
The Local Economic Benefits of Wind Power Development and Operation

A Case Study of Haldimand County and
Neighbouring Aboriginal Groups, Ontario

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Executive Summary

This report estimates the direct local economic benefits that stem from the development and operation of commercial wind farms in Ontario, using the experience of Haldimand County, and neighbouring Aboriginal groups, as an illustrative case study. Since 2011, Haldimand County has seen investment by Canadian and global energy companies in four major wind farms with a combined capacity of 443 MW in the county and estimated investment cost of approximately \$1.4 billion, making it one of the more active municipalities in the province in renewable energy.

The construction and operation of wind farms has brought a significant economic stimulus to the Haldimand economy through the creation of new jobs for local residents, contributions by wind companies to a municipal Community Vibrancy Fund, increased municipal property tax payments, land lease payments to landowners, and contributions to local Aboriginal groups. The value of these direct expenditures and payments is estimated to total more than \$312 million over 20 years:

Wind Company Direct Expenditures in Haldimand, 2013-35	Amount (\$million)	%
Net contributions to local Aboriginal groups	\$46	14%
Community Vibrancy Fund and property tax payments to County	\$52	17%
Salaries for local workers and employees	\$72	23%
Lease payments to local landowners	\$142	46%
<i>Total</i>	<i>\$312</i>	<i>100%</i>

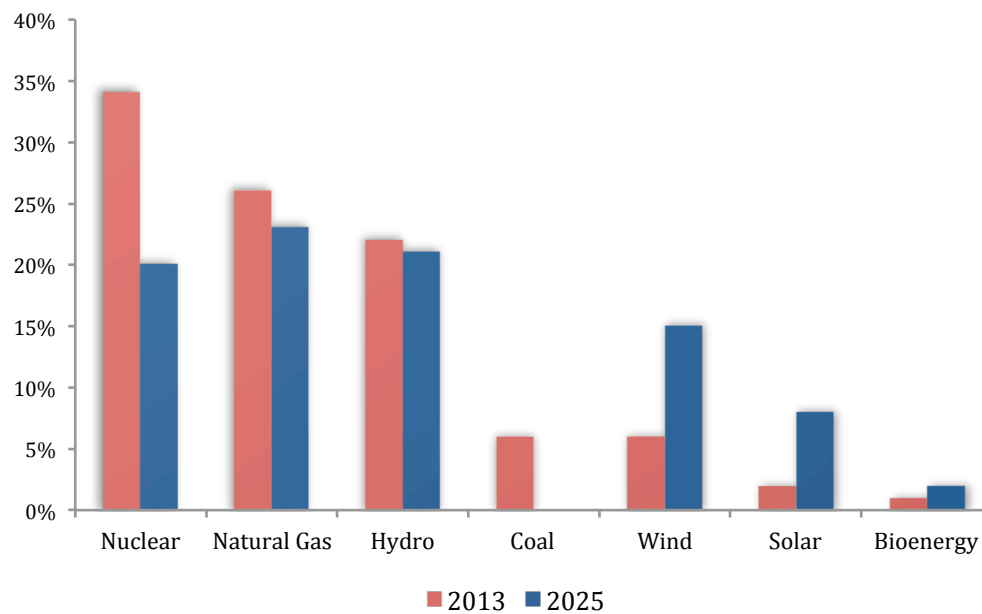
Annual direct local payments by the wind power companies during the operational period of the wind farms total approximately \$15 million per year on average, equivalent to \$260 per person.ⁱ The most visible form of these benefits is in a myriad of local improvement projects in the communities with greatest wind farm development, financed by the Community Vibrancy Fund, which may otherwise not have received municipal funding. The increased Haldimand County property tax receipts and Community Vibrancy Fund contributions total approximately \$2.4 million annually, equivalent to 11% of the 2013 County capital budget or 3% of the 2013 operating expenditure budget.

The estimates contained in this report of the economic benefits to Haldimand County and to local Aboriginal groups are relatively conservative since they do not include indirect or induced effects, which are difficult to accurately measure, or the value of benefits beyond the initial 20 year period even though the expected lifespan of wind farm infrastructure is generally 30 years or more.

Wind Power in Ontario

Ontario is Canada's leading province in the wind power sector with 2,480 MW of installed capacity, representing 7% of total power generation capacity of 33,770 MW in the province.ⁱⁱ Since 2003, the government of Ontario has enacted legislation and regulatory policies, notably to implement feed-in tariff schemes, to stimulate private investment in wind power. The government's 2013 Long Term Energy Plan (LTEP) reinforced the shift towards renewable energy: approximately 15% of provincial generation capacity is forecast to come from wind, and 45% from all renewable sources, by 2025 as a result of Ontario's renewable energy policies (see Figure 1).ⁱⁱⁱ

Figure 1. Share of Electricity Generation Capacity in Ontario by Fuel Type

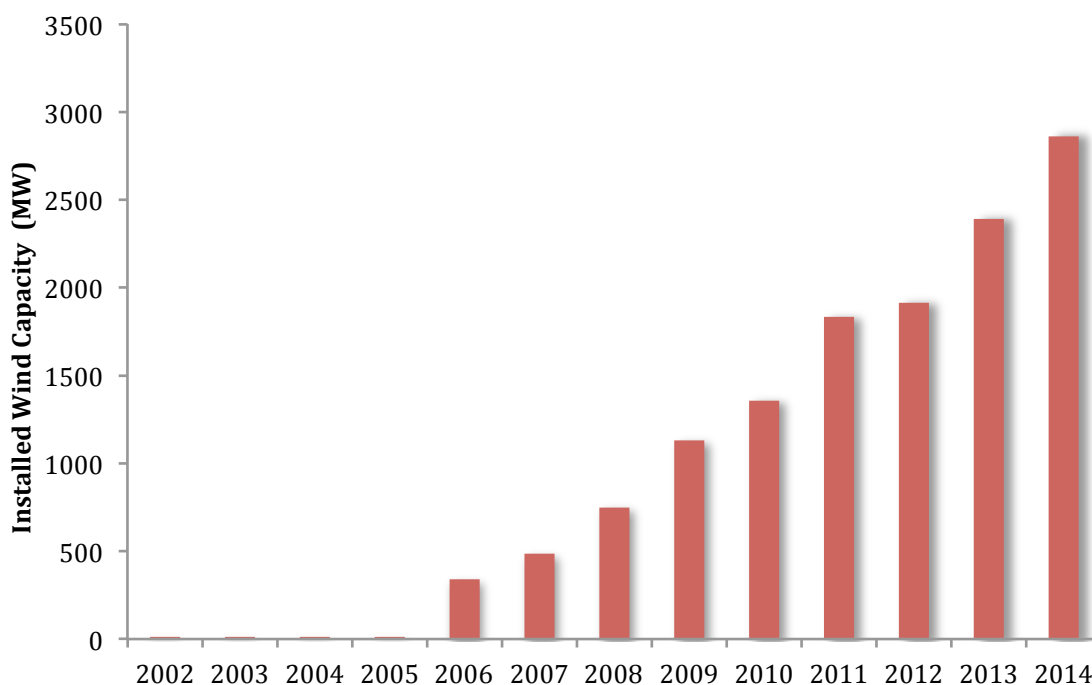


Source: 2013 Long Term Energy Plan, Ministry of Energy, Government of Ontario

The growth in wind generation in Ontario began modestly in the mid-2000s but accelerated with the introduction of the Renewable Energy Standard Offer Program (RESOP) in 2006, and then with the Feed-In-Tariff (FIT) program, which was instituted as part of the 2009 Green Energy and Green Economy Act of Ontario. Under both schemes, modeled on those adopted in European countries, the government pays fixed rates to private wind power developers for each kilowatt hour of electricity generated and supplied to the provincial

grid. A broad range of Canadian, American, European and Asian wind energy companies, including Boralex, Brookfield, Capital Power, International Power, NextEra Energy, Samsung Renewably Energy, and Suncor Energy, have invested in 87 wind farms in the province, of which 45 are operating (and 42 are in development). The average annual compound growth rate in installed wind capacity in Ontario from 2006 to 2014 was 26% percent (see Figure 2). The value of new private investment needed to reach the 2025 Long Term Energy Plan projection of 6,480 MW of wind capacity is anticipated to total more than \$10 billion.

Figure 2. Installed Wind Power Capacity in Ontario



Source: Author compilation

Geographically, most wind farms are located in southern Ontario, close to transmission infrastructure and in areas around Lake Erie and Lake Huron with strong natural wind conditions. 24 municipalities in Ontario have wind farms that are operating (see Table 1), a further 20 municipalities have wind projects that are in development.

Table 1. Operating Wind Projects in Ontario by Municipality

Municipality	Projects	Capacity (MW)	Population (2011)
Adelaide Metcalfe	1	60	3,055
Amherstberg Town	1	10	21,335
Ashford-Colborne-Wawanosh	1	39.6	5,545
Bayham / Malahide	1	99	6,940
Billings	1	4	506
Carnarvon	1	1.6	1,165
Chatham-Kent	8	867.3	101,680
Dorion Township	1	98.9	340
Brooke-Alvinston	1	10	2,935
Essex Town	3	55.6	19,200
Frontenac Islands	1	197.8	1,820
Grand Valley	1	19.8	2,635
Haldimand County	4	364	44,900
Huron-Kinloss	2	136	6,640
Kincardine	2	190.5	10,975
Kingsville Town	1	50.6	20,040
Lakeshore Town	5	244.2	34,305
Lambton Shores	1	9.9	10,380
Melancthon	3	226.5	2,839
Norfolk County	1	9.9	61,360
North Bruce Peninsula	1	5.1	3,675
North Middlesex	1	74	6,360
Sault Ste. Marie	2	189	73,625
Wellington County	1	22.9	86,672
<i>Median</i>	<i>1</i>	<i>58</i>	<i>6,790</i>
<i>Average</i>	<i>2</i>	<i>124</i>	<i>22,034</i>

Source: Author compilation; National Household Survey, Statistics Canada (2011)

Haldimand County Profile

Haldimand County is a small rural community located in southern Ontario on the shore of Lake Erie, less than 100 kilometers from large urban centres such as Hamilton, Kitchener/Waterloo, Mississauga, and Toronto. In 2011 Haldimand County had a population of 44,900 and a labour force of 36,480 persons, distributed across 1,252 square kilometres.

Individuals of Aboriginal identity comprised 1,470 of the County's population, including 1,135 of First Nations identity and 270 of Metis identity.^{iv} Part of the claimed traditional territory of the Six Nations of the Grand River is in Haldimand County, while the Six Nations reserve (with a population of 12,271 in 2013) borders it. The Mississaugas of the New Credit First Nation reserve (population of 530) is also proximate to Haldimand County. The population of Haldimand County decreased by 0.7% between 2006 and 2011, in contrast to provincial population growth of 5.7% in the same period, consistent with a broader migration trend from rural to urban areas. Haldimand households earn roughly the same income as the average household in the province (in 2010, the median after-tax family income in Haldimand County was \$70,619, on par with the provincial average of \$71,128).

Figure 3. Map of Haldimand County



Haldimand's major employment industries consist of manufacturing (19.7%), retail trade (11.3%), health care and social assistance (10.8%), and construction (8.6%). Compared to the provincial profile, Haldimand's industry sector composition has greater representation

of manufacturing, construction and agriculture, and lesser representation of public administration, professional, scientific and technical services, and of finance and insurance (see Table 2). Agriculture plays an important role in Haldimand County with approximately 1,000 farms that produce dairy, beef, hogs, poultry, grains, and fruit.

Table 2. Share of Employment by Industry (2015)

Industry	Haldimand County	Ontario
Manufacturing	19.7%	10.8%
Retail trade	11.3%	11.5%
Health care and social assistance	10.8%	10.7%
Construction	8.6%	5.0%
Accommodation and food services	6.3%	7.1%
Educational services	6.1%	7.6%
Utilities	4.7%	0.8%
Agriculture, forestry, fishing and hunting	4.4%	0.8%
Public administration	4.2%	7.2%
Administrative and support, waste management and remediation services	3.7%	5.7%
Transportation and warehousing	3.6%	4.3%
Wholesale trade	3.4%	5.3%
Other services (except public administration)	3.4%	4.1%
Professional, scientific and technical services	2.0%	5.8%
Finance and insurance	2.0%	5.2%
Mining, quarrying, and oil and gas extraction	1.3%	0.4%
Arts, entertainment and recreation	1.3%	1.6%
Real estate and rental and leasing	0.9%	1.7%
Information and cultural industries	0.8%	2.3%
Management of companies and enterprises	0.0%	0.6%

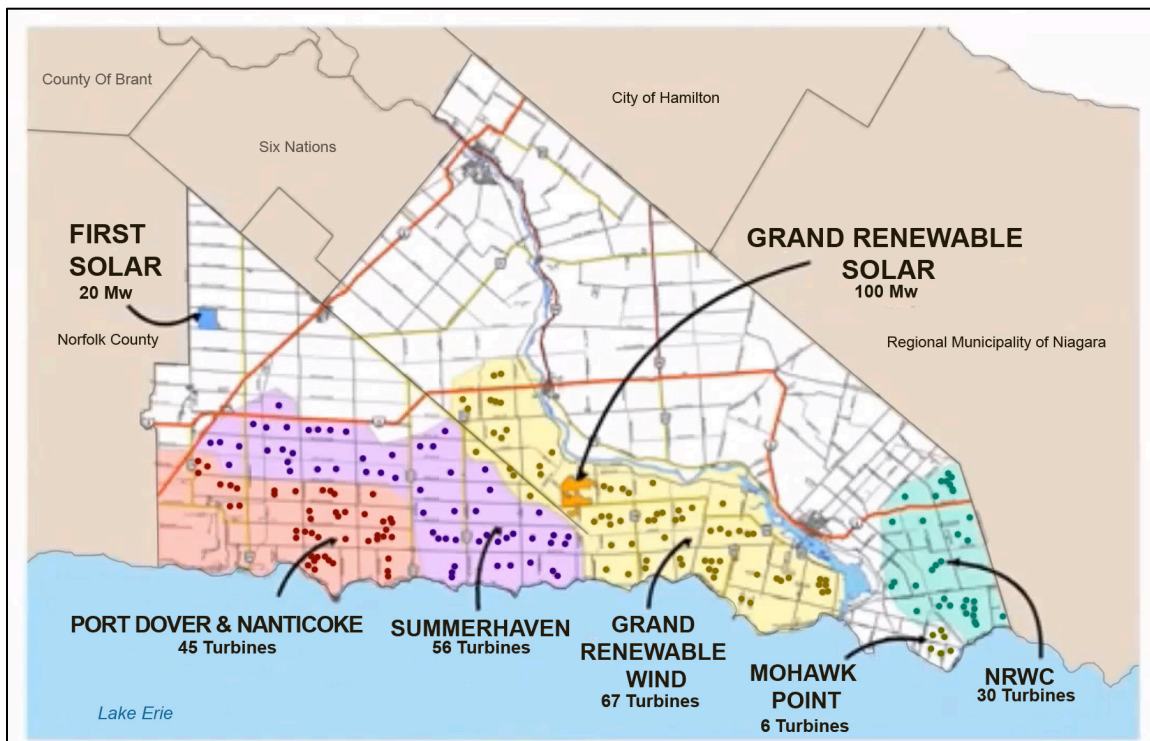
Source: Ontario Ministry of Agriculture Food and Rural Affairs^v

Unemployment in Haldimand County has recently remained below the provincial average (6.6% in 2011 compared to 8.3% in Ontario). Unemployment in the broader region (including Brant County, Elgin County, Haldimand County, Norfolk County, and the Niagara Regional municipality), however, has consistently been one to two percentage points above the provincial average.

Haldimand Wind Power Development

Since 2011 Haldimand County Council has negotiated with renewable energy companies around the development of wind and solar power in the county to ensure that the local economy and community benefited during construction and operational periods.^{vi vii viii} Mohawk Point was the first wind project developed in Haldimand County, commencing operations in October 2008 under the province's Renewable Energy Standard Offer Program. It consists of 6 turbines with a capacity of 10 MW, and is owned by International Power Canada (formerly AIM PowerGen). Four major wind projects have since been developed or initiated, with a combined total of 198 turbines and capacity of 443 MW within county boundaries (see Figure 4) – equivalent to 11% of the province's expected 2015 installed wind capacity.^{ix}

Figure 4. Locations of Wind Power Projects in Haldimand County



Summerhaven Wind Energy Centre

The Summerhaven project is located just east of Nanticoke and is the second of eight major provincial projects developed or owned by NextEra Energy, one of North America's largest wind and solar power generators with more than 100 wind facilities in Canada and the United States. It has a capacity of 124 MW, sufficient to provide electricity to 31,000 homes, powered by 56 turbines. Summerhaven was awarded a 20-year FIT contract by the Ontario Power Authority in April 2010, and commenced commercial operation in August 2013.

Port Dover and Nanticoke Wind Project

The Port Dover and Nanticoke project is in the western part of Haldimand County with 45 of the project's 58 turbines within county boundaries, and 13 turbines in neighboring Norfolk County. It began commercial operations in November 2013 and has an overall capacity of 105 MW (81 MW in Haldimand County). The project is owned by Capital Power, an independent power producer based in Edmonton that owns 2,700 MW of power generation capacity at 15 facilities across North America, including two operational wind projects in Ontario. The project has the capability of providing power to 22,000 homes in Ontario.

Grand Renewable Wind

The Grand Renewable Wind project represents to date the largest operating wind development in the county with 67 turbines and a capacity of 149 MW. The project, owned primarily by Samsung Renewable Energy and Pattern Energy, is located in the South Cayuga region of the county and began commercial operation in January 2015. Samsung Renewable Energy also partly owns the 100 MW Grand Renewable Solar Project in Haldimand and the 270 MW South Kent wind project in Chatham-Kent. The Six Nations of the Grand River own 10% of Grand Renewable Wind.

Niagara Region Wind Project

The Niagara Region Wind project is the second largest wind project proposed in Ontario with 77 turbines (230 MW total) that would be able to produce enough electricity to supply 75,000 homes in Ontario. The project is primarily located in the municipality of Niagara but has 30 turbines (89 MW) in the southeastern tip of Haldimand County. The project is being developed by Niagara Region Wind Corporation, a 50/50 joint venture between Daniels Power and Renewable Energy Business. This project is the sole renewable energy endeavor of both proponents. The project has requested a Renewable Energy Approval from the Ministry of Environment and Climate Change, and is expected to be in operation in 2016.

German turbine manufacturer, Enercon, has established a manufacturing facility in nearby Beamsville which will supply the project.^x

Table 3. Profile of Wind Power Projects in Haldimand County

Project	Description	Proponents	Location	Status
Mohawk Point	10 MW 6 Turbines	International Power Canada	South East Haldimand	Operating since October 2008
Summerhaven Wind Energy Centre	124 MW, 56 Siemens Turbines	NextEra Energy Canada	East of Nanticoke in the Fisherville and Rainham Centre areas	Operating since August 2013
Port Dover and Nanticoke Wind Project	81 MW, 45 Vestas Turbines	Capital Power Corporation	Port Dover to Selkirk (some in Norfolk County)	Operating since November 2013
Grand Renewable Wind	149 MW, 67 Siemens Turbines	Samsung C&T (45%) Pattern Energy (45%) Six Nations (10%)	Between Cayuga and Dunville along the Grand River	Operating since January 2015
Niagara Region Wind Project	89 MW, 30 Enercon Turbines	Daniels Power (50%) Renewable Energy Business (50%)	South-eastern tip of Haldimand County (mostly in Niagara region)	In Development

Local Economic Benefits from Wind Power

Commercial wind farms are capital-intensive infrastructure investments, costing approximately \$275 million per 100 MW of installed capacity to construct in Ontario.^{xi} As such, wind farms provide significant employment for skilled and unskilled workers during the construction period, which typically lasts on average 12 months.

Long-term jobs are created once the operational period of the wind farm commences. Revenues derived from subsequent electricity generation yield economic benefits to the local community by supporting land lease payments to landowners, contributions to community development funds, property tax payments, and, where applicable, contributions to Aboriginal communities. For municipalities such as Haldimand County with small populations and tax bases, these financial flows can amount to a substantial economic stimulus. Wind farm investment has also stimulated the development of a turbine component manufacturing and assembly supply chain in Ontario, a further source of employment and expenditures in various municipalities.

This section provides estimates of the approximate magnitude of each of these local economic benefits for Haldimand County and neighbouring First Nations, based on a combination of data collected by the author through interviews with wind power companies and data gathered from public sources. The report does not include analysis of the economic impact of Haldimand's wind power on electricity prices, its technological impact on grid operations, or its environmental impact on electricity sector greenhouse gas emissions, since these issues are driven by government renewable energy policies determined at the provincial level. Nor does the report assess any potential impact of wind farm development on local property values; there have been few peer-reviewed statistical studies in Ontario, but those that have been published do not find a negative effect.^{xii} The time frame for assessment is limited to 20 years, reflecting the durations of wind farm contracts with the Ontario Independent Electricity System Operator^{xiii} and of benefit agreements. The actual useful lifespan of wind farm infrastructure is expected to be 30 years or more, which would increase the magnitude of the local benefits.^{xiv} The report also includes only the estimated *direct* local expenditure benefits of wind farm development and operation, excluding indirect or induced effects, which are difficult to accurately quantify at the local level. Indirect benefits include increased local supply chain employment and income (e.g. turbine component manufacturing), while induced benefits stem from households spending labor earnings from project construction and operation on local goods

and services. Incorporating these expanded benefits, and a longer time frame, would significantly increase the estimated magnitude of the local economic benefits from wind power presented here. The estimates presented in this report are thus relatively conservative.

The main findings, detailed in Appendix 1, are summarized as follows:

- Direct local expenditures by wind power companies in Haldimand County, and contributions to local Aboriginal groups, are expected to total approximately \$312 million in the first 20 years of operation (\$257 million in present value terms):
 - \$46 million (12%) – net contributions to local Aboriginal groups
 - \$52 million (17%) – Community Vibrancy Fund contributions and property tax payments to Haldimand County
 - \$72 million (24%) – local worker salaries
 - \$142 million (47%) – lease payments to local landowners
- 960 person-year full time local jobs are created during construction and operation.
- Annual local expenditures and payments during the operational period of the wind farms average \$15 million, equivalent to \$260 per person (including the populations of Haldimand County and neighbouring First Nations reserves).^{xv}
- Annual Community Vibrancy Fund and property tax payments of \$2.4 million to Haldimand County are equivalent to 11% of the 2013 County capital expenditure budget or 3% of the 2013 operating expenditure budget.

Aboriginal Participation

First Nations and Metis peoples can be important stakeholders in energy and infrastructure developments in Ontario. When proposed wind farms are situated on, or affect the usage of, Aboriginal traditional and treaty lands, project developers are required to consult with and accommodate impacted Aboriginal groups. In Haldimand, the major wind farms are partly located on the claimed traditional territories of the Six Nations of the Grand River, the Mississaugas of the New Credit First Nation, and the Haudenosaunee Confederacy Chiefs Council. These groups have negotiated agreements with wind power companies that yield economic benefits estimated at approximately \$2.3 million or more per year.^{xvi}

The Six Nations has made its agreements public. The Grand Renewable Energy Wind Park provided the Six Nations with the option to either acquire a 10% equity stake in the wind farm, which would yield expected gross investment revenue of \$38 million over 20 years, or receive \$600,000 in annual royalty payments (linked to inflation), as well as with annual scholarship funding worth \$20,000.^{xvii} It also donated \$400,000 for post-secondary scholarships at the project's groundbreaking. The Port Dover and Nanticoke wind project contributes \$364,740 each year in a Community Benefits Agreement and scholarship funding. Affiliates of NextEra Energy Canada, including the Summerhaven project, contribute \$435,000 annually to the Six Nations community, \$87,000 of which is attributable to the Summerhaven project. The Summerhaven project also contributes \$15,000 in postsecondary bursaries, and \$50,000 towards an eagle and deer monitoring program.

The value of agreements reached with the Haudenosaunee Confederacy Chiefs Council has been reported in the media.^{xviii} The three major operating wind farms are expected to collectively contribute approximately \$10 million over 20 years.

Future contributions by Niagara Region Wind to Aboriginal groups, once the project becomes operational, are imputed proportionately on a MW basis.

Total net payments by wind power companies to Aboriginal groups proximate to Haldimand are expected to reach more than \$46 million over a 20 year period. \$46 million is a conservative estimate of total payments since it excludes the value of agreements established with the Mississaugas of the New Credit First Nation relating to the Port Dover and Nanticoke Wind Project, Grand Renewable Wind, and the Niagara Region Wind Project, since these are not publicly available.

Municipal Community Vibrancy Fund

A very tangible benefit to the broader local community from wind farm development stems from annual contributions to municipal development funds by wind power companies. While not required by law, such contributions enable communities to directly benefit from the revenue stream earned by wind turbines over the contracted period. In Haldimand County, the council negotiated a standard contribution rate with the major developers of \$3,500 per MW and \$5,000 per kilometer of transmission line for a dedicated 'Community Vibrancy Fund' (CVF). Annual contributions will total approximately \$1.6 million once the

four major wind farms are all operational (see Table 4). Over the 20 year period of the contracts, contributions will total approximately \$33 million.

Table 4. Community Vibrancy Fund Contributions

Wind Project	Proponent	Annual CVF Payments
Grand Renewable Wind	Samsung / Patten	\$575,655
Summerhaven	NextEra Energy	\$475,300
Niagara Region Wind	NRWC	\$312,550
Port Dover and Nanticoke	Capital Power	<u>\$283,500</u>
		\$1,647,005

Sources: Community Vibrancy Fund Project Prioritization Principles and Processes. Haldimand County Report CAO-02-2013 of the Chief Administrative Officer. July 22, 2103; Summerhaven Wind, LP

The CVF is directed towards expenditures for the development and construction of capital asset projects such as recreational facilities (arenas, parks, trails), land stewardship initiatives (habitat creation/improvement; tree planting; shoreline rehabilitation), improvement of community and protective services (police, fire, EMS,), and road and municipal infrastructure improvements. CVF projects are allocated to areas of the county most affected by wind farm development, and are intended to augment rather than replace existing capital expenditure plans. Council is responsible for controlling and administering the Community Vibrancy Fund.

For small communities with limited municipal resources, Community Vibrancy Funds, or similar development funds, can have a significant impact on the extent and scope of local projects that are financially feasible. In Haldimand County, the annual CVF contributions by wind energy companies are equivalent to approximately 8% of the 2013 \$22 million Haldimand County Capital Expenditure budget or 2% of the 2013 \$91 million Operating Expenditure Budget.^{xix}

Haldimand Council has already approved several million dollars worth of projects funded by the CVF, including Cayuga library enhancements (\$500,000), Rainham Centre rural streetscaping (\$150,000), and new equipment for Canfield Fire Department (\$60,000). Table 5 provides examples of approved projects.

Table 5. Approved Community Vibrancy Fund Projects

	Cost (\$)
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Project	
Road, storm, curb and sidewalk replacement (Fisherville)	1,550,000
Church Street widening (Nanticoke)	800,000
Cayuga library enhancement	500,000
Gravel road conversion (Ward 5)	400,000
Summerhaven lakescape improvements (Selkirk)	300,000
Splash pad - Hagersville	200,000
Fisherville Lions Park (multi-purpose building)	191,300
Roof replacement (Fisherville District Community Hall)	170,000
Cayuga Kinsmen Hall and Ball Diamond Lights	150,000
Rural streetscaping - Rainham Centre	150,000
Jarvis Library improvements	60,000
Canfield Fire Department - new equipment	60,000
Playground for Nanticoke Hall and Field Management	50,000
Paving of parking lot at Wilson McDonald	20,000
Selkirk Community Hall - New Outdoor Digital Sign	10,000
Automatic door opener, Cayuga Seniors Hall	4,000

Source: Haldimand County 2014 Final Tax Supported Capital Budget and Forecast, 2014-2023

Municipal Property Taxes

Municipalities receive property taxes based on the assessed values of wind turbine towers, substations, and the land on which they stand. Wind turbine towers are assessed by the Municipal Property Assessment Corporation at a standard rate of \$40,000 per MW of installed capacity while each associated 1.5 acres of land hosting a turbine in Haldimand is assessed at approximately \$40,000 as well.

Total annual property tax payments by wind power companies are estimated to be approximately \$1,160,000 in Haldimand once all proposed projects are operational in 2016. The municipality, Haldimand County, receives approximately 62% of property tax collections (\$720,000) with the rest going to the Ministry of Education. Annual property tax payments by the wind power companies to Haldimand County are equivalent to approximately 3% of the 2013 \$22 million Haldimand County Capital Expenditure budget or 1% of the 2013 \$91 million Operating Expenditure Budget. Over a 20 year period, Haldimand County is expected to receive \$18.5 million in property taxes from all five wind farms.

In the absence of wind farms, the annual municipal taxes levied on the same lands would collectively total approximately \$7,500 – less than 1% of the taxes collected on wind farms – since the tax rate on farmland is 0.32% of the assessed value (versus 4.0% for Industrial usage), and the assessed value of an acre of farmland is significantly less (estimated at \$8,000) than the same land hosting a wind turbine.

In addition to property tax payments, municipalities also receive building, entrance and oversize load permit fee payments from project proponents during the construction phase of wind farm projects. These are estimated to total approximately \$2 million for the four major wind projects in Haldimand.^{xx}

Local Job Creation and Employment

Wind farms provide significant employment for labourers, engineers, technicians, administrative staff and project managers during construction and turbine installation periods, which last from 6 to 18 months depending on the size of the wind farm. A review of economic studies of wind farm development suggests that, on average, 108 full-time person-years of employment are required to construct and install 100 MW wind capacity.^{xxi} Haldimand County's 443 MW wind capacity constructed since 2012 thus created an estimated 478 person-years of employment. It is assumed here that 30 percent of these employees resided in Haldimand County, with the balance being drawn from the surrounding region.^{xxii}

Once operational, wind farms are estimated to employ approximately 9 local full time operations, maintenance and management staff per 100 MW capacity – implying 41 full time local employees in Haldimand for 20 years. In aggregate, the construction and operation of wind farms in Haldimand over the period from 2013 to 2035 is likely to create 960 person-years of employment.

Salary and wage payments to local employees during the construction period, assuming an average \$55,000 salary, total approximately \$8 million for the four major wind farms. Salary and wage payments to local operating technicians and managers, assuming a \$65,000 annual salary, sum to \$64 million over the 20 year operational period for all wind farms, including Mohawk Point (assuming 2% annual inflation).^{xxiii} Total employee salaries and wages over 20 years are thus expected to sum to \$72 million.

Land Lease Opportunities for Landowners

Local landowners with property close to electricity transmission lines and with favourable natural wind conditions may have the option to lease small land parcels to wind power companies on which to construct and access wind turbines.

Lease payments are usually based on turbine MW capacity or generated electricity revenues, and are structured for the life of the project (up to 50 years), providing a dependable long-term source of income for landowners. Additional payments may relate to collection, road and overhang easements, and property leases for meteorological, habitat and monitoring facilities. The income generated from such lease agreements with wind power companies is usually significantly greater than the net income landowners might expect to receive from alternative uses of the land such as farming agricultural crops. The market value of agricultural land in Haldimand ranged from \$6,000 to \$10,000 per acre in 2013,^{xxiv} reflecting the present value of expected net cash flows from future farming activities. By contrast, the present value of 20 years of annual lease income of \$20,000 for 1.5 acres of land for a 2MW turbine is approximately \$262,000, or \$175,000 per acre.^{xxv}

Annual lease payments are estimated to be approximately \$7 million for all wind farms in Haldimand County when they are all operational. The cumulative total of lease payments over 20 years is expected to reach \$142 million.

Appendix 1: Estimated Economic Benefits of Wind Power in Haldimand, 2013-2035

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total		
Wind farms under construction																										
	NextEra	GRW	NRWP																							
	PDNW																									
Number of turbines operating by end of year	107	174	204	204	204	204	204	204	204	204	204	204	204	204	204	204	198	198	198	198	198	198	97	30		
Number of MW operating by end of year	215	364	454	454	454	454	454	454	454	454	454	454	454	454	454	454	444	444	444	444	444	444	238	89		
Number of local person-year jobs	68	69	62	41	41	41	41	41	41	41	41	41	41	41	41	41	40	40	40	40	40	40	20	8	960	
	<i>(\$ million)</i>																									
Local salaries (construction and operation)	\$3.73	\$4.02	\$3.76	\$2.74	\$2.79	\$2.85	\$2.90	\$2.96	\$3.02	\$3.08	\$3.14	\$3.21	\$3.27	\$3.34	\$3.40	\$3.47	\$3.45	\$3.52	\$3.59	\$3.66	\$3.74	\$1.88	\$0.76	\$72.29		
Land Lease Payments	\$0.83	\$3.08	\$5.40	\$6.85	\$6.97	\$7.03	\$6.98	\$6.97	\$6.98	\$7.03	\$7.07	\$7.11	\$7.16	\$7.20	\$7.25	\$7.29	\$7.22	\$7.27	\$7.31	\$7.36	\$6.56	\$3.98	\$1.49	\$142.39		
Property Tax Payments to Haldimand County	\$0.06	\$0.36	\$0.60	\$0.72	\$0.74	\$0.76	\$0.79	\$0.81	\$0.83	\$0.86	\$0.88	\$0.91	\$0.94	\$0.97	\$0.99	\$1.02	\$1.03	\$1.06	\$1.09	\$1.13	\$1.16	\$0.57	\$0.18	\$18.46		
Community Vibrancy Fund Contributions	\$0.19	\$0.76	\$1.33	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.65	\$1.46	\$0.89	\$0.31	\$32.94	
Aboriginal Payments	\$0.13	\$0.85	\$1.74	\$2.13	\$2.16	\$2.16	\$2.18	\$2.19	\$2.21	\$2.23	\$2.24	\$2.26	\$2.28	\$2.30	\$2.32	\$2.34	\$2.36	\$2.38	\$2.40	\$2.42	\$2.31	\$1.61	\$0.49	\$45.67		
Total (nominal million dollars)	\$4.94	\$9.07	\$12.85	\$14.08	\$14.31	\$14.45	\$14.50	\$14.58	\$14.69	\$14.84	\$14.99	\$15.14	\$15.29	\$15.45	\$15.61	\$15.77	\$15.70	\$15.87	\$16.04	\$16.21	\$15.22	\$8.93	\$3.23	\$311.76		
Total (2014 million dollars)	\$5.04	\$9.07	\$12.59	\$13.53	\$13.48	\$13.35	\$13.13	\$12.95	\$12.79	\$12.67	\$12.54	\$12.42	\$12.30	\$12.18	\$12.07	\$11.95	\$11.67	\$11.56	\$11.45	\$11.35	\$10.45	\$6.01	\$2.13	\$256.68		

Endnotes

- ⁱ This estimate is based on the combined Haldimand County and local Aboriginal reserve (Six Nations and New Credit) populations.
- ⁱⁱ Independent Electricity System Operator, Supply Overview, available at <http://www.ieso.ca/Pages/Power-Data/Supply.aspx>, accessed 26 January 2015.
- ⁱⁱⁱ Long-Term Energy Plan 2013, Ministry of Energy, Government of Ontario.
<http://www.powerauthority.on.ca/power-planning/long-term-energy-plan-2013>
- ^{iv} National Household Survey, 2011. Statistics Canada
- ^v The Ontario Ministry of Agriculture Food and Rural Affairs combines data on industry employment from the Survey of Employment, Payrolls and Hours (SEPH) with data from the Labour Force Survey (LFS), Census, and Canadian Business Patterns (CBP) to form detailed geographic estimates of employment.
- ^{vi} Haldimand County. 2011. Haldimand County Announces a Community Vibrancy Fund and Support for Renewable Energy Investment in the Local Community [Press release]. Retrieved from <http://cnw.ca/4RLw1>. On February 14, 2013, the Council signaled through a resolution that it would not support additional wind farms beyond those that already had contracts with the Ontario Power Authority.
- ^{vii} Vo, J. (2013, September 27). NextEra Energy Canada finishes Haldimand wind farm. *The Sachem*. <http://www.sachem.ca/news/nextera-energy-canada-finishes-haldimand-wind-farm/>
- ^{viii} Baswick, P. (2011, August 12). Hewitt says new Samsung deal has 'no bearing' on Haldimand. *Simcoe Reformer*. Retrieved from <http://www.simcoereformer.ca/2011/08/12/hewitt-says-new-samsung-deal-has-no-bearing-on-haldimand>
- ^{ix} The IESO predicts in the November 2014 18-Month Outlook that an additional 1,586 MW of new wind capacity will become effective by the end of 2015 if all projects meet expected completion dates.
- ^x Grimsby Lincoln News. (2012, June 29). ENERCON opens \$5 million factory in Lincoln. *Niagara This Week*. Retrieved from <http://www.niagarathisweek.com/news-story/3266969-enercon-opens-5-million-factory-in-lincoln/>
- ^{xi} This estimate is based on the average of publicly reported construction costs for nine wind farms in Ontario.
- ^{xii} See Vyn, R. and McCullough, R. 2014. The Effects of Wind Turbines on Property Values in Ontario: Does Public Perception Match Empirical Evidence? *Canadian Journal of Agricultural Economics*, 62(3): 365-392. The Municipal Property Assessment Corporation also conducted a study in 2012 which yielded a similar conclusion as Vyn and McCullough: Impact of Industrial Wind Turbines on Residential Property Assessments, available at <http://www.mpac.ca/pdf/ReportWindTurbines.pdf>
- ^{xiii} Wind farm contracts were originally entered into by the Ontario Power Authority, which merged into the Ontario Independent Electricity System Operator in January 2015.
- ^{xiv} Many land leases are structured to continue for the life of the project, up to 50 years, so direct benefits from property taxes and employment would continue. Some agreements that contribute to the direct local benefits, including community development funds and First Nations support, would need to be renegotiated or extended in order to provide local benefits beyond 20 years.
- ^{xv} The per capita average expenditure number is based on the 2011 Haldimand County population plus the Six Nations and New Credit reserve populations, and is calculated to provide a basis for comparison with other regions. Naturally, annual wind company payments and expenditures are not evenly distributed across all residents and households in the region. For instance, a limited number of households will have land lease contracts with wind companies.
- ^{xvi} Details of agreements between wind energy companies and the Six Nations are available at <http://www.snfuture.com/>
- ^{xvii} Turtle Island News (January 7, 2015) reported that investment revenue for Six Nations from its 10 percent equity stake in Grand Renewable Wind would be \$38 million over 20 years. It is assumed this number excludes loan principal and interest payments. The analysis in this report assumes that the *net* benefit to the

Six Nations of the 10 percent equity stake is approximately equivalent to the alternative fixed royalty payment scheme of \$600,000 per annum, linked to inflation.

^{xviii} Turtle Island News, January 7, 2015, reports summary information on the value of agreements between HCCC and Six Nations with various energy companies.

^{xix} Message of the Chief Financial Officer, Haldimand County Draft 2013 Tax Supported Operating Budget report

^{xx} Source: Green Energy in Haldimand County. Presentation to Haldimand Council, October 29, 2013 by Kris Franklin, Project Manager Green Energy Infrastructure, Haldimand County. Permit fee payments are not included in the overall analysis of the economic benefits of wind farm development.

^{xxi} Tegen, S., Keyser, D., Flores-Espino, F., and Hauser, R. 2014. Economic Impacts from Indiana's First 1,000 Megawatts of Wind Power. *National Renewable Energy Laboratory*, Technical Report NREL/TP-5000-60914. Gagnon, Y., Leclerc, A., and Landry, M. 2009. Economic Assessment of a 100 MW Wind Farm Project in New Brunswick. *University of Moncton*. Moazzami, B., Crupi, F. and Pucci, P. 2012. Economic Impact of the Greenwich Wind Farm. *Ministry of Natural Resources*. Haines, G., Thibault, B., and Weis, T. 2011. Analysis of Community Power Projects in Ontario. *Pembina Institute*. ClearSky Advisors. 2011. The Economic Impacts of the Wind Energy Sector in Ontario 2011-2018.

^{xxii} It is difficult to measure or accurately estimate the percentage of wind farm construction employment that is drawn directly from Haldimand County. Tegen et al (2014) estimate that 50% to 75% of construction workers in Indiana were local. Haldimand County estimated that 30% of the labour force for the Summerhaven project were from within the County, 60% were within a 35 minute drive radius (see presentation by Kris Franklin to Council on October 29, 2013). To be conservative, the analysis in this report assumes that 30% of the workforce for all the major wind projects is local.

^{xxiii} Salary estimates are based on reported construction and operating salaries in wind farm economic impact studies (e.g. Tegen et al, 2014) and on conversations with wind farm developers.

^{xxiv} Presentation by Marlene Van Ham, Land Value Trends in South Western Ontario, University of Guelph conference, May 13, 2013. <http://www.uoguelph.ca/fare/institute/Docs/Presentations/2B-VAN-HAM-Land-Value-Southwest-ON.pdf>

^{xxv} The calculation of present value assumes a 5% discount rate, which is based on upper estimates of interest rates for long-term mortgages on agricultural land.