

Village of
Grand Manan
New Brunswick, Canada



Eastern Charlotte
WATERWAYS

Village of Grand Manan
Partners for Climate
Protection: Milestone 1

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REPORT TO

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April 4, 2017**

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Executive Summary

The Village of Grand Manan began participating in the Federation of Canadian Municipalities' (FCM) Partners for Climate Protection (PCP) program in July of 2016. The PCP program consists of a five milestone approach that begins by developing a greenhouse gas (GHG) emission inventory for both the municipality (corporate), and the homes and businesses therein (community).

Eastern Charlotte Waterways Inc. received funding from the New Brunswick Environmental Trust Fund (ETF) to commence work on behalf of the Village of Grand Manan under the PCP program by developing the Village's GHG emissions inventory, a forecast of GHG emissions, emissions reduction targets, and to initiate the development of a Local Action Plan for both the corporation and the community.

The corporate GHG inventory was developed by gathering various datasets for buildings, streetlights, vehicle fleet, water and sewage, and solid waste. In total, these five sectors produced 303 tonnes of CO₂e in 2015 (Figure A). The buildings generated the greatest volume of greenhouse gas emissions.

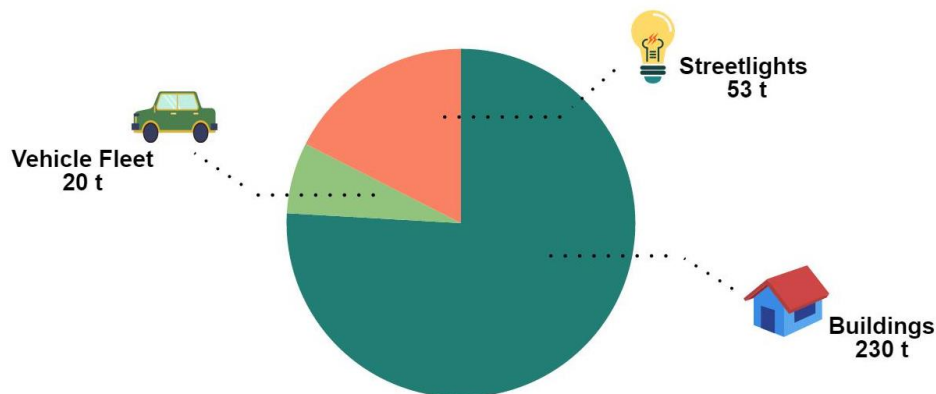


Figure A Corporate Greenhouse Gas Emissions by Sector (2015)

The community GHG inventory was developed by gathering various datasets for the residential, commercial, industrial, transportation and waste sectors within the Village of Grand Manan. These emissions are under the direct control of community stakeholders, however the Village can influence these sectors by providing education and outreach, and program and policy support for reduction measures in each sector. In total, these five sectors produced 23,377 tonnes of CO₂e in 2015 (Figure B). The transportation, and residential sectors contributed to the greatest proportion of total emissions.

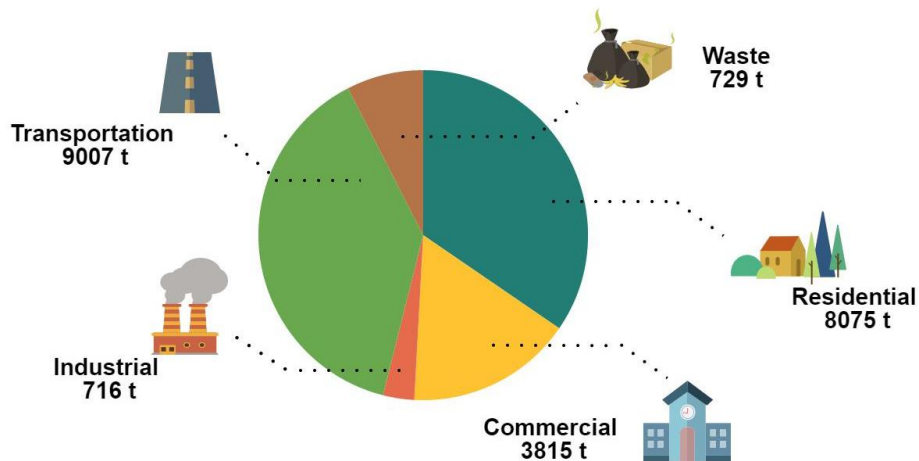


Figure B Summary of Community Greenhouse Gas Emissions by Sector (2015)

1.0 Introduction

Human activity has dramatically increased emissions of greenhouse gases (GHGs) in the atmosphere. The build-up of GHGs in the atmosphere has led to an enhancement of the natural greenhouse effect and ongoing emissions of GHGs have the potential to warm the planet to levels that have never been experienced in the history of human civilization. Such climate change could have far-reaching and/or unpredictable environmental, social, and economic consequences. These consequences have motivated governments to reduce greenhouse gas emissions and act on climate change.

In 2016, more than 190 countries, including Canada, signed the Paris Agreement. Under the agreement, countries set their own targets for reducing emissions, with a goal to limit the global temperature increase to below 2°C and to pursue efforts to limit this increase to 1.5°C, in order to avoid the most severe climate change impacts.

The Government of Canada has set a GHG emission reduction target of 523 Mt by 2030, and the Government of New Brunswick has set a target of 10.7 Mt by 2030. These targets represent a reduction of 30% below 2005 levels by 2030. New Brunswick has also set a GHG emission target of 5 Mt by 2050.

Local governments will play a crucial role in helping to reach these targets as up to half of Canada's GHG emissions are under the direct or indirect control or influence of municipal governments. In response, the Federation of Canadian Municipalities (FCM) designed its Partners for Climate Protection (PCP) program to encourage and assist municipalities to manage their contributions to climate change and encourage their communities to participate in local reduction initiatives. At the same time, it was recognized that municipalities are on the front line of this issue; and that they have an opportunity to save money while leading the development of much more sustainable communities. Local governments can drive systemic low-carbon practices, including: building high-efficiency buildings, undertaking building retrofits and developing district heating; building active transit, electric vehicle infrastructure and electrified public transit; implementing near-zero GHG waste plans; and delivering high-efficiency water and wastewater services.

Investments in these types of measures also reduce operating costs, help municipalities maintain and plan for future community services, protect public health, support sustainable community development, increase community resilience and reduce a community's vulnerability to environmental, economic and social stresses.

The PCP program commits members to adopt a community GHG reduction target of 30 per cent below 2005 levels by 2030, in line with the Government of Canada's target, and to adopt a corporate GHG reduction target that is similar or more ambitious, and to consider adopting a deeper community and corporate emissions reduction target of 80 per cent by 2050.

2.0 Community Profile

The Village of Grand Manan is a small island community located in the Bay of Fundy, and is surrounded by several smaller islands. The island is twenty-four kilometres long, and eleven kilometres wide. The Village was amalgamated on May 8, 1995; it is comprised of the former Villages of North Head, Grand Harbour and Seal Cove, and two former local service districts Castalia and Woodwards Cove. The population of the Village of Grand Manan was 2377 in 2011 and dropped to 2360 in 2016. An annual population decline of 1.67% (Statistics Canada, 2017).

The main industry of the village has always been fisheries, and more recently, the lobster industry has flourished. The tourism industry also continues to grow on Grand Manan as whale watching, sea kayaking, and bird watching have made this area favourable to domestic and international tourists alike. Additionally, Seal Cove has been designated as a National Historic Site of Canada, as it remains comparatively unchanged since the 19th century.

2.1 Joining the Partners for Climate Protection Program

In 2016, Eastern Charlotte Waterways Inc. (ECW), a local not-for-profit environmental resource and research centre, was granted funding from the New Brunswick Environmental Trust Fund (ETF) to quantify the Village of Grand Manan's GHG emissions, set a reduction target, and develop a local action plan following PCP program framework. In July, ECW presented the details of the PCP Program to the Village of Grand Manan council, highlighting the benefits, and requested that council join the program.

The Mayor and Council of the Village of Grand Manan resolved, on July, 14 2016, that Village of Grand Manan join the FCM PCP Program by completing the National Resolution form.

The PCP program allows flexibility in the progression through it, but recommends that GHG inventories be developed as a first step. A GHG inventory is an audit of activities that contribute to the release of emissions. The program requires that a baseline GHG emission inventory be developed, and that a 10 year forecast of the Village's GHG emissions from the baseline be estimated for both the municipality and for the community as a whole. Based on the availability of accurate data, the Village, in consultation with Eastern Charlotte Waterways Inc., selected a base year of 2015.

2.2 Partners for Climate Protection Process

The PCP program is administered through the FCM, and prescribes a five milestone framework used to assist local governments and municipalities in a process intended to reduce greenhouse gas emissions.

Over 300 municipal governments across Canada representing more than 65 per cent of the population have already committed to reducing corporate and community GHG emissions through the PCP program since its inception in 1994. To date, 44 municipal governments in New Brunswick have joined the program.

This project will enable the Village to complete Milestones #1 and #2. In addition, the outcome of this project serves as the foundation for the development of the Local Action Plan (LAP) required to fulfill Milestone #3. The five program milestones include:

- Milestone 1: Creating a greenhouse gas emissions inventory and forecast;
- Milestone 2: Set an emissions reductions target;
- Milestone 3: Develop a LAP to reduce GHG emissions;
- Milestone 4: Implement the local action plan or a set of activities; and
- Milestone 5: Monitor progress and report results.

3.0 Methodology

The following guidance and standards documentation was considered when developing the GHG emission inventory:

- Developing Inventories for Greenhouse Gas Emissions and Energy Consumption (Partners for Climate Protection);
- Cities for Climate Protection Guidelines (International Council for Local Environmental Initiatives (ICLEI));
- Canadian Standards Association (CSA) ISO 14064 Standards;

Real energy consumption (RC) data was used as the preferred input for GHG emission calculations. A data set is considered real consumption data when a vendor can provide accounting records that adhere to rigorous, third party scrutiny in accord with standard accounting principles. Where these data sets were not available, activity data (AD) from authoritative, defensible sources were used to estimate the inputs required for GHG emission calculations. A data set is considered activity data when indicators, averages, survey results, or national, provincial, or regional data is employed to estimate consumption.

Table 1 Summary of Data Type Sources - Real Consumption (RC) or Activity Data (AD)

Operational Category or Sector Category	Type of Data Source					
	Electricity	Natural Gas	Fuel Oil	Gasoline /Diesel	Other Fuels	Waste
CORPORATE INVENTORY						
Buildings	RC	RC	RC	-	-	-
Wastewater & Potable Water	RC	-	RC	-	-	-
Fleet	-	-	-	RC	-	-
Solid Waste	-	-	-	-	-	-
Street & Area Lighting	RC	-	-	-	-	-
COMMUNITY INVENTORY						
Residential	RC	AD	AD	-	AD	-
Commercial	RC	AD	AD	-	AD	-
Industrial	RC	AD	AD	-	AD	-
Transportation	-	-	-	AD	AD	-
Solid Waste	-	-	-	-	-	RC

4.0 Corporate Greenhouse Gas Emissions Inventory - Milestone 1

The Corporate GHG emission inventory includes energy consumption and contributions from:

- Buildings;
- Vehicle Fleet;
- Street, Traffic and Area Lights;
- Water and Waste Water Systems (e.g., lift stations, water pumps); and
- Corporate Solid Waste.

The energy consumption data was converted into a GHG emissions inventory using the web-based PCP Milestone Tool. The Milestone Tool includes the ability to input energy and emissions data for multiple inventory years, and track progress over time.

Overall, the Village of Grand Manan’s operations consumed 3,993 GJ of energy and produced 303 tonnes of CO₂e in 2015 (Table 2). Approximately 85% of the emissions were produced by electricity consumption, and the remainder propane, fuel oil, diesel and gasoline consumption. A more detailed look into emissions can be found in the following sections.

Table 2 Corporate Greenhouse Gas Emissions Summary for 2015

GHG Emissions (Tonnes of CO₂e)	2015
Buildings	230
Vehicle Fleet	20
Streetlights	53
Water and Wastewater	-
Solid Waste	-
Total GHG	303

4.1 Buildings

The building sector traditionally accounts for a significant proportion of local government operations emissions. Corporate building electricity consumption data was retrieved from monthly NB Power bills provided by the Village. Furnace oil and propane consumption data was retrieved from monthly Irving Ltd. invoices provided by the Village.

Several municipal buildings have been designed, or have undergone upgrades, to increase energy efficiency. For example, the Community Complex, constructed in 2009, is the newest building owned by the Village of Grand Manan. It currently houses the Grand Manan Boys and Girls Club, Municipal Offices, Community Arena, Fitness Centre and Community Gymnasium. The building is equipped with and utilizes Geothermal technology, and the arena is fitted with Eco Ice Technology. In addition, both the Business Centre and Fire Hall has been retrofitted to comply with NB Power's Energy Efficiency Program (Table 3).

Table 3 Energy Consumption and GHG Emissions in Village Owned Buildings

Building	Electricity (kWh)	Furnace Oil (L)	Propane (L)	Total Emissions (t of CO₂e)
Community Complex	577,080			161.58
Business Centre	40,320			11.29
North Head Hall	28, 035			7.85
Castalia Hall	1,936	3142.5		9.13
Fire Hall	10,080		11,231.7	20.16
Redemption Centre /Transfer Station	33,330			9.33
Storage Shed	1378			0.39
Airport Building	15,417			4.32
Airport Tower	6,318			1.77
Swimming Pool	11,610			3.25
Total	725,504	3142.5	11,231.7	229.07

In total, the GHG emission's associated with operating the Village's buildings were 230 tonnes of CO₂e. This represents 76% of all corporate sector emissions.

4.2 Vehicle Fleet

The vehicle fleet includes all motorized vehicles operated by the Village of Grand Manan. Vehicle fleet fuel consumption data was retrieved from monthly financial and fuel purchase records provided by the Village (Table 4). Litres of diesel for fire department trucks was based on the total cost of diesel provided by the Village, and Statistic Canada's average cost of diesel per litre in 2015 which was 112 cents. There may be considerable error in the calculation of volume of gasoline and propane consumed by the Transfer Station and C&D vehicle fleet since only total cost (\$4,629.42) was available. Therefore, it was assumed that each fuel type account for 50% of the total cost (\$2,314.71). Statistic Canada's average cost of gasoline and auto-propane per litre in 2015 which was 90.8 cents, and 79 cents, respectively was used to determine fuel volume consumed. An actual breakdown of volume of fuel used is necessary to refine the data set and provide a higher level of confidence in emissions.

Table 4 Fuel Consumption and GHG Emissions for Village Owned Vehicles

Vehicle	Gasoline (L)	Diesel (L)	Propane (L)	Total Emissions (t of CO ₂ e)
Fire Department		1238.10		3.36
Transfer Station and C&D Fleet	2366.8	1934. 80	1828.62	13.59
Personal Vehicle Use	1172.47			2.70
Total	3,539.27	3,172.9	1828.62	19.65

Further, there may be considerable error in the calculation of personal vehicle use since only vehicle kilometers travelled (VKT) was available (14,475 km). VKT was converted to fuel volume using a fuel efficiency factor of 8.1 L/100 KM. A breakdown of fuel type used by personal vehicles was not provided (e.g., gasoline vs. diesel fuel). Therefore, it was assumed that personal vehicles consumed gasoline. An actual breakdown of VKT, fuel type, and fuel efficiency for each vehicle in use is necessary to refine the data set and provide a higher level of confidence in emissions allocated to the Village's vehicle fleet.

In total, the GHG emission's associated fuel combustion in the Village's vehicle fleet were 20 tonnes of CO₂e. This represents 7% of all corporate sector emissions.

4.3 Street, Traffic and Area Lights

Street light electricity consumption data was retrieved from monthly NB Power bills provided by the Village which detailed streetlights and unmetered services in the Village. The first two light groups were billed on the basis of monthly estimates of electricity used. To determine total kWh used, it was assumed that the Village was charged 0.1295\$/kWh from January to September, and 0.1316\$/kWh as indicated on the bill. Based on the total monthly cost, kWh used were determined.

The remaining light groups were billed at yearly rates. To determine kWh, a conversion factor of 438 kWh/year/100W-light was applied. This was found by assuming each light was on for an average of 12 hours per day over the 365 days in the year (Table 5).

Table 5 Energy Consumption and GHG Emissions for Village Streetlights

Streetlight Group Name	Total Use (kWh)	# of Streetlights	Total Emissions (t of CO ₂ e)
100 W/HPS Light with wood pole	4,978	3	1.39
250 W/MH Floodlight	2,485	1	0.7
100 W/LED Light only	102,054	233	28.58
100 W/LED Light with wood pole	876	2	0.25
100 W/HPS Light	75,336	172	21.09
100 W/HPS Light with wood pole	438	1	0.12
200 W/HPS Light	2,628	3	0.74
70 W/HPS Photo-Controlled	1,226	4	0.34
Total	190,021	419	53.21

In total, the GHG emissions associated with operating the Village’s streetlights were 53 tonnes of CO₂e. This represents 17% of all corporate sector emissions.

4.4 Water and Wastewater Systems

The emissions associated with water and wastewater management systems can be highly variable in local government operations inventories. The Village of Grand Manan does not provide water or wastewater services as residents rely on well water and septic systems. Septic systems are the principal means of wastewater disposal for most homeowners in rural areas. In rural areas, where lots are larger and houses are spaced widely apart, they are more efficient and less expensive than centralized systems which require greater density to justify their large costs.

4.5 Corporate Solid Waste

Emissions from solid waste, mostly in the form of methane, enter the air directly as waste decomposes. The corporate solid waste sector is often a small portion (> 3%) of total corporate sector emissions. Nonetheless, cost-savings and emission reduction opportunities are present within this sector. The data for this sector was deemed inconclusive, or not statistically significant. The overall admissions for this section are ad minimus.

4.6 Business-As-Usual (BAU) Forecast

The PCP Program requires municipalities to develop a simple forecast reflecting a business-as-usual scenario 10 years into the future. Generally, forecasts for municipal operations for most sectors will mirror the population projections for a community. For the Village of Grand Manan, this is challenging, as the permanent resident population has been in decline over recent years as it is a small, rural community. The population of the Village of Grand Manan was 2377 in 2011 and dropped to 2360 in 2016. An annual population decline of 1.67% (Statistics Canada, 2017) which would indicate a potential for limited or no increase in emissions over the next 10 years.

4.7 Reduction Target – Milestone 2

As of 2016, the PCP program commits members to adopt a corporate GHG reduction target of 30 per cent below 2005 levels by 2030, in line with the Government of Canada's target. In the past, the PCP program committed members to adopt a corporate GHG reduction target of 20 per cent below 2000 levels within 10 years of joining the PCP program.

With recent population decline, an increase in federal and provincial funding for GHG emission reduction projects (see Section 6.0 for further details), and the fact GHG emissions associated with electricity generation in New Brunswick is likely to decrease in the upcoming years, it is recommended that the Village of Grand Manan set a reduction target of 30% below 2015 levels by 2030. This is a reduction of 91 tonnes of CO₂e.

5.0 Community Greenhouse Gas Emissions Inventory – Milestone 1

The Community GHG emission inventory includes energy consumption and contributions from the:

- Residential Sector;
- Commercial and Institutional Sector;
- Industrial Sector;
- Transportation; and
- Solid Waste.

Overall, the community of Grand Manan consumed 300,181 GJ of energy and produced 23,377 tonnes of CO₂e in 2015 (Table 6). Approximately 41% of the emissions were produced by electricity consumption, 26% by gasoline consumption, and the remainder from diesel, fuel oil, and propane consumption. A more detailed look into emissions can be found in the following sections.

Table 6 Summary of Community Greenhouse Gas Emissions in 2015

GHG Emissions (Tonnes of CO₂e)	2015
Residential	8,075
Commercial	3,815
Industrial	716
Transportation	9,007
Solid Waste	1,763
TOTAL GHG	23,377

5.1 Residential Sector

Similar to the building sector in the municipal inventory, the residential sector is a large producer of GHG emissions. Real consumption data for the residential sector in the form of total electricity consumption was acquired from NB Power. Under NB Power, residential includes domestic use, use in churches and farms. In 2015, NB Power had a total of 1,585 residential contracts. The majority, 1,402, were urban; 157 seasonal; and 26 rural, which resulted in a total of 23,175,663 kWh.

Based on the Natural Resources Canada’s (NRCAN) Comprehensive Energy Use Database data for New Brunswick, the 23,175,663 kWh used by the residential sector in the Village of Grand Manan is assumed to account for 61.7 % of the energy consumed in 2015. However, natural gas, accounting for 1.8% of the energy consumed, is not available for the residential sector in Grand Manan. Therefore, we assume that the electricity used by the residential sector accounted for 63.5% of the energy consumed in 2015. The remaining energy consumption data was estimated using the consumption breakdown given in the database.

Table 7 New Brunswick Residential Sector Energy Use by Energy Source and Estimated Consumption in the Village of Grand Manan

Energy Source	Consumption Breakdown (%)	Energy Consumed (GJ)
Electricity	63.5	83,432.39
Heating Oil	16.9	22,204.84
Other (Propane)	0.2	262.78
Wood	19.4 (N/A)	25,489.58
Total	100	131,389.59

Table 8 Residential Energy Consumption Estimates and GHG Emissions

Fuel Type	Units	Total Use	Total CO ₂ e
Electricity	kWh	23,175,663	6489.19
Heating Oil	L	574,065	1570.07
Propane	L	10,382	16.03
Total	-	-	8,075.29

The total value of all CO₂e produced by the residential sector in Grand Manan is estimated to be approximately 8,075 tonnes. This represents 34% of all community sector emissions.

5.2 Commercial and Institutional Sector

Real consumption data for the commercial sector in the form of total electricity consumption was acquired from NB Power. Under NB Power, the commercial and institutional sector fall under “General Service” which are customers who use electricity for all purposes other than those specifically covered under the residential, industrial, street lighting or unmetered service categories. In 2015, NB Power had a total of 293 commercial contracts. The majority, 280, were “General Service 1” and the remaining 13 were “General Service 2” which resulted in a total of 9,427,186 kWh.

Based on the Natural Resources Canada’s (NRCAN) Comprehensive Energy Use Database data on commercial energy use for Atlantic Provinces, the 9,427,186 kWh used by the commercial sector in the Village of Grand Manan is assumed to account for 54.3% of the energy consumed in 2015. However, natural gas, accounting for 12.5% of the energy consumed, we assume, is not used by the commercial sector on Grand Manan. Therefore, we assume that the electricity used by the commercial sector accounted for 66.8% of the energy consumed in 2015. The remaining energy consumption data was estimated using the consumption breakdown given in the database. The remaining energy consumption data was estimated using the consumption breakdown given in the database.

Table 9 Atlantic Provinces Commercial Sector Energy Use by Energy Source and Estimated Consumption in the Village of Grand Manan

Energy Source	Consumption Breakdown (%)	Energy Consumed (GJ)
Electricity	66.8	33,937.87
Light Fuel Oil	26.3	13,361.77
Heavy Fuel Oil	2.6	1,320.94

Other (Propane)	4.3	2,184.62
Total	100	50,805.19

Table 10 Commercial Energy Consumption Estimates and GHG Emissions

Fuel Type	Units	Total Use	Total CO ₂ e
Electricity	kWh	9,427,186	2,639.61
Fuel Oil	L	345,443.81	944.79
Heavy Fuel Oil	L	31,080.82	97.75
Propane	L	86,314.63	133.27
Total	-		3,815.42

The total value of all CO₂e produced by the commercial sector in Grand Manan is estimated to be approximately 3,815 tonnes. This represents 16% of all community sector emissions.

5.3 Industrial Sector

Similar to the commercial and institutional sector, industrial sector energy consumption and GHG emissions can vary across municipalities based on the level of industry present within the municipality. Real consumption data for the residential sector in the form of total electricity consumption was acquired from NB Power. Under NB Power, industrial includes customers who use electricity chiefly for manufacturing, assembly or processing of goods, or the extraction of raw materials. In 2015, NB Power had a total of 12 small industrial contracts (up to 750 kilowatts) which resulted in a total of 1,948,560 kWh.

Based on the Natural Resources Canada's (NRCAN) Comprehensive Energy Use Database data on industrial energy use for Atlantic Provinces, the 1,948,560 kWh used by the industrial sector in the Village of Grand Manan is assumed to account for 24.4% of the energy consumed in 2015. However, natural gas, assuming to account for 34.5% of the energy consumed, we assume, is not used by the industrial sector on Grand Manan. Therefore, we assume that the electricity used by the industrial sector accounted for 58.9% of the energy consumed in 2015. The remaining energy consumption data was estimated using the consumption breakdown given in the database. The remaining energy consumption data was estimated using the consumption breakdown given in the database.

Table 11 Atlantic Provinces Industrial Sector Energy Use by Energy Source and Estimated Consumption on Grand Manan

Energy Source	Consumption Breakdown (%)	Energy Consumed (GJ)
Electricity	58.9	7,041.82
Fuel Oil	9.4	1,119.51
Heavy Fuel Oil	10.4	1,238.61
Wood Waste and Pulping Liquor	21.3 (N/A)	2,536.77
Total	-	11,909.71

Table 12 Industrial Energy Consumption Estimates and GHG Emissions

Fuel Type	Units	Total Use	Total CO ₂ e
Electricity	kWh	1,948,560	545.6
Fuel Oil	L	28,942.94	79.16
Heavy Fuel Oil	L	29,143.76	91.66
Total	-		716.42

The total value of all CO₂e produced by the industrial sector in Grand Manan is estimated to be approximately 716 tonnes. This represents 3 % of all community sector emissions.

5.4 Transportation

The Vehicle Kilometers Travelled (VKT) method in the PCP Milestone Tool was used to determine community transportation emissions. This method takes into consideration the number of households in the community, the average number of vehicles per household in New Brunswick, and the average annual distance traveled by vehicles in New Brunswick. Based on the 2011 census, Grand Manan had a total of 1.60 households. As provided in the PCP Milestone Tool, the average number of vehicles per household was 1.60, and the average annual distance travelled by vehicles in was 15,864.

The total value of all CO₂e produced by the transportation sector in Grand Manan is estimated to be approximately 9,007 tonnes. This represents 39% of all community sector emissions.

5.5 Solid Waste

Solid waste production information for the residential sector was available directly from the Southwest Solid Waste Commission. The waste category includes emissions produced from waste generated from the residential and also industrial waste, construction waste and demolition waste.

The 'methane commitment' approach available in the PCP Milestone Tool was used to determine emissions from the decomposition of waste. The Southwest Solid Waste Commission facility does have containment cells 1-7 equipped with wells that allow for landfill gas (LFG) collection. Over the last two years, the facility has not been flaring methane regularly to convert into CO₂ because of an insufficient volume of gas. In 2015, the facility flared for 28 days. However, an accurate estimate of the landfill gas collected by the system is unavailable at this time (Dan Harrington, Regional Service Commission, Personal Communication, January 31 2017).

The total mass of waste sent to landfill from the Village of Grand Manan was 1332.25 tonnes. The decomposition of this waste is estimated to release 1762.57 tonnes of CO₂e. This value represents 7.5% of all community sector emissions.

5.6 Business-As-Usual (BAU) Forecast

The PCP Program requires municipalities to develop a simple forecast reflecting a business-as-usual scenario 10 years into the future. Generally, forecasts for municipal operations for most sectors will mirror the population projections for a community. For the Village of Grand Manan, this is challenging, as the permanent resident population has been in decline over recent years as it is a small, rural community. The population of the Village of Grand Manan was 2377 in 2011 and dropped to 2360 in 2016. An annual population decline of 1.67% (Statistics Canada, 2017) which would indicate a potential for limited or no increase in emissions over the next 10 years.

5.7 Reduction Target - Milestone 2

As of 2016, the PCP program commits members to adopt a community GHG reduction target of 30 per cent below 2005 levels by 2030, in line with the Government of Canada's target. In the past, the PCP program committed members to adopt a community GHG reduction target of 6 per cent below 2000 levels within 10 years of joining the PCP program.

With recent population decline, an increase in federal and provincial funding for GHG emission reduction projects (see Section 6.0 for further details), and the fact GHG emissions associated with electricity generation in New Brunswick is likely to decrease in the upcoming years, it is recommended that the Village of Grand Manan set a community reduction target of 30% below 2015 levels by 2030. This is a reduction of 7,013 tonnes of CO₂e.

6.0 Discussion

This report completes Milestone #1 of the PCP program with the development of the corporate GHG emissions inventory and estimates for the community sectors. These may now be reported to the FCM and the Village's PCP status updated on the FCM website. Milestone #2 requires the setting of firm corporate and community GHG emissions reduction targets by the

Village which needs to be adopted by council. It is recommended that council adopts the target of 30% below 2015 levels by 2030 as recommended by the PCP program, and set in this report.

In total, the GHG emission's associated with the Village of Grand Manan's operation in 2015 were 303 tonnes of CO₂e, and community emissions were 23,377 tonnes of CO₂e. GHG emissions vary for each municipality and energy needs and sources used are also different by community (Table 13).

Table 13 Comparison of GHG Emissions Across Similar Sized Municipalities in New Brunswick

Municipality	Population	Corporate Emissions (t CO₂e)	Community Emissions (t CO₂e)	Per Capita Emissions
Grand Manan	2377	303	23,377	9.8
Kedgwick	2089	331	28,262	13.5
Saint Quentin	2095	595	33,813	16.1
Shippagan	2603	1492	40,742	15.6

Milestone #3 requires the development of a Local Action Plan (LAP) designed to meet the Corporate and Community emissions targets set in Milestone #2. Achievement of the corporate target will require close attention to each future decision that impacts the Village's energy consumption. As participants in the PCP program, the Village of Grand Manan is eligible for financial assistance from the FCM Green Municipal Fund and Municipalities for Climate Innovation Program. The Village is also eligible to participate in other funding programs including the NB Power Commercial Buildings Retrofit Program and Locally Owned Renewable Energy Small Scale (LORESS) Program, and the New Brunswick Environmental Trust Fund (ETF). These funding programs can be used reduce energy consumption of municipal operations.

Additional resources will be required to engage the community and develop that portion of the Local Action Plan in a manner whereby the community takes ownership and identifies champions and initiatives that are most appropriate for it.

The setting of a community emission reduction target and the achievement of emission reductions may be much more of a challenge than meeting the corporate target, given the lack of data regarding the growth plans of the institutional, commercial, and small industrial sector. However, there are opportunities to improve the accuracy of the emissions inventory through participation of the community as part of a LAP. Given that most of the community GHG emissions are outside the direct control of the Village, the development of the LAP may best include considerable and effective involvement and interaction with the community, including the residents, businesses, industry and the operators of institutional facilities. The Village and the community may also wish to include their energy suppliers in their consultations.

While 44 other New Brunswick communities have joined the PCP program, Grand Manan has the opportunity to showcase leadership among its peers across the Province. This report provides an opportunity for the Village to complete Milestones #1 and #2 and, with some

additional consultation with the corporate staff and community, to complete Milestone #3 in the future.

7.0 References

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Appendix A – Emission and Conversion Factors

Table 14 PCP Tool Emission Factors (Tonnes of CO₂e/Unit)

Energy Source	Emission Factor (Tonnes of CO ₂ e/Unit)
Electricity	0.000280
Natural Gas	0.001912
Fuel Oil	0.002735
Heavy Fuel Oil	0.003145
Kerosene	0.002544
Propane	0.001544
Diesel Stationary	0.002790

Table 15 PCP Tool Conversion Factors (GJ/Unit)

Energy Source	Conversion Factor (GJ/Unit)
Electricity	0.003600
Natural Gas	0.038430
Fuel Oil	0.038680
Heavy Fuel Oil	0.042500
Propane	0.025310
Gasoline	0.035000
Kerosene	0.037680
Diesel Stationary	0.038300
Ethanol Blend	0.033860
Biodiesel (B5)	0.038170
Biodiesel (B10)	0.038040
Biodiesel (B20)	0.038780