

Sault Ste. Marie Community Greenhouse Gas Emissions Inventory

Prepared by: FutureSSM, Community Development & Enterprise Services

Table of Contents

Executive Summary	1
1. Background.....	2
2. Methodology	2
3. Sault Ste. Marie Community Greenhouse Gas (GHG) Emission Inventory Analysis	3
3.1. Project Overview	3
3.2. Data Collection Process	3
3.2.1. Excluded Emissions Data.....	5
3.2.2. Actual Data Consumption Collection and Analysis.....	5
<i>Electricity Emissions</i>	5
<i>Natural Gas Emissions</i>	7
<i>On-road Transportation Emissions</i>	7
<i>Solid Waste Emissions</i>	8
<i>Industry Processes and Product Use Emissions</i>	9
3.2.2. Estimate Data Consumption Collection and Analysis.....	10
<i>Propane and Fuel Oil Emissions</i>	10
<i>Rail Emissions</i>	11
4. Sault Ste. Marie Community Greenhouse Gas (GHG) Emissions Inventory	13
4.1 Community GHG Emissions Inventory Results	13
4.1.2 Community Energy Use and Emissions by Source	14
4.2 Corporate GHG Emissions Inventory Results	17
Business-as-usual Emissions Projection.....	19
Recommendations	21
Stakeholder Engagement.....	22
Next Steps	23
Appendices	24
Appendix A: PCP Protocol Community Inventory Requirements	25
Appendix B: Community GHG Emissions Inventory PCP Tool Input Data.....	27
Stationary Energy.....	27
Non-specified sources	27
Transportation	27
Waste.....	28
Appendix C: Sault Ste. Marie Street Designations	29
Appendix D: On-road transportation - Vehicle Kilometres Travelled (VKT) Data Analysis	30

Estimate Methodology	30
Appendix E: VKT Vehicle Characteristics, fuel type and efficiencies	32
Appendix F: Ontario Historical Electricity Rates and Time of Use Rates	33
Appendix G: City of Sault Ste. Marie Corporate Emissions Update	34
<i>2017 Building Consumption, Costs and tCO₂e</i>	34
<i>City of Sault Ste. Marie Fleet Composition</i>	38
<i>Vehicle Fleet and Equipment Fuel Usage, Costs and tCO₂e</i>	39
<i>Outdoor Lighting Consumption, Cost and tCO₂e</i>	41
<i>Wastewater Consumption, Cost and tCO₂e</i>	42
Acknowledgements	44
References	45

List of Tables:

Table 1: Sault Ste. Marie 2017 Community GHG Emissions	1
Table 2: City of Sault Ste. Marie 2017 Corporate GHG Emissions	1
Table 3: Required Data Providers for 2017 Community GHG Inventory	4
Table 4: Optional Data Provider for 2017 Community GHG Emissions Inventory	5
Table 5: PUC Electricity Bill Codes	6
Table 6: Sault Ste. Marie Energy Consumption Sectors	6
Table 7: Sault Ste. Marie 2017 Electricity Consumption	7
Table 8: Sault Ste. Marie 2017 Natural Gas Consumption	7
Table 9: On-road transportation Greenhouse Gas (GHG) Emission Calculation Approaches	7
Table 10: VKT Calculations for Sault Ste. Marie	8
Table 11: Sault Ste. Marie IPPU GHG Emissions	10
Table 12: Sault Ste. Marie Propane and Fuel Oil Estimate Variables	10
Table 13: Sault Ste. Marie Rail Emission Variables	11
Table 14: City of Sault Ste. Marie Community Inventory and Energy Emissions by Sector	14
Table 15: Community Energy Use and GHG Emissions by Source (tonnes)	14
Table 16: City of Sault Ste. Marie Corporate 2017 GHG Emissions	17
Table 17: Corporate Inventory Comparison Figures	17
Table 18: Comparison of Corporate Inventories for 2007 and 2017	18
Table 19: Total Community Current and BAU Emissions	19
Table 20: Corporate BAU GHG Emissions Forecast	19
Table 21: 2017 Residential energy consumption data	27
Table 22: 2017 Commercial & Institutional energy consumption data	27
Table 23: 2017 Industrial energy consumption data	27
Table 24: 2017 Propane and Fuel Oil Consumption Data	27
Table 25: 2017 On-Road Transportation Data	27
Table 26: Sault Ste. Marie Railway Track Emissions Data	27
Table 27: 2017 Solid Waste Data	28
Table 28: Sault Ste. Marie Street Type and Totals	30
Table 29 VKT Vehicle Characteristics	32
Table 30: VKT Fuel Efficiencies	32

List of Figures:

Figure 1: Propane Estimate Calculations	11
Figure 2: Fuel Oil Estimate Calculations	11
Figure 3: Rail Line Emission Estimate Calculation	12
Figure 4: City of Sault Ste. Marie Community GHG Emissions by Sector	13
Figure 5: Community BAU GHG Emissions Forecast	19
Figure 6: Corporate BAU GHG Emissions Forecast	20
Figure 7: Sault Ste. Marie MCIP Staff Grant Next Steps	24

List of Acronyms

AADT – Average Annual Daily Traffic	IT – Information Technology
ATR – Automated Traffic Recorder	kW – kilowatt
CAC – Community Adjustment Committee	kWh – kilowatt hours
CD&ES – Community Development and Enterprise Services	LFG - Landfill Gas
CH ₄ - Methane	MCIP – Municipal Climate Innovation Program
CO ₂ - Carbon Dioxide	N ₂ O - Nitrous Oxide
ECCC - Environment and Climate Change Canada	NAICS – North American Industry Classification System
EPA – Environmental Protection Act	NPRI - National Pollutant Release Inventory
EV – Electric Vehicle	OEB – Ontario Energy Board
FCM - Federation of Canadian Municipalities	PCP – Partners for Climate Protection Program
GHG – Greenhouse Gas	SSMIC – Sault Ste. Marie Innovation Centre
GHGRP - Greenhouse Gas Reporting Program	t – tonnes; typically the unit of measure in which GHG emissions are calculated
GIS – geographic information systems	tCO ₂ e – tonnes of carbon dioxide equivalent
GJ – gigajoule	TOR – Time-of-Use
HOEP – Hourly Ontario Energy Price	USA – United States of America
ICI – Industrial, Commercial and Institutional	VKT – Vehicle Kilometers Travelled
ICLEI – Local Governments for Sustainability	
IPPU -Industrial processes and product use	

Executive Summary

Greenhouse gas (GHG) inventories provide an overview of community emissions over a specific period of time. They can also summarize emissions from a municipality or organization, and can be used as a tool for policy development. The Corporation of the City of Sault Ste. Marie (the City) joined the Federation of Canadian Municipalities (FCM) Partners for Climate Protection (PCP) program (a five milestone climate action framework) to facilitate the creation of a community GHG emissions inventory. This report completes the PCP Milestone 1 requirement of a community GHG emissions inventory, and also provides an update to the City (corporate) GHG inventory, which was last completed in 2007. Both the community and corporate GHG emissions inventories were completed following the PCP protocol, using the municipal boundary of the City, and a baseline year of 2017. The following tables highlight community and corporate emissions in tonnes of carbon dioxide equivalent (tCO₂e) in Sault Ste. Marie in 2017.

Table 1: Sault Ste. Marie 2017 Community GHG Emissions

Sector	Emissions (tCO ₂ e)	% of Emissions	Scope of Data
Energy	1,306,759	87%	Natural gas, electricity, fuel oil and propane
Transportation	186,618	12%	Vehicle kilometres travelled
Waste	8,764	1%	Landfill gas captured
Total Emissions	1,502,142	100%	

Table 2: City of Sault Ste. Marie 2017 Corporate GHG Emissions

Sector	Emissions (tCO ₂ e)	% of Emissions	Scope of Data
Buildings	3,652	33.6%	Natural gas and electricity
Vehicle Fleets and Equipment	6,076	56%	Gasoline and diesel
Outdoor Lighting	48	9.9%	Electricity
Water & Sewage	1,080	0.4%	Electricity and natural gas
Total Emissions	10,857	100%	

The 2017 GHG inventories indicate that approximately 99% of emissions are produced by the greater community with 1% attributed to emissions from the City. The GHG emissions inventory section of this report will break down emissions in more detail. As well, this report focuses predominantly on the community GHG emissions inventory data collection and includes a brief overview of corporate GHG emissions. A high level review of preliminary recommendations, next steps and an overview of plans for stakeholder engagement is also included in this report but will be furthered upon in the actual GHG reduction plan. Immediate next steps include reviewing the feasibility of setting community and corporate GHG reduction targets and developing a GHG reduction plan. This will include incorporating climate change and GHG reduction policies and strategies into the City Official Plan and FutureSSM documents.

1. Background

Sault Ste. Marie is a medium sized single tier municipality located in Northern Ontario with a population of 73,368 people (Statistics Canada, 2017). It is located along the St. Mary's River and borders the northern part of the state of Michigan in the United States of America (USA). Major industry and business sectors include steel manufacturing and fabrication, forestry, lottery and gaming, Information Technology (IT); and Tourism (Invest Sault Ste. Marie, n.d.).

In February of 2019, the City received funding from the Federation of Canadian Municipalities (FCM) Municipal Climate Innovation Program (MCIP) to increase capacity to reduce community greenhouse gas (GHG) emissions. This funding aligns with the community development pillar of Environmental Sustainability, which was identified as one of four strategic priorities in the Community Adjustment Committee (CAC) report *A Common Cause and New Direction for Sault Ste. Marie* (Community Adjustment Committee, 2017). FutureSSM was tasked with implementing and building on recommendations in the CAC report, including creating a community GHG emissions inventory to help plan and implement municipal climate change priorities.

To support municipalities in creating GHG emissions inventories, the FCM and ICLEI – Local Governments for Sustainability (ICLEI Canada) created the Partners for Climate Protection (PCP) Program to provide a forum for municipal governments on how to reduce GHG emissions. Participation in the program includes the completion of a 5-milestone framework which is intended to guide the municipality towards the development of a Climate Action Plan. The program is free to join and allows member cities to gain access to tools, resources, a community of practice and an online tool that assist in the development of GHG emissions inventories.

In September 2019, City Council passed a resolution to join the Partners for Climate Protection (PCP) Program. In doing so, the City committed to joining over 350 municipalities across Canada in working to reduce community GHG emissions. The PCP is a five milestone framework which includes:

1. Creating a baseline emissions inventory and forecast
2. Setting emissions reduction targets
3. Developing a local action plan
4. Implementing the local action plan, and
5. Monitoring progress and reporting results

Joining the PCP program gave the City access to the PCP online milestone tool that would allow them to create a community GHG emissions inventory.

2. Methodology

The GHG inventory methodology used for this report is based on the 2014 *PCP Protocol: Canadian Supplement to the International Emissions Analysis Protocol* created by ICLEI Canada and the FCM. The PCP program began in 1997 and has evolved over time to reflect changes in emission factors and improved GHG accounting methodologies. It is important to note that “other standards and protocols exist for different reasons such as compliance with provincial acts and regulations, funding arrangements or recognition program” (ICLEI and FCM, 2014, p.4). The following section of this report will document the community GHG emissions data collection

process, accounting methodology and analysis to facilitate the possibility of repeating this in the future to measure actions to reduce community emissions.

3. Sault Ste. Marie Community Greenhouse Gas (GHG) Emission Inventory Analysis

3.1. Project Overview

The purpose of developing a greenhouse gas (GHG) emissions inventory is to provide a baseline against which the community can measure progress towards the reduction of GHGs. The *Partners for Climate Protection (PCP) Protocol: Canadian Supplement to the International Emissions Analysis Protocol* defines a community GHG inventory as a measurement of “emissions generated by key activities within the territorial boundary of the local government” (ICLEI and FCM, 2014, p.9). The PCP protocol outlines a series of sectors and emission sources that are required, as well as optional attributes for the development of a community GHG emissions inventory. For more details on PCP protocol reporting requirements, please see Appendix A. To be considered in compliance with the PCP protocol, community GHG inventories must include emissions from the following five activity sectors:

1. Stationary energy use for residential buildings;
2. Stationary energy for institutional and commercial buildings;
3. Stationary energy use for industrial buildings;
4. Transportation; and
5. Community solid waste

The baseline inventory expresses GHG production as the number of tonnes of carbon dioxide equivalent (CO₂e) produced by energy use, transportation, and waste production in the community. CO₂e is a commonly used measure that expresses all greenhouse gas as an equivalent amount of carbon dioxide. The following section outlines the data collection and analysis process of the emission sources used to develop the community GHG emissions inventory for Sault Ste. Marie.

3.2. Data Collection Process

The data for this report was obtained through a variety of different channels including utility consumption metrics, stakeholder interviews, City staff engagement and reports, as well as, publically available data. Data types include electricity and natural gas consumption, vehicle kilometres travelled, solid waste and estimates for fuel oil and propane use.

Between July and October 2019, FutureSSM met with City Staff, as well as relevant data stakeholders who offered required sources of information for the community GHG emissions inventory. Research was also conducted on what public GHG emissions data was available for organizations in Sault Ste. Marie. Given that public data was available for 2017, it was determined that this would be the logical baseline for the study. Therefore all data consumption requests were for 2017 metrics.

It is important to note that due to challenges inherent in collecting local activity data and relying on diverse data sets, it is sometimes necessary to rely on national averages or other generalized data. For the purpose of transparency, anytime that estimates and assumptions were used instead of actual consumption metrics, will be identified in this report. Below is an

overview of the data providers where both the required and optional data was obtained from as part of the creation of the community GHG emissions inventory.

Table 3: Required Data Providers for 2017 Community GHG Inventory

Emissions Source	Service Provider	Quality of Data¹	Data Attribute	Comments
Electricity	PUC Services Inc.(Mark Britton, Conservation Officer)	High	Consumption	Actual kilowatt hour (kWh) usage was provided by sector from the utility.
Natural Gas	Enbridge Inc.(Xi Wang, Advisor Business Intelligence)	High	Consumption	Actual metres square (m3) usage was provided by sector from the utility.
Fuel Oil	Statistics Canada	Low	Consumption	Provincial fuel oil consumption (litres) was obtained and broken down per capita to obtain an estimate of emissions from this source in Sault Ste. Marie.
Propane	Statistics Canada	Low	Consumption	Provincial propane consumption (litres) was obtained and broken down per capita to obtain an estimate of emissions from this source in Sault Ste. Marie.
On Road Transportation	City of Sault Ste. Marie (Spencer Laverne, former Engineering Technician II) and Sault Ste. Marie Innovation Centre (SSMIC) (Travis Favretto (Municipal/Utilities GIS Technician)	High	Vehicle Kilometres Travelled (VKT)	Daily VKT were calculated by multiplying 24-hour average annual weekday traffic volumes by the centre-line length of the primary roadways within city limits.
Waste	City of Sault Ste. Marie (Susan Hamilton Beach, Director of Public Works, and Catherine Taddo,	High	Landfill gas collected and flared	City of Sault Ste. Marie 2017 Landfill Data Collection Form submitted to the Ministry of

¹ High relates to actual consumption data and low relates to estimate data.

	Land Development and Environmental Engineer)			Environment and Climate Change.
--	--	--	--	---------------------------------

Table 4: Optional Data Provider for 2017 Community GHG Emissions Inventory

Emissions Source	Service Provider	Quality of Data	Data Attribute	Comments
Railway Diesel	Statistics Canada, 2019 National Inventory Report 1990-2017 and Sault Ste. Marie Innovation Centre (SSMIC)	Low (Estimate)	Rail	Total kilometres of rail track in Canada was obtained from Statistics Canada, as well as emissions for rail diesel from the <i>National Inventory Report 1990-2017</i> datasets to estimate an average emission per kilometre of rail in Canada. The total length of rail in Sault Ste. Marie was obtained from the SSMIC and this was multiplied by the emissions factor to obtain the estimate of emissions from this source for Sault Ste. Marie.

3.2.1. Excluded Emissions Data

The PCP program outlines optional reporting for several sources of emissions, including: off-road transportation, rail, waterborne navigation, aviation, incineration and open burning, agriculture, forestry and other land uses, and industrial processes and product use. These emission sources are optional as they are often difficult to obtain with a level of accuracy and are beyond the control of a municipality. The community inventory in this report also excludes emissions from wood as it is considered biogenic in the PCP protocol, meaning that it assumes that carbon released during combustion is equal to carbon removed during the growth of the tree and it can be assumed that it is carbon neutral (ICLEI and FCM, 2014, p.10). The protocol does state that methane (CH₄) and nitrous oxide (N₂O) can be reported from wood combustion; however, this data is not readily available and figures for wood heat would be an estimate at best. A summary of input values into the PCP tool used to create the GHG emissions inventory, please see Appendix B. The next section of this report will identify actual emissions data metrics, and will be followed by emissions data that required estimates due to lack of availability and/or privacy concerns.

3.2.2. Actual Data Consumption Collection and Analysis

Electricity Emissions

The author of this report contacted the PUC (the City's local electricity utility), to obtain 2017 electrical consumption data by sector. The PUC provided a spreadsheet that broke down energy consumption by bill code. To calculate consumption data by sector, bill code consumption types were combined to ensure reasonable calculations for sector data and to maintain individual customer privacy. The PUC has 18 bill codes that describe the type of

customer. Table 5 below illustrates the customer types and a description of what type of energy consumption those codes include:

Table 5: PUC Electricity Bill Codes²

Line No.	Bill Code	Explanation
1	G1	General Service <50 kilowatt (kW) - Non Time of Use
2	G1I	General Service <50 kW Interval Meter
3	G1TOU	General Service Time of Use
4	G51	General Service >50 kW Regular Meter - Non Time of Use
5	G51I	General Service >50 kW Interval Meter
6	G51S	General Service > 50 kW Spot Price
7	G51SGA	> 50KW Provincial rebate along with the modifier
8	GSTI	City Street Light Interval Meter Hourly Ontario Energy Price (HOEP)
9	S51	Sentinel Light Energy PUC
10	ST51	Street Light - not city
11	TL1	City Traffic Lights
12	UG1	Unmetered Scattered Load
13	MR51	Multi-Unit Residential >50kW (T1 600 kilowatt hour (kWh))
14	MR51I	Multi Residential > 50 interval meter (T1 600 kWh)
15	MRTOU	Multi-Residential Time of Use
16	R1	Residential Regular Meter - Non Time of Use
17	R1I	Residential Interval Meter
18	R1TOU	Residential Time of Use

For the purpose of this report, the above customer codes were combined into two distinct sectors (residential and commercial) in order to streamline the electrical consumption analysis for Sault Ste. Marie and to meet the category requirements of the PCP inventory tool. The PUC does not categorize customers into the industrial category, therefore customer codes were not identified in this format. The table below displays the sector names and which PUC bill codes were combined in order to establish consumption metrics for that category.

Table 6: Sault Ste. Marie Energy Consumption Sectors

Sector	PUC Bill Code Combination
Commercial	G1, G1I, G1TOU, G51, G51I, G51S, G51SGA, GSTI, S51, ST51, TL1, UG1
Residential	MR51, MR51I, MRTOU, R1, R1I, R1TOU

According to the *PUC Sustainability Report 2018*, the PUC has over 60,140 residential and business customers (PUC, 2019). The majority of electricity consumption came from the residential, sector accounting for 55% of total consumption, followed by 45% of consumption coming from the commercial sector. The following table outline the electricity consumption by sector for the community with 2017 as the base year.

² M.Britton (Conservation Officer, PUC Services), personal communication, September 12, 2019.

Table 7: Sault Ste. Marie 2017 Electricity Consumption

Sector	Consumption (kWh)
Commercial	330,100,574.42
Residential	396,485,631.44
TOTAL	726,586,205.86

The electrical consumption data for Sault Ste. Marie was input into the PCP online tool to identify associated GHG emissions for this fuel type by sector.

Natural Gas Emissions

The author of this report contacted Enbridge to obtain 2017 natural gas consumption data by sector. Enbridge provided a spreadsheet that broke down energy consumption at the postal code level and summarized it by sector including: residential, commercial, and industrial. This information is displayed in the table below.

Table 8: Sault Ste. Marie 2017 Natural Gas Consumption

Sector	Premise Count	% of Customer Base	2017 Consumption (m3)	% of Consumption
Commercial	2,021	8%	37,574,750	6%
Industrial	10	0.04%	547,446,031	87%
Residential	22,657	92%	47,357,679	7%
Total	24,688	100%	632,378,459.490	100%

The results from Enbridge show that while only representing 0.04% of the customer base, the industrial sector accounts for 87% of the natural gas consumption locally. The total sector natural gas consumption data was input into the PCP milestone tool by sector.

On-road Transportation Emissions

An additional requirement of the community greenhouse gas (GHG) emissions inventory includes calculating emissions from on-road transportation within the municipal boundary. There are a variety of different methods of collecting transportation data. The table below outlines the three strategic alternatives identified in the PCP Protocol (2014) and provides a summary of each alternatives associated benefits and limitations regarding the data collection process.

Table 9: On-road transportation Greenhouse Gas (GHG) Emission Calculation Approaches³

Strategic Alternatives	Cost	Benefits	Limitations
1. Fuel Sales	\$135	Easy to obtain	Fuel sale volumes do not account for inbound or outbound
2. Vehicle Kilometres Travelled (VKT)	\$0.00	Easy to calculate if a municipality has a traffic volume counting program	Does not include travel on all roadways and some counts are dated.

³ Source adapted from Federation of Canadian Municipalities and ICLEI Local Governments for Sustainability. (2014). *PCP Protocol: Canadian Supplement to International Emissions Analysis Protocol*. Retrieved from: <https://fcm.ca/sites/default/files/documents/resources/report/protocol-canadian-supplement-pcp.pdf>

3. Vehicle Registration	Unknown	Data includes type of vehicles present in the community, and also on the average weighted fuel efficiencies of vehicle classes.	Some vehicles do not necessarily operate in the community they are registered in (e.g. companies with large fleets).
-------------------------	---------	---	--

A review of each of the three strategic alternatives was evaluated by consulting with the City's former Area Coordinator – Environmental Initiatives on data availability, as well as other municipalities completing community GHG emissions inventories. It was determined that using the vehicle kilometres travelled (VKT) methodology would offer the most reliable form of transportation emissions data for the City as it already collects the data required for the calculation.

FutureSSM calculated the VKT by collecting traffic volume data and centre line length data of primary roads within the City limits. For an overview of all roads by type in Sault Ste. Marie please see Appendix C for a map obtained by Sault Ste. Marie Innovation Centre (SSMIC)). It is important to note that approximately 3% of roads do not have traffic counts and estimates were created to obtain a more comprehensive dataset. Please see Appendix D for the estimate methodology for roads that did not have traffic counters, as well as specifics and definitions related to the City's traffic count methodology. For a breakdown on the provincial vehicle characteristics and fuel type as well as fuel efficiencies used in the VKT methodology, please see Appendix E.

Daily VKT is calculated by multiplying the observed 24-hour average annual daily traffic volumes by the single centre-line length of the primary roadways within city limits. The following table is the VKT in Sault Ste. Marie

Table 10: VKT Calculations for Sault Ste. Marie

Line No.	Street Designation	Total Centreline Length (km)	Average Annual Daily Traffic (AADT)	VKT (Daily)	VKT (Yearly)
1	Rural Arterial	17	177,041	118,373	43,206,154
2	Rural Collector	21	87,773	47,419	17,307,918
3	Rural Local	123	85,665	61,275	22,365,265
4	Urban Arterial	71	4,370,160	802,067	292,754,356
5	Urban Collector	55	1,556,230	227,430	83,012,045
6	Urban Local	260	970,221	145,512	53,111,802
	TOTAL	547	7,247,090	1,402,075	511,757,541

The total VKT of 511,757,541 was input into the PCP tool to calculate emissions from on-road transportation in Sault Ste. Marie.

Solid Waste Emissions

The PCP online inventory tool outlines four strategic alternatives for determining community emissions from waste. The alternatives are:

1. Landfill with a comprehensive Landfill Gas (LFG)

2. Landfill with a partial LFG
3. Landfill with no LFG
4. Methane commitment approach

For the purpose of this report, the author opted to pursue the first alternative (Landfill with a comprehensive Landfill Gas (LFG) as the City landfill has an active LFG collection system which was commissioned in 2011.

The quantity of LFG collected and flared in 2017 was 3,488,234 m³ at an average methane concentration of 48%. This information was input into the PCP milestone tool to determine the tCO₂e from solid waste in the community.

Industry Processes and Product Use Emissions

This section of the report was not included in the inventory but is being shared as it discusses an additional source of emissions. Emissions from industrial processes and product use (IPPU) are not a required reporting attribute of the community greenhouse gas (GHG) emissions inventory under the PCP protocol. The reasoning for this is that there is an emissions threshold for industry that regulates them report to provincial and federal governing bodies, which is not controlled by municipalities in which they operate. Should a municipality decide to include IPPU in their inventory, a starting point is to speak directly to the industries that operate in their municipal boundary and obtain both their energy consumption information as well as process emissions information. Large emitters in Canada are required to report their GHG emissions under the Environment and Climate Change Canada (ECCC) Greenhouse Gas Reporting Program (GHGRP). This data is available publically online. The GHGRP “has collected data from industrial facilities every year since 2004” and information is collected under section 46 of the *Canadian Environmental Protection Act*” (Environment and Climate Change Canada, 2019a).

The GHGRP uses a threshold which identifies reporting emitters. Of note:

“2017 marked the first year of the expansion of the GHGRP where the reporting threshold was lowered to 10 kilotonnes (kt) of CO₂e, meaning that all facilities that emit 10 kt or more of GHGs in CO₂e per year are required to submit a report. The GHGs reported include: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆)” (*Environment and Climate Change Canada, 2019a*).

In Sault Ste. Marie in 2017, there were three facilities that were required to report to the GHGRP. The facilities were:

1. Essar Power Canada Ltd.
2. Essar Steel Algoma Inc.⁴
3. Tenaris Algoma Tubes

The following table includes emissions data for the above three facilities reported under the GHGRP for 2017.

⁴ Essar Steel Algoma Inc. is now known as ‘Algoma Steel Inc.’ due to company name change and restructuring.

Table 11: Sault Ste. Marie IPPU GHG Emissions⁵

Line No.	Facility Name	NAICS Code	CH ₄ (tonnes CO ₂ e / tonnes éq. CO ₂)	N ₂ O (tonnes CO ₂ e / tonnes éq. CO ₂)	CO ₂ (tonnes CO ₂ e / tonnes éq. CO ₂)
1	Essar Power Canada Ltd.	Other Electric Power Generation (221119)	12,578.50	3,456.80	1,415,052.45
2	Essar Steel Algoma Inc.	Iron & Steel Mills & Ferro-Alloy Mfg. (331110)	20,287.50	8,695.64	2,530,388.36
3	Tenaris Algoma Tubes	Iron & Steel Pipes & Tubes Mfg.(331210)	35.40	376.08	71,852.00
TOTAL					4,017,292.81

The total tonnes CO₂e for local facilities that emit 10 kt of CO₂e was not input into the community GHG inventory. It can be inferred that the industrial natural gas metrics are included in the Enbridge data pull for the community so this information would have double counted that emissions metric. This information is for reference purposes only and is publically available online as reported by the emitting facilities.

3.2.2. Estimate Data Consumption Collection and Analysis

This section of the community GHG emissions inventory report is based on estimates obtained by accessing national and provincial consumption metrics that have been broken down based on local variables.

Propane and Fuel Oil Emissions

Propane and fuel oil are other sources of energy that are a requirement to report in a community GHG emissions inventory, under the PCP protocol. Attempts to acquire complete actual consumption data from local fuel oil and propane distributors were unsuccessful; therefore, provincial averages were used to create emissions estimates in Sault Ste. Marie. Ontario energy consumption averages for propane and fuel oil were obtained from the 2019 Statistics Canada *Report on Energy Supply and Demand in Canada* (Statistics Canada, 2019). Averages were divided by the population of Ontario to obtain a provincial consumption per capita value by fuel type. This value was multiplied by the population of Sault Ste. Marie to obtain an estimate value of litres of propane and fuel oil consumed in the City per capita (2016 population is 73,368 people). The table and figures below identify the variables used for calculating the estimate emissions as well as the estimate calculation method.

Table 12: Sault Ste. Marie Propane and Fuel Oil Estimate Variables

Variable	Metric
Ontario Propane Consumption	1,961,800,000.00 litres (l)
Ontario Light Fuel Oil Consumption	362,600,000 litres (l)
Ontario Population	13,448,494 people
Sault Ste. Marie Population	73,368 people

⁵ Government of Canada. (2019)

Figure 1: Propane Estimate Calculations

$\frac{1,961,800,000.00 \text{ l of Propane Consumed in Ontario in 2017}}{13,448,494 \text{ Population of Ontario (2017)}} = 145.88 \text{ l of propane consumed per capita in Ontario}$
$145.88 \text{ l} \times 73,368 \text{ population of Sault Ste. Marie (2017)} = 10,702,562 \text{ litres of propane consumed in Sault Ste. Marie in 2017}$

Figure 2: Fuel Oil Estimate Calculations

$\frac{362,600,000 \text{ litres (l) of Fuel Oil Consumed in Ontario in 2017}}{13,448,494 \text{ Population of Ontario (2017)}} = 26.96 \text{ l of fuel oil consumed per capita in Ontario}$
$26.96 \text{ l} \times 73,368 \text{ population of Sault Ste. Marie (2017)} = 1,978,157.32 \text{ litres of fuel oil consumed in Sault Ste. Marie in 2017}$

The 2017 consumption values of 10,702,562 litres of propane consumption and 1,978,157.32 litres of fuel oil consumption per capita were input into the PCP milestone tool.

Rail Emissions

Rail emissions are not a required calculation of a community GHG emissions inventory under the PCP protocol as they are not regulated by municipalities. Similarly to energy emission, acquiring actual consumption of rail diesel is the most accurate way of calculating emissions; however, this can be difficult to obtain and must be collected in a manner that does not infringe upon the privacy of the railway operator. As well, it is important to note that just because rail fuel was purchased in a municipality does not mean that it was consumed in the municipal boundary. Therefore, often times rail emissions are estimated, or omitted completely.

Staff discussed estimating methodologies with ICLEI Canada and it was determined that calculating the emissions per kilometre (km) of rail would be an acceptable estimate methodology. This calculation was established by taking the total kilotonnes of CO₂e from the railway sector (based on the 2019 *National Inventory Report*) in Canada and multiplying it by 1000 to achieve the tonnes of CO₂e which equates to 6,570,000 tCO₂e (Environment and Climate Change Canada, 2019). Subsequently, the total km of track in Canada was obtained from Statistics Canada which is 61,859 (Statistics Canada, 2019). The tCO₂e per kilometre of rail in Canada was calculated by dividing the total tCO₂e from the railway sector by the total national rail track kms to obtain the tCO₂e per kilometre of rail which is 106.21 tCO₂e. Then the length of rail in the municipal boundary was obtained from the Sault Ste. Marie Innovation Centre (SSMIC) which is 120.24 km (which includes main lines, as well as spurs, sidings, and freight yards)⁶. Lastly the total length of rail track in Sault Ste. Marie was multiplied by the tCO₂e factor per km of rail which equates to 12,770.60 tCO₂e of rail emissions in Sault Ste. Marie. The following tables and figures further elaborate on the estimate variables and formulas used to calculate the rail emissions in Sault Ste. Marie.

Table 13: Sault Ste. Marie Rail Emission Variables

Variable	Metric
Railway Emissions in Canada	6,570,000

⁶ T. Favretto (Municipal/Utilities GIS Technician, Acorn Information Solutions, Sault Ste. Marie Innovation Centre), personal communication, August 1, 2019.

Kilometres (km) of rail line operated in Canada	61,859
Variable	Metric
tCO ₂ e / km	106.21
Km of line in Sault Ste. Marie	120.24
tCO ₂ e / km of rail in Sault Ste. Marie	12,770.6

Figure 3: Rail Line Emission Estimate Calculation

$\frac{6,570,000 \text{ Railway Emissions in Canada}}{61,859 \text{ Kilometres (km) of rail line operated in Canada}} = 106.21 \text{ tCO}_2\text{e / km of rail in Canada}$	
$106.21 \text{ tCO}_2\text{e / km of rail in Canada} \times 120.24 \text{ (Km of rail line in Sault Ste. Marie)} = 12,770.6 \text{ tCO}_2\text{e/km of rail in Sault Ste. Marie}$	

The total tCO₂e / km of rail in Sault Ste. Marie which is 12,770.6 was input into the PCP milestone tool to identify total rail emissions in the community inventory.

The following section of this report reviews the Sault Ste. Marie community GHG emissions inventory, as well as provides an update and brief comparison to the corporate emissions which was last completed in 2007.

4. Sault Ste. Marie Community Greenhouse Gas (GHG) Emissions Inventory

The Sault Ste. Marie's community greenhouse gas (GHG) emissions inventory refers to an estimate of aggregate emissions within the municipal boundary. Community emission metrics were broken down by sector and source to obtain an understanding of where community emissions come from.

4.1 Community GHG Emissions Inventory Results

The community greenhouse gas (GHG) emissions inventory provides an overview of all GHGs produced within the community of Sault Ste. Marie, for the baseline year of 2017, both by residents in their homes and by local businesses and institutions as they carry out their operations. Six key sectors were included in the community inventory including: residential, commercial and institutional, and industrial stationary energy emissions (natural gas and electricity), solid waste, rail, non-specified sector energy emissions (propane and fuel oil), and on-road transportation. In 2017, the community produced approximately 1,502,142 tCO₂e. Figure 4 and Table 14 provide a summary of GHG emissions produced by each sector.

Figure 4: City of Sault Ste. Marie Community GHG Emissions by Sector

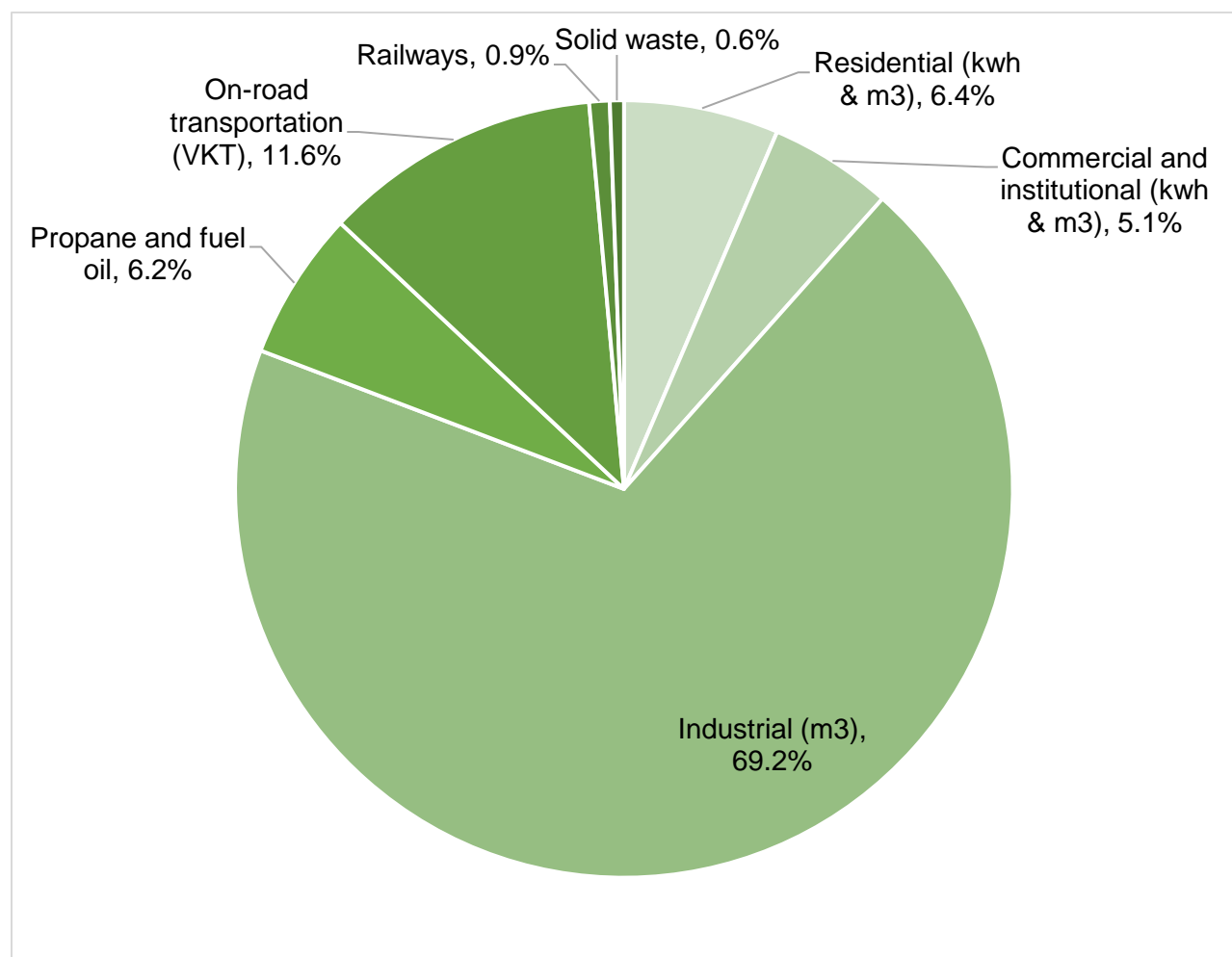


Table 14: City of Sault Ste. Marie Community Inventory and Energy Emissions by Sector

Category	Sector	Emissions (tCO ₂ e)	Data Scope
Energy	Residential	96,807	Electricity (kWh) and natural gas (m3)
	Commercial and institutional	77,078	Electricity (kwh) and natural gas (m3)
	Industrial	1,039,794	Natural gas (m3)
	Propane and fuel oil	93,080	Estimate of propane (l) and fuel oil (l)
Transportation	On-road transportation	173,847	Vehicle Kilometres Travelled (VKT)
	Railways	12,771	Estimate of emissions / km of rail track
Waste	Solid waste	8,764	Annual landfill gas (LFG) collected
	Total GHG Emissions	1,502,142	

The community GHG emissions inventory indicates that energy used in buildings is the largest source of GHGs. When you break down energy emissions by sector, the industrial sector emits the most emissions due to its consumption of natural gas. The residential sector use of natural gas and electricity contributes to the second highest amount of energy GHGs, followed by community estimates on propane and fuel oil use. It is important to note that in Ontario, electricity generation is cleaner than natural gas, therefore the emissions from the residential sector are considerably lower. Natural gas emissions from the industrial sector created the largest portion of GHG emissions in the community. This is reasonable as manufacturing is significantly more energy intensive than other sector operating within the City. The second largest source of emissions comes from transportation accounting for 12% of community emissions. The least amount of emissions are produced from the solid waste sector accounting for just 0.6% of community emissions. Emissions are further reviewed by their fuel source in the following section.

4.1.2 Community Energy Use and Emissions by Source

Breaking emissions by source provides a deeper understanding what produces the most GHGs. Table 15 provides a summary of community emissions produced by energy source.

Table 15: Community Energy Use and GHG Emissions by Source (tonnes)

Source	Emissions (tCO ₂ e)	Energy (GJ)	GHG (%)
Electricity	12,568	2,615,710	1%
Natural gas	1,201,110	24,302,305	91%
Diesel	12,770	163,981	1%
Fuel oil	76,515	76,515	5.8%
Propane	16,565	270,882	1.3%
TOTAL	1,319,528		100%

As can be seen in Table 15, natural gas is the primary cause of greenhouse gas emissions in Sault Ste. Marie. Natural gas is responsible for 91% of energy emissions which minimizes electricity at 1%, the other significant energy source in buildings. The next largest emitter comes from fuel oil and propane emissions at 6.2%.

The concentration of industrial activity in Sault Ste. Marie is a significant contributor to the use of natural gas in the city. Industrial processes and heating of large industrial facilities uses a large amount of natural gas and therefore creates a considerable source of emissions. The emissions by sector are explained in more detail below with some preliminary recommendations.

Buildings and Energy

The building and energy sector accounts for emissions generated through the use of electricity, natural gas, propane, and heating oil. Emissions are created in the process of generating, delivering, and consuming forms of energy. Energy use is primarily consumed for space heating, cooling, appliances and lighting. Natural gas is also used in the manufacturing process of steel. In Sault Ste. Marie, when you break buildings down by subsector (residential, commercial and institutional, and industrial), the largest emitter is the industrial sector based on their consumption of natural gas. This high level of GHG emissions from the industrial sector is reasonable as manufacturing and industry are more energy intensive than other industrial sectors, such as mining.

Preliminary Recommendations

It is recommended that consultations occur with local industrial facilities to understand their current and planned environmental and GHG reduction efforts. This type of collaboration can be incorporated into the local GHG reduction action plan. With regards to best practices relating to mitigation, energy efficiency is the easiest method for lowering carbon emissions for existing buildings. Research regarding the creation of policies for efficient new builds that go above the Ontario Building Code are also a starting point with regards to lowering building GHG emissions. Renewable energy procurement is also an option; however the business case must be evaluated based on current renewable energy cost effectiveness.

Transportation

In the Sault Ste. Marie community GHG emissions inventory, the transportation sector includes emissions from the mobile combustion of gasoline and diesel and is broken down by on-road transportation and railway diesel. The majority of transportation emissions come from on-road transportation which are the second largest emitting sector accounting for 173,847 tCO₂e of transportation, and the other 12,771 tCO₂e from railways. Transportation emissions are often one of the highest emitting sectors in Ontario due to the heavy reliance on personal vehicles with combustion engines.

Preliminary Recommendations

According to the *Canadian Municipal Background* (an annual survey of mayors and councilors in more than 400 municipalities across Canada, 90% of Sault Ste. Marie residents commute to work by car, 5% walk, 4% use transit and 1% bike (Canadian Municipal Barometer, n.d.). In order to address the emissions from on-road transportation, opportunities regarding increasing transit ridership should be explored. In addition, seeking alignment to existing City plans, such as the Transportation Master Plan (2015), Green Fleet Plan (2011), and Cycling Master Plan (2007) are a great way to encourage the use of sustainable forms of transportation in Sault Ste. Marie. Sustainable transportation not only supports the environment, but it also encourages uptake in outdoor activity and increases personal quality of life. In addition, a review of increasing the use of electric vehicles (EVs) should be explored for both the City and

community. Electrification of transit as well as personal vehicles would considerably reduce emissions from on-road transportation. Simple activities such as a 'Bike to Work Week' and working with community partners to promote the economic and health benefits of active transportation are also avenues to explore in the local action plan.

Waste

The City has a landfill gas collection system which is designed to capture methane emitted from the decomposition of waste. The gas that is captured is flared onsite and accounts for 8,764 tCO₂e of the community emissions.

Preliminary Recommendations

Pursuit of new and increased efforts to divert waste from municipal landfills is encouraged for municipalities looking to reduce their emissions associated to solid waste. Expanding landfill gas capture will be included as part of the landfill expansion plans, as well as consideration given to using the gas as a form of energy generation. Organics curbside collection is another initiative that has been reviewed, and with the shift of the Province of Ontario to a circular economy as outlined in their 2017 Strategy for a Waste-Free Ontario: Building the Circular Economy, may be required for the City of Sault Ste. Marie. Legislation and implementation timelines are being developed by the Province with the details for compliance by the City at its initial stages.

Other potential action areas in the GHG reduction plan could include energy supply (e.g. increasing renewable energy use on municipal buildings and in the community) as well as land use (e.g. encouraging density development and maintaining and expanding Sault Ste. Marie's urban forest).

As previously mentioned in this section, these recommendations are preliminary and should be furthered through greater consultations within the community as well as with City leadership. The next section of this report provides an update to the corporate GHG inventory and reviews changes in emissions and costs over the last ten years.

4.2 Corporate GHG Emissions Inventory Results

The City corporate GHG emissions inventory was not part of the original scope of this project; however, it was decided that an update from the latest inventory (2007) would be beneficial. As well, it is important to note that the City has already implemented many initiatives that save money and reduce GHG emissions over the years. This section of the report contains high level insights of the emissions and cost data collected internally. For a more thorough overview of corporate emissions by sector, please refer to Appendix G. The City of Sault Ste. Marie corporate greenhouse gas (GHG) emissions inventory refers to emissions from municipal operations in 2017. Corporate emission sources include municipal buildings, fleet and equipment, streetlights, and energy used for wastewater. It is important to note that due to the recently completed community GHG inventory having included emissions from community waste, it will not be included in the corporate inventory. In 2017, the City produced approximately 10,857 tCO₂e and cost the City approximately \$8,394,614 in energy and fuel costs. The following table illustrates the tCO₂e by sector.

Table 16: City of Sault Ste. Marie Corporate 2017 GHG Emissions

Sector	Emissions (tCO ₂ e)	Energy (GJ)	Cost
Building	3,652	122,903	\$3,027,157
Fleet and Equipment	6,076	86,327	\$2,610,905
Streetlights	48	9,955	\$932,934
Water & Sewage	1,080	53,741	\$1,818,410
Total	10,857		\$8,394,614

The majority of 2017 corporate GHG emissions came from fleet, followed by buildings, then wastewater and streetlights

Due to the fact that the City of Sault Ste. Marie (the City) completed a corporate greenhouse gas (GHG) emissions inventory in 2007, an overall comparison for corporate emissions and costs between 2007 and 2017 was conducted. Results are shown in Table 17 below.

Table 17: Corporate Inventory Comparison Figures

	2007	2017	Change (Δ) Summary
Emissions (tCO ₂ e)	18,243	10,857	↓40%
Cost (\$)	\$6,832,99	\$8,389,40	↑23%

The decrease in corporate emissions compared with an increase in costs, may be due to different sources of data being used for the benchmarking information than for the original baseline inventory and should be taken lightly. It may also be due in part to measures implemented by the corporation such as LED outdoor lighting upgrades and building upgrades and retrofits.

Table 18 shows the comparison between 2007 and 2017 across the various categories of the corporate GHG emissions inventory as well as the increase (or decrease) in both emissions and cost values.

Table 18: Comparison of Corporate Inventories for 2007 and 2017

Sector	2007		2017		Change (Δ) Summary	
	Costs	tCO ₂ e	Costs	tCO ₂ e	Costs	tCO ₂ e
Buildings	\$2,393,598	6,694	\$3,027,156.71	3,652.33	↑26%	↓45%
Vehicle Fleet and Equipment	\$2,510,310	7,295	\$2,616,113	6,076	↑4%	↓17%
Outdoor Lighting	\$889,975	1,779	\$932,933.58	47.83	↑5%	↓97%
Wastewater	\$1,034,142	2,414	\$1,818,408.66	1,080.29	↑76%	↓55%
Refuse	\$4,965	60	N/A	N/A	N/A	N/A
Total	\$6,832,990	18,243	\$8,394,614	10,857	↑23%	↓40%

It is important to note that due to different sources of data for the 2007 inventory and the 2017 corporate GHG inventories, the categories may not be comparing exactly the same type or number of activities, buildings, etc. In particular, corporate waste is no longer measured therefore it is not included at all. As well, corporate fuel consumption by vehicle is not regularly recorded by department, therefore estimates were created based on the average retail price of fuel (both gasoline and diesel) in 2017. In addition, as of 2014, Ontario no longer used coal to create electricity under the *Ending Coal for Cleaner Air Act* (2015) which greatly contributed to lower emissions for all electricity use.

Lastly, it is also important to recognize that with regards to cost, the cost of electricity has also increased despite reductions on the part of the municipality. Please see Appendix F for a comparison overview of electricity rates between 2007 and 2017 from the Ontario Energy Board (OEB).

The 2017 community and corporate GHG inventories provide a baseline for which GHG reduction can be measured in the future. The next section of this reports looks at emissions projects for both the community and the corporate GHG inventories if no action is taken over the next 20 years.

Business-as-usual Emissions Projection

A business-as-usual (BAU) emissions forecast is used to estimate future GHG emission levels in the absence of local government action on climate change based on projected population growth. Based on Sault Ste. Marie Population Projections, which estimate population growth to increase 14% in the next 20 years, BAU emissions were extrapolated based on a 0.7 percent average annual population growth rate (Metro Economics, 2019). This assumes emissions will increase at the same rate as population growth. The following table and figure show the BAU forecast over 20 years for the community of Sault Ste. Marie and the City (corporate emissions).

Table 19: Total Community Current and BAU Emissions

Category	Year	tCO ₂ e	tCO ₂ e Increase
Baseline Emissions	2017	1,502,142	↑ 224,890 (or 14%)
BAU Emissions	2037	1,727,032	

If Sault Ste. Marie does not make any changes, emissions are estimated to increase 14% (or 224,890 tCO₂e) in the next 20 years.

Figure 5: Community BAU GHG Emissions Forecast

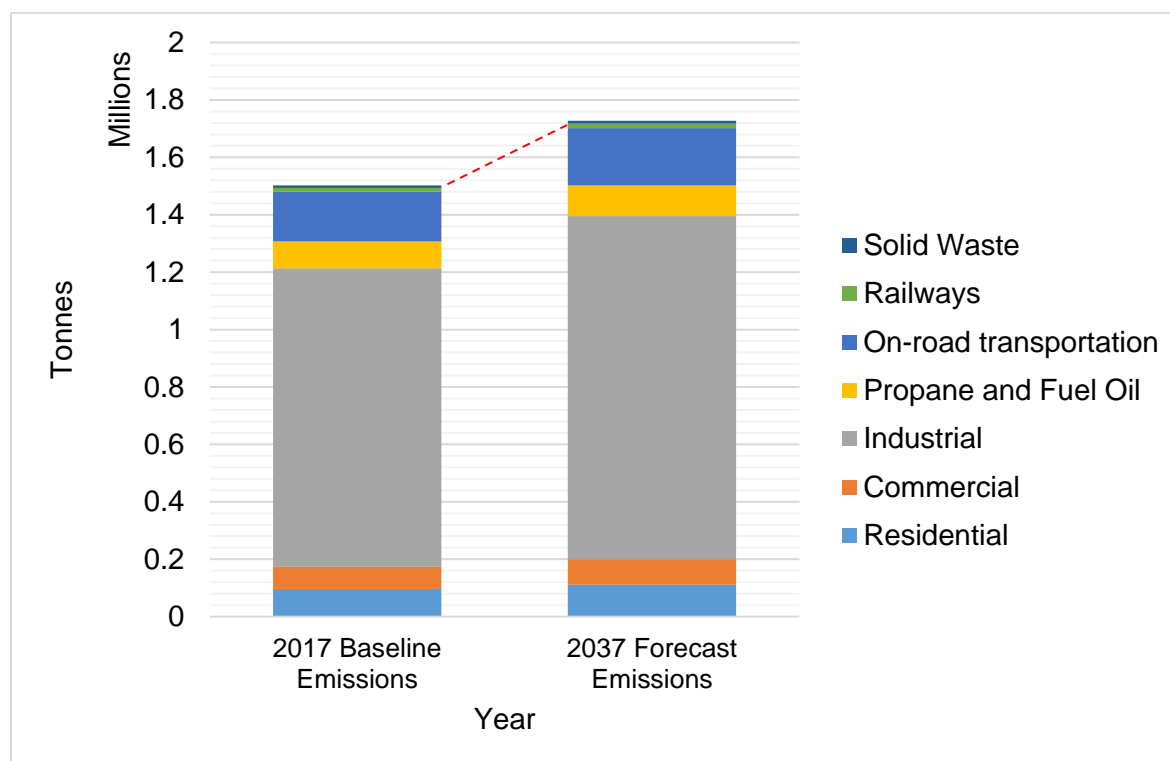
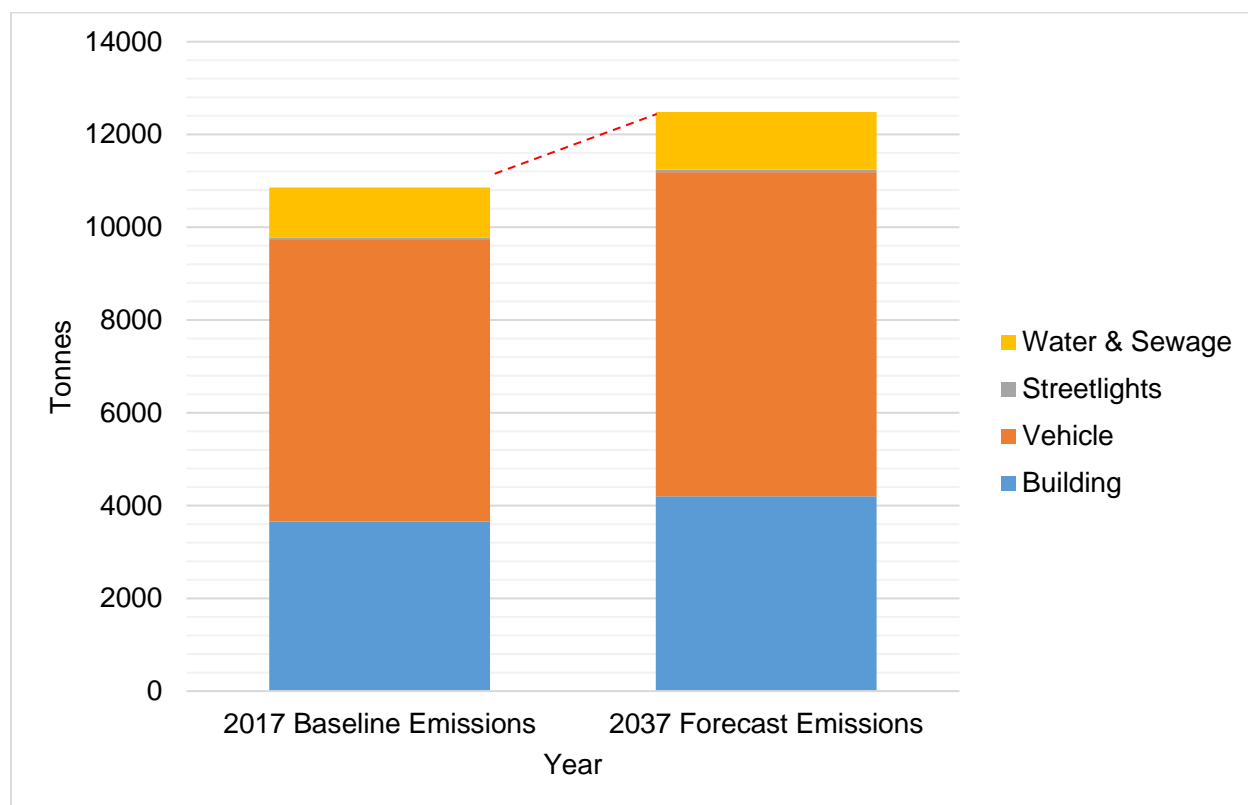


Table 20: Corporate BAU GHG Emissions Forecast

Category	Year	tCO ₂ e	tCO ₂ e Increase
Baseline Emissions	2017	10,856	↑ 1,626 (or 14%)
BAU Emissions	2037	12,482	

Figure 6: Corporate BAU GHG Emissions Forecast



If Sault Ste. Marie does not make any changes, emissions are estimated to increase 14% (or 1,626 tCO₂e) in the next 20 years.

The BAU emissions for both the community and the City indicate what emissions will look like in twenty years if no action or changes are made. This sets the stage for action to create an action plan to reduce GHG emissions.

The next three sections of this report outline high level recommendations regarding fulfilling the PCP Milestones, stakeholder engagement and MCIP project next steps.

Recommendations

The Sault Ste. Marie community and corporate GHG emissions inventory provide a starting point for both the community of Sault Ste. Marie and the City to advance their efforts and commitment to GHG reduction. The completion of the inventories accomplish Milestone 1 of the PCP program. The next milestones of the PCP include setting targets and developing a local action plan to reduce community GHG emissions. The PCP program recommends a 6% reduction in emissions from community operations and a 10% reduction in corporate emissions within 10 years of joining the program. However, this is best determined through consultation with stakeholders and the community to gather insights on what the community is already doing and planning to do and what initiatives gauge the most interest. Targets can also be established by reviewing international, national and other municipal targets to establish context for municipalities interested in climate action goals. The following are a preliminary list of recommendations that would encourage progress in moving forward in the PCP program.

1. Collaborate

Establish a Community Climate Change committee to assist the Climate Change Coordinator in identifying achievable emission reduction targets (Milestone 2), if feasible and develop a local climate action plan to reach identified targets (Milestone 3). An expansion of the existing Municipal Environmental Initiatives Committee (Green Committee) is recommended to include members of the community at large from different sectors identified in the GHG inventory. Community stakeholders could include representatives from industry, commercial business, institutions (e.g. hospital, schools, and post-secondary institutions), environmental groups and general members of the public.

2. Inform

Inform public and stakeholders of the community GHG emissions inventory and obtain insights for the reduction plan through a series of public engagement activities including, but not limited to: Community GHG Emissions Inventory Open House, Online Survey, Pop-up consultations, Presentations and/or one on one consultations. To see the draft planned list of consultations, please see the next section of this document entitled Stakeholder Engagement.

3. Review

It is recommended that the greenhouse gas inventory be updated every 2-3 years to measure corporate and community emissions reduction. This document serves as a guide in data collection that can be replicated on an annual basis.

4. Integrate

Work with City Planning Department on integrating Climate Change considerations into the City of Sault Ste. Marie's Official Plan update.

5. Implement

Compile an inventory of energy and climate action funding programs and grants for initiatives of interest to Corporate, residential and industrial organizations to be used in the local action plan implementation strategy.

This list of recommendations is a starting point and will be further elaborated upon in the GHG reduction plan.

Stakeholder Engagement

The purpose of stakeholder engagement is to inform the public and stakeholders of the community GHG emissions inventory and gather GHG reduction ideas to develop a vision and principles as part of the reduction plan development. The following section breaks down consultations in two parts: Stage 1 will occur to discuss results of the GHG emissions inventory and Stage 2 will obtain feedback on the reduction plan and discuss the plan for implementation.

Stage 1: Preliminary Stakeholder Consultations

1. Press Release, FutureSSM Social Media, and direct invitation outreach to stakeholders who offer relevant project insights and/or expressed interest.

Who/Target	Purpose	When/Frequency
All stakeholders	Introduction to the community GHG Inventory and invitation for members of the public to attend an open house. Also an opportunity to introduce the climate action plan survey.	Placed in media 1 week before the Open House

2. Community GHG Emissions Inventory Open House

Who/Target	Purpose	When/Frequency
All stakeholders	Public event to share community GHG results and start communication about reduction plan actions. <ul style="list-style-type: none">Share City GHG accomplishments, community inventory, education on mitigation and opportunity for written input on stickie notes.	March 4, 2020, City Hall

3. Online Survey

Who/Target	Purpose	When/Frequency
All Stakeholders	Obtain community insights on perceived benefits and preferred GHG reduction actions	February 25 – March 31, 2020

4. Pop-up consultations

Who/Target	Purpose	When/Frequency
Pop-Up Consultation 1: Algoma University	Additional opportunity to obtain community insights on GHG reduction plan, share survey.	March 5, 2020
Pop-Up Consultation 2: Outspoken	Additional opportunity to obtain community insights on GHG reduction plan, share survey.	March 12, 2020

Pop-Up Consultation 3: Sault College	Additional opportunity to obtain community insights on GHG reduction plan, share survey.	March 16, 2020
Pop-Up Consultation 4: Mall	Additional opportunity to obtain community insights on GHG reduction plan, share survey.	March 19, 2020

5. Presentations

What	Purpose	Planned Date
Joint open house with Planning Department and APH on ' Urban Design, Healthy Community & Mobility'	Opportunity to integrate GHG inventory into OP process	TBD
Direct invite workshop for specific stakeholders whose efforts impact energy and environment	Share results of community GHG emissions inventory and ask specific questions from organizations. Include community Surveys	March 24, 2020

The preliminary stakeholder consultations will assist with the development of the local action plan. It is recommended that consultations take place again to obtain input on the draft action plan.

Stage 2: Direct Stakeholder Input on Initial Feedback

What	Who/Target	Purpose	When/Frequency
Expansion of green committee.	City staff, elected officials and representatives from the industrial, commercial and institutional, industrial and residential sectors.	Purpose will be to garner support and input on the GHG reduction plan, target and to move implementation actions forward. Committee will require a terms of reference. Draft reduction target (if City wants to)	Committee to meet quarterly and as needed.
Public input on draft GHG reduction plan and targets	All stakeholders	Public event to share draft GHG reduction plan	Once, TBD

Next Steps

The next steps of the MCIP climate staff grant is to set targets and develop a local climate action plan. The following figure highlights key deliverables and objectives to be obtained by the end of the grant period which is March 2021.

Figure 7: Sault Ste. Marie MCIP Staff Grant Next Steps

- 1. Temporary Staff Hired - Climate Change Coordinator, FutureSSM**
(COMPLETE: June 2019)
- 2. Project Kickoff - the City joins the PCP program**
(COMPLETE: September 2019)
- 3. Phase 1: Develop Community and update Corporate Greenhouse Gas Emission Inventory** (COMPLETE: November 2019)
- 4. Phase 2: Develop Community GHG Reduction Plan - Set reduction targets and develop a local action plan**
(Planned for September 2020)
- 5. Phase 3: Preparatory work leading to implementation of municipal GHG emissions reduction** (DUE: February 2021)

Appendices

The following section of this reports contains the Appendices A through F, referenced through the preceding document.

Appendix A: PCP Protocol Community Inventory Requirements⁷

Line No.	Activity Sector / Emission Source	PCP Reporting Requirements (Y/N)	Recommended Accounting Approach(es)	Data Acquired (Y/N)
1	Residential Energy Consumption			
a	Natural Gas	Y	Actual Consumption Data	N
b	Fuel Oil	Y	Actual Consumption Data	N
c	Propane	Y	Actual Consumption Data	N
d	Electricity	Y	Actual Consumption Data	Y
2	Commercial/Institutional Energy Consumption			
a	Natural Gas	Y	Actual Consumption Data	N
b	Fuel Oil	Y	Actual Consumption Data	N
c	Propane	Y	Actual Consumption Data	N
d	Electricity	Y	Actual Consumption Data	N
3	Industrial Energy Consumption			
a	Natural Gas	Y	Actual Consumption Data	N
b	Fuel Oil	Y	Actual Consumption Data	N
c	Propane	Y	Actual Consumption Data	Y
d	Electricity	Y	Actual Consumption Data	Y
4	On-road transportation			
a	Tailpipe combustion emissions from motor vehicles travelling within the community	Y	Retail Fuel Sales or Vehicle Kilometres Travelled or Vehicle Registration	Y
5	Local Public Transit Systems			
a	Combustion emissions from local rail and/or bus transit systems	Y	Actual Consumption Data	N
b	Emissions from electricity used in local rail and/or bus transit systems	Y	Actual Consumption Data	N
6	Solid Waste			

⁷ Source adapted from ICLEI – Local Governments for Sustainability and the Federation of Canadian Municipalities (FCM). (2014). *PCP Protocol: Canadian Supplement to the International Emissions Analysis Protocol*. Retrieved from: <https://fcm.ca/sites/default/files/documents/resources/report/protocol-canadian-supplement-pcp.pdf>

a	Projected downstream (future) emissions from disposal of community solid waste	Minimum	Methane commitment model	N
b	Emissions from in-boundary landfills, waste incineration and/or composting facilitates	Recommended	Landfill gas collection data or first order decay model	N
7	Agriculture			
a	Methane emissions from enteric fermentation	Optional	Livestock counts	N
b	Methane emissions from manure management	Optional	Livestock counts	N
8	Industrial Processes			
a	Non-energy related emissions from industrial processes (mineral products, chemical industries, metal product, etc.).	Optional	Seeking input	Y
9	Fugitive Emissions			
a	Fugitive emissions from the production, processing, transmission, storage and delivery of fossil fuels	Optional	Seeking input	N

Appendix B: Community GHG Emissions Inventory PCP Tool Input Data

Stationary Energy

Table 21: 2017 Residential energy consumption data

Fuel Type	Usage	Units	Data source(s)
Electricity	396,485,631.44	kWh	PUC Services Inc.
Natural Gas	47,357,678.70	m3	Enbridge Inc.

Table 22: 2017 Commercial & Institutional energy consumption data

Fuel Type	Usage	Units	Data source(s)
Electricity	330,100,574.42	kWh	PUC Services Inc.
Natural Gas	37,574,749.89	m3	Enbridge Inc.

Table 23: 2017 Industrial energy consumption data

Fuel Type	Usage	Units	Data source(s)
Natural Gas	547,446,030.90	m3	Enbridge Inc.

Non-specified sources

Table 24: 2017 Propane and Fuel Oil Consumption Data

Fuel Type	Usage	Units	Data source(s)
Propane	10,702,562	Litres (l)	Statistics Canada
Fuel Oil	1,978,157.32	Litres (l)	Statistics Canada

Transportation

Table 25: 2017 On-Road Transportation Data

Input	Usage	Units	Data source(s)
Vehicle Kilometres Travelled (VKT)	511,757,541	VKT	Sum of road segment length x volume on that segment (vehicles per day)

Table 26: Sault Ste. Marie Railway Track Emissions Data

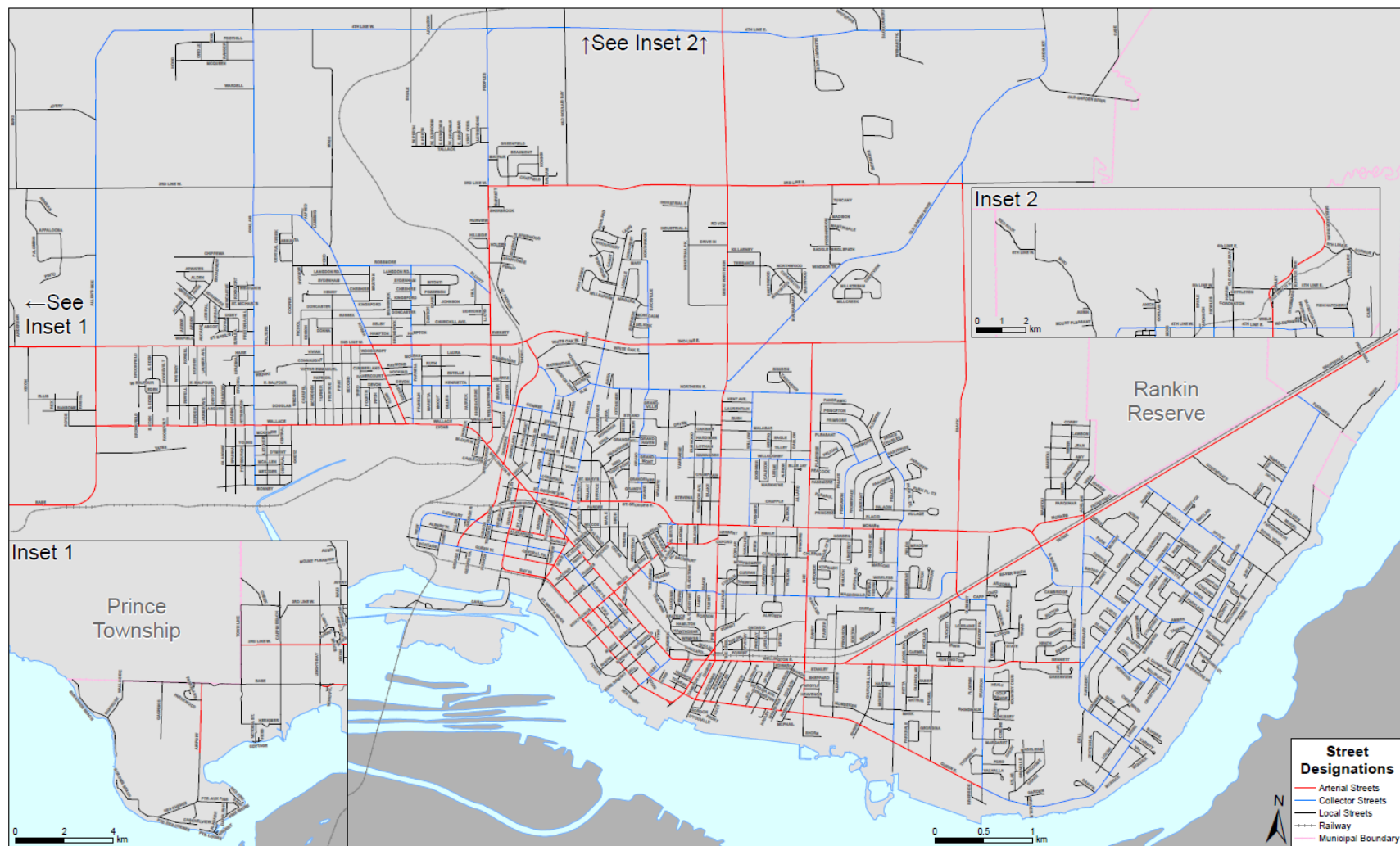
Input	Usage	Units	Data source(s)
tCO _{2e} / km of rail in Sault Ste. Marie	12,770.6	tCO _{2e}	Estimate based on the 2019 National Inventory Report, Statistics Canada and total rail length in Sault Ste. Marie.

Waste

Table 27: 2017 Solid Waste Data

Input	Usage	Units	Data source(s)
Waste	3,488,234	Landfill gas collected (m3)	2017 Landfill Data Collection Form submitted to the Ministry of Environment and Climate Change.)

Appendix C: Sault Ste. Marie Street Designations⁸



⁸ T. Favretto (Municipal/Utilities GIS Technician, Acorn Information Solutions, Sault Ste. Marie Innovation Centre), personal communication, July 31, 2019.

Appendix D: On-road transportation - Vehicle Kilometres Travelled (VKT) Data Analysis

Estimate Methodology

Estimates for roads in Sault Ste. Marie where traffic counts were not accounted for (3% of roads) were calculated based on the following methodology obtained through collaboration with the Sault Ste. Marie Innovation Centre (SSMIC):

- For residential cul-de-sacs and crescents, average annual daily traffic (AADT) values generally increase by 6 vehicles with each additional house that is present on a street. AADT values for these streets were estimated by multiplying the number of homes by 6.
- For residential feeder streets, AADT values were estimated by counting the number of homes which are likely to be accessed by driving down a particular street, then multiplying this number by 6.
- For thoroughfares, AADT values were estimated by averaging the AADT values of the adjacent segments on the same street.
- Some streets presented unique situations which required a combination of these methods or simply using best guesses by looking at AADT values of similar streets⁹.

Definitions

As of July 30, 2019 there are 2,698 streets in Sault Ste. Marie. Streets are classified as either urban or rural and are further broken down as local, collector or arterial. The Ontario Traffic Manual (2014) defines the road segments as follows:

1. **Local Road** – A street or road primarily for access to residence, business or other abutting property.
2. **Collector Road** – A road for which vehicle movement and access are of equal importance. Direct access to adjacent properties may be permitted in some cases, typically in lower density residential areas. Intersections are spaced at varying intervals and are typically only signalized where the collector road intersects an arterial road or in some cases another collector road.
3. **Arterial Road** – A major road, used primarily for through traffic rather than for access to adjacent land, that is characterized by high vehicular capacity and continuity of movement. Intersections are spaced relatively far apart and are frequently signalized¹⁰.

The following table identifies the total count of roads by type in Sault Ste. Marie:

Table 28: Sault Ste. Marie Street Type and Totals

Line No.	Street Designation	Actual Count	Estimate Count	Total Count
1	Rural Arterial	22	0	22
2	Rural Collector	40	0	40

⁹ T. Favretto (Municipal/Utilities GIS Technician, Acorn Information Solutions, Sault Ste. Marie Innovation Centre), personal communication, August 1, 2019.

Line No.	Street Designation	Actual Count	Estimate Count	Total Count
3	Rural Local	189	21	210
4	Urban Arterial	406	5	411
5	Urban Collector	380	2	382
6	Urban Local	1561	72	1633
	TOTAL	2598	100	2698

In order to obtain traffic counts, the City uses an automated traffic recorder (ATR) to obtain AADT in the City. The following definitions are derived directly from the Ontario Ministry of Transportation *Ontario Traffic Manuals* (2014)¹¹:

AADT – Average Annual Daily Traffic – an average 24 hour, two-way traffic volume for the period January 1st to December 31st. Usually AADT most closely approximates May or October vehicle volumes.

ATR – Automated Traffic Recorder – A sensor either permanently placed within the pavement or temporarily placed on the pavement to gather vehicle classification, speed, and volume.

In Sault Ste. Marie the City typically setup counters to record 24 hours of data (12am – 12am). Counts typically occur on Tuesdays, Wednesdays, and Thursday to avoid any inconsistent data that may be collected on a Monday or Friday. If weekend counts are requested data is collected; however weekend counts do not contribute to AADT¹².

¹¹ Ontario Ministry of Transportation. (2014). *Ontario Traffic Manuals*. Retrieved from: https://ontario-traffic-council.s3.amazonaws.com/uploads/2018/04/cona-OTM_Book_7_-_Temporary_Conditions_Jan_20141.pdf

¹² S. Laverne (Engineering Technician II, Engineering & Construction – Public Works & Engineering Services, The Corporation of the City of Sault Ste. Marie), personal communication, August 7, 2019.

Appendix E: VKT Vehicle Characteristics, fuel type and efficiencies¹³

The vehicle characteristics and fuel type used were the provincial averages included directly in the PCP tool. The table below outlines their characteristics.

Table 29 VKT Vehicle Characteristics

Fuel Type	Cars	Light Trucks	Heavy Trucks	Total
Gasoline	53.17%	32.67%	1.2%	87.04
Diesel	0.15%	0.93%	10.6%	11.68%
Propane	1.28%	0%	0%	1.28%
Compressed Natural Gas	0%	0%	0%	0%
Ethanol (E10)	0%	0%	0%	0%
Total	54.6%	33.6%	11.79%	100%

Fuel efficiencies representative of on-road vehicles during the inventory year were the provincial averages included directly in the PCP tool. The table below outlines their characteristics.

Table 30: VKT Fuel Efficiencies

Fuel Type	Cars	Light Trucks	Heavy Trucks
Gasoline	9 L/100km	14.7 L/100km	31.5 L/100km
Diesel	7.7 L/100km	12.5 L/100km	34.5 L/100km
Propane	14.4 L/100km	15.3 L/100km	0 L/100km
Compressed Natural Gas	5/4 L/100km	8.3 L/100km	0 L/100km
Ethanol (E10)	8.9 L/100km	13.2 L/100km	0 L/100km

¹³ Obtained directly from the PCP Milestone Tool for 2017 VKT Data.

Appendix F: Ontario Historical Electricity Rates and Time of Use Rates¹⁴

Effective Date	Off-peak price (¢ per kWh)	Mid-peak price (¢ per kWh)	On-peak price (¢ per kWh)
July 1, 2017	6.5	9.5	13.2
May 1, 2017	7.7	11.3	15.7
Average	7.1	10.4	14.45
November 1, 2007	3	7	8.7
May 1, 2007	3.2	7.2	9.2
Average	3.1	7.1	8.95

¹⁴ Ontario Energy Board. (n.d). *Historical electricity rates*. Retrieved from <https://www.oeb.ca/rates-and-your-bill/electricity-rates/historical-electricity-rates>

Appendix G: City of Sault Ste. Marie Corporate Emissions Update

2017 Building Consumption, Costs and tCO₂e

Department and Building	Electricity			Natural Gas			Total	
	Use (kWh)	Cost \$	tCO ₂ e	m ³	Cost (\$)	tCO ₂ e	Cost	tCO ₂ e
Community Development & Enterprise Services								
<i>Arenas</i>								
Essar Centre	2,399,345.91	\$422,607.59	41.5	200,890.32	\$55,527.36	381.56	\$478,134.95	423.06
John Rhodes	3,444,301.58	\$573,389.28	59.58	534,929.17	\$174,901.73	1016.02	\$748,291.01	1,075.60
McMeeken	366,800.00	\$64,090.24	6.34	31,925.93	\$12,035.22	60.64	\$76,125.46	66.98
West End Community Centre - 556 Goulais Avenue	558,240.00	\$96,099.55	9.66	43,123.66	\$15,380.76	81.91	\$111,480.31	91.57
<i>Outdoor Pools</i>								
Greco	23,972.04	\$3,624.44	0.41	9,997.89	\$3,887.69	18.99	\$7,512.13	19.4
Manzo	15,533.64	\$2,227.97	0.27				\$2,227.97	0.27
<i>Marinas</i>								
Bellevue	81,965.28	\$11,710.28	1.42				\$11,710.28	1.42
Roberta Bondar	64,658.04	\$9,131.87	1.12				\$9,131.87	1.12
<i>Day Care</i>								
Jessie Irving	61,530.83	\$9,708.53	1.06	15,776.60	\$6,090.56	29.97	\$15,799.09	31.03
Maycourt	12,891.86	\$2,041.31	0.22	6,458.66	\$3,208.14	12.27	\$5,249.45	12.49
<i>Senior Facilities</i>								
Senior Citizens Centre (Wellington)	103,490.43	\$15,054.79	1.79	123,493.39	\$43,233.95	234.56	\$58,288.74	236.35
Senior Citizens Centre (Bay)	176,720.00	\$28,971.86	3.06	10,169.14	\$4,072.13	19.31	\$33,043.99	22.37
Department and Buildings	Electricity			Natural Gas			Total	

	Use (kWh)	Cost \$	tCO2e	Use (m3)	Cost \$	tCO2e	Cost	tCO2e
<i>Other</i>								
Ermatinger	63,441.72	\$9,166.00	1.1	9,112.50	\$3,583.70	17.31	\$12,749.70	18.41
Roberta Bondar Park	33,372.06	\$4,848.45	0.58	5,440.06	\$2,331.10	10.33	\$7,179.55	10.91
Department and Building	Electricity			Natural Gas			Total	
	Use (kWh)	Cost \$	tCO2e	Use (m3)	Cost \$	tCO2e	Cost (\$)	tCO2e
Norgoma	16,765.07	\$2,228.28	0.29				\$2,228.28	0.29
Fifth Line E Demo	29,926.03	\$4,892.32	0.52				\$4,892.32	0.52
Heritage Centre Bay	100,911.66	\$14,562.24	1.75	12,112.11	\$3,919.84	23	\$18,482.08	24.75
Account # 0205570 - 272 Wellington St. W	1,211.83	\$329.67	0.02				\$329.67	0.02
Public Works and Transportation								
<i>Cemetery</i>								
Garage	11,256.05	\$2,187.25	0.19				\$2,187.25	0.19
Chapel/Office	109,772.79	\$16,624.79	1.9	68,311.67	\$23,805.06	129.75	\$40,429.85	131.65
<i>Landfill</i>								
Administration	34,080.72	\$5,242.03	0.59	21,684.42	\$8,292.42	41.19	\$13,534.45	41.78
Scale House	15,615.75	\$2,421.90	0.27				\$2,421.90	0.27
Landfill Garage	110,117.62	\$15,857.91	1.9				\$15,857.91	1.9
Household Special Waste	15,047.47	\$2,485.60	0.26	3,387.78	\$1,564.19	6.44	\$4,049.79	6.7
<i>Outdoor Rinks</i>								
Central Park	3,754.20	\$776.32	0.06				\$776.32	0.06
Mark Street	7,746.33	\$1,339.06	0.13				\$1,339.06	0.13
Patrick Street	1,539.72	\$369.52	0.03				\$369.52	0.03
Department and Buildings	Electricity			Natural Gas			Total	
	Use (kWh)	Cost \$	tCO2e	Use (m3)	Cost \$	tCO2e	Cost	tCO2e

<i>Parks</i>								
Bellevue Greenhouse	45,763.94	\$7,832.61	0.79	39,394.20	\$14,870.08	74.82	\$22,702.69	75.61
Bellevue Canteen	49,996.40	\$7,116.88	0.86				\$7,116.88	0.86
Pointe Des Chenes	67,260.00	\$9,699.71	1.16				\$9,699.71	1.16
James Elliot Park	5,851.92	\$1,266.38	0.1				\$1,266.38	0.1
Department and Building	Electricity			Natural Gas			Total	
	Use (kWh)	Cost (\$)	tCO2e	Use (m3)	Cost (\$)	tCO2e	Cost (\$)	tCO2e
North Street Stand	7,610.48	\$1,135.64	0.13				\$1,135.64	0.13
Strathclair	5,628.23	\$1,066.68	0.1				\$1,066.68	0.1
Bay Street Fountain	27,767.91	\$3,729.79	0.48				\$3,729.79	0.48
Foster Drive Sprinkler (Bondar)	8,712.98	\$1,243.18	0.15				\$1,243.18	0.15
Esposito Park				2,341.80	\$1,095.09	4.45	\$1,095.09	4.45
<i>Public Works Centre</i>								
Public Works Centre	889,660.08	\$132,758.78	15.39	206,941.22	\$69,474.59	393.05	\$202,233.37	408.44
<i>Transit</i>								
Terminal	68,754.75	\$9,846.81	1.19	2,939.81	\$1,392.99	5.58	\$11,239.80	6.77
Admin / Office / Garage	334,440.00	\$57,135.11	5.79	72,859.77	\$24,670.71	138.39	\$81,805.82	144.18
Engineering and Planning								
Civic Centre	2,372,140.88	\$389,078.30	41.03				\$389,078.30	41.03
Department and Buildings	Electricity			Natural Gas			Total	
	Use (kWh)	Cost \$	tCO2e	Use (m3)	Cost \$	tCO2e	Cost	tCO2e
Fire/EMS Services								

Number 1 Fire Hall	149,198.90	\$22,281.35	2.58	43,800.00	\$16,465.74	83.19	\$38,747.09	85.77
Number 2 Fire Hall	54,757.80	\$8,072.23	0.95	5,014.37	\$2,141.46	9.52	\$10,213.69	10.47
Number 3 Fire Hall	50,621.40	\$7,836.94	0.88	5,768.77	\$2,422.98	10.96	\$10,259.92	11.84
Garden River Road Number 4 Fire Hall (RESC)	565,650.00	\$10,791.09	9.78	113,568.41	\$40,592.31	215.71	\$51,383.40	225.49
River Road - 2 Murphy Street				14,566.35	\$8,085.75	27.67	\$8,085.75	27.67
SSM Police Service								
Department and Building	Electricity			Natural Gas			Total	
	Use (kWh)	Cost (\$)	tCO2e	Use (m3)	Cost (\$)	tCO2e	Cost (\$)	tCO2e
Police Admin.	1,141,760.00	\$190,446.17	19.75	30,350.59	\$9,907.63	57.65	\$200,353.80	77.4
Police Radio Garage	2,639.02	\$491.23	0.05				\$491.23	0.05
Police Airport Tower	3,999.22	\$686.79	0.07				\$686.79	0.07
SSM Public Library								
Main Branch	478,560.00	\$85,361.54	8.28	52,838.00	\$18,365.54	100.36	\$103,727.08	108.64
Library Churchill				787.88	\$389.38	1.5	\$389.38	1.5
SSM Museum								
Museum	244,800.00	\$42,570.52	4.23	18,716.94	\$6,899.48	35.55	\$49,470.00	39.78
Social Services								
Ontario Works	507,200.00	\$87,905.28	8.77	74,719.13	\$25,956.70	141.92	\$113,861.98	150.69
Social Housing	133,188.92	\$20,406.70	2.3	4,173.03	\$1,843.67	7.93	\$22,250.37	10.23
Total	15,075,971.46	\$2,420,748.76	260.83	1,785,593.50	\$606,407.95	3,391.5	\$3,026,469.92	3,652.33

City of Sault Ste. Marie Fleet Composition

The following list described the composition of the City of Sault Ste. Marie's vehicle fleet¹⁵.

Line No.	Year	Description	# of Vehicles
1	2011	Ambulances	12
2	2003	Fire Trucks	10
3	2011	Fire Department Units (Owned)	14
4	2008	Fire Department Units (Leased)	2
5	2007	Police Units (Owned)	8
6	2013	Police Units (Leased)	47
7	2008	Police Motorcycle (Leased)	1
8	2013	Police Motorcycles (Owned)	1
9	2009	Heavy Class Units (e.g. ¾ ton pickup)	12
10	2007	Light Class Units (e.g. private passenger car)	116
11	2009	Winter Road Maintenance Trucks	24
12	2010	Garbage Trucks	7
13	2002	ATV's	4
14	2009	Snowmobiles	2
15	2010	Para Bus Transit	16
16	2008	Transit Buses	32
17	2009	Sewer Flusher/Vacuum Trucks	5
18	2014	Street Cleaners	3
Avg Year.	2008	Total	316

¹⁵ Fleet composition does not include non-fuel powered units such as trailers.

Vehicle Fleet and Equipment Fuel Usage, Costs and tCO₂e

Department / Division	Gasoline Consumption Litres (L)	Gasoline Cost (\$)	Total t CO ₂ e (t)	Diesel Consumption Litres (L)	Diesel Cost (\$)	Total t CO ₂ e (t)	Total t CO ₂ e (t)	Total Cost	Total t CO ₂ e (t)
Fire - Support	15,090.53	\$17,354.11	34.97	37,325.19	\$42,177.46	102.58	137.55	\$59,531.57	137.55
EMS - SSM	13,863.58	\$15,943.12	32.12	41,284.29	\$46,651.25	113.46	145.58	\$62,594.37	145.58
EMS - GR	730.60	\$840.19	1.69	7,210.37	\$8,147.72	19.81	21.50	\$8,987.91	21.50
PW - Bldgs & Equipment	200,032.15	\$230,036.97	463.49	801,904.83	\$906,152.46	2203.84	2667.33	\$1,136,189.43	2667.33
Transit - Fleet	35,296.81	\$40,591.33	83.59	838,745.62	\$947,782.55	2288.73	2372.32	\$988,373.88	2372.32
Transit - Parabus	69,002.18	\$79,352.51	159.88	14,914.09	\$16,852.92	40.99	200.87	\$96,205.43	200.87
Transit - Operations	7,145.52	\$8,217.35	16.56				16.56	\$8,217.35	16.56
CD&ES - Cemetery	12,229.30	\$14,063.70	28.34	13,619.07	\$15,389.55	37.43	65.77	\$29,453.25	65.77
CD&ES - Rec & Culture	157.31	\$180.91	0.36				0.36	\$180.91	0.36
CD&ES - McMeeken	1,777.67	\$2,044.32	4.12				4.12	\$2,044.32	4.12
CD&ES - JRCC	8,010.07	\$ 9,211.58	18.56				18.56	\$9,211.58	18.56
CD&ES - GFL	3,640.21	\$4,186.24	8.43				8.43	\$4,186.24	8.43
Police - Executive	1,288.50	\$1,481.78	2.99				2.99	\$1,481.78	2.99
Police - Support	9,674.51	\$11,125.69	22.42				22.42	\$11,125.69	22.42
Police - Patrol	129,128.10	148,497.31	299.20				299.20	\$148,497.31	299.20
Police - Investigation	22,631.81	\$26,026.58	52.44				52.44	\$26,026.58	52.44
Police - Community Services	3,993.43	\$4,592.44	9.25				9.25	\$4,592.44	9.25
Engineering - Technical	4,844.03	\$5,570.64	11.22	1,566.75	\$1,770.43	4.31	15.53	\$7,341.07	15.53
Engineering - Building Inspection	5,002.73	\$ 5,753.14	11.59				11.59	\$5,753.14	11.59

Department / Division	Gasoline Consumption Litres (L)	Gasoline Cost (\$)	Total t CO2e (t)	Diesel Consumption Litres (L)	Diesel Cost (\$)	Total t CO2e (t)	Total t CO2e (t)	Total Cost	Total t CO2e (t)
Engineering - By-Law Enforcement	791.37	\$910.07	1.83				1.83	\$910.07	1.83
2017 Staff Mileage	982.68	\$5,208.20	2.28				2.28	\$5,208.20	
Total	544,330.42	\$631,188.18	1,265	1,756,570.21	\$1,984,924.34		4,811.15	\$2,616,112.52	6,076

Outdoor Lighting Consumption, Cost and tCO₂e

Outdoor Lighting Group Name	Total Electricity (kWh)	Total Costs	Total tCO₂e
Traffic Lights			
Main	325,628	\$51,675.76	5.63
Bruce Street	2,073	\$517.04	0.04
Carmen's Ways	2,742	\$608.66	0.05
Great Northern Road	3,011	650.38	0.05
Second Line W (312)	3,088	\$656.24	0.05
Lyons	2,066	\$500.68	0.04
Traffic- 818 Wellington St. East	3,836	\$755.50	0.07
Total	342,443	55,364	6
Street Lights			
Main	2,277,577	\$853,805.66	39.4
St. Mary's River Park	26,547	\$3,494.96	0.46
Foster Drive	3,115.79	\$617.25	0.05
Total	2,307,240	857,918	40
Parking Lots			
King Street	15,753.81	\$2,220.13	0.27
Spring Street	3280.94	\$684.31	0.06
Brock Street	13,605.42	\$2,119.88	0.24
Bruce Street KIOSK	1,513.05	\$450.85	0
Bruce Street Lot	122.54	\$242.49	0
Queen Street KIOSK	2,624.20	\$607.18	0.05
Bingham	4,235.01	\$799.41	0.07
Sackville	1,337.64	\$396.72	0.02
Civic Lot	17,704.98	\$2,411.86	0.31
West Korah Cemetery	9.37	\$229.08	0
Mausoleum	21,894.46	\$3,320.90	0.38
Pointe Des Chenes	5,594.43	\$864.64	0.1
Bay Street Lights	65.30	\$217.95	0
Total	87,741.15	14,565.40	1.50
Hub Trail Lights			
Hub Trail Texas Lights	1,149.36	\$828.14	0.02
Hub Trail Northwood Lights	533.54	\$294.85	0.01
Hub Trail Bay Lights	4,713.70	\$816.64	0.08
Hub Trail Church Lights	20,329.12	\$2,752.38	0.35
Hub Trail Queen Street E Lights	1,715.71	394.04	0.03
Total	28,441.43	5,086.05	0.49
Total (All Outdoor)	2,765,865.68	\$932,933.58	47.83

Wastewater Consumption, Cost and tCO₂e

Facility Group	Electricity Total (kWh)	Total Cost (\$)	Total tCO ₂ e	Natural Gas (m3)	Total Costs (\$)	Total tCO ₂ e	Total Costs (\$)	Total tCO ₂ e
Pump Stations (At Grade)								
Gore Street	6,882.94	\$1,214.18	0.12				\$1,214.18	0.12
Bonney Street	22,224.55	\$3,366.17	0.38				\$3,366.17	0.38
Muriel	19,974.95	\$2,990.16	0.35				\$2,990.16	0.35
Huron	5,103.36	\$943.15	0.09				\$943.15	0.09
Lower Lake	2,310.76	\$492.84	0.04				\$492.84	0.04
Pine Street	13,786.24	\$2,203.14	0.24				\$2,203.14	0.24
McGregor	2,889.11	\$646.38	0.05				\$646.38	0.05
Foster Drive	27,102.77	\$3,565.99	0.47				\$3,565.99	0.47
Landfill	153,345.00	\$25,678.57	2.65				\$25,678.57	2.65
Varsity	6,652.02	\$1,171.90	0.12				\$1,171.90	0.12
Fort Creek	8,866.58	\$1,511.27	0.15				\$1,511.27	0.15
Tallack	3,291.39	\$748.48	0.06				\$748.48	0.06
Mary	5,492.77	\$1,012.82	0.1				\$1,012.82	0.1
Industrial Court B	7,429.52	\$1,422.10	0.13				\$1,422.10	0.13
Upper Lake	18,897.63	\$2,891.56	0.33				\$2,891.56	0.33
Glasgow	7,101.84	\$1,233.94	0.12				\$1,233.94	0.12
Millwood	11,132.05	\$1,787.35	0.19				\$1,787.35	0.19
Frontenac	2,304.63	\$547.99	0.04				\$547.99	0.04
Atlas	864.00	\$283.19	0.01				\$283.19	0.01
Dell	864	\$306.20	0.01				\$306.20	0.01
Total	325,652.11	\$54,017.38	5.65				\$54,017.38	5.65
Pumping Stations (Above Ground)								
West End Plant Main	703,500.00	\$117,548.24	12.17				\$117,548.24	12.17
Clark Street A	864.00	\$1,210.54	0.01				\$1,210.54	0.01
Clark Street Main	753,600.00	\$144,390.53	13.04				\$144,390.53	13.04
Pim/Bay Street Pump Station	486,720.00	\$103,752.54	8.42				\$103,752.54	8.42
River Road	191,700.00	\$35,924.28	3.32				\$35,924.28	3.32
Bellevue SSO	112,860.00	\$21,761.31	1.95				\$21,761.31	1.95

Facility Group	Electricity Total (kWh)	Total Cost (\$)	Total tCO2e	Natural Gas (m3)	Total Costs (\$)	Total tCO2e	Total Costs (\$)	Total tCO2e
Lyons Sensor	348.00	\$211.55	0.01				\$211.55	0.01
Young Street	380,400.00	\$70,375.99	6.58				\$70,375.99	6.58
John Street	181,440.00	\$37,147.53	3.14				\$37,147.53	3.14
Total	2,811,432	\$532,323	48.64				\$532,323	48.64
Treatment Plants								
West End Plant	1,503,600	\$252,735.84	26.01	116,137.21	\$25,254	221	\$277,990.12	246.6
East End Plant	5,145,380	\$831,675.24	89	363,278	\$118,981	690	\$950,655.80	778.99
Pointe Des Chenes Water Treatment Facility	23,563.68	\$3,422.85	0.41				\$3,422.85	0.41
Total	6,672,544	\$1,087,834	115.42	479,416	\$144,235	911	1,232,069	1,026
Final Total	9,809,628	\$1,674,174		479,416	\$144,235		\$1,818,409	1080

Acknowledgements

Numerous staff members from various City of Sault Ste. Marie (City) departments, as well as external organizations provided invaluable assistance to completing the community greenhouse gas (GHG) emissions inventory and updating the corporate GHG emissions inventory. Their time and information is much appreciated. The list below acknowledges those contributed to the development of this document

City of Sault Ste. Marie

- Adam Shier, Risk Manager
- Ashley Caputo, Financial Analyst - Budget
- Brent Lamming, Director Community Services
- Catherine Taddo, Land and Environmental Engineer
- Christina Periard, Accounting Coordinator
- Dan Crozier, Assistant Fire Chief
- Don Elliott, Director of Engineering
- Emily Cormier, Climate Change Coordinator, FutureSSM
- Frank Cocchimiglio, Manager, Information Technology
- Jacob Bruzas, Manager of Audits & Capital Planning
- Jason Mihailiuk, Maintenance and Operations Manager
- Jeffrey King, Solicitor/Prosecutor
- Katie Elliott, Communications Coordinator, FutureSSM
- Karen Fields, City Solicitor
- Kristin Izydorczyk, Budget and Business Coordinator
- Lauren Doxtater, Social Equity Coordinator, FutureSSM
- Lisa Petrocco, Manager of Taxation
- Madison Zuppa, Deputy City Clerk
- Michael Vanderloo, Maintenance Supervisor
- Nicole Maione, Manager, Transit and Parking
- Paul White, Manager – Equipment and Building Maintenance
- Robin Miners, Office Supervisor
- Roger Nenomen, Manager – Cemeteries
- Spencer Laverne, Supervisor, Waste Management

- Susan Hamilton Beach, Director Public Works
- Tom Vair, Deputy CAO, Community Development and Enterprise Services
- Travis Anderson, Project Manager, FutureSSM

Climate Risk Institute

- Paul Cobbs, Project Manager

Enbridge

- Gerald Laforest, Advisor, Energy Solutions, Ontario Northeast Districts
- Vitha Krishnamurthy, Lead – Business Intelligence
- Xi Wang, Advisor Business Intelligence

PUC Services Inc

- Mark Britton, Conservation Officer

ICLEI – Local Governments for Sustainability

- Sarah Shenstone-Harris, Climate and Energy Planner

Sault Ste. Marie District Social Services

- Susi Ford, Executive Assistant

Sault Ste. Marie Innovation Centre

- David Thompson, RAIN Research Project Coordinator
- Paul Beach, Manager, Acorn Information Solutions (Geomatics Division)
- Travis Favretto, Municipal/Utilities GIS Technician, Acorn Information Solutions

Sault Ste. Marie Police Service

- Gary Mancuso, Fleet & Building Services Technician

References

- Canadian Municipal Barometer Background Data Series. (n.d.). Retrieved <https://cmb-bmc.shinyapps.io/cmb1/>
- City of Hamilton. (2019). *Hamilton and Burlington Low-Carbon Scenario and Technical Report 2016 to 2050*. Retrieved from: <https://pub-hamilton.escribemeetings.com/filestream.ashx?DocumentId=195837>
- City of Kawartha Lakes. (2019). *City of Kawartha Lakes Healthy Environment Plan*. Retrieved from: <https://www.kawarthalakes.ca/en/resourcesGeneral/Documents/Healthy-Environment-Plan-Long.pdf>
- City of Peterborough. (2016) *Peterborough Area Climate Change Action Plan*. Retrieved from: <https://sustainablepeterborough.ca/wp-content/uploads/2015/11/CCAP-City-of-Peterborough-PCP-Milestone-1-Report-UPDATED-Nov-32016.pdf>
- City of Windsor. (n.d.) *City of Windsor Canada Partnership for Climate Protection Program Milestone 1: Inventory of Greenhouse Gas Emissions*. Retrieved from: <https://www.citywindsor.ca/residents/environment/Environmental-Master-Plan/Goal-D-Use-Resources-Efficiently/Documents/City%20of%20Windsor%27s%20greenhouse%20gas%20inventory.pdf>
- Community Adjustment Committee Report. *A Common Cause and New Direction for Sault Ste. Marie*. (2017). Retrieved from: <https://futuressm.com/documents/assets/uploads/files/en/futuressm-final-full-report-rp1.pdf>
- EarthCare Thunder Bay. (2017). *Earthcare Thunder Bay – Annual Report 2017*. Retrieved from: <https://www.thunderbay.ca/en/city-hall/resources/Documents/EarthCare/EarthCare-Annual-Report-2017.pdf>
- Environment and Climate Change Canada. (2019a). *About the greenhouse gas reporting program*. Retrieved from: <https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/facility-reporting/about.html>
- Environment and Climate Change Canada. (2019). *National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada Canada's Submission to the United Nations Framework Convention on Climate Change Part 3*. Table A9-3: 2017 GHG Emissions Summary for Canada.
- Government of Canada. (2019a). *Greenhouse gas sources and sinks: executive summary 2019*. Retrieved from: <https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/sources-sinks-executive-summary-2019.html>
- Government of Canada. Open Government. *Greenhouse Gas Reporting Program (GHGRP) – Facility Greenhouse Gas (GHG) Data*. (2019). Retrieved from <https://open.canada.ca/data/en/dataset/a8ba14b7-7f23-462a-bdbb-83b0ef629823>

- Government of Ontario. (2019). *Food and Organic Waste Framework*. Retrieved from:
<https://www.ontario.ca/page/food-and-organic-waste-framework>
- ICLEI – Local Governments for Sustainability and the Federation of Canadian Municipalities (FCM). (2014). *PCP Protocol: Canadian Supplement to the International Emissions Analysis Protocol*. Retrieved from:
<https://fcm.ca/sites/default/files/documents/resources/report/protocol-canadian-supplement-pcp.pdf>
- Invest Sault Ste. Marie. (n.d.). *Community Profile*. Retrieved from:
<https://investsaultstemarie.com/why-sault-ste.-marie/community-profile/>
- Ontario Energy Board. (n.d). *Historical electricity rates*. Retrieved from
<https://www.oeb.ca/rates-and-your-bill/electricity-rates/historical-electricity-rates>
- Ontario Ministry of Transportation. (2014). *Ontario Traffic Manuals*. Retrieved from:
https://ontario-traffic-council.s3.amazonaws.com/uploads/2018/04/cona-OTM_Book_7_-_Temporary_Conditions_Jan_20141.pdf
- PUC Services Inc. (2019). *PUC Sustainability Report 2019*. Retrieved from:
<https://www.flipsnack.com/ssmpuc/puc-sustainability-report-2018-fvkfvsg1.html>
- Source adapted from Federation of Canadian Municipalities and ICLEI Local Governments for Sustainability. (2014). *PCP Protocol: Canadian Supplement to International Emissions Analysis Protocol*. Retrieved from:
<https://fcm.ca/sites/default/files/documents/resources/report/protocol-canadian-supplement-pcp.pdf>
- Statistics Canada. (2019a). Table 23-10-0051-01 Railway industry length of track operated at the end of the year, by company. Retrieved from:
<https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=2310005101>
- Statistics Canada. (2019). *Tables 57-003-X; Table 1-8 Primary and secondary energy, natural units – Ontario. Report on Energy Supply and Demand in Canada*. Retrieved from:
<https://www150.statcan.gc.ca/n1/pub/57-003-x/2019002/tbl/tbl-1-8-eng.htm>
- Statistics Canada. 2017. Sault Ste. Marie, CY [Census subdivision], Ontario and Ontario [Province] (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017.
<https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E>
 (accessed October 8, 2019).