

Nexen Inc.

Soderglen Windfarm Project Report

GHG Offset Project Report
February 4, 2010



Table of Contents

1. Overview	1
2. Project Information	1
3. Project Reporting Period	1
4. GHG Calculation	1
5. Emission Reduction Credits	2
Appendix A - GHG Offset Project Plan	3
Part 1: Project and Proponent Identification	5
Part 2: Project Overview	6
Part 3: System Functions & Scope	12
Part 4: Project and Baseline Data Templates	14
Appendix AA	16
Soderglen Land Descriptions	16
Individual Turbine Locations	17
Appendix BB – Soderglen Windfarm Offset Calculation	18

1. Overview

This Project Report is intended to provide a summary for the year 2008 of the Soderghlen Windfarm Project (Project) operations and processes that give rise to GHG reductions. Further details and evidence regarding the Project are provided in the Offset Project Plan.

2. Project Information

The Project converts environmental attributes associated with the wind powered electrical generation, referred to as Renewable Energy Certificates (RECs) and measured in Megawatt Hours (MWh), into Greenhouse Gas (GHG) offsets for use in the Alberta Offset System. The GHG Offsets generated by this project are quantified in accordance with Alberta Environment's Quantification Protocol for Wind-Powered Electricity generation, Alberta Environment's Project Guidance Document and Alberta Environment Project Verification Document.

The Soderghlen Windfarm, commissioned in September 2006, and consists of 47 wind turbines of 1.5 MWe capacity with a total capacity of 70.5 MW. The wind generated electric energy from the Soderghlen Windfarm is delivered to the Alberta Electricity System (AESO). Nexen Inc. and Canadian Hydro Developers Inc. own 50% respectively of the Soderghlen Wind Powered Electricity Generation project. Canadian Hydro Developers Inc. is the operator.

3. Project Reporting Period

For this project, the carbon dioxide equivalent emission reduction credits are claimed for activities from January 1, 2008 to December 31, 2008. No material changes to the project operation occurred during this time.

4. GHG Calculation

GHG emission reductions were calculated by Amberg Corp. using the Alberta Environment Quantification Protocol for Wind-Powered Electricity Generation (March 2008). The activities and procedures outlined in the Offset Project Plan provide detailed description of the project's adherence to the requirements of the qualification protocol. See Appendix BB.

Solderghlen Windfarm	Year: 2008
Electricity Generation Offset - Gross	166264.68 tonnes CO _{2e}
Related Emissions	
Electricity Consumption	415.02 tonnes CO _{2e}
Natural Gas Combustion	26.41 tonnes CO _{2e}
Natural Gas Extraction	1.28 tonnes CO _{2e}
Natural Gas Processing	1.35 tonnes CO _{2e}
Vehicle Fuel Combustion	43.19 tonnes CO _{2e}
Vehicle Fuel Production	6.74 tonnes CO _{2e}
Total	493.99 tonnes CO _{2e}

Electricity Generation Offset –	165770.70 tonnes CO_{2e}
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5. Emission Reduction Credits

Emission Reduction Credits Creation Period: January 01, 2008 to December 31, 2008

Emission Type: tonnes of CO₂e

Quantity: 2008 - 165,770.00 tonnes CO₂e

Nexen Inc.

Soderglen Windfarm Project Plan

Appendix A - GHG Offset Project Plan

February 4, 2010

Table of Contents

1. Overview	1
2. Project Information	1
3. Project Reporting Period	1
4. GHG Calculation	1
5. Emission Reduction Credits	2
Appendix A - GHG Offset Project Plan	3
Part 1: Project and Proponent Identification	5
Part 2: Project Overview	6
Part 3: System Functions & Scope	12
Part 4: Project and Baseline Data Templates	14
Appendix AA	16
Soderglen Land Descriptions	16
Individual Turbine Locations	17
Appendix BB – Soderglen Windfarm Offset Calculation	18

Part 1: Project and Proponent Identification

The Project proponent for the GHG emissions reductions is Nexen Inc.. Nexen owns 50% of the GHG credits associated with the Soderglen Windfarm Project by virtue of our working interest. We have contractual entitlement to the other 50% under the terms of our joint venture agreement with Canadian Hydro Developers, Inc. Nexen Inc. has notified Canadian Hydro Developers, Inc. that all available GHG emission reductions for the Soderglen Windfarm Project will be registered in Nexen Inc.'s name and this has been acknowledged and accepted by Canadian Hydro Developers, Inc.

Project Proponent

Title

Address

Phone

Fax

Robert J. Black

Vice President of Energy Marketing, Nexen Inc.

801 – 7th Ave. SW, Calgary, Alberta T2P 3P7

403-699-4000

403-303-2209

Project Contact

Title

Address

Phone

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Sheila Kelly

Manager Business Development, Nexen Marketing

801 – 7th Ave. SW, Calgary, Alberta T2P 3P7

403-699-6776

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Part 2: Project Overview

Introduction

Nexen Inc. in joint venture with Canadian Hydro Developers Inc. own 50% respectively of Soderghlen Windfarm Project. This project was commissioned in September 2006. It is a 70.5 MW (gross) wind farm in southern Alberta. This project generates approximately 245,000 MWh annual of green power for sale, or 159,000 tonnes per annum of marketable CO₂ equivalents (assuming 0.65 tonnes CO₂/MWh).

The project is emission-free with the exception of minor emissions related to natural gas use for building heating and gasoline use for project vehicles. All MWh generated will directly off-set the marginal price setting unit, be that natural gas or coal fuelled generating units, with the exception of a minor quantity of power required for on-site use.

Project Background

The Soderghlen Wind Project is located in the Province of Alberta, 20 kilometres southwest of Ft. McLeod on approximately 4,000 acres of native prairie grasslands and cultivated lands. The majority of the land is located on the southern most edge of the plateau visible from Ft. McLeod and is at an elevation of 1190 m (3900 feet). The figure below indicates the position of the Soderghlen Windfarm Project (SWP) relative to the major roads and urban areas.



Presently, Soderghlen Windfarm Project has a capacity of 70.5 MW. However, the land allows for the development of approximately 120 MW of wind energy.

The project employs state of the art wind turbines with a rating of 1.5 MW each. There are 47 wind turbines located throughout the project lands producing a total capacity of 70.5 MW.

The turbines power is collected through a medium voltage collection system to the main substation. At the main substation the voltage is increased to 138 kV for direct connection to the Alberta Interconnected Electrical System via a 12 kilometre

interconnection line. The substation is located at the north-western corner of the wind farm lands. The enclosed map shows the current layout of Phase I of the Soderglen Wind Farm.

The turbines are interconnected via a 25 kV collector system to the main substation where the electrical energy is transformed into the required 138 kV grid voltage for connection. Each wind turbine has a meter attached to it for the purposes of measuring its performance and output characteristics. The aggregate wind farm production will be measured through an approved custody transfer meter located at the substation.

The following provides additional detail of the major project parameters:

Nearest Substation:	Peigan Substation, 59S
Nearest Transmission line:	725L (138 kV)
Energy Sales:	Power Pool of Alberta or End users within Alberta
Phase I Capacity:	70.5 MW
Projected Average Energy production:	245,000 MWh/year
Machine Type:	GE 1.5 SLE Class 2 turbines
Full Project Capacity:	70.5 MW
Project Average Energy Production:	245,000 MWh/Year

Greenhouse gases will be removed from the environment by the project via the displacement of marginal price setting electricity units in Alberta. Power generated with wind turbines will displace natural gas and coal fuelled generators.

Project Proponent

Nexen Inc. is a thriving Oil, Gas and Chemicals Company with operations around the world. The company was formed in 1971 and was originally known as Canadian Occidental Petroleum Ltd.

Nexen's partner for this project, Canadian Hydro Developers, Inc. is Canada's premier independent developer of EcoLogo® certified low-impact renewable energy. Publicly listed since 1990, the company owns and operates twenty green power facilities. Wind-generated electricity accounts for seven sites and hydroelectric power twelve sites.

Environmentally responsible projects are projects which have certain fundamental attributes in their relation to the environment. These projects use the best available technologies to exploit the resource and contribute towards a cleaner environment. The attributes of environmentally responsible projects result in "clean" energy, best described as follows:

Clear skies, Low impact, Efficient, Attractive economic returns, New technology

Projects which clearly fall within this definition employ technologies to harness energy from wind, water through "run-of-river" hydro, biomass and natural gas co-generation. Soderglen Windfarm Project is Nexen's first wind project.

Project Partnerships

Nexen Inc. was originally partnered with GW Power with each have a 50% interest in the project. In 2007, GW Power sold its 50% interest to Canadian Hydro Developers, Inc. Nexen owns 50% of the GHG credits associated with the Soderglen Windfarm Project by virtue of our working interest. We have contractual entitlement to the other 50% under the terms of our joint venture agreement with Canadian Hydro Developers, Inc. Nexen

Inc. has notified Canadian Hydro Developers, Inc. that all available GHG emission reductions for the Soderghen Windfarm Project will be registered in Nexen Inc.'s name and this has been acknowledged and accepted by Canadian Hydro Developers, Inc.

Monitoring and Data Management

Nexen Inc. & Canadian Hydro Developers, Inc. monitor and measure all electricity produced through a SCADA system. The Alberta Electric System Operator (AESO) also provides monitoring. Data is housed in a secure database, such as Oracle.

Project Technology

The project proponents presently anticipate installing approximately 47 General Electric 1.5 SLE wind turbines. These turbines are capable of producing 1.5 MW of electrical energy from a wind resource. They use proven existing technology.

As wind power is emission free and has a near-zero marginal cost, all wind power produced will off-set the marginal price setting electricity generating facility in Alberta - either natural gas or coal.

Real and Measurable

This project meets the Real criteria as no emissions are created in the creation of electricity through wind turbines. Emissions in Alberta are reduced as electricity from wind will displace electricity produced from natural gas and coal fired units.

This project meets the Measurable criteria as Greenhouse Gas (GHG) emissions with this project in place are lower than those in the reference without this project.

Based on Alberta's Quantification Protocol for Wind-Powered Electrical Generation Version 1, March 2008, this project will produce 0.65 tonnes CO₂e GHG offsets for every mega-watt hour of electricity it will produce. Given that the project produces measurable electricity, the GHG offsets are measurable.

Verifiable

Steps taken to manage and make available all data records required to conduct an audit.

- All electricity produced is accurately metered. Each individual WTG is metered for control purposes. A separate single revenue meter located at the wind farm substation is used for revenue metering. For all metering system management services, MIDAS is contracted to provide the required services. MIDAS is contracted to certify metering every 6 years.
- Emission reductions claimed have been verified by Mr. David Mack P.Eng., CEA, EMS(A) of Laxford consulting Inc. David Mack is a Professional Engineer, registered by the Association of Professional Engineers, Geologists and Geophysicist of Alberta, and is also a Certified Environmental Auditor, registered by the Canadian Environmental Certification Approvals Board. He has over 30 years of experience in energy related process operations. Current activities include environment, health and safety management consulting and auditing, including greenhouse gas emissions verifications.

Surplus

All emission reductions for this wind project, offered in this proposal, are presently available as they represent a net reduction in emissions that is not otherwise contracted.

Sustainable

Wind projects such Soderghen Windfarm Project have high capital costs but low operating costs. In essence, this project it will continue to operate almost regardless of future economic conditions. As natural gas fired power plants are expected to be the marginal price setting units in Alberta for the next 20 years or so, this wind project is sustainable. Electricity produced from wind turbines will off-set emissions produced from natural gas fuelled power plants.

Location

This project is located approximately 20 km south of Fort McLeod in Alberta, Canada. The location of both baseline emissions and project emission reductions encompass all of Alberta through the Alberta Interconnected Electric System.

Latitude: DD Lat. 49.513
Longitude: DDD Lon. 113.494

The latitudinal and longitudinal coordinates are taken from the middle of the wind farm. Appendix AA outlines the land position.

Project Conditions

Most of the project land is native prairie with a small portion cultivated. During construction, careful consideration was given to how top soil was removed, segregated and stored to build access roads, crane pads and the foundations, while mitigating erosion from wind or water. Access during construction was restricted to access road ways to reduce impact on surrounding lands and wildlife habitat. Once construction was completed, the access roads were reduced to a narrow track to allow access by work truck to the turbine sites. The soil was reclaimed to the adjacent land of the access roads. The crane pads were also removed and had the soil restored. The disturbed areas were then reclaimed in accordance with accepted industry standards. Seed mixtures were selected with consultation of the landowner and included a native seed mix that was selected specifically for that region, in consultation with Alberta Agriculture. Consideration was also given to control weed growth through out the construction and reclamation phases.

Currently, the native prairie component of the reclaimed areas has recovered very well as a result of the reclamation efforts. Aside from the narrow tracks for the access roads, there is very little visible differentiation between the original native lands and the reclaimed lands from construction.



Quantification Protocol Applicability

The applicability criteria, identification of sources and sinks, and quantification methodologies for this Project have been determined in accordance with the Alberta Offset System Quantification Protocol for Wind Powered Electricity Generation (AENV, 2008). As outlined in the protocol, the Project must conform to the following applicability criteria. This Offset Project Plan must demonstrate that:

1. The metering of net electricity production must be made at a point downstream of both generation and any storage system, typically to where generated electricity is connected to its loads; and
2. The quantification of reductions achieved by the Project is based on actual measurement and monitoring (except where indicated in this protocol) as indicated by the proper application of this protocol.

Demonstration that the Project complies with the applicability criteria outlined above is provided in the following sections.

Metering of Electricity Downstream of Generation

Metering of electricity occurs downstream of generation at the substation before electricity is transmitted to the AESO Transmission Grid.

Quantification of Reductions

Reductions can be quantified as accurate metering has been applied to the project's power generation and Alberta has set an electrical system emissions intensity factor of 0.65 tonnes CO₂e per MWh of power generated.

Offset Eligibility Requirements

This Project meets the requirements for offset eligibility as specified in the applicable regulation and guidance documents for the Alberta Offset System. In particular:

1. Ownership of the GHG emission reductions has been established. Nexen owns 50% of the GHG credits associated with the Soderglen Windfarm Project by virtue of our working interest. We have contractual entitlement to the other 50% under the terms of our joint venture agreement with Canadian Hydro Developers, Inc. Nexen Inc. has notified Canadian Hydro Developers, Inc. that all available GHG emission reductions for the Soderglen Windfarm Project will be registered in Nexen Inc.'s name and this has been acknowledged and accepted by Canadian Hydro Developers, Inc. No other entity is claiming credit for the reductions realized at the Project site. Credits created from the specified reduction activity have not been created, recorded or registered in more than one trading registry for the same time period.
2. The wind powered electricity generation system installed at the facility produces reductions that are real and are not the result of a shutdown or cessation of an activity.
3. The emission reductions are related to the facility's operations and are quantifiable using the provided protocol based on metered and measured data.
4. The emission reductions created as a result of the Soderglen Windfarm Project are surplus to any regulation.

Part 3: System Functions & Scope

System Functions

A: Project System Function	Functional Unit (quantitative reference)
Function 1 – Wind Input	Available wind in the natural environment is used to produce zero emission electricity.
Function 2 – Energy Output	MWh (mega-watt hours).
Function 3 – Emissions Output	Tonnes CO2 equivalent (0).

Scope of Measurement & Reporting

B: Baseline System Function	Functional Unit (quantitative reference)
Function 1 – Fuel Input	Tonnes coal or GJ natural gas
Function 2 – Energy Output	MWh (mega-watt hours)
Function 3 – Emissions Output	Tonnes CO2 equivalent.

A: Project System Elements	Element Descriptions	A	B	C (% of total system)	D	Included in Scope?
1. Creation of electricity through the conversion of wind energy to electrical energy.	Force exerted by wind is converted to electrical energy. This process is emission free.	Yes	No	Yes, 100%	Yes	Yes
				Total:	100%	

B: Baseline System Elements	Element Descriptions	A	B	C (% of total system)	D	Included in Scope?
1. Creation of electricity through combustion of hydrocarbons.	Natural gas and coal are burned to create electricity. Emissions are created through this process.	Yes	Yes – Fuel Combustion	Yes, 100%	Yes	Yes
				Total:	100%	

Element GHG Overview Information		
Element GHG Intensity (CO ₂ e/unit)	0.65	n/a
Element Installation GHG Emissions	n/a	n/a
Element Maintenance GHG Emissions	n/a	n/a
Element Decommissioning GHG Emissions	n/a	n/a
Environmental Information		
Comments about Air	addition to the GHG emissions which are produced by thermal power plants, numerous other pollutants (NOx, SOx,etc) and particulates are discharged into the air. As an example, combined cycle gas fired power projects produce 0.5 kg/MWh. For the same power production as the Soderglen Wind Project a gas fired plant would produce upwards of 125,000 kg of NOx annually. Coal fired power plants emit more GHG and other noxious elements as they are particularly high emitters due to the nature of the fuel. All fossil fuel based thermal power plants have a long term negative effect on the environment resulting from the air emissions.	Wind power projects do not emit any pollutants into the air.
Comments about Water	Thermal power plants can consume water large quantities to produce steam and for cooling, they generally are not large polluters of water resources.	Wind Power projects do not utilize water.
Comments about Land	Thermal power plants typically have a small footprint and a corresponding low impact on land; however the land which is utilized is removed from the ecosystem.	Wind power project utilize a very small amount of land and have a minimal impact. The land which comprises the wind farm may still be used for the purposes that it was being used prior.
Comments about Wildlife	Thermal power plants impact on wildlife is the direct result of the removal of land from the ecosystem, however given that the land footprint is small; overall effect on wildlife would be minimal.	Due to the low impact on land and the ecosystem, wind power projects have a minimal impact on wildlife.

Part 4: Project and Baseline Data Templates

General Element Information		
Element Name	Baseline – Hydrocarbon Electricity Production	Project – Wind Electricity Production
Element Description	Hydrocarbons are burned to produce electrical energy	Kinetic energy of the wind is converted to electrical energy using a wind turbine
Type of Element (direct or indirect)	Direct	Direct
Element Measurement Unit	MWh	MWh
Expected Life of Element (years)	25+	25+
Type of Element Emission Estimation Method	Published emission factors	Published emission factors
Element Input Information		
Name of Input	Hydrocarbon fuel	Wind Energy
Type of Input (energy, mass, GHG)	Energy (natural gas)	Kinetic wind energy
Number of Units of Input	~8 GJ	0
Units of Measure	GJ	0
GHG/Unit of Input	~0.65 tonnes CO ₂ E/MWh	0.00 tonnes CO ₂ E/MWh
Units of Measure	MWh	MWh
Element Output Information		
Name of Output	Electricity	Electricity
Type of Output (energy, mass, GHG)	Energy	Energy
Number of Units of Output	235,000 MWh/year	235,000 MWh/year
Units of Measure	MWh	MWh
GHG/Unit of Output	~0.65	0
Units of Measure	tonnes	tonnes

References

The following provides the names of organizations, documents etc which were utilized to produce this application.

- Nexen Inc.
- Alberta Offset System Project Guidance Document (AENV, 2008)
- Alberta Offset System Quantification Protocol for Wind Powered Electricity Generation (2008)
- General Electric Web site
- Information generated by GW Power in the course of project development
- Options Paper prepared by the Electricity Table of the National Secretariat for Climate Change
- Amberg Corp. reviewed document and calculated the emissions related to the operation for 2008.
- Laxford consulting Inc. reviewed document as part of the Verification process.

Appendix AA

Soderglen Land Descriptions

Deeded Lands

NE 24-6-27-W4M (160 acres)
NE 5-7-26-W4M (59.68 acres)
SE 5-7-26-W4M 167.4 acres)
SW 5-7-26-W4M (168 acres)
NE 6-7-26 –W4M (29.95 acres)
SE 6-7-26 –W4M (168.079 acres)
SW 6-7-26 –W4M (166.891 acres)
NE 23-6-27-W4M (33.80 acres)
NW 24-6-27-W4M (160 acres)
NE 26-6-27-W4M (34 acres)
SE 26-6-27-W4M (34 acres)
NE 35-6-27-W4M (36.3 acres)
SE 35-6-27-W4M (34.1 acres)
NE 36-6-27-W4M (167 acres)
NW 36-6-27-W4M (168 acres)
SE 36-6-27-W4M (160 acres)
SW 36-6-27-W4M (160 acres)

Grazing Leased Lands

NE 31-6-26-W4M
NW 31-6-26-W4M
SE 31-6-26-W4M
SW 31-6-26-W4M
NE 25-6-27-W4M
NW 25-6-27-W4M
SE 25-6-27-W4M
SW 25-6-27-W4M

NOTE: All UTM coordinates are NAD83 Zone 12.

Individual Turbine Locations

Soderglen Windfarm Turbine Coordinates									
Turbine #	X	Y	Z	N	Turbine #	X	Y	Z	N
1	317458	5489684	1169.7	a01	28	318041	5485714	1206	e08
2	317565	5489854	1168	a02	29	318065	5485564	1203.3	e09
3	317661	5490011	1164.9	a03	30	318105	5485416	1201.7	e10
4	317749	5490156	1163.1	a04	31	318122	5485250	1205	e11
5	317880	5490351	1160.3	a05	32	318198	5485110	1206.6	e12
6	318191	5489095	1171.6	b01	33	318296	5484978	1215.1	e13
7	318315	5489248	1173.8	b02	34	318349	5484840	1217.4	e14
8	318439	5489429	1171	b03	35	318388	5484706	1219.3	e15
9	318627	5489583	1169	b04	36	318805	5485700	1204.2	f01
10	319820	5488752	1176	c01	37	318848	5485860	1205.8	f02
11	319955	5488950	1170.2	c02	38	318902	5486050	1204	f03
12	319993	5489189	1175	c03	39	318950	5486203	1204	f04
13	320051	5489311	1170	c04	40	319505	5487181	1189	g01
14	320129	5489439	1172	c05	41	319457	5487329	1191	g02
15	320196	5489595	1167.7	c06	42	319616	5487513	1189	g03
16	320037	5489718	1157.4	c07	43	319802	5487682	1186	g04
17	317273	5485189	1194	d01	44	319872	5487873	1184	g05
18	317358	5485061	1201	d02	45	319973	5488081	1184	g06
19	317355	5484817	1207.8	d03	46	320050	5488272	1183	g07
20	317504	5484768	1212.3	d04	47	320112	5488415	1183	g08
21	317308	5486661	1177	e01					
22	317324	5486420	1176.5	e02					
23	317475	5486353	1179	e03					
24	317683	5486213	1184.4	e04					
25	317795	5486097	1188.8	e05					
26	317904	5485995	1194.6	e06					
27	317983	5485862	1202.2	e07					

Appendix BB – Soderglen Windfarm Offset Calculation



February 2, 2010

Nexen Inc.
Nexen Marketing
801 – 7th Avenue SW
Calgary, Alberta T2P 3P7

Atten: Ms. Sheila Kelly – Manager, Business Development

Re: Soderglen Windfarm – 2008 Offsets Calculation (ABG105000)

Amberg Corp. has calculated a 2008 greenhouse gas offset of 165770 tonnes CO₂e generated by the Soderglen Windfarm located near Fort MacLeod in southern Alberta. Calculation details are provided in spreadsheet "Soderglen2008GHGOffset18Jan10.xls" and a hard copy is attached.

Greenhouse gas offsets created by the operation of the Soderglen Windfarm were calculated according to the guidance provided in Alberta Environment's "Quantification Protocol for Wind-Powered Electricity Generation - March 2008". References for emission factors were either taken from that protocol or verified from Environment Canada's "National Inventory Report - May 2008".

The Alberta Electricity Displacement Factor of 0.65 kg CO₂e/kWh was applied for wind generated power and during times when power was imported into the windfarm (ie: no wind), the National Inventory Report electricity displacement factor for Alberta (a value of 0.93 kg CO₂e/kWh for 2006) was applied. Also note that rounding down to the nearest whole number was applied to the total offsets generated.

Please call me direct at (403) 616-0788 should you have any questions.

Sincerely Yours,

A handwritten signature in black ink, appearing to read "Frank W. Kloiber".

Frank W. Kloiber P.Eng. CEA
Sr. Environmental Advisor

Attach:

Suite 600, 440 – 10816 MacLeod Trail S. Calgary, Alberta T2J 5N8
Tel: (403) 247-3088

Solderglen Windfarm Year: 2008

Electric Energy Generation

Month	MWh		
January	30156.99		
February	24132.69		
March	26945.07		
April	25593.36		
May	18685.59		
June	14524.64		
July	14197.97		
August	15831.54		
September	11035.14		
October	24778.14		
November	28571.71		
December	21338.98		
TOTAL	255791.82	0.65 tonnes CO₂e/MWh	166264.68 tonnes CO₂e

*Electricity Displacement Factor from
Offset Credit Project Guidance Document
February 2008*

Electric Energy Consumption

Month	MWh			
	Turbines	Office		
January	57.79	1.106		
February	46.84	0.992		
March	26.64	1.172		
April	21.08	0.562		
May	24.81	0.702		
June	39.89	0.687		
July	31.62	0.582		
August	29.56	0.721		
September	40.37	0.582		
October	34.06	1.154		
November	15.98	0.807		
December	66.89	1.664		
TOTAL	435.53	10.73	446.26	0.93

*National Factor tCO₂e/MWh
Year 2006, Reported May 2008*

415.02 tonnes CO₂e

Solderglen Windfarm Year: 2008

ENERGY CONSUMPTION

Natural Gas

	Office GI				
January	83.55				
February	100.32				
March	69.80				
April	63.48				
May	63.48				
June	49.60				
July	6.33				
August	1.05				
September	2.11				
October	7.39				
November	28.31				
December	31.33				
TOTAL	527.15 st		37.98 MJ/m ³	equals	13879.67 m ³

Estimated Heat Content

Fuel Combustion

	g/m ³	m ³	tonnes	GWP	tonnes CO ₂ e	
CO ₂	1891	13879.67	26.24646	1	26.25	
CH ₄	0.037	13879.67	0.000514	21	0.01	
N ₂ O	0.035	13879.67	0.000486	310	0.15	
			TOTAL		26.41	26.41 tonnes CO₂e

Emission Factors from

Alberta Environment - Quantification Protocol for Wind-Powered Electricity Generation, March 2008
 Table A1
 Origin - Environment Canada - National Inventory Report 1990 - 2006, May 2008
 Table A12-1

Fuel Extraction

	kg/m ³	m ³	tonnes	GWP	tonnes CO ₂ e	
CO ₂	0.043	13879.67	0.596826	1	0.60	
CH ₄	0.0023	13879.67	0.031923	21	0.67	
N ₂ O	0.000004	13879.67	0.000056	310	0.02	
			TOTAL		1.28	1.28 tonnes CO₂e

Emission Factors from

Alberta Environment - Quantification Protocol for Wind-Powered Electricity Generation, March 2008
 Table A1
 Origin - CAPP - National Inventory of Greenhouse Gas, Criteria Air Contaminant and Hydrogen Sulphide
 Emissions by the Upstream Oil & Gas Industry, Volume 1, April 2005, Table 4, Pg.30

Fuel Processing

	kg/m ³	m ³	tonnes	GWP	tonnes CO ₂ e	
CO ₂	0.09	13879.67	1.24917	1	1.25	
CH ₄	0.0003	13879.67	0.00416	21	0.09	
N ₂ O	0.000003	13879.67	0.00004	310	0.01	
			TOTAL		1.35	1.35 tonnes CO₂e

Emission Factors from

Alberta Environment - Quantification Protocol for Wind-Powered Electricity Generation, March 2008
 Table A1
 Origin - CAPP - National Inventory of Greenhouse Gas, Criteria Air Contaminant and Hydrogen Sulphide
 Emissions by the Upstream Oil & Gas Industry, Volume 1, April 2005, Table 4, Pg. 30

Solderglen Windfarm Year: 2008

ENERGY CONSUMPTION

Vehicle Fuel	Gasoline Liters
January	1154.24
February	903.75
March	1255.07
April	790.63
May	1121.46
June	1585.37
July	1259.02
August	1237.08
September	2467.03
October	2439.78
November	2453.26
December	1632.25
TOTAL	18298.94

Fuel Combustion

	g/L	L	tonnes	GWP	tonnes CO ₂ e	
CO ₂	2289	18298.94	41.89	1	41.89	
CH ₄	0.43	18298.94	0.01	21	0.17	
N ₂ O	0.20	18298.94	0.00	310	1.13	
				TOTAL	43.19	43.19 tonnes CO₂e

Emission Factors from

Environment Canada - National Inventory Report 1990 - 2005, May 2005
Table A12-7

Fuel Extraction / Production

	kg/L	L	tonnes	GWP	tonnes CO ₂ e	
CO ₂	0.138	18298.94	2.52525	1	2.53	
CH ₄	0.0109	18298.94	0.19946	21	4.19	
N ₂ O	0.000004	18298.94	0.00007	310	0.02	
				TOTAL	6.74	6.74 tonnes CO₂e

Emission Factors from

Alberta Environment - Quantification Protocol for Wind-Powered Electricity Generation, March 2005
Table A1

Solderglen Windfarm **Year:** **2008**

Electricity Generation Offset - Gross **166264.68 tonnes CO₂e**

Related Emissions

Electricity Consumption	415.02 tonnes CO ₂ e
Natural Gas Combustion	26.41 tonnes CO ₂ e
Natural Gas Extraction	1.28 tonnes CO ₂ e
Natural Gas Processing	1.35 tonnes CO ₂ e
Vehicle Fuel Combustion	43.19 tonnes CO ₂ e
Vehicle Fuel Production	6.74 tonnes CO ₂ e

Total	493.99	subtract	493.99 tonnes CO ₂ e
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Electricity Generation Offset - Net **165770.70 tonnes CO₂e**

Solderglen Windfarm **Year:** **2008**

Greenhouse gas offsets created by the operation of the Soderglen Windfarm were calculated according to the guidance provided in Alberta Environment's "Quantification Protocol for Wind-Powered Electricity Generation - March 2008".

References for emission factors were either taken from that protocol or verified from Environment Canada's "National Inventory Report - May 2008". Energy content of natural gas could not be confirmed from billing information supplied by the gas supply company. A typical energy content value of 37.98 MJ/m³ (1020 BTU/ft³) was used.

Total MWhs of power generation were multiplied by the Alberta Environment "Electricity Displacement" factor of 0.65 tonnes CO₂e/MWh to determine the Gross Offset.

The MWhs used by the turbine facilities and office facility was accounted for, multiplied by the National Inventory Report "Alberta Electricity Displacement" factor, (0.93 kg CO₂e/kWh) and deducted from the Gross Offset.

Emissions from Natural Gas combustion (in the facility office), extraction and processing were deducted from the Gross Offset.

Similarly, Vehicle (gasoline) fuel combustion and production emissions were deducted from the Gross Offset.

The disposition of the Gross Offset and related deductions are shown in the "Summary" tab.