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# Economic Benefits of Wind Power Development and Operation in Dutton Dunwich, Ontario

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# Executive Summary

This report estimates the direct local community and Aboriginal economic benefits associated with the development and operation of a 57.5 megawatt wind project in the municipality of Dutton Dunwich, Ontario. In March 2016, Invenergy LLC, a global renewable energy company, was awarded a long-term contract by Ontario's Independent Electricity System Operator (IESO), as part of its Large Renewable Project procurement exercise, to construct and operate the Strong Breeze Wind Project, which will supply enough power for approximately 18,000 homes.

The construction and operation of wind power projects can bring significant short-term and long-term enhancements to local economies through the creation of new jobs for local residents, voluntary financial donations by developers to municipal community development funds, increased municipal property tax payments, land lease payments to landowners, as well as investment opportunities for local coops and Aboriginal groups. In the case of Strong Breeze, the value of these direct expenditures and payments is estimated to total \$52 million over 21 years:

Strong Breeze Wind Project Expenditures	Amount (\$M)	%
Lease payments to local landowners	13.1	25%
Local expenditures on employee wages and salaries	10.6	21%
Local expenditures on goods and services	11.0	21%
Erie Breezes Energy Coop investment return	5.8	11%
Northern Chiefs Council Development Fund investment return	5.8	11%
Community Benefit donations and property tax payments to Dutton Dunwich	3.8	7%
Property tax payments accruing to Elgin County	1.6	3%
<b>Total</b>	<b>51.7</b>	

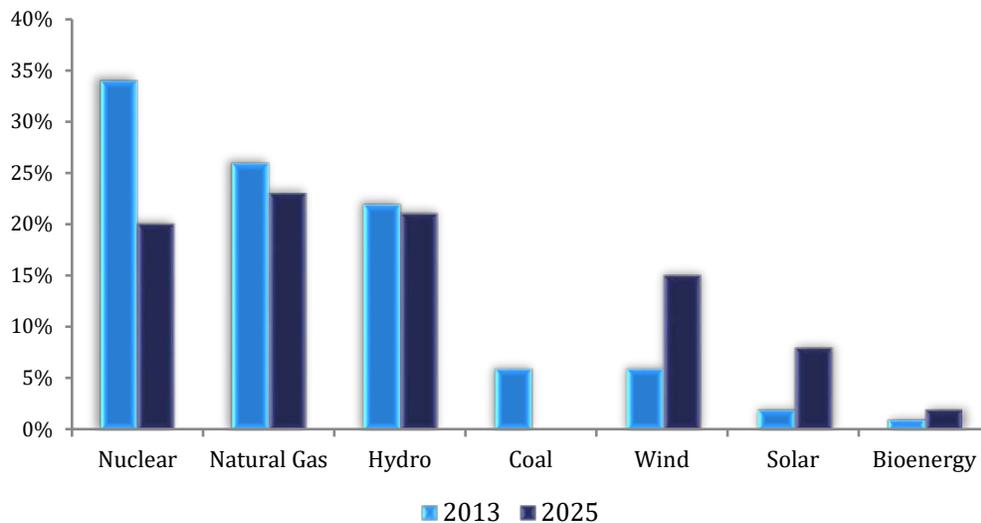
Direct economic benefits to the Dutton Dunwich community from the Strong Breeze Wind Project total approximately \$1.7 million annually, equivalent to \$1,170 per household. The increased value of Dutton Dunwich municipal property tax receipts and Community Benefit Fund donations amounts to \$180,000 annually on average, equivalent to 6% of Dutton Dunwich's net property tax revenue in 2015. These monies may be used by Council to fund new projects or to support existing commitments, potentially offsetting residential property taxes.

The estimates contained in this report of the economic benefits to Dutton Dunwich are relatively conservative since they do not include indirect or induced effects, which are difficult to accurately measure at the very local level, 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. Incorporating these aspects would augment the overall value of the expected economic benefits. Extending the time frame to 30 years would add \$24 million to the overall estimate.

# Wind Power in Ontario

Ontario is Canada's leading province in the wind power sector with 3,923 MW of installed capacity, representing 11% of total power generation capacity of 36,050 MW in the province.<sup>i</sup> Since 2003, the government of Ontario has enacted legislation and regulatory policies to stimulate private investment in wind and solar power generation, while simultaneously reducing reliance on coal as a power generation fuel. 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).<sup>ii</sup>

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 grid.

In 2014 the government directed the Independent Electricity System Operator to initiate a competitive procurement process for an additional 565 MW of renewable capacity, composed of up to 300 MW wind, 140 MW solar, 75 MW hydro power, and 50 MW bio energy. 42 applicants qualified, of which four were ultimately awarded contracts in March 2016 to construct five on-shore wind projects, ranging from 32 to 100 MW (Table 1), including the Strong Breeze Wind

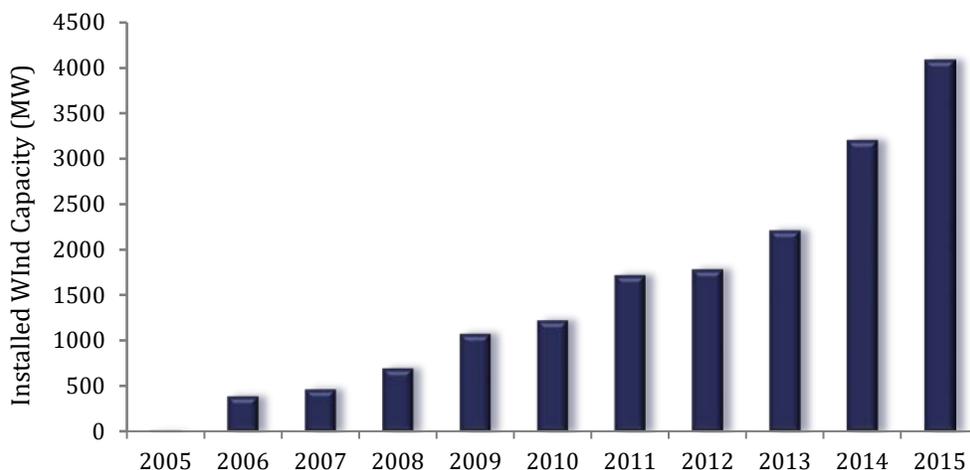
Project in Dutton Dunwich. The weighted average purchase price for energy from the wind projects was 8.6 cents/kWh, much lower than the prior feed-in tariff rate of 13.5 cents/kWh.

Table 1. 2016 Large Renewable Project RFP Selected Proponents (Wind energy)

Proponent / Project	Capacity (MW)	Location
EDF / Romney	60	Chatham-Kent and Lakeshore
EDP Renewables / Nation Rise	100	North Stormont
Invenergy / Strong Breeze	57.5	Dutton Dunwich
RES Canada / Otter Creek	50	Chatham-Kent
RES Canada / Parc Eolien Gauthier	32	The Nation and Champlain

A broad range of Canadian, American, European and Asian wind energy companies, including Boralex, Brookfield, Capital Power, International Power, Invenergy, NextEra Energy, Samsung Renewable Energy, and Suncor Energy, have invested in more than 100 wind farms in the province, of which 63 were operating by 2015. The average annual growth rate in installed wind capacity in Ontario from 2006 to 2015 was 30% 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 \$6 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. 34 municipalities in Ontario have wind farms that are operating (see Table 2).

Table 2. Operating Wind Projects in Ontario by Municipality (2015)

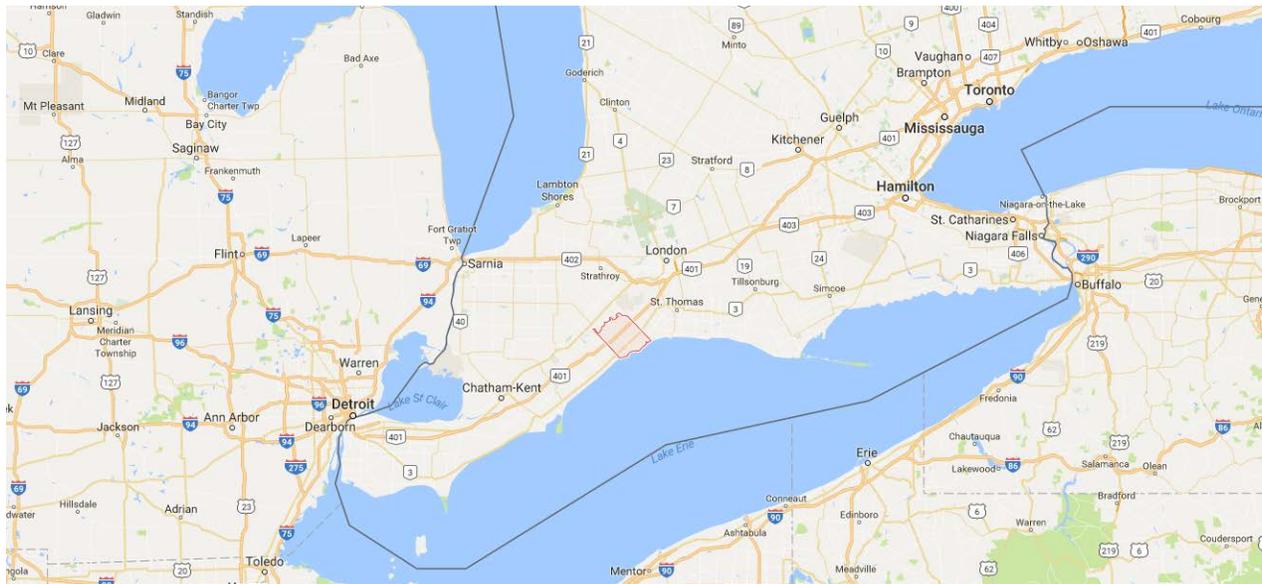
Municipality	Projects	Capacity (MW)	Population (2011)
Adelaide Metcalfe	3	104	3,055
Algoma district	2	83	115,870
Amaranth	1	6	3,963
Amherstberg Town	1	10	21,335
Ashford-Colborne-Wawanosh	2	310	5,545
Bayham / Malahide	1	99	6,940
Billings	1	4	506
Carnarvon	1	2	1,165
Chatham-Kent	8	867	101,680
Dorion Township	1	99	340
Brooke-Alvinston	1	10	2,935
Essex Town	3	56	19,200
Frontenac Islands	1	198	1,820
Grand Valley	2	60	2,635
Haldimand County	4	364	44,900
Huron East	1	33	9,264
Huron-Kinloss	2	136	6,640
Kincardine	3	364	10,975
Kingsville Town	1	51	20,040
Lakeshore Town	5	244	34,305
Lambton Shores	2	160	10,380
Loyalist Township	1	10	16,221
Melancthon	4	309	2,839
Norfolk County	1	10	61,360
North Bruce Peninsula	1	5	3,675
Northeastern Manitoulin	1	60	2,706
North Middlesex	1	74	6,360
Plympton-Wyoming	1	100	7,576
Sault Ste. Marie	2	189	73,625
South Dundas	1	30	10,794
South Huron	1	102	9,945
Wainfleet	1	9	6,356
Wellington County	1	23	86,672
West Grey	1	23	12,286
<i>Median</i>	<i>1</i>	<i>67</i>	<i>8,420</i>

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

# Dutton Dunwich Profile

Dutton Dunwich is a small rural community located in western Elgin County, southern Ontario, on the shore of Lake Erie, approximately 50 kilometers southwest from London and 225 kilometers southwest from Toronto. In 2011 it had a population of 3,880, 1410 households, and a labour force of 2,200 persons, distributed across 295 square kilometers (73,000 acres). The population of Dutton Dunwich increased by a modest 1.4% between 2006 and 2011, in contrast to provincial population growth of 5.7% in the same period, consistent with a broader net migration trend from rural to urban areas. Dutton Dunwich households earn somewhat more than the average household in the province (in 2010 the median after-tax family income in Dutton Dunwich was \$74,221, 4% more than with the provincial average of \$71,128).

Figure 3. Location of Dutton Dunwich, Ontario



The profile of industry employment in Dutton Dunwich is quite distinct from that of Ontario as a whole. Its major employment industries consist of manufacturing (15.4%), health care and social assistance (12.2%), transportation and warehousing (9.6%), retail trade (9.0%), and agriculture (8.4%). Compared to the provincial profile, Dutton Dunwich has significantly greater representation of manufacturing, transportation and warehousing, and agriculture, and lesser representation of educational services, professional, scientific and technical services, and of finance and insurance (see Table 3). Agriculture plays an important role in Dutton Dunwich with the majority of the acreage in the municipality classified as farmland.

Table 3. Share of Dutton Dunwich Employment by Industry

Industry	Dutton Dunwich (2016)	Ontario (2015)
Manufacturing	15.4%	10.8%
Health care and social assistance	12.2%	10.7%
Transportation and warehousing	9.6%	4.3%
Retail trade	9.0%	11.5%
Agriculture, forestry, fishing and hunting	8.4%	0.8%
Accommodation and food services	7.3%	7.1%
Construction	5.9%	5.0%
Public administration	4.6%	7.2%
Other services (except public administration)	4.4%	4.1%
Administrative and support, waste management and remediation services	4.3%	5.7%
Wholesale trade	3.6%	5.3%
Information and cultural industries	2.7%	2.3%
Educational services	2.7%	7.6%
Finance and insurance	2.5%	5.2%
Real estate and rental and leasing	2.1%	1.7%
Utilities	1.4%	0.8%
Professional, scientific and technical services	1.4%	5.8%
Arts, entertainment and recreation	1.4%	1.6%
Mining, quarrying, and oil and gas extraction	0.0%	0.4%
Management of companies and enterprises	0.0%	0.6%

Source: Statistics Canada and Elgin County

Unemployment in Dutton Dunwich has remained below the provincial average recently (6.4% in 2011 compared to 8.3% in Ontario; 5.5% in 2016 compared to 6.8% in Ontario).

As a municipality, Dutton Dunwich provides the typical range of municipal services such as roads and transportation, water and wastewater treatment, police protection, general government, environmental, and recreation and cultural services. The municipal budget in 2015 was \$6.2 M.

The principal source (60%) of municipal revenue is from property taxes levied on local households and businesses, with the province of Ontario and user charges contributing an additional approximate 25% of total revenue. 75% of Dutton Dunwich municipal property tax receipts come from residential households, 15% from farmlands, and 10% from commercial, industrial, and pipeline facilities (see Table 4). The typical household paid \$3,370 in property taxes in 2015, 49% of which was allocated to Dutton Dunwich municipality, 36% to Elgin County, and 15% to school boards.

Table 4. Property Tax Rates in Dutton Dunwich

Property Tax Category	Total Assessed Value by MPAC in 2013 (\$M)	Tax rate in 2013 (DD component)	Property Tax Revenue in 2013 to DD (\$M)	Number of Taxable Units (2015)
Residential	252.3	0.74%	\$1.866	1188
Farmlands	197.0	0.18%	\$0.364	828
Commercial occupied	8.2	1.21%	\$0.099	88
Multi-residential	4.2	1.74%	\$0.073	5
Pipelines	2.4	0.85%	\$0.021	
Industrial occupied	0.86	1.65%	\$0.014	23
New construction commercial	0.43	1.21%	\$0.005	
Commercial vacant land	0.44	0.85%	\$0.004	
Managed forests	0.13	0.18%	\$0.0002	
Commercial vacant units	0.11	0.85%	\$0.001	
Industrial vacant units	0.05	1.07%	\$0.0005	
Large industrial occupied	0.00	2.09%	\$0.000	
<b>Total</b>	<b>\$466.2</b>		<b>\$2.448</b>	

Source: Dutton Dunwich annual budget documents<sup>iii</sup>

In recent years, rising policing costs and reductions in provincial funding have led the Council to increase property tax percentage rates on all property categories. In combination with higher MPAC assessments of property values, household and business property tax payments have increased by approximately 8% annually since 2013.

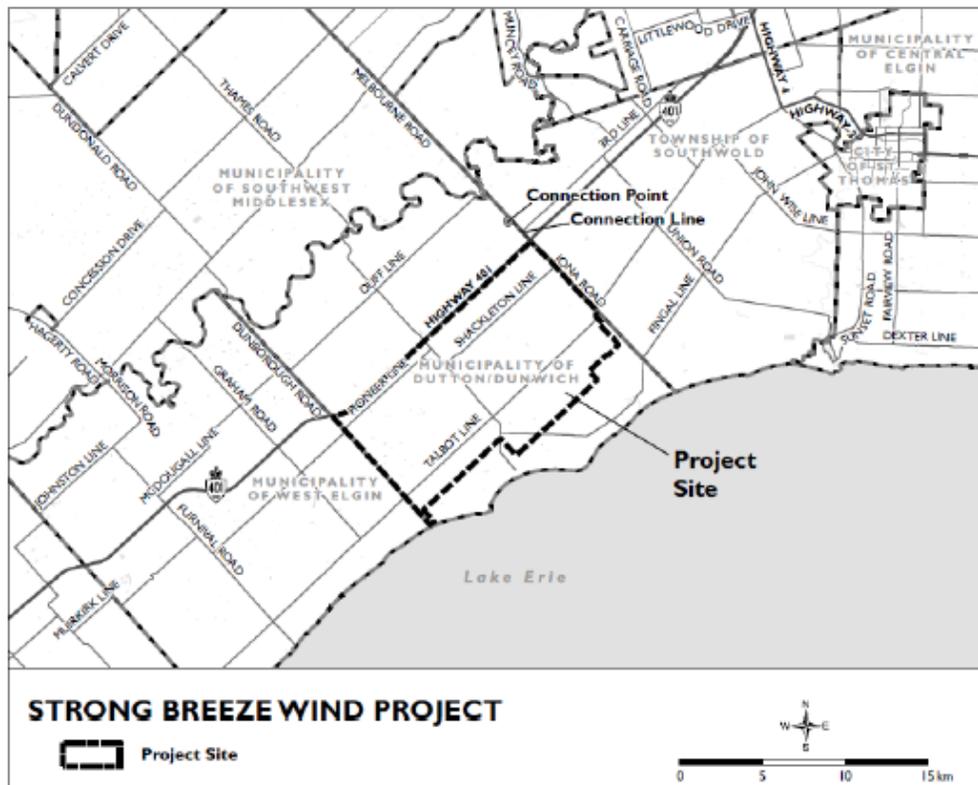
# Elgin County Wind Power Development

## Strong Breeze Wind Project

In 2012 Invenergy approached Dutton Dunwich council to discuss a proposal to develop a 55-60 MW wind project within municipal boundaries. Invenergy is one of the largest independent wind power generation companies in Canada and the United States, with more than 67 wind projects and 7,654 MW globally. It developed the Raleigh wind project in Chatham-Kent in 2011, and four projects in Quebec from 2012-2016.

After gaining the support of more than 100 landowners who signed land option agreements, Invenergy was awarded a 20 year contract by the Independent Electricity System Operator in March 2016 to develop the 57.5 MW Strong Breeze wind project in Dutton Dunwich, subject to receiving a Renewable Energy Approval from the Ministry of the Environment and Climate Change. The wind project will consist of 17 turbines, capable of generating electricity sufficient for 18,000 households. Commercial operation may be expected in 2019.

Figure 4. Site Area for Strong Breeze Wind Project, Dutton Dunwich



## Erie Shores Wind Farm

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Although Strong Breeze is the first wind project to be situated in the municipality of Dutton Dunwich, Elgin County is the site of one of the earliest large scale wind developments in Ontario. The 99 megawatt Erie Shores Wind Farm, also known as the Port Burwell Wind Farm, was originally developed by AIM Power Generation and Clean Power Income Fund after receiving a 20 year contract from the provincial government in 2004 as part of its Renewable Energy Supply procurement process. It commenced commercial operation in May 2006. The wind farm is situated along 25 kilometers and on 5,260 hectares of farmland, located in the Municipality of Bayham and Township of Malahide in eastern Elgin County, and also in Old Houghton Township in Norfolk County. It consists of 66 General Electric 1.5 MW wind turbines. The electrical energy generated by the wind turbines is collected and delivered by 34.5 kV lines, which ultimately deliver the power to the Port Burwell substation where the voltage is increased to 115 kV for delivery to Ontario's transmission grid. The project has the capability of providing power to 24,000 homes, and is one of the larger wind farms in Ontario. It is now owned by Capstone Infrastructure.

Table 5. Profile of Wind Power Projects in Elgin County

Project	Description	Owner	Location	Status
<b>Strong Breeze</b>	57.5 MW 17 Turbines	Invenergy	Dutton Dunwich	Development
<b>Erie Shores</b>	99 MW 66 Turbines	Capstone Infrastructure	Bayham / Malahide	Operating since May 2006

## Local Economic Benefits from Wind Power

Wind power development can provide significant short-term and long-term boosts to local economies, especially in rural areas where employment, investment, and economic development opportunities may be more limited than in larger conurbations.<sup>iv</sup> In the short-term, wind project construction provides employment and income for both skilled and unskilled workers in the local labour force. Wind farms are capital-intensive infrastructure investments, costing approximately \$275 million per 100 MW of installed capacity to fully develop, construct and commission in Ontario.<sup>v</sup> While externally-sourced turbine components usually constitute the largest single cost in a wind project, developers spend a significant fraction of the overall cost on locally-sourced goods and services, such as gravel, concrete, fuel, hardware, and consumables, a further source of economic stimulus.

Long-term jobs are created once the operational period of the wind farm commences. While the number of operational jobs is smaller than during the construction phase, they tend to be high skilled technical positions that command salary and benefit premiums. In addition to providing stable employment income, project owners contribute directly to local communities over the long-term in at least four other ways: first, through lease payments to landowners who host wind turbines on their property. In agricultural areas, landowners may invest lease revenues, which are guaranteed for the 20 year duration of contracts, in capital machinery and equipment, potentially improving the productivity of existing farming operations. Second, project owners often make voluntary donations to municipal community development funds to help support local improvement projects that may otherwise not receive funding. Third, property tax payments to local governments increase substantially based on the assessed value of turbines, surrounding land, and any new commercial operations buildings, supporting government expenditures on community services. For municipalities such as Dutton Dunwich with small populations and tax bases, these financial flows can amount to a substantial economic stimulus for the public and private sectors. Fourth, when local cooperatives or Aboriginal groups co-invest with wind developers, they also receive direct economic returns on their investments.

This rest of this section provides estimates of the magnitude of each of these local economic benefits from the Strong Breeze Wind project for Dutton Dunwich based on a combination of data collected from municipalities, wind power companies, and publicly available sources. The report does not include analysis of the economic impact of local 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.<sup>vi</sup> The time frame for assessment is limited to 20 years, reflecting the durations of wind farm contracts with the Ontario Independent Electricity System Operator<sup>vii</sup> 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.<sup>viii</sup> 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 and induced benefits stem from households and businesses spending earnings from project construction and operation on local goods and services. Incorporating these expanded benefits, and a longer time frame, would 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:

- The economic benefit from the Strong Breeze Wind Project accruing to the local community and to partner First Nations is estimated to total approximately \$52 million in the first 20 years of operation (\$43 million in 2016 present value terms):
  - \$13.1 million (25%) – lease payments to local landowners
  - \$11.0 million (21%) – expenditures on local employee wages and salaries
  - \$10.6 million (21%) – expenditures on local goods and services
  - \$5.8 million (11%) – Erie Breezes Energy Cooperative investment return
  - \$5.8 million (11%) – Northern Chiefs Council Development fund return
  - \$3.8 million (7%) – Community Benefit Fund donations and property tax payments to Dutton Dunwich
  - \$1.6 million (3%) – property tax payments accruing to Elgin County
- 121 person-year full time local jobs are created during construction and operation.
- Invenergy’s annual total local expenditures and payments within Dutton Dunwich average \$1.7 million over the construction and operation period, equivalent to \$1,170 per household.
- Invenergy’s annual Community Benefit Fund donations and property tax payments to Dutton Dunwich average \$180,000, which is equivalent to (a) 3% of the 2015 municipal operating expenditure budget, (b) 14% of the 2015 capital expenditure budget, and (c) approximately the same amount as the increase in the value of Dutton Dunwich net property taxes revenues from 2014 to 2015.

## Donations to Dutton Dunwich Community Benefit Fund

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A benefit to the broader local community from wind project development stems from annual donations to municipal development funds by wind power companies. While not required by law, such donations enable communities to directly benefit from the revenue stream earned by wind turbines over the contracted period. For the Strong Breeze Wind Project, Invenergy has offered to donate a total of \$1.65 million over the 21 year period of construction and operation of the wind farm (equivalent to \$1,125 per household), commencing with a donation of \$0.25 million once construction begins, and a further \$0.25 million upon operational commissioning. Over the 21 year period, Invenergy’s donations would average about \$80,000 per year.

Donations may be directed towards expenditures for upgrading or development of cultural and recreational facilities (libraries, splash pads, parks, trails), land stewardship initiatives (tree planting, streetscaping, shoreline rehabilitation), improvement of community and protective services (police, fire, EMS), and road and municipal infrastructure improvements. Council is responsible for controlling and administering the funds.

As an illustration, Haldimand County has funded a variety of local projects using donations to the Community Vibrancy Fund from four wind power companies operating in the municipality (Table 6):

Table 6. Haldimand County Approved Community Vibrancy Fund Projects

Project	Cost (\$)
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

For small communities with limited municipal resources, community benefit fund donations can have a significant impact on the extent and scope of local projects that are financially feasible. In Dutton Dunwich, the 2016 municipal budget for cultural and recreational support is \$365,000, 25% lower than the \$482,000 spent on this category in 2013. Invenergy's average annual planned donations are equivalent to about 20% of the 2016 cultural and recreational budget.

## Municipal Property Tax Payments

Municipalities receive property taxes based on the assessed values of wind turbine towers, substations, and the land on which they stand. Wind turbine towers were assessed by the Municipal Property Assessment Corporation in 2013 at a standard rate of \$40,000 per MW of installed capacity, which has increased 3% annually since then. By 2019 the MPAC assessment

of a MW is forecast to be \$48,000. Each associated three acre parcel of land hosting a turbine and access route is assessed at approximately \$30,000 based on forecast agricultural land values in Dutton Dunwich. Invenergy also plans to build a new commercial operations building in the municipality for permanent staff and equipment.

Wind turbine towers are classified as ‘Large Industrial Occupied’ property, which is taxed at the highest rate among all property classes in Dutton Dunwich at 4.7%. Out of this rate, 2.2% is remitted to Dutton Dunwich, 1.8% to Elgin County, and the balance to school boards. Dutton Dunwich thus retains about 49% of overall property taxes paid by households and businesses. The commercial operations building would be classified as ‘Commercial Occupied’, taxed at 2.7%.

Based on these property assessment values and tax rates, Invenergy’s total property tax payments over the first 20 years of operation of Strong Breeze are estimated to be \$4.5 million, of which \$2.2 million is retained by Dutton Dunwich – approximately \$110,000 on average each year. This is equivalent to 3.8% of Dutton Dunwich’s net property tax receipts in 2015 (\$2.88 million). Out of the \$4.5 million total, \$1.6 million in property tax payments is retained by Elgin County.

The combination of Invenergy’s annual property tax payments and annual community benefit fund donations to Dutton Dunwich sum to \$250,000 in the construction year, and more than \$300,000 in the first year of operation of Strong Breeze. During the first 21 years of the project (including a year of construction), the average annual payment to Dutton Dunwich is approximately \$180,000. This is approximately the same amount as the increase in net property taxes that Dutton Dunwich received in 2015 as compared to 2014. Invenergy’s payments to the municipality may be used by Council to fund new projects or to support existing commitments, potentially offsetting residential property taxes.

Table 7. Dutton Dunwich Municipal Revenue Sources, 2013-2016

	<b>2016 Budget</b>	<b>2015 Budget</b>	<b>2014 Actual</b>	<b>2013 Actual</b>
<b>Net Property Tax Revenue (\$)</b>	3,155,398	2,881,803	2,693,508	2,448,392
Annual Increase (%)	9.5%	7.0%	10.0%	
Annual Increase (\$)	273,595	188,295	245,116	
<b>Other Revenue (\$)</b>	3,936,061	4,047,602	4,787,083	4,250,113
<b>Total Revenue (\$)</b>	7,091,459	6,929,405	7,480,591	6,698,505
<b>Expenditures</b>	6,438,683	6,189,596	7,200,923	6,832,332

Source: Dutton Dunwich 2016 budget presentation and 2014 audited financial statements<sup>ix</sup>

In addition to property tax payments, municipalities also receive building permit fees and road use payments from project developers during the construction phase of wind farm projects. It is uncertain what these amounts will be for the Strong Breeze Wind Project, and they are not included in the quantitative estimates of the report.

## Expenditures on Local Employee Wages and Salaries

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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.<sup>x</sup> Strong Breeze's 57.5 MW wind capacity is thus estimated to create 62 person-years of full-time employment during construction (or a larger number of shorter-term positions).<sup>xi</sup> It is assumed here that 30 percent (19) of these employees will reside in Dutton Dunwich, with the balance being drawn from the surrounding region.<sup>xii</sup> In addition, two local full time community liaison managers will be employed to assist with project management during the construction and development period. Construction of Strong Breeze is assumed to take place over 12 months.

Once operational, wind farms are estimated to employ approximately 9 local full time operations, maintenance and management staff per 100 MW capacity – implying 5 full time local employees in Dutton Dunwich for 20 years. In aggregate, the construction and operation of Strong Breeze is likely to create 121 person-years of employment over a 21 year period.

Wage and benefit payments to local employees during the construction period, assuming an average \$55,000 per annum, total approximately \$1.1 million for Strong Breeze. Wage and benefit payments to permanent local operating technicians and managers, assuming \$77,500 average, sum to approximately \$9.5 million over the 20 year operational period (assuming 2% annual inflation).<sup>xiii</sup> Total employee salaries and wages over 21 years are expected to sum to \$10.6 million.

## Expenditures on Local Goods and Services

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Based on industry average costs in Ontario, Strong Breeze is estimated to cost \$150 - \$160 million to completely develop, construct and commission, including the purchase price of 17

turbines. Approximately 15% to 25% of the construction costs, excluding turbines, is typically spent locally on goods and services, representing a significant infusion of spending power to local communities during the course of the construction period. In the case of Strong Breeze, \$8 - \$14 million may be spent on local goods and services (the analysis here assumes the mid point value, \$11 million).

Wind project developers may seek local contractors to undertake site preparation, build access roads, install drainage systems, pour concrete turbine foundations, assemble turbine components, erect turbine towers, install blades and hubs, and so forth. Other project needs are related to logistics management, travel and transportation, lodging, and material supplies. Employees and workers involved in construction create further demands for local restaurants, lodging, and amenities.

Within Dutton Dunwich and neighbouring municipalities such as West Elgin and Southwold, more than 25 local businesses may be positioned to provide goods and service to the Strong Breeze project.<sup>xiv</sup>

## Erie Breezes Energy Cooperative

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The Erie Breezes Energy Cooperative, incorporated in December 2013, provides an opportunity for local residents of Dutton Dunwich to personally invest in the Strong Breeze Wind Project and to earn an economic return on their investment. Renewable energy developers are increasingly creating opportunities for local communities to co-invest in renewable energy projects, carving out minority equity stakes. For instance, EDF offered Chatham-Kent a nine percent equity interest in the 60MW Romney project for \$5.4 million, with an expected net return of \$2.196 million over 20 years, yielding an internal rate of return of 9.6%.<sup>xv</sup>

Invenergy has supported the Erie Breezes Energy Cooperative, which allows residents to collectively invest up to \$3 million for a ten percent equity stake in the Strong Breeze Wind Project. Individuals, who can become members of the cooperative by paying a \$100 fee, may invest amounts in the range \$5,000 to \$200,000. Annual dividend payments to investors would be \$288,000, assuming the same 9.6% financial return as for the Romney wind project. Over the initial 20 year operational period of the project, dividend returns sum to \$5.8 million.

## Northern Chiefs Council

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As with the Erie Breezes Energy Cooperative, the Northern Chiefs Council, which represents six First Nations in the Ontario's remote north, has invested in a ten percent equity interest in the Strong Breeze Wind Project. For remote First Nation communities, earnings from such investments provide an important opportunity to reduce their reliance on diesel power and to shift to local solar or wind sources of power generation. Remotely located First Nations may spend up to two million dollars annually transporting diesel to their communities, limiting available funds for housing, public buildings or economic development projects. Investing in new solar systems not only provides a source of environmentally clean power, but also jobs and skills training for residents.

Annual dividend returns to the Northern Chiefs Council Development fund investment are expected to be \$288,000, totaling \$5.8 million over 20 years.

## Lease Payments to Local Landowners

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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. Neighbouring properties may also receive financial compensation from wind companies.

Lease payments 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 Dutton Dunwich was approximately \$8,000 per acre in 2014,<sup>xvi</sup> reflecting the present value of expected net cash flows from future farming activities. By contrast, the present value of 21 years (1 year of construction plus 20 years of operation) of annual lease income of \$15,000 for 3 acres of land for a 3MW turbine is approximately \$202,000, or \$67,000 per acre.<sup>xvii</sup>

Annual payments by Invenergy to local landowners are estimated to total approximately \$13.1 million over 21 years.

# Appendix

## Estimated Local Economic Benefits of Strong Breeze Wind Project, 2018-2039<sup>xviii</sup>

Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	Average
Number of local person-year jobs	21	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	121	
	(\$ million)																						
Lease payments to local landowners	0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.59	0.60	0.61	0.62	0.63	0.65	0.66	0.67	0.69	0.70	0.71	0.73	0.74	0.76	13.15	0.63
Local expenditures on goods and services	11.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.00	0.52
Local expenditures on wages and salaries	1.17	0.39	0.40	0.40	0.41	0.42	0.43	0.44	0.45	0.45	0.46	0.47	0.48	0.49	0.50	0.51	0.52	0.53	0.54	0.55	0.56	10.59	0.50
Erie Breezes Energy Coop investment return		0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	5.76	0.29
Northern Chiefs Council investment return		0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	5.76	0.29
Property tax payments to Dutton Dunwich	0.00	0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.13	0.14	0.14	2.18	0.10
Community Benefit Fund donations	0.25	0.31	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	1.65	0.08
Property tax payments accruing to Elgin County		0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.10	0.10	1.60	0.08
<b>Total (nominal dollars)</b>	<b>12.93</b>	<b>1.93</b>	<b>1.71</b>	<b>1.73</b>	<b>1.75</b>	<b>1.78</b>	<b>1.80</b>	<b>1.82</b>	<b>1.85</b>	<b>1.88</b>	<b>1.90</b>	<b>1.93</b>	<b>1.96</b>	<b>1.99</b>	<b>2.01</b>	<b>2.04</b>	<b>2.07</b>	<b>2.10</b>	<b>2.14</b>	<b>2.17</b>	<b>2.20</b>	<b>51.70</b>	<b>2.46</b>
Total (2016 dollars)	12.93	1.82	1.58	1.57	1.56	1.55	1.54	1.53	1.52	1.51	1.50	1.49	1.48	1.48	1.47	1.46	1.45	1.44	1.44	1.43	1.42	43.15	2.05
<b>Total economic benefits to Dutton Dunwich</b>	<b>4.68</b>	<b>1.59</b>	<b>1.36</b>	<b>1.38</b>	<b>1.40</b>	<b>1.42</b>	<b>1.44</b>	<b>1.47</b>	<b>1.49</b>	<b>1.51</b>	<b>1.54</b>	<b>1.56</b>	<b>1.59</b>	<b>1.61</b>	<b>1.64</b>	<b>1.67</b>	<b>1.69</b>	<b>1.72</b>	<b>1.75</b>	<b>1.78</b>	<b>1.81</b>	<b>36.08</b>	<b>1.72</b>
Per household (\$'000)	3,193	1,080	924	938	953	968	983	999	1,015	1,031	1,047	1,064	1,081	1,099	1,117	1,135	1,154	1,173	1,193	1,213	1,233	24,596	1,171

# Endnotes

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- <sup>i</sup> Independent Electricity System Operator, Supply Overview, available at <http://www.ieso.ca/Pages/Power-Data/Supply.aspx>, accessed 10 October 2016.
- <sup>ii</sup> Long-Term Energy Plan 2013, Ministry of Energy, Government of Ontario. <http://www.powerauthority.on.ca/power-planning/long-term-energy-plan-2013>
- <sup>iii</sup> See <http://www.duttondunwich.on.ca/sites/default/files/pdfs/Tax%20Rates%202013.pdf> and <http://www.duttondunwich.on.ca/sites/default/files/pdfs/Budget%202013%20presentation.pdf>.
- <sup>iv</sup> Brown et al (2012) provide a large scale statistical analysis of the economic impact of wind power development in rural counties in the U.S., finding positive effects on income and employment (see Brown, J., Pender, J., Wisler, R., Lantz, E. and Hoen, B. 2012. Ex Post Analysis of Economic Impacts from Wind Power Development in U.S. Counties. *Energy Economics*, 34: 1743-1754
- <sup>v</sup> This estimate is based on the average of publicly reported construction costs for nine wind farms in Ontario.
- <sup>vi</sup> See Vyn, R. and McCulloch, 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 McCulloch: Impact of Industrial Wind Turbines on Residential Property Assessments, available at <http://www.mpac.ca/pdf/ReportWindTurbines.pdf>
- <sup>vii</sup> Wind farm contracts were originally entered into by the Ontario Power Authority, which merged into the Ontario Independent Electricity System Operator in January 2015.
- <sup>viii</sup> 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, would need to be renegotiated or extended in order to provide local benefits beyond 20 years.
- <sup>ix</sup> See <http://www.duttondunwich.on.ca/sites/default/files/Dutton%20Dunwich%202014FS.pdf> and <http://www.duttondunwich.on.ca/sites/default/files/Budget%20For%20Website%202016%20%282%29.pdf>.
- <sup>x</sup> 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.
- <sup>xi</sup> Invenergy estimates that 150 distinct jobs will be created during the construction phase, which is consistent with 62 full-time person-years of employment.
- <sup>xii</sup> It is difficult to accurately predict the percentage of wind project construction employment that will be drawn directly from Dutton Dunwich. Tegen et al (2014) estimate that 50% to 75% of construction

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workers in Indiana were local. Haldimand County estimated that 30% of the labour force for NextEra's Summerhaven project was from within the County, 60% were within a 35 minute drive radius (presentation by Kris Franklin to Haldimand County Council on October 29, 2013). The analysis in this report assumes that 30% of the future employed workforce (19 persons) for Strong Breeze will reside in Dutton Dunwich.

<sup>xiii</sup> 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.

<sup>xiv</sup> The Elgin County Business directory lists firms in each municipality by their primary activity, such as construction, transportation, restaurants, retail. See [www.progressivebynature.com](http://www.progressivebynature.com)

<sup>xv</sup> See Chatham-Kent Council meeting minutes, July 13, 2015, pages 50-53.

<sup>xvi</sup> Land values for various regions of Ontario are contained in the ReMax 2014 Farm Report.

<sup>xvii</sup> 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.

<sup>xviii</sup> The calculation of Total Economic Benefits to Dutton Dunwich is the sum of: lease payments to local landowners, local expenditures on wages and salaries, 25% of local expenditures on goods and services, Erie Breeze Energy Coop investment return, property tax payments to Dutton Dunwich, and Community Benefit Fund donations.