



The City of North Bay

Energy Conservation and Demand Management Plan



June 2017

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Executive Summary

The City of North Bay recognizes that energy conservation and demand management is an integral part of the organization's long term sustainability as it strives to build a healthy and vibrant community. In 2008, the City established its initial Green Plan. During the life of the plan (2008 to 2012) the City reduced its annual greenhouse gas (GHG) footprint on the environment from the consumption of fossil fuels from 12,752 CO_{2e} tonnes in 2007 (base year) to 12,155 CO_{2e} tonnes in 2012 while adding and expanding assets to the organization. This represented an overall reduction of approximately 5% from the base year.

In 2013 the City of North Bay used as its base its experience working through its initial plan to establish a Conservation and Demand Management Plan that not only meets its regulatory requirements under the Green Energy Act (2012), O. Reg. 397/11, but will continue to guide the organization as it embeds environmental awareness into the City's processes and decision-making in order to minimize its carbon footprint on the environment while meeting social and economic responsibilities.

The City of North Bay's Conservation and Demand Management (CDM) Plan establishes a commitment to improve monitoring, tracking and reporting systems, embeds conservation into departmental planning and budgeting, and identifies energy conservation opportunities throughout the corporation. A central consideration of the City of North Bay's Conservation Management Plan was to ensure it was aligned to the City's Corporate Business Plan's Vision and Mission.

Successful implementation of the CDM Plan will support economic and community development, demonstrates financial responsibility, promote a healthy community, support the organization's goal to foster a culture of continuous improvement and enhance communication to our stakeholders.

The City has demonstrated that it is capable of reducing energy consumption despite pressures that include growth in services, addition of assets and year-to-year weather variations. The objectives, goals, and targets detailed in the CDM Plan were established recognizing the need to balance competing environmental, economic and social aims of the community.

Over the life of the CDM Plan the City has targeted to annually reduce its greenhouse gas emissions into the environment by 2.5% per year (300 tonnes of CO_{2e} equivalent gases). The path to achieving this target is detailed in this Plan.

The Plan articulates the City of North Bay's commitment to reducing its impact on global climate change by making energy and demand management an integral part of the City's operations, planning and the way it delivers services to the community.

The City of North Bay's Energy CDM Plan was endorsed by senior management and the Energy Efficiency Action Committee in early 2014.

Background

The Conservation and Demand Management Plan is the City's roadmap to reduce its impact on the environment through energy reduction and process improvements to improve the City's long term sustainability.

In 2007, the City engaged Energy Advantage Inc. to complete an Energy and Environmental Plan (2008). From this plan the City of North Bay voluntarily developed and implemented a corporate wide Green Plan. The five year plan established in 2008 used 2007 as its baseline. Targets and objectives were established. The City reported its progress through an annual report summarizing its performance against the baseline and the previous year. In 2013, the City committed to establishing a new Green Plan that built on the previous Green Plan and would meet the requirements established by the Green Energy Act (2009).

The City of North Bay Energy and Conservation Demand Management Plan (2014 – 2018) uses 2012 as its baseline. The City of North Bay's CDM Plan outlines the City's energy management plan for the next 5 years. Progress against the plan will be reviewed annually by the Energy Efficiency Action Committee and reported to Senior Management and Council.

The plan will assist the City of North Bay to meet its regulatory requirements under the Energy and Demand Management Regulation under the Green Energy Act (2009). The above requirement came into effect on January 1, 2012. Under the new regulation public agencies are required to report annually to the Ministry of Energy their energy use and greenhouse gas emissions, develop and implement energy management plans and report on results.

Plan Development

The City of North Bay's Energy Conservation and Demand Management Plan utilized a framework established in the development of its original Green Plan. This included the Energy and Environment Action Plan (2008) that was developed by Energy Advantage Inc. to assess the City's practices, policies and energy consumption that led to the development of the City of North Bay's Energy Conservation Action Plan (2008). In addition, The City utilized its experience over the period of 2008 to 2012 to establish objectives, goals and targets for the new Energy CDM Plan.

The development of the initial draft was completed by department managers and directors. It was presented and discussed by senior managers to ensure it was aligned with the City of North Bay's Strategic Plan and the Energy Efficiency Action Committee to ensure input from leaders and doers of the organization was included.

The plan was developed using the Ontario Provincial Government's Guide to Preparing Conservation and Demand Management Plans.

Key steps in developing the plan are illustrated in the following figure



Through the process the City of North Bay's Corporate Mission Statement, Goals, Objectives and Targets were established.

Mission Statement

North Bay commits to actively and sustainably reduce its impact on global climate change by making energy and demand management an integral part of the City's operations, planning and the way it delivers services to the community.

Objectives

- Reduce corporate dependency on conventional (GHG intensive) forms of energy (electricity, natural gas and transportation fossil fuels) through smart management of all assets.
- Use renewable forms of energy where feasible to reduce GHG impacts.
- Support and enhance the City's corporate culture with respect to energy conservation through management leadership and employee engagement.
- Incorporate life-cycle and global climatic impact analysis into business plans and policies.
- Engage and develop community partners.
- Exemplify energy conservation leadership that can be emulated by ABC's and the community at large.
- Communicate progress to all stakeholders.

Goals

- Re-mandate steering and working committees.
- Develop Energy Management Systems to establish a more effective energy measuring, tracking and monitoring system.
- Establish a Sustainable Buildings Program.
- Integrate Energy Conservation & Demand Management Programs into the Wastewater and Water Distribution and Facilities operations and modernization plans.
- Review and update the Green Fleet Plan to continue to improve energy efficiency of the municipal fleet.
- Support energy conservation training and education to expand corporate ability to better address global warming impacts on the corporation.
- Reduce energy related costs.
- Make energy conservation and demand management an element of departmental budget and purchasing processes.
- Meet regulatory requirements.
- Establish a funding plan to help finance energy conservation and demand management projects including expanding renewable energy projects.
- Develop a Communication Plan to spread information to the corporation and to the community.

Targets

- Reduce electricity from the grid by 2.5% per year (540,000 kWhr/year)
- Reduce natural gas consumption by 2% per year (29,500 m³/year)
- Reduce the use of traditional transportation fuels by 3% per year (40,500 L/year)
- Realize a 2.5% reduction of GHG or 300 tonnes of CO_{2e} gases annually.

An expanded discussion of the City of North Bay's Objectives and Goals is presented in Appendix 1.

Baseline Year

The City of North Bay's Green Plan (2008-2012) utilized 2007 as its baseline. The new Green Plan (2013-2018) has established 2012 as its new baseline for comparison due to the availability of data and a re-confirmation of the commitment to reduce energy.

The baseline year will be used for analysis and measurement of progress for future energy and emission reduction calculations.

Table 1 below is a high level summary of 2016 versus the baseline year and 2017 versus the baseline year. Detailed annual consumption data is summarized in Appendix 2.

Table 1: City of North Bay 2016/2017 versus 2012 Energy Use – All Sectors

2012 Baseline	Electricity (kWh)	Natural Gas (m³)	Transportation Fuel (L)	Total
Total Quantity Used	21,595,914	1,478,430	1,354,793	
Total GHG Produced (tonnes of CO_{2e})	16,067	2,871	2,649	21,587

2016	Electricity (kWh)	Natural Gas (m³)	Transportation Fuel (L)	Total
Total Quantity used	19,002,094	1,441,921	1,646,863	
Total GHG Produced (tonnes CO_{2e})	14,138	2,801	3,286	20,225
Annual Quantity Targets	19,435,914	1,360,430	1,189,793	
2016 vs. 2012 Reduction Quantity Achieved	2,593,820	36,509	-292,070	
Percent Reduction Achieved	12.01%	2.5%	-21.6	
GHG Reduction Achieved in 2015 (tonnes CO_{2e})	1,929	70	-583	1,416

2017	Electricity (kWh)	Natural Gas (m³)	Transportation Fuel (L)	Total
Total Quantity used	18,556,633	1,748,034	1,725,667	
Total GHG Produced (tonnes CO_{2e})	13,806	3,395	3,443	20,644
Annual Quantity Targets	18,895,914	1,330,930	1,149,293	
2017 vs. 2012 Reduction Quantity Achieved	3,039,281	-269,604	-370,874	
Percent Reduction Achieved	14.07 %	-18.2%	-27.4%	
GHG Reduction Achieved in 2017 (tonnes CO_{2e})	2,261	-524	-740	997

Table 2 below is a brief comparison of the energy consumption and GHG emissions between 2007 and 2012.

Table 2: City of North Bay 2012 versus 2007 Baseline Energy use – All Sectors

2007 Baseline	Electricity (kWh)	Natural Gas (m³)	Transportation Fuel (L)	Total
Total Quantity Used	23,093,113 kWh	1,359,460 m ³	1,509,279 L	
Total GHG Produced (tonnes of CO_{2e})	17,181	2,641	2951	22,773

2012 Baseline	Electricity (kWh)	Natural Gas (m³)	Transportation Fuel (L)	Total
Total Quantity Used	21,595,914	1,478,430	1,354,793	
Total GHG Produced (tonnes of CO_{2e})	16,067	2,871	2,649	21,587
2007 vs 2012 Reduction Quantity Achieved	1,497,199	-118,970	154,486	
Percent Reduction Achieved	6.5%	-8.0%	10.2%	
Total GHG Reduction Achieved since 2007 (tonnes of CO_{2e})	1,114	-230	302	1,186

Future reporting will provide annual consumption data by major activity versus baseline year of 2012 highlighting progress of data versus the overall goals.

Greenhouse Gas Emissions

Another important metric that the City will measure to monitor its progress is through the reduction of greenhouse gas emissions to the environment. The City has established a target of reducing its greenhouse gas emissions by 2.5% per year or the approximate equivalent of 300 tonnes of CO_{2e} gases to the environment.

A summary of its performance from 2007 through 2017 relative to the 2007 baseline is presented in Appendix 3.

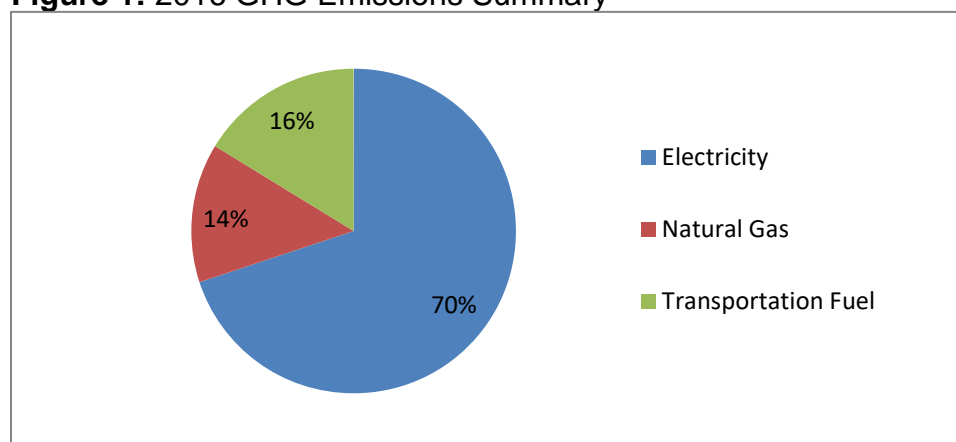
Table 3 below summarizes the greenhouse gases generated in 2016 by the City of North Bay.

Table 3: City of North Bay 2016 Energy Use – All Sectors

2016	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Total
Total Quantity used	19,002,094	1,441,921	1,646,863	
Total GHG Produced (tonnes CO_{2e})	14,138	2,801	3,286	20,225
Annual Quantity Targets			1,189,793	
2016 vs. 2012 Reduction Quantity Achieved	19,435,914	1,360,430	-292,070	
Percent Reduction Achieved	12.01%	2.5%	-21.6	
GHG Reduction Achieved in 2015 (tonnes CO_{2e})	1,929	70	-583	1,416

Figure 1 provides a summary of energy used and overall greenhouse gas emissions for the City of North Bay in 2016. Electricity and Transportation Fuel comprise the majority of emissions. In 2016 The City of North Bay produced 20,225 tonnes of CO_{2e}, a decrease of 1,416 tonnes compared to 2012.

Figure 1: 2016 GHG Emissions Summary



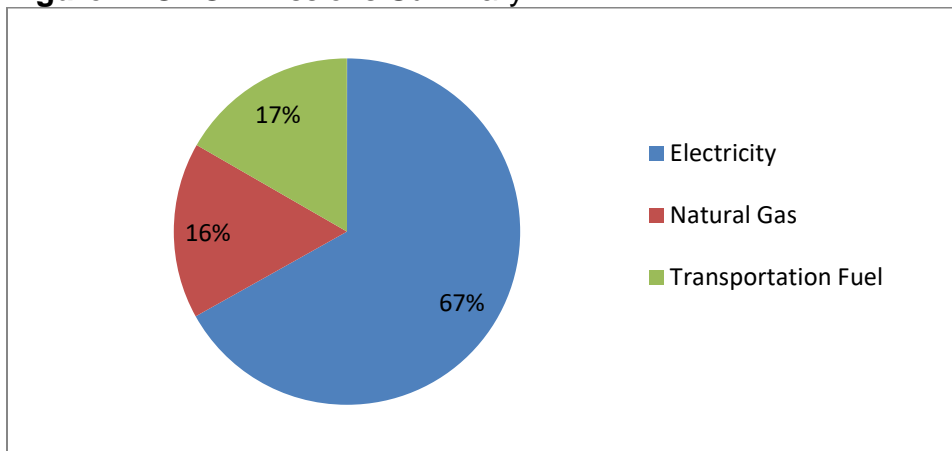
City of No Table 4 below summarizes the greenhouse gases generated in 2017 by the City of North Bay.

Table 4: City of North Bay 2017 Energy Use – All Sectors

2017	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Total
Total Quantity used	18,556,633	1,748,034	1,725,667	
Total GHG Produced (tonnes CO_{2e})	13,806	3,395	3,443	20,644
Annual Quantity Targets	18,895,914	1,330,930	1,149,293	
2017 vs. 2012 Reduction Quantity Achieved	3,039,281	-269,604	-370,874	
Percent Reduction Achieved	14.07 %	-18.2%	-27.4%	
GHG Reduction Achieved in 2017 (tonnes CO_{2e})	2,261	-524	-740	997

Figure 2 provides a summary of energy used and overall greenhouse gas emissions for the City of North Bay in 2017. Electricity and Transportation Fuel comprise the majority of emissions. In 2017 The City of North Bay produced 20,644 tonnes of CO_{2e}, a decrease of 997 tonnes compared to 2012.

Figure 2: GHG Emissions Summary



North Bay's Energy Projects

Since 2007, the City of North Bay has investigated, developed and implemented many energy efficiency projects.

During the initial Green Plan (2008 through 2012) the City investigated and evaluated over 30 potential projects and/or programs throughout the corporation. The City implemented over 15

projects. A summary of major initiated, completed, and future energy related projects is presented in Appendix 4.

Listed below is a sampling of some of the projects / programs.

Completed Energy Projects

- Replacement of HPS Street Lights with LED Fixtures
- Converting traffic lights to LED's
- Evaluating and replacing decorative lights
- Lighting and heating upgrades at City/YMCA Aquatics Center
- Utilization of Landfill Gas for the production of electricity
- Evaluation of Cogeneration Project at Wastewater Treatment Plant
- Installation of Residential Water Meters
- Reduce the City's fleet size
- Potential elimination of Janey Avenue Pumping Station
- Education and Awareness Training Pilot with LAS/AMO
-

Current Projects

- Parking lot lighting review
- Improve traffic flows/automate signalization systems

Future Energy Projects

Going forward, the City has identified several potential projects. These include:

- Improved use of Building Automation Systems

For the full listing of major projects see Appendix 4.

Renewables

Solar Initiatives

In 2008, the City commissioned a 60 panel (10-kilowatt) solar photovoltaic array on the roof of City Hall (shown in Figure 3). In 2017 it generated 5,653 kWh or \$4,534 in revenue. Since commissioning to the end of 2017, the system generated 84,734 kWh of electricity. The electricity was originally sold to the Ontario Power Authority under the Renewable Standard Offer Program (RSOP) for 42¢ per kilowatt hour. Beginning in November 2010 the City applied and was approved to transfer the RSOP to the OPA's microFIT program and received 80.2¢ per kWh for all power produced until May 2028.

The power produced by the solar PV system on City Hall in 2017 (5,653 kWh) was enough power to meet the requirements of 112 average homes for one day and offset 4.21 tonnes of CO_{2e}. Solar energy offsets peak power which is more reliant on hydrocarbon sourced energy and thus it has enhanced green benefits. Live and historic solar production from this site is available for viewing at [AuroraVision.net](https://easyview.auroravision.net/easyview/index.html?entityId=111914).

<https://easyview.auroravision.net/easyview/index.html?entityId=111914>



Figure 3: Solar PV on roof of City Hall



Figure 4: Solar Hot Water on roof of new Water Plant

In 2010 the City commissioned its new Water Filtration Plant which uses a solar hot water system on its roof (shown in Figure 4) to heat water used for filter cleaning.

Landfill Gas to Electricity

The City partnered with North Bay Hydro Services to install a power generation facility that utilizes landfill gas produced at the Merrick Landfill Site. The station was commercialized in June 2012. Prior to providing landfill gas to the power generation facility the City operated a landfill gas flaring station. In 2013, the landfill collected and supplied **7,829,552 m³** of landfill gas (LFG). Utilization of the LFG for electricity generation reduced greenhouse gas emissions by **58,829**

tonnes by the City’s landfill. Without the flare and generator set in place, Merrick would have produced approximately 2.5 times more greenhouse gas emissions than all of the energy used by the City in its operations. In its first full year of operation the project generated \$391,984 in LFG sales for the City. At its peak, the Merrick Project will generate enough electricity to satisfy the electrical power needs of approximately 1300 homes per year.

Figure 5: Landfill Gas Utilization to Electricity Facility and Landfill Gas Flaring Station located at the City’s Merrick Landfill Site



Table 5 presents a summary of the LFG to electricity project in terms of finances and energy produced.

Table 5: Merrick Landfill Gas to Electricity Project

Total Costs	\$4,000,000
Start Date	May 2010
Construction Start Date	July 2011
Completion Date	June 12, 2013
Electricity Generated (2017 average/month)	652,463 kWh
Electricity Generated (Peak month)	756,741 kWh
Projected Annualized Revenue	\$1.05 to 1.15 Million
Projected Annual Revenue to the City	\$350,000 to \$450,000
Expected Payback	10 Years

Sewage Treatment Plant Digester Gas Utilization

Currently digester gas is utilized by the site's boiler system to supplement plant heating. In the summer, when heating demand is nominal, the digesters continue to produce gas and consequently most of this fuel is flared.

The City initially completed a Digester Gas Utilization Plan for the North Bay Sewage Treatment Plant in 2009. The report completed by J.L. Richards identified that the digester gas could be utilized to produce electricity and subsequent heat from the power production utilized for plant heating. It was determined that the primary digester produced sufficient gas to run a 250 kW engine.

In 2010, one of the primary digesters was upgraded. The upgrades resulted in an increase in gas production. In 2012, the City, funded by the Ontario Power Authority, completed a Cogeneration Feasibility Study (CRA Report – 2012) for the Waste Water Treatment Plant (WWTP). The study concluded that although it was technically feasible to support a 400 kW cogeneration facility with the digester gas produced at the WWTP the economics were not favourable under today's conditions. The best case scenario presented a 17 year payback. This will be revisited as circumstances change. In the meantime the City realizes the benefit at the Wastewater Treatment Plant of the cleaning and better utilization of the primary digester that was completed in late 2010.

Education, Training, and Awareness

Education, training and awareness is an integral part of the project plan and is critical to the success of the projects in terms of achieving and sustaining proposed savings. The overall intent of the training program is to complement the technological and organizational changes proposed in the plan and maximize the energy savings resulting from projects.

Training on building systems and energy efficiency will allow the building staff to modify operations to increase efficiencies, identify opportunities for energy savings measures and raise awareness of energy efficiency among all staff.

In 2014, the City undertook a partnership with LAS to complete an Energy Conservation Education and Awareness Training initiative. The purpose of this workshop is to help inspire the change of typical workplace behaviours from energy consuming to energy conserving. In order to do this, the workshop is intended to promote the understanding of energy consumption as well as to offer many workplace energy conservation tips. The training will also include helpful tips that participants can utilize to reduce their energy consumption in their homes.

In an office environment it is recognized that lighting can account for up to 40% of energy costs, space heating and cooling can account for between 20-40%, and plug loads for 5-10%.

Thus training sessions will include ways to save costs through conservation by exploring means to reduce lighting consumption, heating and cooling demand, plug loads. In addition the training sessions will provide a vehicle to communicate past and present progress on energy conservation and demand management and introduce future conservation and demand management plans.

Initial training is scheduled to begin June 2014. The participants targeted in 2014 will include City Hall, Water and Wastewater, and Arena staff.

Demand Response Initiatives

Since the beginning of 2011 the City of North Bay has participated in the Ontario Power Authority's (OPA) Demand Response 3 (DR3) Program. The City's Water Treatment Plant (WTP) since 2011 and through to 2015 committed to shed approximately 600 kWh of electricity capacity as part of the OPA DR3 program. From 2015-2017 the City's water Treatment plant has committed to shed 300 kWh of electricity due to the drop in water usage in the city. Over the life of the program the City will earn between \$120,000 and \$200,000 depending on the number of demand response events participated in by the WTP.

The City has investigated and evaluated the opportunity to enroll other facilities in the program. To date no other facility has been identified an attractive opportunity to aggregators of the OPA Demand Response (DR) Program. The City continues to explore potential DR Programs including a program developed by North Bay Hydro for local businesses. In addition to providing a small revenue stream the locally driven North Bay Hydro program provides tools that will improve electrical usage management to allow for opportunities to reduce electrical consumption and therefore realize electrical cost savings. The program will allow for smaller blocks of commitment to the OPA's DR Programs. The City is committed to participating in this program if it is confirmed that it is eligible. The potential benefits to the City beyond the financial include broadening its partnership with the local utility and demonstrating the benefits to the broader business community. Benefits are on-going as of 2017.

This program has the potential to be an additional tool to assist North Bay in achieving its conservation targets while generating a nominal financial return. Participation with this program demonstrates that the City is committed to showing leadership in energy conservation and demand management.

Interval Metering

Expanding our participation in the Demand response program offered by North Bay Hydro will also provide opportunities to expand the number of interval meters installed at our top ten electricity consuming assets at nominal or no cost. Expanding interval metering in our large electricity consuming facilities will improve our ability to monitor and act on electrical power anomalies as they occur to better manage our electricity demand.

Action Items, Responsibilities and Timelines

Appendix 1 expands the City of North Bay's Objectives and Goals previously presented. It also provides for responsibilities and timelines.

Appendix 1: City of North Bay's Expanded Objectives and Goals

1. Re-Mandate steering committee and working committee.

- a. Senior management meets 1-2 times per year
- b. Steering committee meets 3-4 times per year to review corporate and departmental progress, exchange CDM information, learn about new opportunities etc.

Timing: Ongoing.

2. Update Energy Data Management System to establish a more effective Monitoring and Tracking System that includes:

- a. Efficient Data Collection
- b. User Friendly Interface for major asset groups
- c. Monthly, Quarterly and Annual Reports
- d. Identify, investigate and implement where viable sub-metering capabilities

Timing: Bulk of the effort will take place in 2019/2020. Once established the system will be modified as required to improve its effectiveness. Responsibility is shared between the Energy Conservation Officer and the Director of Information Technology.

3. Establish a Sustainable Buildings Program

- a. Develop a Sustainable Building Policy.
- b. Complete 2 Building Energy Studies targeted on major energy consumers with potential for significant improvement over the next 5 years.
- c. Integrate Sustainable Building Best Practices into all new building construction and retrofit projects.
- d. Improve utilization of BAS where available
- e. Investigate feasibility of a corporate wide open protocol BAS
- f. Identify peak demand for development of peak demand management strategies
- g. Include major departments and ABC's
- h. Promote (improve) energy efficiency for new and existing residential and commercial buildings in the community.

Timing: Established a corporate subcommittee mandated to establishing a Sustainable Buildings Program in 2019/2020.

4. Wastewater and Water Distribution and Facilities

- a. Integrate CDM into operations and modernization plans.

Timing: Driven by the Director Engineering, Facilities Manager (Water/Wastewater), Operations Manager (Water/Wastewater) and Manager (Sewer/Water) the CDM plan will be integrated in current operations planning modernization plans. Plan development is targeted for 2019/2020.

5. Establish key partners and relationship.

- a. To identify and develop viable projects

- b. To fill technical and resource gaps where applicable
- c. To effectively utilize all available funding avenues to finance best in class projects that meet the corporation's goals.

Timing: Ongoing. In 2014 partnership established with AMO/LAS to deliver Education and Awareness Training.

6. Improve the energy efficiency of the municipal fleet.

- a. Establish goals to be achieved by 2020
- b. Establish plan for switching to more efficient vehicles during the normal replacement cycle
- c. Investigate and evaluate potential of alternative fuels

Timing: Ongoing.

7. Renewable Energy Project to reduce Corporations GHG impact.

- a. Work with local partners (LDC or other) to identify and implement small-scale local renewable energy projects with the objective of obtaining/displacing 3% of energy consumed by the Corporation from low-impact renewable sources by the year 2020.
- b. Supply landfill gas for destruction through the Electricity from LFG Utilization Plant at Merrick Landfill
- c. Establish a plan for future projects with targeted paybacks that will sustainably fund projects while reducing GHG impacts by the City.

Timing: The City has previously implemented a microFIT solar rooftop project and installed (2008) and operated a Landfill Gas Flaring station (2007-2012) to reduce the greenhouse gas generation from the municipal landfill. In 2012 the City worked with North Bay Hydro Services to complete the installation of electricity from landfill gas utilization plant. Supply landfill gas to Electricity from LFG Utilization Plant. (a) And (b) is ongoing.

The City will explore other potential opportunities during the life of the plan. (c) 2015 and beyond.

8. Update Green Fleet Plan

- a. Identify new potential projects
- b. Audit operating practices

9. Establish a funding plan to help finance energy conservation and demand management projects including expanding renewable projects.

- a. Utilizes multiple funding options.
- b. Wherever possible funding for projects should include all available sources including other government incentives, utility and/or equipment incentives etc.
- c. Develop policy and guidelines for the CDM Project Fund.

Timing: 2019-2020.

10. Facilitate communication to the corporation and to the community

- a. Communication of performance
- b. Continue to enhance energy conservation culture
- c. Communication to Developers/Builders for new construction

Timing: Items (a) and (b) are ongoing. Develop a communication plan to communicate results to other local groups (2019-2020).

11. Develop an Energy Awareness Program

- a. That includes energy awareness training and management plan that can be integrated into departmental plans

Timing: Top 3 user groups (On-going). Expand to major user groups (On-going).

12. Meet all provincial regulatory requirements.

- a. Green Energy Act

Timing: Ongoing.

Appendix 2: City of North Bay Detailed Energy Consumption Data

2.1 Electricity

Table 6: The City of North Bay's Electricity Annual Consumption Data 2009-2017

Activity	2009 kW-hrs	2010 kW-hrs	2011 kW-hrs	2012 Baseline kW-hrs	2013 kW-hrs	2014 kW-hrs	2015 kW-hrs	2016 kW-hrs	2017 kW-hrs	Variation 2017 vs. 2012 kW-hrs
Trout Lake WTP	4,460,818	4,989,975	5,366,195	5,319,491	4,850,254	4,860,223	4,849,053	3,807,006	3,499,669	1,819,822
Sewage Plant	3,405,202	3,417,049	3,672,187	3,406,524	3,424,430	3,481,070	3,172,180	3,126,839	3,050,911	355,613
Street Lights	3,322,759	3,324,191	3,204,120	2,790,237	2,348,268	2,026,566	2,036,369	2,042,502	2,036,369	753,868
Pete Palangio Arena	1,370,688	1,284,074	1,252,270	1,394,515	1,417,325	1,349,068	1,284,907	1,206,968	1,054,418	340,097
City Hall	1,318,658	1,351,874	1,413,099	1,438,746	1,402,933	1,336,316	1,301,602	1,369,273	1,367,351	71,395
Public Works	1,100,822	739,463	811,268	744,366	787,751	754,278	711,649	696,063	674,167	70,199
Memorial Gardens Arena	1,103,817	1,028,890	1,053,315	1,157,214	1,359,309	1,967,695	1,907,766	1,862,129	1,857,488	-700,274
Reservoirs/ Water PS	1,375,804	1,697,232	1,410,418	1,307,494	1,042,909	1,000,710	1,062,011	962,603	980,312	327,182
Aquatic Centre	926,995	916,481	870,711	976,630	836,640	885,314	888,605	837,715	897,485	79,145
Parks/Beaches	*825,000	*825,000	*825,000	*825,000	*825,000	*825,000	*825,000	*825,000	*825,000	0
Sewage Lift/ Pump Stations	597,226	554,558	451,236	503,205	497,732	569,506	504,729	433,204	460,104	43,101
West Ferris Arena	500,160	482,813	454,044	470,681	519,075	466,941	416,102	413,664	389,430	81,251
Fire Stations	297,847	275,375	296,444	272,730	344,203	346,901	343,813	303,763	283,420	-10,690
Other Parking Lots	*195,000	*195,000	*195,000	*195,000	*195,000	*195,000	*195,000	*195,000	*195,000	0
Parking Garage	149,299	144,888	119,783	73,794	68,192	70,884	68,829	66,018	54,091	19,703
Traffic Lights	138,507	104,675	160,103	104,927	194,319	161,218	158,670	164,116	168,128	-63,201
Merrick Landfill	159,904	39,596	130,589	120,528	4,699	193,689	215,672	182,014	311,294	-190,766
Marina	136,420	108,626	134,071	136,623	130,032	126,123	121,962	113,299	101,807	34,816
Lee Park	116,480	107,610	123,212	124,212	83,440	77,064	107,558	107,201	80,589	43,623
Marsh Landfill	79,646	55,119	68,032	70,245	93,004	134,254	138,447	112,637	99,500	-29,255

Other Waterfront	*75,000	*75,000	*75,000	*75,000	*75,000	*75,000	*75,000	*75,000	75,000	0
Transit/Shelters	*70,000	121,680	107,880	100,920	81,520	106,020	105,120	100,080	95,100	5,820
Annual Total	21,656,052	21,839,169	22,193,977	21,608,082	20,581,035	21,008,840	20,490,044	19,002,094	18,556,633	3,051,449

Note: Numbers with an asterisk (*) are estimate.

Figure 6 presents annual electricity consumption of the top 10 users of the City from 2007 to 2017. These locations plus the Public Library consume most of the City’s electricity and this is where the majority of energy efficiency recommendations are focused.

Figure 6: Electricity Consumption by Facility (2008-2017)

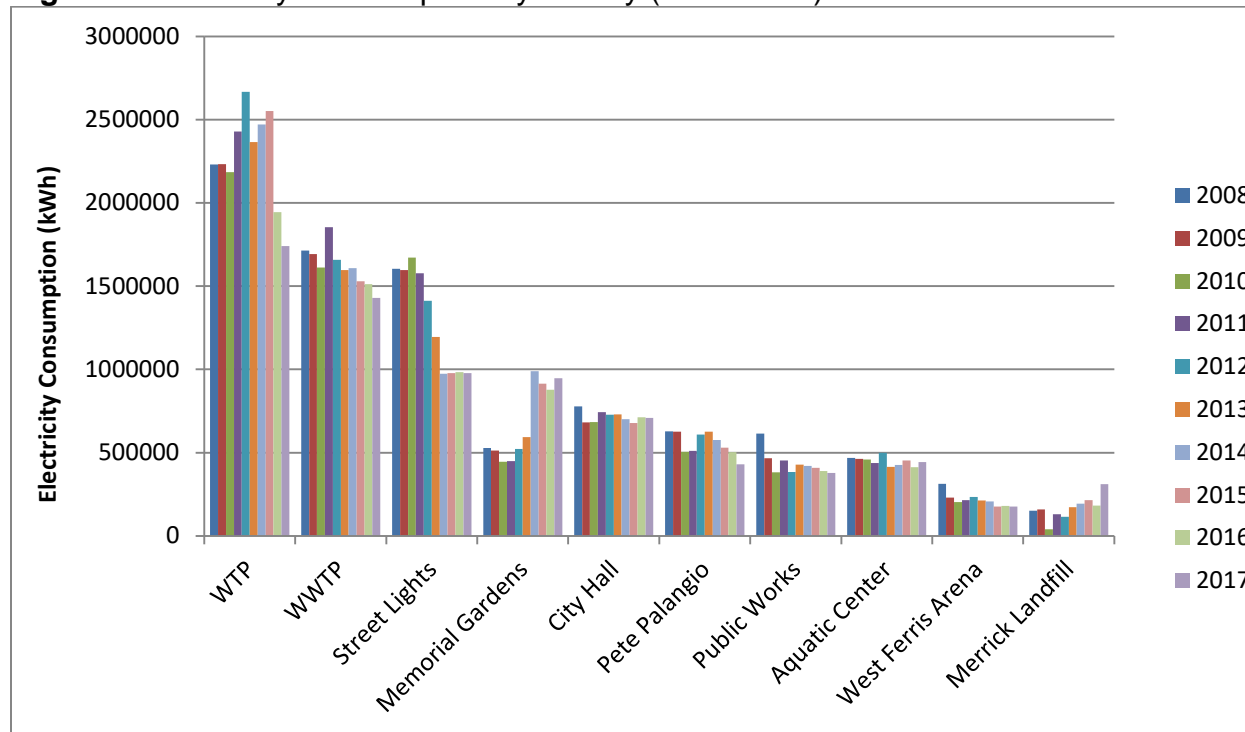


Figure 7 presents the electricity used by facility by the percentage of total used in 2016 by the City of North Bay. The top 10 users are identified. All other facilities such as Parks, Marina, Merrick Landfill, etc. are combined as "Other".

Figure 7: Breakdown by Facility of 2016 Electricity Consumption

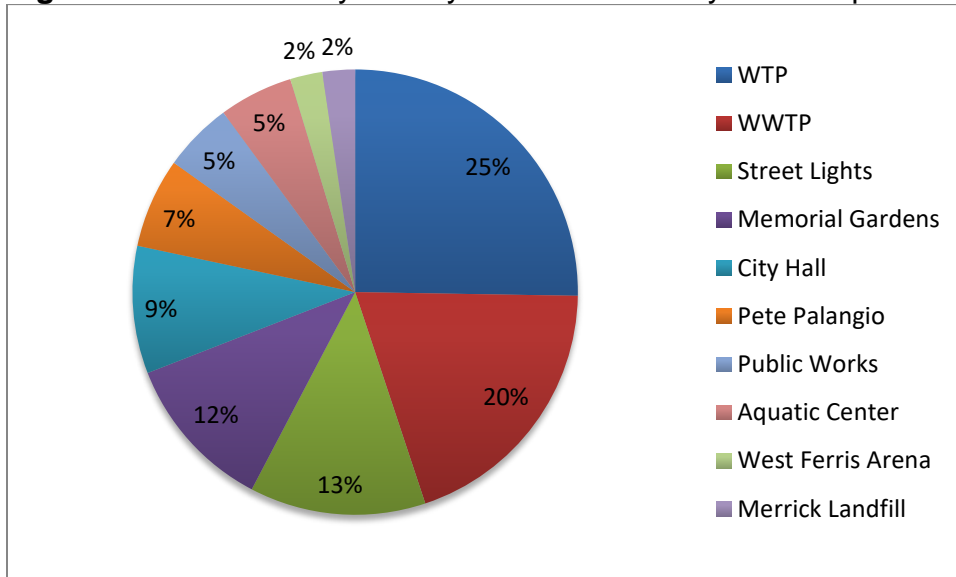
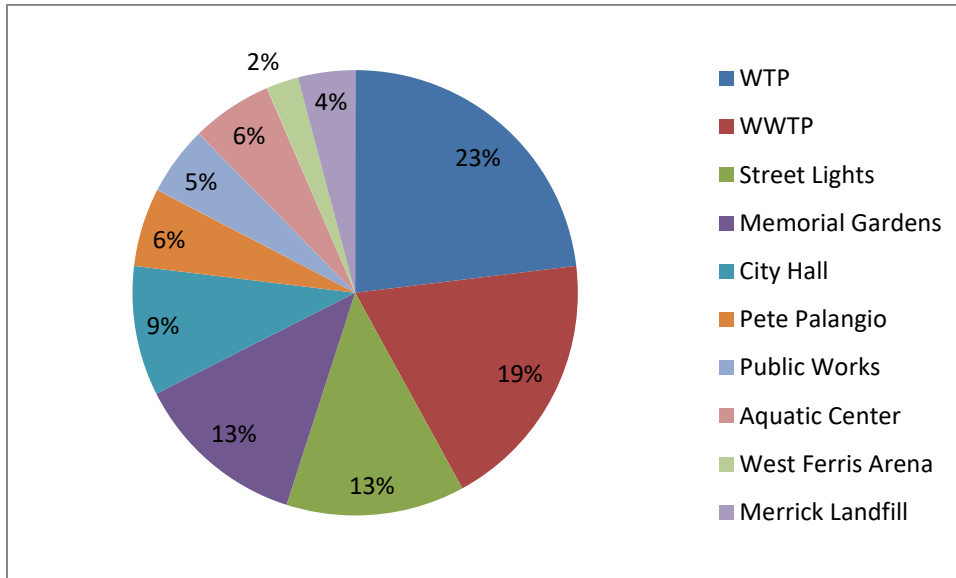


Figure 8 presents the electricity used by facility by the percentage of total used in 2017 by the City of North Bay. The top 10 users are identified. All other facilities such as Parks, Marina, Merrick Landfill, etc. are combined as “Other”.

Figure 8: Breakdown by Facility of 2017 Electricity Consumption



2.2 Natural Gas

Table 7: The City of North Bay’s Natural Gas Annual Consumption Data 2009-2015

Facility	2009 m ³	2010 m ³	2011 m ³	2012 Baseline m ³	2013 m ³	2014 m ³	2015 m ³	2016 m ³	2017 m ³	2017 vs 2012 m ³
Public Works - Franklin	331,209	266,450	338,148	315,001	305,025	288,632	184,215	192,941	238,662	76,339
Aquatic Center	319,940	289,051	320,784	321,417	301,016	369,495	338,466	339,000	309,552	11,865
Memorial Gardens Arena	178,500	129,138	186,744	202,858	182,829	313,080	274,389	291,146	324,157	-121,299

Facility	2009 m ³	2010 m ³	2011 m ³	2012 Baseline m ³	2013 m ³	2014 m ³	2015 m ³	2016 m ³	2017 m ³	2017 vs 2012 m ³
Sewage Treatment Plant	130,420	121,524	114,901	114,080	136,965	117,668	52,954	162,568	395,452	-281,372
Pete Palangio Arena	113,178	112,195	102,383	134,439	141,336	151,754	145,466	137,934	144,668	-10,229
West Ferris Arena	68,373	57,471	58,582	64,343	66,637	61,302	52,018	42,474	47,980	16,363
City Hall	63,762	66,707	73,563	101,140	80,504	101,053	77,523	82,458	86,132	15,008
Fire Stn 1 - Princess	44,453	43,476	37,865	46,012	53,562	51,176	43,489	33,263	36,522	9,490
Lee Park - Memorial Dr	23,480	20,874	18,354	32,157	25,386	24,215	22,110	17,794	18,027	14,130
Fire Stn 2 - McKeown	18,769	16,669	16,522	12,584	13,994	13,590	10,937	9,134	8,492	4,092
352 McIntyre (Rented)	14,396	11,588	12,372	6,005	0	0	0	0	0	6,005
Fire Stn 3 - Marshall	14,944	13,743	11,982	13,440	12,794	13,126	12,216	11,717	12,399	1,041
New Bus Trml - Oak	14,385	12,503	14,687	13,712	14,798	18,941	21,207	22,332	23,779	-10,067
NB Water Treatment Plant	12,460	18,689	38,293	36,826	17,365	90,648	109,742	31,529	32,775	4,051
Fire Stn 4 - Duxford	10,536	10,856	10,000	6,911	6,752	6,651	2,110	3,424	3,858	3,053
Kinnette Playground	7,235	5,658	6,872	6,287	7,416	6,504	6,554	6,419	7,104	-817
Circle Lake Playground	5,875	2,576	2,404	0	0	0	0	0	0	0
Police Playground	3,778	3,360	4,994	3,781	5,354	5,323	4,367	3,804	3,902	-121
Parks - First Ave Unit 1	2,417	1,921	2,191	2,831	2,544	0	0	0	0	2,831
Marathon Beach	2,847	1,732	1,879	1,416	1,584	1,340	1,078	10	891	525
Parks - First Ave Unit 2	2,924	2,321	2,104	1,404	0	0	0	0	0	1,404
Laurentian Playground	1,441	1,210	1,278	1,217	1,293	1,638	1,228	1,364	1,322	-105
Granitville Playground	800	914	1,311	1,148	1,349	1,376	1,167	1,234	1,133	15
Thompson Park	935	924	994	816	205	0	0	0	0	816
ONR Field	73	84	144	97	192	67	0	183	66	31
330 Main East	1,464	7,828	11,591	12,009	13,789	15,840	13,388	11,282	11,826	183
1105 Lakeshore Drive	1,755	5,828	5,060	5,502	6,039	6,433	6,338	5,815	5,134	368
Library	6,236	21,048	31,920	28,406	34,523	41,645	36,147	34,094	34,200	-5,794
Total m³	1,396,585	1,246,338	1,427,922	1,485,839	1,433,250	1,701,487	1,417,109	1,441,921	1,748,034	-262,195

Figure 9 presents the annual Natural Gas consumption of the top 10 users of the City since 2009.

Figure 9: Natural Gas Consumption by Facility (2009-2017)

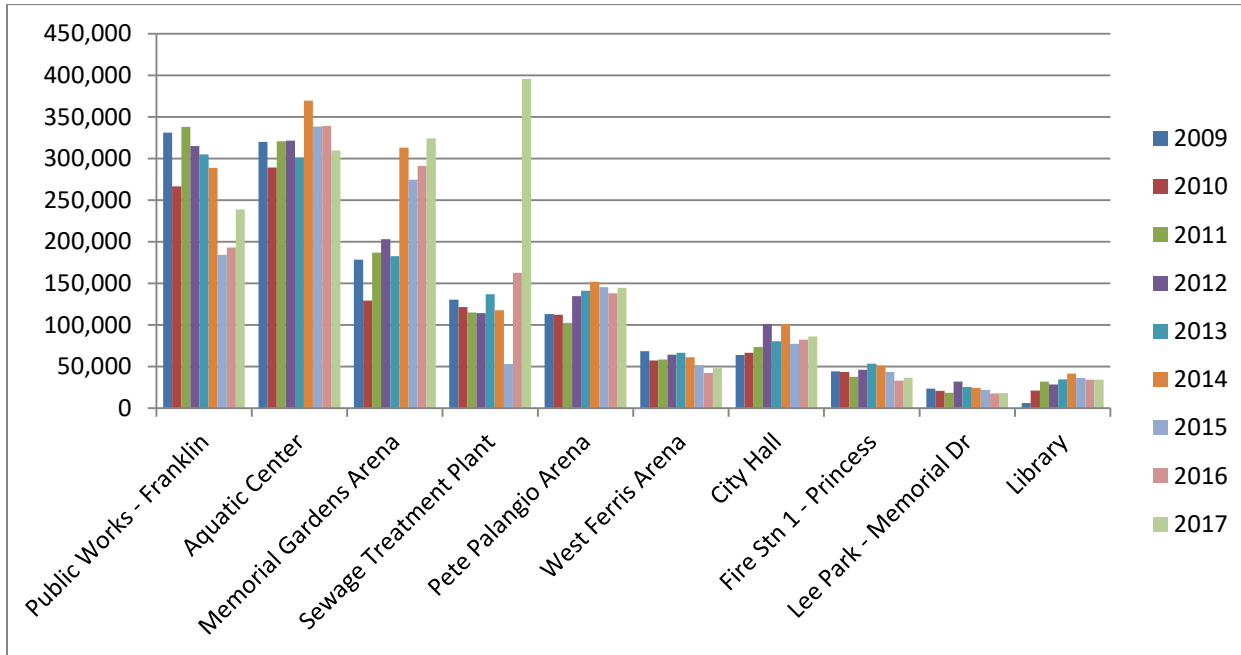


Figure 10 illustrates natural gas consumed by facility by the percentage of total used in 2016 by the City of North Bay. The top 10 users are identified. All other facilities such as Parks, Marina, Merrick Landfill, etc. are combined as "Other".

Figure 10: Breakdown by Facility of 2016 Natural Gas Consumption

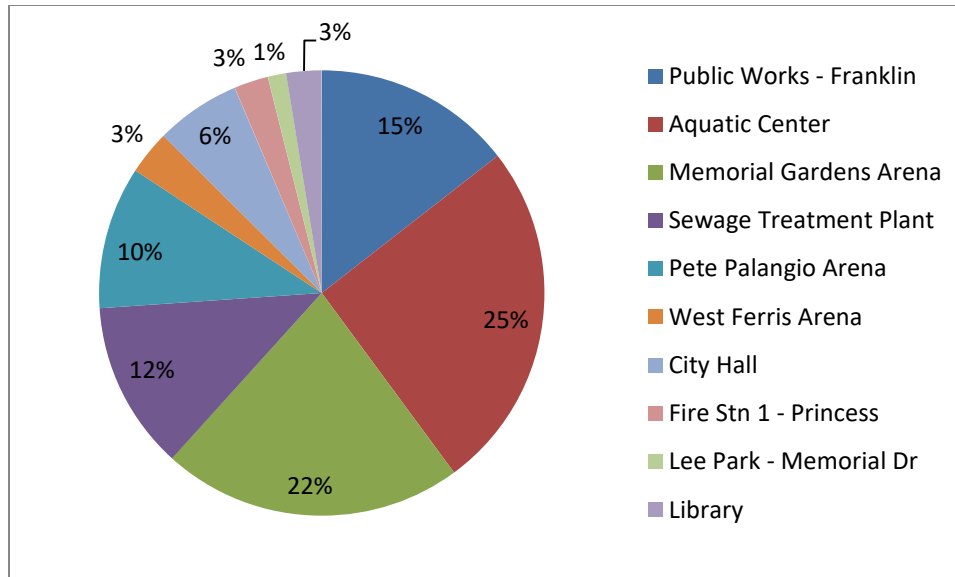
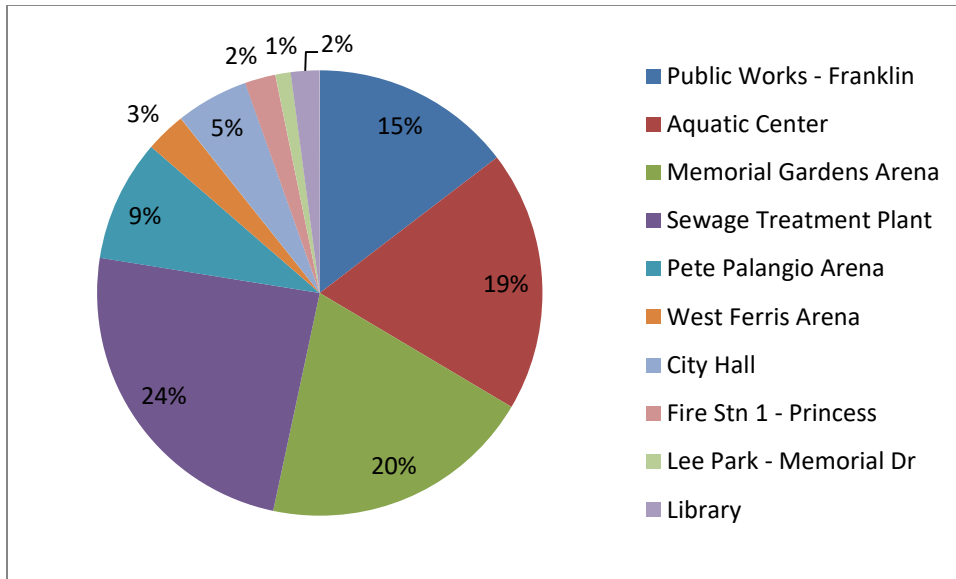


Figure 11 illustrates natural gas consumed by facility by the percentage of total used in 2017 by the City of North Bay. The top 10 users are identified. All other facilities such as Parks, Marina, Merrick Landfill, etc. are combined as “Other”.

Figure 11: Breakdown by Facility of 2017 Natural Gas Consumption



2.3 Transportation Fuel

Table 8: Annual Transportation Fuel Consumption Data

Function	2007 (L)	2008 (L)	2009 (L)	2010 (L)	2011 (L)	2012 (L)	2013 (L)	2014 (L)	2015 (L)	2016 (L)	2017 (L)
Fleet/Garage	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	31,482	25,380	32,986	25,011
Police	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	146,348	149,601	142,168	129,595
Parks	70,174	67,741	63,461	64,609	60,642	67,836	67,536	55,556	58,418	57,695	57,536

Function	2007 (L)	2008 (L)	2009 (L)	2010 (L)	2011 (L)	2012 (L)	2013 (L)	2014 (L)	2015 (L)	2016 (L)	2017 (L)
Transit	868,826	836,213	810,395	794,827	759,058	728,874	728,954	734,086	707,329	717,464	776,136
Ambulance	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	75,306	71,130	73,006	86,192
Public Works	501,824	521,544	476,489	481,318	499,643	497,595	482,545	523,122	475,667	470,938	503,332
Hydro	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	94,898	90,528	87,741	87,143
Water/Waste Water Plant	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	See Misc.	8,247	8,097	7,526	6,487
By-law, Parking, Survey	2,447	23,046	20,775	17,578	19,787	21,441	21,241	21,419	21,016	20,524	18,952
Fire	46,507	44,357	42,176	39,906	42,394	39,047	38,797	35,662	32,599	36,817	35,283
Misc.	868,826	836,213	810,395	794,827	759,058	728,874	728,954	See Above	See Above	See Above	See Above
City Total	1,489,778	1,492,901	1,413,296	1,398,238	1,381,524	1,354,793	1,339,073	1,726,126	1,639,764	1,646,863	1,725,667
Reduction		-3,123	79,605	15,058	16,714	26,731	15,720	-387,053	86,362	-7,099	-78,804
CO_{2e} (tonne)	2,972	2,978	2,820	2,790	2,756	2,703	2,672	3,444	3,271	3,286	3,443

*In years 2007 to 2013 fuel consumption data for fleet/garage, police, ambulance, hydro, and water/wastewater plant were all categorized together in the miscellaneous category. From 2014 to 2017 the miscellaneous category was separated into its respective categories.

Figure 12 presents the annual transportation fuel consumption by department in the City of North Bay since 2007.

Figure 12: Transportation Fuel Consumption by Function (2007-2013)

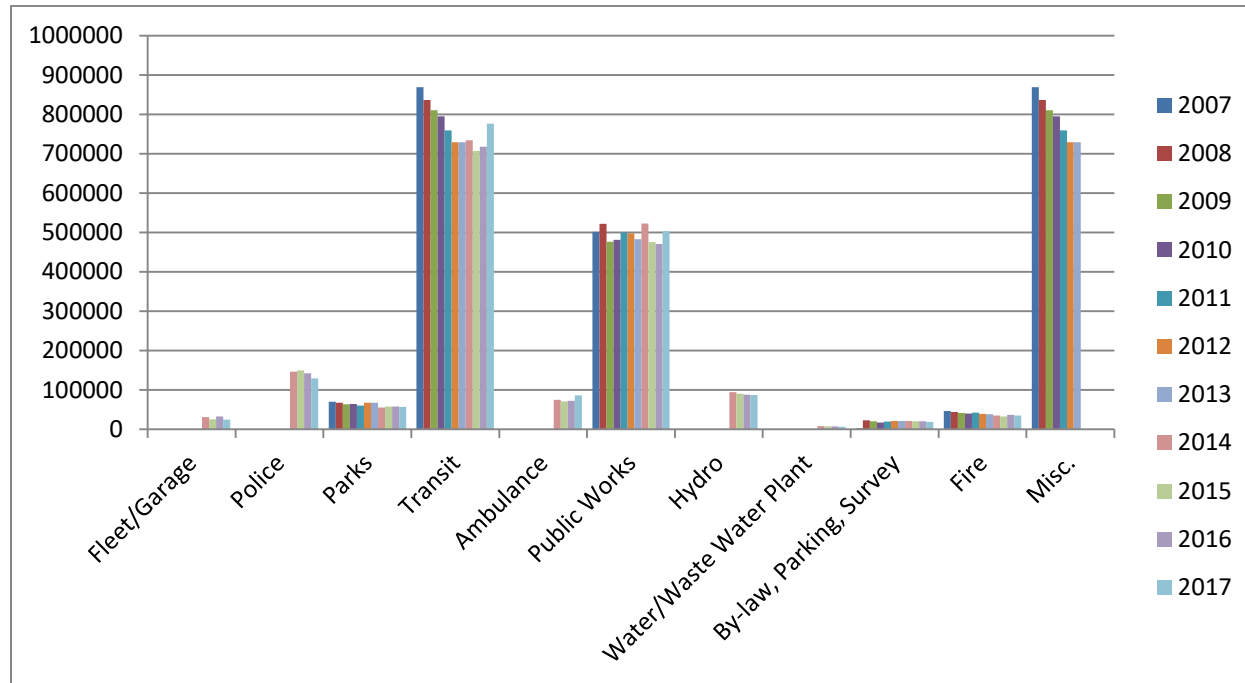


Figure 13 presents the transportation fuel used by the various functions in North Bay during 2016 . Detailed annual consumption of transportation fuel data is provided in Appendix 2.3.

Figure 13: Breakdown by Function of 2016 Transportation Fuel Consumption

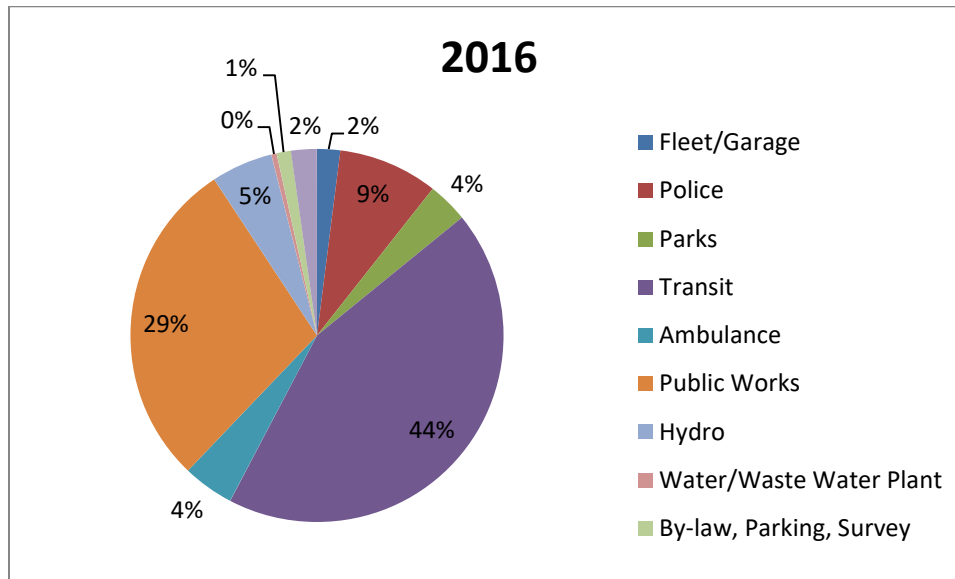
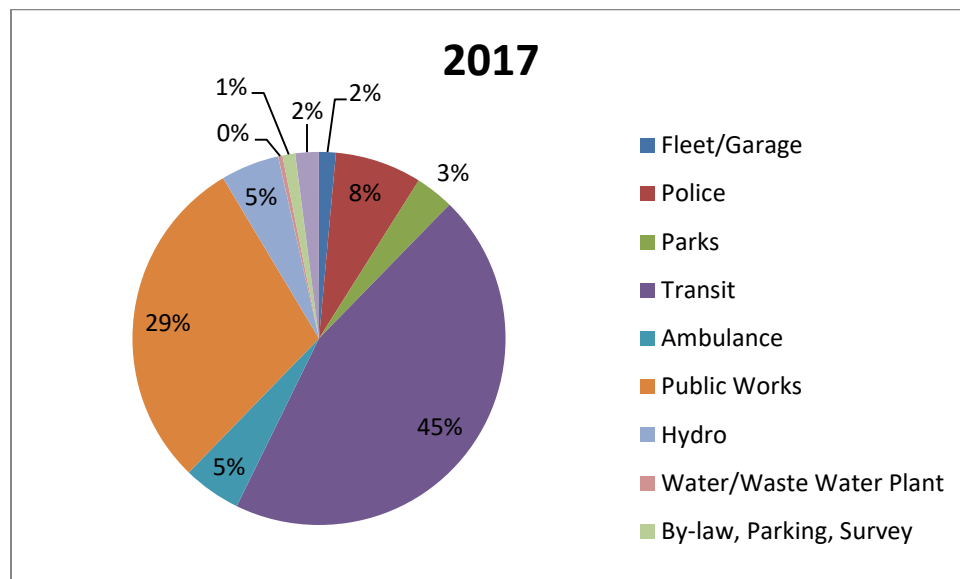


Figure 14 presents the transportation fuel used by the various functions in North Bay during 2017. Detailed annual consumption of transportation fuel data is provided in Appendix 2.3.

Figure 14: Breakdown by Function of 2017 Transportation Fuel Consumption



2.4 Isometrics

Accurately comparing energy consumption from year-to-year requires an appreciation of external factors such as weather and climatic influences. For example, hot summers drive up the demand for air conditioning, cold winters increase demand for heating, damp weather reduces water pumping but can increase pumping at sewage lift stations and at the landfill.

Heating Degree Days (days that average less than 18° C) and Cooling Degree Days (days that average greater than 18°C) can be examined to help understand energy demand at City buildings.

Table 9: Average Temperature at North Bay Airport

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Average
2010	-10.6	-8.9	1.8	7.5	14.2	15.9	20.6	19.3	12.5	6.1	0.5	-8.2	6.0
2011	-8.2	-10.5	-5.9	3.2	12.6	16.6	20.7	18.9	14.7	8.5	2.5	-6.2	5.6
2012	-9	-7	2	4	14	18	20	19	13	7	-1	-7	6.1
2013	-11.6	-11.1	-3.9	1.7	11.7	15	18.3	17.2	12.2	7.2	-3.3	-13.3	3.3
2014	-15.6	-13.3	-10.6	1.7	11.1	16.7	16.7	16.7	12.8	6.7	-3.9	-7.2	2.7
2015	-16.4	-19.2	-7.9	3.4	12.1	14.7	18.5	18.6	17.1	5.6	3.3	-0.5	4.1
2016	-10.5	-11.5	-3.4	-0.1	11.9	15.8	19.1	20	14.7	7.3	3.2	-8.3	4.9
2017	-8.7	-6.5	-8.3	5.8	10.3	15.2	18.4	16.2	15	10.2	-2.6	-15.7	4.1
Average	-11.3	-11	-4.5	3.4	12.2	16.0	19.0	18.2	14	7.3	-0.2	-8.3	4.6

Table 10: Heating Degree Days at North Bay Airport (Degree Days with temperatures below 18°C)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
2010	789	670	429	390	335	88	47	18	85	254	402	596	4103
2011	875	960	783	622	388	120	42	11	47	151	354	530	4883
2012	837	704	502	429	148	64	20	41	172	339	561	757	4574
2013	890	793	679	487	202	102	48	64	174	327	613	945	5324
2014	1002	854	849	478	216	70	70	73	178	340	628	761	5519
2015	996.4	1041	778	438.8	191.1	100.6	37.1	27.4	68.8	358.5	426.8	481.2	4945.7
2016	854.9	856.7	663.4	542.1	201	85.7	24.1	9.2	75.6	213.9	324.8	473.3	4324.7
2017	427.9	417.1	709	269.5	170.2	66.9	15.8	59	114.2	203.9	411.1	875.6	3740.2
Average	834.0	787.0	674.1	457.1	231.4	87.2	38	37.8	114.3	273.4	465.1	677.4	4676.7

Table 11: Cooling Degree Days at North Bay Airport (Degree Days with temperatures above 18°C)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
2010	0	0	0	12	70	57	168	131	25	2	0	0	465
2011	0	0	0	1	37	73	171	113	50	14	0	0	459

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
2012	0	0	5	0	33	64	98	53	19	1	0	0	273
2013	0	0	0	1	26	23	76	41	8	2	0	0	177
2014	0	0	0	0	10	47	34	38	16	1	0	0	146
2015	0	0	0	0	8.1	1.6	52.7	44.9	43.1	0	0	0	150.4
2016	0	0	0	0	11.7	21.6	55.4	61.9	2.1	0	0	0	152.7
2017	0	0	0	0	0.7	1.6	24.8	11.6	30.4	0	0	0	69.1
Average	0	0	0.625	1.75	24.5625	36.1	84.9875	61.8	24.2	2.5	0	0	236.5

Tables 9, 10, and 11 show that the weather in 2017 was cooler than it was in 2012. It was also relatively the same average temperature 2017 relative to years previous. Heating degree days are significantly lower than the long term average (4,676.7) at 3,740.2 while cooling degree days are significantly lower than the long term average (236.5) at 69.1. These impact energy demands.

Table 12: Monthly and Annual Precipitation

	2011 (mm)	2012 (mm)	2013 (mm)	2014 (mm)	2015 (mm)	2016 (mm)	2017 (mm)
January	62.8	82.2	72.4	69.3	0.9	54.1	14.2
February	60.6	44	37.6	24.4	3.8	43.2	36.8
March	73.4	57	32.8	55.9	20.4	109	16.1
April	133.4	70	90.2	67.3	74.2	24.3	106
May	51.6	23.8	57.4	49.3	79.1	48.8	92.8
June	90.2	115.4	59.2	175.8	57.4	52.9	86.1
July	62.8	61.8	82.3	241.8	53	77.6	71.1
August	43.2	145.8	91.7	88.9	92.3	105.8	149.4
September	79.4	102	68.8	86.4	45.2	67.9	70.1
October	126.8	126	102.9	77.2	85.7	33.6	104.9

	2011 (mm)	2012 (mm)	2013 (mm)	2014 (mm)	2015 (mm)	2016 (mm)	2017 (mm)
November	106.4	54.2	63.7	58.4	66.5	22.7	59.5
December	81.4	79.9	31	22.6	69.1	26.5	41.3
Total	972	962.1	790	1017.3	647.6	666.4	848.3

Table 12 shows an increase in precipitation in 2017 compared to the two years previous, and a decrease compared to the baseline (2012). The peak year for precipitation was 2014, which had 169mm more rain than 2017 and 55.2mm more than the baseline (2012).

Appendix 3: Greenhouse Gas Emissions Reductions

Table 13: Summary of Annual Energy Consumption and GHG Emissions from 2007-2017

2007	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Annual Total	Cumulative Total
Total Quantity Used	23,093,113 kWh	1,359,460 m ³	1,489,778 L		
Total GHG Produced (tons CO2e)	17,181	2,641	2,972	22,794	22,794

2008	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Annual Total	Cumulative Total
Total Quantity Used	22,190,198 kWh	1,525,287 m ³	1,492,901 L		
Total GHG Produced (tons CO2e)	16,510	2,963	2,978	22,451	45,245
Reduction Quantity Achieved	902,915 kWh	-165,827 m ³	-3,123 L		
Percent Reduction Achieved	3.9%	-12.2%	-0.2%		
GHG Reduction Achieved (tons)	671	-322	-6	343	343

2009	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Annual Total	Cumulative Total
Total Quantity Used	21,726,052 kWh	1,396,585 m ³	1,413,296 L		
Total GHG Produced (tons CO2e)	16,164	2,713	2,820	21,697	66,942
Reduction Quantity Achieved	464,146 kWh	128,702 m ³	79,605 L		
Percent Reduction Achieved	2.1%	8.4%	5.3%		
GHG Reduction Achieved	1,017	-72	152	1,097	1,440

2010	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Annual Total	Cumulative Total
Total Quantity Used	21,839,169 kWh	1,246,338 m ³	1,398,238 L		
Total GHG Produced (tons CO2e)	16,248	2,421	2,790	21,459	88,401
Reduction Quantity Achieved	113,117 kWh	150,247 m ³	15,058 L		
Percent Reduction Achieved	0.5%	10.8%	1.0%		
GHG Reduction Achieved	933	220	-18	1,135	2,575

2011	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Annual Total	Cumulative Total
Total Quantity Used	22,193,977 kWh	1,427,922 m ³	1,381,524 L		
Total GHG Produced (tons CO ₂ e)	16,512	2,774	2,756	22,042	110,443
Reduction Quantity Achieved	354,808 kWh	-181,584 m ³	16,714 L		
Percent Reduction Achieved	1.6%	-14.6%	1.1%		
GHG Reduction Achieved	669	-133	16	552	3,127

2012	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Annual Total	Cumulative Total
Total Quantity Used	21,608,081 kWh	1,485,839 m ³	1,35,793 L		
Total GHG Produced (tons CO ₂ e)	16,067	2,871	2,703	21,641	132,084
Reduction Quantity Achieved	585,896 kWh	-57,917 m ³	26,731 L		
Percent Reduction Achieved	2.6%	-4.1%	1.8%		
GHG Reduction Achieved	1,114	-230	69	953	4,080

2013	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Annual Total	Cumulative Total
Total Quantity Used	20,581,037 kWh	1,433,250 m ³	1,339,073 L		
Total GHG Produced (tons CO ₂ e)	15,312	2,784	2,672	20,768	152,852
Reduction Quantity Achieved	1,027,044 kWh	52,589 m ³	15,720 L		
Percent Reduction Achieved	4.8%	3.5%	1.1%		
GHG Reduction Achieved	1,869	-143	100	1,826	5,906

2014	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Annual Total	Cumulative Total
Total Quantity Used	20,227,559 kWh	1,701,498 m ³	1,726,126 L		
Total GHG Produced (tons CO ₂ e)	15,049	3,305	3,444	21,798	174,650
Reduction Quantity Achieved	1,380,522 kWh	-215,704	-387,053		
Percent Reduction Achieved	6.0%	-15.9%	-25.9%		
GHG Reduction Achieved	2,132	-664	-672	796	6,702

2015	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Annual Total	Cumulative Total
Total Quantity Used	20,490,045 kWh	1,417,109 m ³	1,639,764 L		
Total GHG Produced (tons CO2e)	15,245	2,753	3,271	21,269	195,919
Reduction Quantity Achieved	2,603,068 kWh	-57,649	86,362		
Percent Reduction Achieved	11.3%	-4.2%	5.8%		
GHG Reduction Achieved	1,936	-112	-499	1,325	8,027

2016	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Annual Total	Cumulative Total
Total Quantity Used	19,002,094 kWh	1,441,921 m ³	1,646,863 L		
Total GHG Produced (tons CO2e)	14,138	2,801	3,286	20,225	216,144
Reduction Quantity Achieved	4,091,019 kWh	-82,461	-7,099		
Percent Reduction Achieved	17.2%	-6.1%	-0.4%		
GHG Reduction Achieved	3,043	-160	-514	2,369	10,396

2017	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Annual Total	Cumulative Total
Total Quantity Used	18,556,633 kWh	1,748,034 m ³	1,725,667 L		
Total GHG Produced (tons CO2e)	13,806	3,395	3,443	20,644	236,788
Reduction Quantity Achieved	4,536,480 kWh	-388,574	-78,804		
Percent Reduction Achieved	19.6%	-28.6%	-5.3%		
GHG Reduction Achieved	3,375	-754	-671	1,950	12,346

2007-2017 Cumulative	Electricity (kWh)	Natural Gas (m ³)	Transportation Fuel (L)	Total
Total Quantity Used	231,507,958 kWh	13,064,636 m ³	16,608,023 L	
Total GHG Produced (tons CO2e)	172,232	31,421	33,133	236,788
Reduction Quantity Achieved	11,967,996 kWh	-818,178 m ³	-235,889 L	
Percent Reduction Achieved	5.17%	-6.3%	-1.4%	
GHG Reduction Achieved	16,759	-2,370	-2,043	12,346

Figure 15 illustrates the progress made in the reduction of GHG's generated by fossil fuel consumption by the City of North Bay from 2007 to 2017.

Figure 15: Annual Greenhouse Gas Emissions 2007-2017

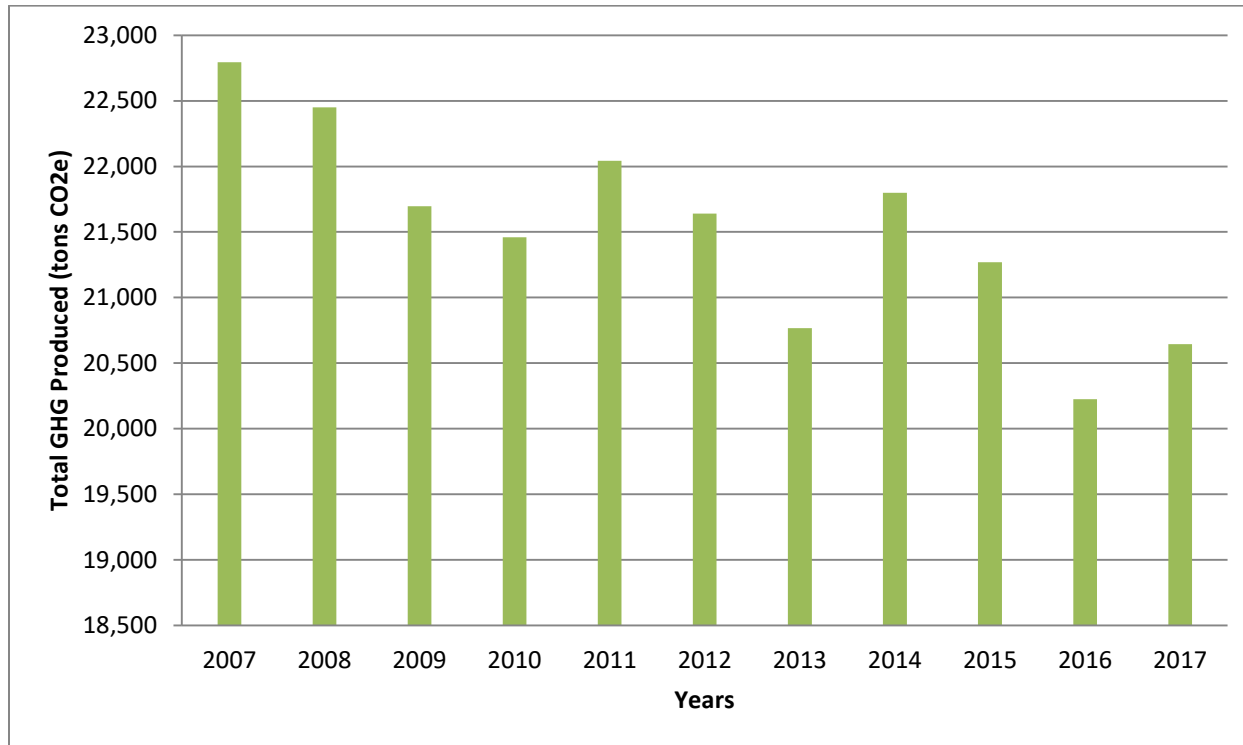
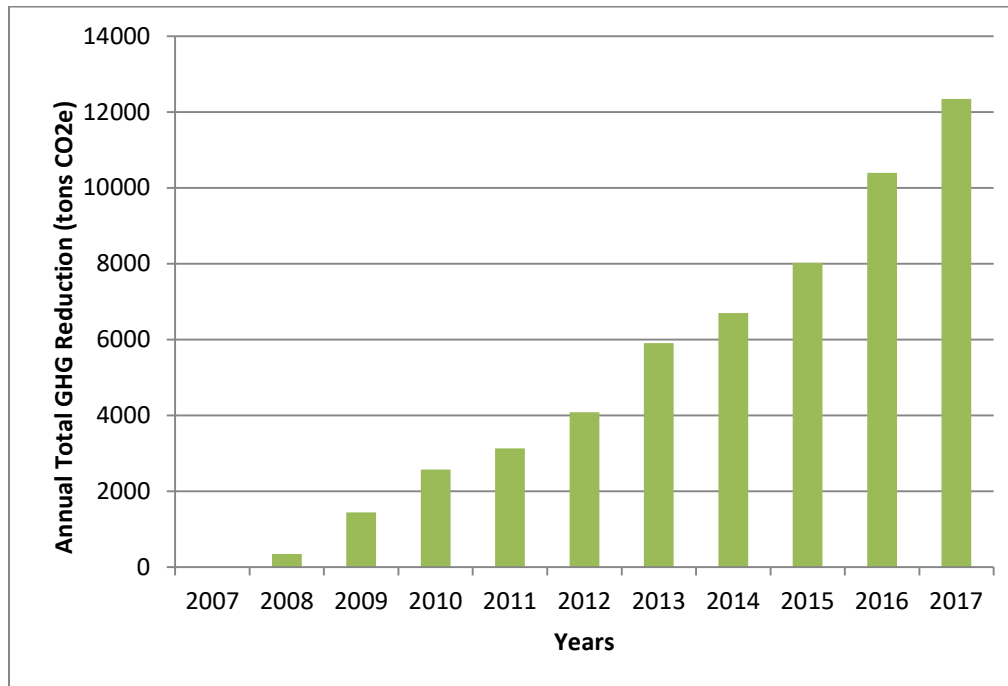


Figure 16 illustrates the cumulative annual reduction of GHG's from 2007 to 2017. By 2017, the City has decreased the annual amount of GHG's generated by a total of 12,346 CO_{2e} tonnes.

Figure 16: Cumulative Reduction of GHG's from 2007 to 2017



Appendix 4: Initiated, Completed, and Future Major Energy Projects

Table 14: The City of North Bay's Completed Major Energy Projects

Project	Costs	Savings Realized	Est. Simple Payback
Replace HPS Street lights with LED Fixtures (2013)	\$2,800,800	\$281,000/yr.	13 years
Replaced Decorative lights	\$200,000	\$37,500/yr.	6 years
Lighting & heating upgrades at YMCA Aquatics Center	\$750,000	\$75,000/yr.	10 years
EMP Mini-Hybrid on City Transit Buses	\$268,000	\$151,400/yr.	2 years
Cogeneration Project at Wastewater Treatment Plant	\$3,900,000	\$150,940/yr.	26 years
Driver Training using Smart Driver Program	\$50,000	30,000 L/yr.	2 years

Table 15: The City of North Bay's Initiated and Future Major Electricity Reduction Projects

Projects	Potential Savings
*Install Residential Water Meters (bill based on use)	500,000 kWh/yr.
Continue with relamping/controls in City buildings	25,000 kWh/yr.
Eliminate Janey Avenue Pumping Station	12,650 kWh/yr.
*Parking lot lighting review	Being Evaluated
*Education and Awareness Training with AMO/LAS	Being Evaluated
Study Sewage Plant low lift pumping system	Being Evaluated
Study improved use of Building automation systems	Future Evaluation
Study to improve water distribution system	Future Evaluation

Table 16: The City of North Bay's Future Major Natural Gas Reduction Projects

Projects	Potential Savings
Insulate/Seal Digesters/Replacement of STP Boilers	25,000 m3
Insulate/Seal Garages at Public Works/Automatic Door Closure	25,000 m3
Insulate Roof of City Hall	10,000 m3

Insulate Roof at Fire Station #4	5,000 m3
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Table 17: The City of North Bay’s Initiated and Future Major Transportation Fuel Reduction Projects

Projects	Potential Savings
*Reduce Idling	35,000 L/year
*Reduce Vehicle Weight	10,000 L/year
*Cull older inefficient vehicles/ Reduce fleet size	7,600 L/year
*Enhance vehicle preventative maintenance	5,000 L/year
*Improve traffic flows/automate signalization system	Being Evaluated

Note: Projects marked with an asterisk (*) are currently ongoing.