion - 0.65 t CO <sub>2</sub> e/MWh | CO <sub>2</sub> e (tonnes) |
|----------------------------|----------------|---|----------------------------|
| September-14               | 9434.63        | 9434.63 MWh x 0.65 t CO <sub>2</sub> e    | 6132.51                    |
| October-14                 | 18019.92       | 18019.92 MWh x t CO <sub>2</sub> e        | 11712.95                   |
| November-14                | 12035.70       | 12035.7 MWh x t CO <sub>2</sub> e         | 7823.21                    |
| December-14                | 17926.17       | 17926.17 MWh x t CO <sub>2</sub> e        | 11652.01                   |
| 2014 -Sept 1st to Dec 31st | 57416.42       | 57416.42 MWh x 0.65 CO <sub>2</sub> e     | 37320.67                   |

## P1 Facility Operations - Electricity Consumption

## Total P1 Facility Operations - Electricity

|                                   | MWh    | Conversion EF Electricity Consumed 0.88t CO <sub>2</sub> e / MWh | t CO <sub>2</sub> e |
|-----------------------------------|--------|--|---------------------|
| Site Electricity Consumed         | 143.87 | 143.87 MWh x 0.88 t CO <sub>2</sub> e                            | 126.61              |
| O&M Building Electricity Consumed | 4.22   | 4.223 MWh x 0.88 t CO <sub>2</sub> e                             | 3.72                |
| 2014 - Sept 1st to Dec 31st       | 148.09 | 148.093 MWh x 0.88 t CO <sub>2</sub> e                           | 130.32              |

## Site Consumption

| Month                       | Electricity Consumed MWh | Conversion EF Electricity Consumed 0.88t CO <sub>2</sub> e / MWh | t CO <sub>2</sub> e |
|-----------------------------|--------------------------|--|---------------------|
| September-14                | 27.77                    | 27.77 MWh x 0.88 t CO <sub>2</sub> e                             | 24.44               |
| October-14                  | 26.97                    | 26.97 MWh x 0.88 t CO <sub>2</sub> e                             | 23.73               |
| November-14                 | 61.63                    | 61.63 MWh x 0.88 t CO <sub>2</sub> e                             | 54.23               |
| December-14                 | 27.50                    | 27.5 MWh x 0.88 t CO <sub>2</sub> e                              | 24.20               |
| 2014 - Sept 1st to Dec 31st | 143.87                   | 143.87 MWh x 0.88 t CO <sub>2</sub> e                            | 126.61              |

## O&M Building Consumption

| Month                                   | O&M Building Electricity Consumed MWh | Conversion EF Electricity Consumed 0.88t CO <sub>2</sub> e / MWh | t CO <sub>2</sub> e |
|---|---------------------------------------|--|---------------------|
| September-14                            | 1.13                                  | 1.1326 MWh x 0.88 t CO <sub>2</sub> e                            | 1.00                |
| October-14                              | 1.12                                  | 1.1162 MWh x 0.88 t CO <sub>2</sub> e                            | 0.98                |
| November-14                             | 1.06                                  | 1.0574 MWh x 0.88 t CO <sub>2</sub> e                            | 0.93                |
| December-14                             | 0.92                                  | 0.9166 MWh x 0.88 t CO <sub>2</sub> e                            | 0.81                |
| 2014 - Sept 1 <sup>st</sup> to Dec 31st | 4.22                                  | 4.2229 MWh x 0.88t CO <sub>2</sub> e/MWh                         | 3.72                |

Pro Rata of Electricity  
Consumption

| Dates                 | Days -<br>M1 | Days -<br>M2 | kWh     | September-<br>14 | October-<br>14 | November-<br>14 | December-<br>14 |
|-----------------------|--------------|--------------|---------|------------------|----------------|-----------------|-----------------|
| 25/08/2014 07/09/2014 | 7            | 7            | 531     | 265.5            | -              | -               | -               |
| 08/09/2014 07/10/2014 | 23           | 7            | 1131    | 867.1            | 263.9          | -               | -               |
| 08/10/2014 07/11/2014 | 24           | 7            | 1101    | -                | 852.4          | 248.6           | -               |
| 08/11/2014 07/12/2014 | 23           | 7            | 1055    | -                | -              | 808.8           | 246.2           |
| 08/12/2014 07/01/2015 | 24           | 7            | 866     | -                | -              | -               | 670.5           |
|                       | 101.00       |              | 4684.00 | 1132.6           | 1116.29        | 1057.45         | 916.62          |

## P1 Facility Operations – Fossil Fuel

## Total P1 - Fossil Fuel Emissions

| Total P1  | Total t CO2e | t CO2e | t CO2e for CH4 | t CO2e for N2O |
|---|--------------|--------|----------------|----------------|
| Vehicle   | 6.718        | 6.688  | 0.010          | 0.019          |
| O&M Building  | 2.141        | 2.128  | 0.001          | 0.012          |
| 2014 - Sept 1 <sup>st</sup> to Dec 31 <sup>st</sup> | 8.859        | 8.817  | 0.011          | 0.031          |

| Total P1  |         | CO2 (g)  | CH4 (g)  | N2O (g)  |
|---|---------|----------|----------|----------|
| Vehicle   |         | 6688435  | 409      | 64.3     |
| O&M Building  |         | 2128171  | 41       | 39       |
| 2014 - Sept 1 <sup>st</sup> to Dec 31 <sup>st</sup> | grammes | 8816606  | 450      | 103      |
| 2014 - Sept 1 <sup>st</sup> to Dec 31 <sup>st</sup> | tonnes  | 8.816606 | 0.000450 | 0.000103 |

## Vehicles

## Total Vehicle Emissions from Combustion

|         | (VolFuel)Fuel         | Fuel EF CO2 (g)     | FuelEF CH4            | FuelEF N2O             |
|---------|-----------------------|---------------------|-----------------------|------------------------|
|         | Consumed in L (total) | 2289g CO2/L (total) | 0.14g CH4 / L (total) | 0.022g N2O / L (total) |
| BMX9593 | 1069.1                | 2447069.2           | 149.7                 | 23.5                   |
| BMX9650 | 840.5                 | 1923929.7           | 117.7                 | 18.5                   |
| EDF     | 1012.4                | 2317436.2           | 141.7                 | 22.3                   |
| Total   | 2922.0                | 6688435.1           | 409.1                 | 64.3                   |

## P1 Facility Operations - Fossil Fuel Emissions

### O&M Building

| EF Natural Gas Consumed     |                                      | -                               |                                       |  |  |
|-----------------------------|--------------------------------------|---------------------------------|---------------------------------------|--|--|
| Month                       | O&M Building Natural Gas Consumed GJ | Conversion GJ to m3 (26.8m3/GJ) | Conversion m3 to CO2, EF 1918g CO2/m3 | Conversion m3 to CH4, EF 0.037g CH4/m3 | Conversion m3 to N2O, EF 0.035g N2O/m3 |
| September-14                | 1.9                                  | 51.8                            | 99,406                                | 1.9                                    | 1.81                                   |
| October-14                  | 5.4                                  | 145.5                           | 279,098                               | 5.4                                    | 5.09                                   |
| November-14                 | 14.4                                 | 386.2                           | 740,641                               | 14.3                                   | 13.52                                  |
| December-14                 | 19.6                                 | 526.1                           | 1,009,026                             | 19.5                                   | 18.41                                  |
| 2014 - Sept 1st to Dec 31st | 41                                   | 1,110                           | 2,128,171                             | 41                                     | 38.84                                  |

#### Pro Rata

| Dates                       | Days - M1 | Days - M2 | GJ    | September-14 | October-14 | November-14 | December-14 |
|-----------------------------|-----------|-----------|-------|--------------|------------|-------------|-------------|
| Aug. 25, 2014 Sep. 10, 2014 | 7         | 9         | 0.19  | 0.1          | -          | -           | -           |
| Sep. 10, 2014 Oct. 10, 2014 | 21        | 9         | 2.61  | 1.827        | 0.783      | -           | -           |
| Oct. 10, 2014 Nov. 12, 2014 | 22        | 11        | 6.97  | -            | 4.647      | 2.323       | -           |
| Nov. 12, 2014 Dec. 10, 2014 | 19        | 9         | 17.81 | -            | -          | 12.085      | 5.725       |
| Dec. 10, 2014 Jan. 13, 2015 | 22        | 12        | 21.49 | -            | -          | -           | 13.905      |
|                             | 91        | 50        | 49    | 1.9          | 5.4        | 14.4        | 19.6        |

## P3 – Fossil Fuel Extraction

| Total P3                    | Total | t CO2e | t CO2e for CH4 | t CO2e for N2O |
|-----------------------------|-------|--------|----------------|----------------|
| Vehicle                     | 1.203 | 0.403  | 0.796          | 0.003          |
| O&M Building                | 0.222 | 0.148  | 0.072          | 0.002          |
| 2014 - Sept 1st to Dec 31st | 1.425 | 0.551  | 0.868          | 0.006          |

| Total                       | CO2 (g)  | CH4 (g) | N2O (g) |
|-----------------------------|----------|---------|---------|
| Vehicle                     | 403234.6 | 31849.7 | 11.7    |
| O&M Building                | 147573.9 | 2884.9  | 7.8     |
| 2014 - Sept 1st to Dec 31st | 550808.5 | 34734.6 | 19.5    |

## Total Vehicle

|                             | (VolFuel)Fuel<br>Consumed in L<br>(total) | Fuel EF CO2 (g)<br>138g CO2 / L | FuelEF CH4<br>10.9g CH4 / L | FuelEF N2O<br>0.004g N2O / L |
|-----------------------------|---|---------------------------------|-----------------------------|------------------------------|
| BMX9593                     | 1069.1                                    | 147529.7                        | 11652.7                     | 4.3                          |
| BMX9650                     | 840.5                                     | 115990.5                        | 9161.6                      | 3.4                          |
| EDF                         | 1012.4                                    | 139714.4                        | 11035.4                     | 4.0                          |
| 2014 - Sept 1st to Dec 31st | 2922.0                                    | 403234.6                        | 31849.7                     | 11.7                         |

| O&M Building                |                                      |                                 |   |   |   |
|-----------------------------|--------------------------------------|---------------------------------|---|---|---|
| Month                       | O&M Building Natural Gas Consumed GJ | Conversion GJ to m3 (26.8m3/GJ) | Conversion m3 to CO2, EF (43+90) g CO2/m3 | Conversion m3 to CH4, EF (2.3+0.3) g CH4/m3 | Conversion m3 to N2O, EF (0.004+0.003) g N2O/m3 |
| September-14                | 1.93                                 | 51.8                            | 6,893                                     | 135   | 0.4   |
| October-14                  | 5.43                                 | 145.5                           | 19,354                                    | 378   | 1.0   |
| November-14                 | 14.41                                | 386.2                           | 51,358                                    | 1,004                                       | 2.7   |
| December-14                 | 19.63                                | 526.1                           | 69,969                                    | 1,368                                       | 3.7   |
| 2014 - Sept 1st to Dec 31st | 41.40                                | 1110                            | 147,574                                   | 2,885                                       | 7.8   |

**CALCULATION OF GE EMISSION**

Project Specific Data      Sept-Dec 2014

| Date         | Siemens BMX 9650 |                  | Siemens BMX 9593 |                  | EDF Truck 1 |                  | Substation Gen. |                     |
|--------------|------------------|------------------|------------------|------------------|-------------|------------------|-----------------|---------------------|
|              | KM               | L <sub>gas</sub> | KM               | L <sub>gas</sub> | KM          | L <sub>gas</sub> | HRS             | L <sub>diesel</sub> |
| oct 16 2014  |                  |                  | 3022.1           | 98.5             |             |                  | 0               | 0                   |
| Oct 17 2014  | 3761             | 107.959          |                  |                  |             |                  |                 |                     |
| oct 7 2014   |                  |                  |                  |                  | 3102        | 119.105          |                 |                     |
| oct 20 2014  |                  |                  |                  |                  |             |                  |                 |                     |
| oct 24 2014  |                  |                  |                  |                  | 3801        | 114.627          |                 |                     |
| nov 5 2014   |                  |                  |                  |                  | 4462        | 105.41           |                 |                     |
| nov 13 2014  |                  |                  |                  |                  | 5159        | 119.027          |                 |                     |
| nov 6 2014   |                  |                  | 3348             | 125.071          |             |                  |                 |                     |
| nov 7 2014   | 4395             | 122.445          |                  |                  |             |                  |                 |                     |
| nov 10 2014  |                  |                  | 3975             | 90.565           |             |                  |                 |                     |
| Nov 20 2014  |                  |                  |                  |                  | 5888.6      | 95.34            |                 |                     |
| Nov 23 2014  |                  |                  | 4612             | 94.405           |             |                  |                 |                     |
| Nov 26 2014  |                  |                  | 5478.7           | 112.996          |             |                  |                 |                     |
| Nov 25 2014  | 5007             | 120.562          |                  |                  |             |                  |                 |                     |
| Nov 28 2014  |                  |                  |                  |                  | 6558.4      | 129.59           |                 |                     |
| Dec 5 2014   |                  |                  |                  |                  | 7088.9      | 110.205          |                 |                     |
| Dec 12 2014  |                  |                  |                  |                  | 7718.1      | 100.102          |                 |                     |
| Dec 31 2014  |                  |                  |                  |                  | 8444.2      | 119.017          |                 |                     |
| Dec 1 2014   |                  |                  | 6178.7           | 117.958          |             |                  |                 |                     |
| Dec 7 2014   |                  |                  | 6903.8           | 92.69            |             |                  |                 |                     |
| Dec 12 2014  |                  |                  | 7511.5           | 102.831          |             |                  |                 |                     |
| Dec 18 2014  | 5469.3           | 93.827           |                  |                  |             |                  |                 |                     |
| sept 2 2014  |                  | 88.957           |                  |                  |             |                  |                 |                     |
| sept 7 2014  |                  | 109.605          |                  |                  |             |                  |                 |                     |
| sept 12 2014 |                  | 88.279           |                  |                  |             |                  |                 |                     |
| sept 25 2014 |                  | 108.877          |                  |                  |             |                  |                 |                     |
| sept 11 2014 |                  |                  |                  | 122.777          |             |                  |                 |                     |
| sept 30 2014 |                  |                  |                  | 111.263          |             |                  |                 |                     |
|              |                  |                  |                  |                  |             |                  |                 |                     |
|              |                  |                  |                  |                  |             |                  |                 |                     |
|              |                  |                  |                  |                  |             |                  |                 |                     |
|              |                  |                  |                  |                  |             |                  |                 |                     |
|              |                  |                  |                  |                  |             |                  |                 |                     |
|              |                  |                  |                  |                  |             |                  |                 |                     |

|       |        |         |        |          |        |          |   |   |
|-------|--------|---------|--------|----------|--------|----------|---|---|
| Total | 1708.3 | 840.511 | 4489.4 | 1069.056 | 5342.2 | 1012.423 | 0 | 0 |
|-------|--------|---------|--------|----------|--------|----------|---|---|

|               |   |
|---------------|---|
| Total         |   |
| Gas Liters    | 2921.99 This cell is the total of Gas liters for the 3 trucks                         |
| Diesel Liters | 0 This cell is the total of Diesel liters   |
| Km            | 11539.9 this cell est the total of the Km of Siemens truck 1, truck 2 and EDF truck 1 |