Municipal Energy Plan

2016

A COLLABORATION BETWEEN THE CITY OF TEMISKAMING SHORES AND VIP ENERGY SERVICES, INC.

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EXECUTIVE SUMMARY

High-quality, reliable, efficient, low cost energy services are fundamental to the overall competiveness and environmental impact of cities and towns. In the future, energy prices globally are likely to be volatile, with an underlying upward trend. Concerns over climate change resulting from the greenhouse gases caused by energy use are growing, and are increasingly the subject of national and international legislation and agreements. Canada has the highest energy use, and the highest greenhouse gas emissions, per capita in the industrialized world[1]. As a major energy exporter, it also makes no sense for Canada to waste energy domestically when it could be sold on the global market at increasingly attractive prices. Eighty percent of Canada's energy is used in urban centres. Municipalities that embrace the challenges of energy efficiency, climate change and overall energy costs will create major and sustainable opportunities for their residents and businesses.

The City of Temiskaming Shores today is a rural community of about 10,600 inhabitants, anticipating to grow to about 14,000 by 2031. An aggressive economic development plan aims to create 2,600 jobs by 2031. Despite this growth, the City is committed to preserve its heritage and rural charm through the preservation of heritage buildings and natural areas as outlined in the City's Official Plan[2]. This growth may require the adoption of sustainable community design practices that call for attractive, higher density mixed-use walkable neighbourhoods served by a variety of transportation choices. Through their basic design and lessening the dependence on the car, this kind of development is both socially attractive and more energy efficient.

The City of Temiskaming Shores recognizes the vital importance of a sustainable, long-term approach to energy. The Municipal Energy Plan (MEP) aims to ensure its energy use and energy services will make it one of the most attractive Canadian communities in which to live, work, play, learn and invest. At the same time the City's MEP will ensure that its impact on the environment will always meet, or be, global best practice. The MEP is a critical element in supporting successful growth of the City.

The Plan outlines specific and broad measures that will be implemented within the City that will reduce the overall energy used, the emissions levels per capita, and reduce or negate the impacts of future growth on both energy use and emission levels. These results will be achieved by

[1] Canada is only surpassed by Iceland and Luxemburg in terms of total energy use per capita. Energy Use (kg of oil equivalent per capita), World Bank, 2013.
[2] Official Plan, City of Temiskaming Shores, March 20 2015

implementing the MEP recommendations that ensure all of the links in the energy supply chain from the final use to the choice of energy source are as reliable, economic, efficient and clean as they can be. These recommendations build on each other and should be seen as an integrated solution. They begin with measures specifically geared towards City operations and broaden to include community wide measures.

Initiative	Priority	Timing
City of Temiskaming Shores Led Measures		
Lighting Upgrades and Standards for New Construction	High	Short-Term
Halting the Rise in Natural Gas Usage	High	Short-Term
Increase the Share of Public Transportation in the City's Modal Distribution	Medium	Medium-Term
Installing VFD's at Water Handling Facilities	Low	Medium-Term
Energy Audits, Retro-commissioning and New Building Commissioning	Medium	Medium-Term
Provide the Energy Needed for Projected Growth through Improved Energy Efficiencies	High	Long-Term
Retrofit All Municipal Buildings with High Efficiency Lighting Systems	High	Long-Term
Building Envelope Upgrades	Low	Long-Term
Community-Focused Measures		
Generating a Community Conservation Culture	High	Medium-Term
Increasing Energy Efficiency in Residential, Commercial and Industrial Sectors	High	Medium-Term
Energy Generation Expansion and Infrastructure Security	Low	Long-Term
Sustainable Land Use and Growth	Medium	Medium-Term

A springboard of commitment for decades to come, the MEP is a long-term road map that will require a sustained commitment of the present and future elected leadership of the City, community, and the District of Timiskaming to succeed. Some relatively short-term decisions around planning and energy infrastructure need to be made to secure the long-term implementation trajectory.

Immediately after the final approval of the MEP, the City is committed to put in place the necessary detailed information, guidelines and policies to ensure there is no ambiguity around what is expected.

The progress of the plan, in terms of the key goals is to attract investment, create jobs, increase energy efficiency and reduce greenhouse gas emissions, can be consistently measured and reported on a regular basis. The MEP recommendations ensure the City's overall energy structure has flexibility to add multiple renewable heating, cooling and electricity sources in the future years, further reducing the City's greenhouse gas footprint.

At least once every five years the plan's targets should be revisited to ensure they are still consistent with the overriding commitment of the City to use global best practices and act as a model for the province, the nation, and the world to show that competitive growth can occur with sensitivity for the environment and climate.

1 INTRODUCTION

The City of Temiskaming Shores has made it a priority to promote environmental sustainability and awareness. We have taken many steps towards creating an operational environment that values the minimization of the environmental impacts of our operations.

We believe that climate change is an important issue confronting the world, and accept that human activity has a major impact on our environment through our use of non-renewable energy, depletion of natural resources, and the emission of greenhouse gases. We are motivated to encourage residents, visitors and the employers to lessen their ecological footprint and accept responsibility in this regard.

The City embarked on energy conservation through a broad spectrum of inspired ideas. The steps we have taken represent a strong commitment to playing a greater role in environmental stewardship. We have developed and implemented policies that will allow us to weave 'sustainable' thinking throughout all future planning and day-to-day operations. An action-based, goal-oriented Energy Conservation and Demand Management Plan 2014 (CDM Plan 2014) has been developed to guide our transformation from inspired ideas into a strategy for all future operations and policies.

The City's CDM Plan 2014 is intended to be a guiding reference document for all initiatives and policies undertaken by our staff. The timing of the CDM Plan 2014 is aligned with Ontario Regulation 397/11 made under the Green Energy Act, 2009. The Plan contains progressive initiatives and goals stemming from other organizations and jurisdictions, and a willingness from all levels of the organization to take action. The Plan is intended to guide sustainable operations management as the City embarks on a series of both short-term and long-term action steps.

Our comprehensive CDM Plan 2014 clearly describes the conservation measures that are, or will be deployed, to reduce energy consumption. It documents answers to areas such as:

- Type(s) of energy that are used and how much is consumed,
- The nature of our energy consumption,
- Identification of specific measures to reduce consumption,

- A detailed plan to implement these measures in the short, medium, and longer terms,
- A description of the resources required to carry out our plan including the roles and responsibilities of City employees,
- A detailed Risk/Benefit analysis, and
- A detailed plan for Monitoring and Verification.

Furthermore, the City has established the goals and objectives for our Energy Conservation and Demand Management Plan 2014 as:

- To create a culture of conservation within the City facilities and operations to reduce greenhouse gas emissions and to ensure the wise use of resources,
- To promote the sustainable use of resources through:
    - Energy Conservation,
    - Energy Efficiency, and
    - Renewable Energy.
- To reduce energy operating costs through implementation of best practices and technology,
- To maximize fiscal resources through direct and indirect energy savings,
- To demonstrate sound operating and maintenance practices to reduce the environmental impact of the City's operations,
- To improve the reliability of equipment and reduce maintenance, and
- To provide a forum for discussion with the City on Energy Management to be able to explore new ideas and trends.

A natural progression from this solid foundation was the adoption of a strategy to create a Municipal Energy Plan (MEP). A MEP is a comprehensive long-term plan to improve energy efficiency, reduce energy consumption and greenhouse gas emissions, foster green energy solutions and support the City's economic development. The MEP looks at energy use across the entire municipality and includes residential, commercial, industrial, transportation and public-sector energy use (municipal operations and energy and water infrastructure). Energy conservation for all sectors are examined within a broader context of the built environment, land use planning, growth planning and the generation and transmission infrastructure. Further, the MEP enables the City to communicate its commitment to other Regional and Provincial Energy Plans.

Municipalities play a significant role in determining how energy is used. Efficient energy use is a Provincial priority and has been communicated in print via ***the Planning Act***[3], the ***Provincial Policy Statement, 2005***[4], and the ***Places to Grow Act, 2005***[5].

This MEP 2016 begins with a review of the historic energy consumption patterns at each of our facilities. The City has approached this strategic plan with consideration for its social, economic and environmental responsibilities and is committed to creating a culture of conservation and efficiency within the Community.

[3] Section 2 of the Planning Act states the "Supply, efficient use and conservation of energy" is a matter of provincial interest; Section 7 identifies energy efficiency as an eligible cost of a Municipal improvement plan; and Section 6 states that subdivision planning shall be designed to optimize the available supply, means of supplying, efficient use and conservation of energy efficiency.
[4] Section 1.8 of the Provincial Policy Statement, 2005 sets out a number of policies requiring planning authorities to support energy efficiency.
[5] Section 6 of the Places to Grow Act, 2005 lists the conservation of energy as a consideration in growth plans.

2 AN OVERVIEW OF THE CITY OF TEMISKAMING SHORES

The City of Temiskaming Shores is comprised of the three former municipalities of Haileybury, New Liskeard and Dymond. In 2004, the three municipalities came together to form the new municipality of Temiskaming Shores, creating a bustling hub of economic and cultural prosperity in North-Eastern Ontario. The community is located along the shores of Lake Temiskaming and has large agricultural, forestry and mining industries within and around the region. The City is home to approximately 11,000 residents and is a popular throughway and tourist destination for those travelling through Northern Ontario.

The City's economic outlook, based on our Community Profile:

- The City's population is projected to grow from 10,600 (2006) to 13,760 by 2031.
- Creating 1,540 new housing unit by 2031.
- Employment growth is projected to create 2,600 new export-based jobs by 2031.
- The available land supply will provide for an estimated 2,078 residential building lots and 157 ha. (388 ac.) for new industrial, commercial and institutional development.

2.1 Vision

This Municipal Energy Plan was created with our defining goals in mind.

The City will continue to reduce energy consumption and costs through the wise use of energy. This will involve education, awareness and an understanding of energy management within the City.

"To create a culture of conservation and to continually reduce energy consumption and the associated carbon footprint through efficient use of resources and energy, while maintaining an efficient and effective level of service for the general public."[6]

Using these guiding principles, the City has undertaken measures to reduce our Energy Use and Carbon Footprint while taking a leading role in Sustainable Operations and Development. This Vision can be achieved through the integration of energy efficient facilities, infrastructure, operational strategies and a shift in the awareness and knowledge of energy in the community.

[6] Energy Conservation and Demand Management Plan, City of Temiskaming Shores, 2014

This document will serve as our roadmap to implement various Energy Conservation Measures while improving our sustainable practices. The technology and innovation put in place under these initiatives will lead the way and educate our community in the important new frontier of Energy and Environmental Management practices. We will not only foster this culture, but help shape its future.

2.2 Importance of a Municipal Energy Management Plan

Energy Management has become increasingly important in a global sense. A major portion of the energy used within our buildings is generated from fossil or non-renewable fuels. In addition to depleting scarce resources, the continuous use of fossil fuels is also attributed to other problems with pollution and global warming.

Global warming can at least, in part, be described as the effect of pollution on the climate. Primarily, the burning of fossil fuels (coal, oil, and gas) causes emissions of large amounts of greenhouse gases to the atmosphere, of which the most prevalent is carbon dioxide (CO_2). These gases absorb infrared radiation emitted by the earth's surface and act as "blankets" over the atmosphere, keeping the climate warmer than it would be otherwise. Global warming leads to problems such as melting of the polar ice cap and a subsequent rise in sea levels, creating more arid climates where freshwater resources are depleted and crop patterns are altered, and decreased air quality and smog leads to an overall reduction in the quality of human health.

Even though alternate sources of renewable energy, which are more environmentally friendly, are being explored, the use of these technologies is not yet widespread enough to eliminate our dependence on fossil fuels. It is, therefore, important for us to reduce our energy consumption in order to minimize our environmental impact. Reducing our overall energy consumption, in addition to reducing our environmental footprint, will also help reduce our operating costs.

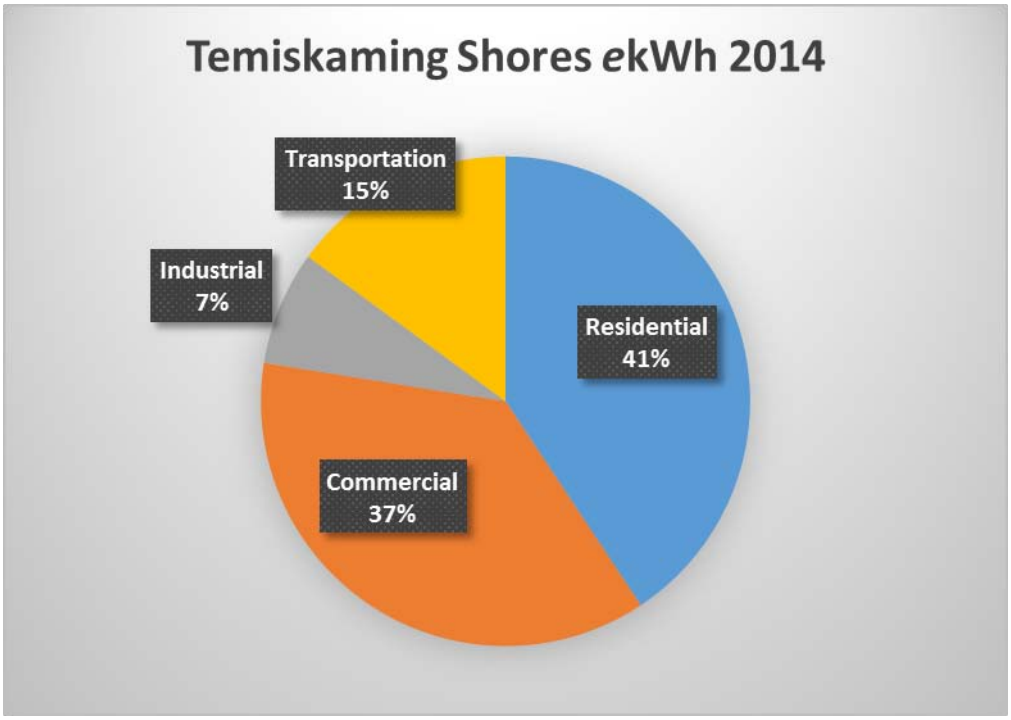
The Canadian Green Building Council notes that design, operation, and behaviour each share a one-third responsibility for long-term energy performance. This Municipal Energy Plan is the key to a cohesive strategy for all.

3 CITY OF TEMISKAMING SHORES ENERGY PERFORMANCE

3.1 Energy Consumption

The predominant forms of energy consumed within the City are electricity, natural gas, and transportation fuels such as gasoline and diesel. Hydro One Networks Incorporated (H1) and Unions Gas Limited (UG) supply and deliver the electricity and natural gas, while gasoline and diesel are provided by multiple vendors within the City's borders. Through data collected and submitted to the Ministry of Energy, and data provided by the City, a comprehensive understanding of how energy is consumed by the approximately 10,600 residents of the City can be generated. Due to a lack of comprehensive transportation studies conducted within the City, the energy consumed by the transportation sector has been estimated from census data and provincial averages of fuel economy and annual travel distances. Should such a study be conducted, the fraction of energy consumed by this sector may differ from the data presented at the time of writing this MEP. It should also be noted that a lack of data from other fuel sources, such as fuel oil, has led to these fuel types being omitted from this chart. However it is expected that their contribution would not drastically alter the overall energy distribution with the City.

Figure 3-1 Total Energy Consumption Distribution



Residential and commercial buildings represent the greatest opportunities for improvement in the City and analysis has shown that overall consumption grew by 3% from 2013 to 2014. Energy distribution did not significantly change from year to year. On a per capita basis, Temiskaming shores consumes approximately 33 *e*MWh/capita. This is significantly higher than the Ontario Average of approximately 10 *e*MWh/capita[7] and is closer to averages seen in larger cities like Toronto (29 *e*MWh/capita)[8].

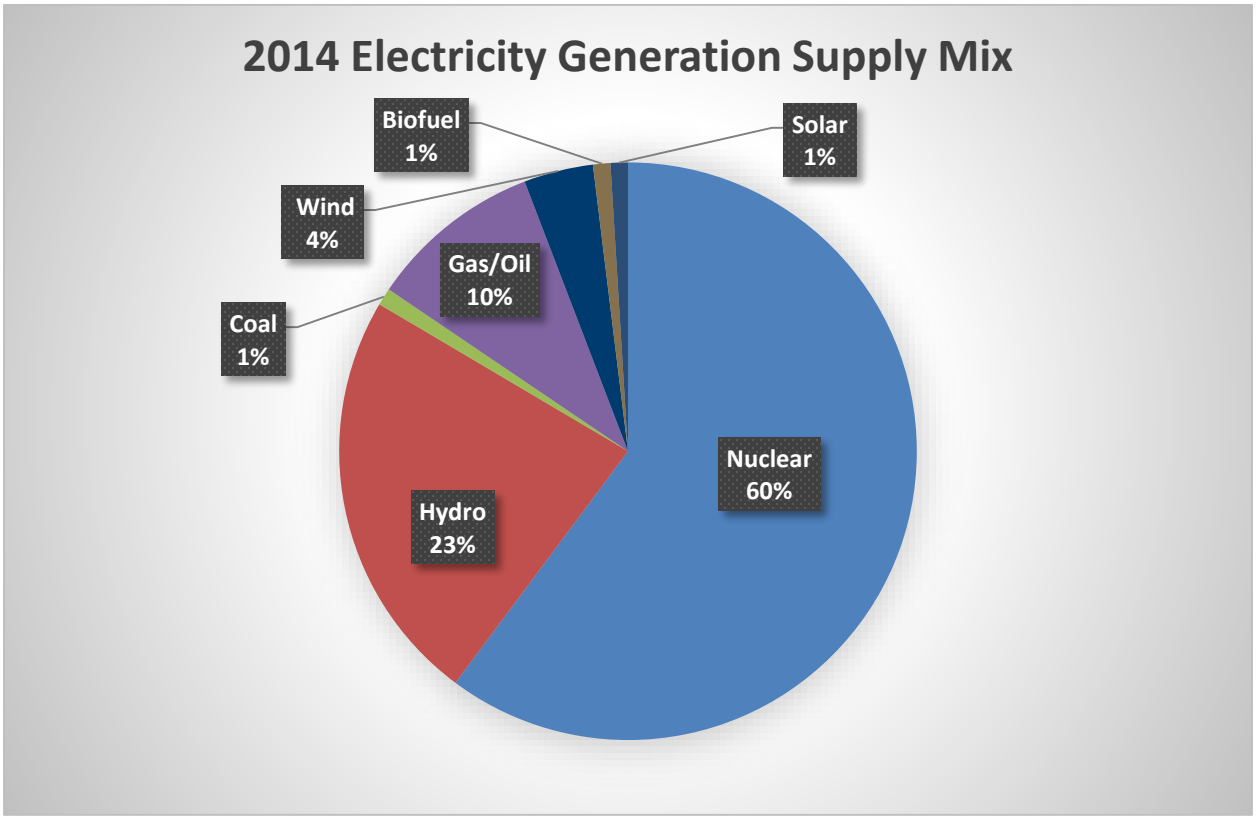
3.1.1 Electricity

H1 owns and operates one of the largest electrical grids in the world and services communities all across Ontario. H1 is committed to managing its environmental impacts and delivering social and societal benefits while maintaining a strong economic performance. Recently, in 2015, H1 received a "Sustainable Electricity Company" designation by the Canadian electricity Association in recognition of these efforts.

The energy supply mix in Ontario is an ever evolving mixture which has changed drastically in the past few years. As Ontario has moved away from coal-fired power generation, more renewable energy sources are beginning to emerge as contributors to the overall energy supply. Bio-mass coal plant conversions, wind farms and solar plants are now all represented in the power generation grid and will continue to grow, reducing the environmental impacts of our electrical generation. Nuclear generation has long been a part of Ontario's energy supply but our nuclear generating stations are aging and will require costly refurbishment in the coming years. To avoid the high costs associated with new nuclear stations, Ontario will increasingly look to new, innovative ways to sustainably support our growing energy demand. The electrical infrastructure itself is also aging. This will lead to repairs, maintenance and refurbishments of substations, power lines, and generating stations. All of this activity will reduce the funding available for improving or expanding the existing infrastructure and place further pressure on Ontario to reduce this growing demand. Below is a representation of the energy supply mix as reported by the IESO for the 2014 calendar year[9].

[7] Ontario electricity Options Comparison, Strategic Policy Economics, 2013
[8] Toronto's Sustainable Energy Plan, 2007
[9] http://www.ieso.ca/Pages/Power-Data/2014-Electricity-Production-Consumption-and-Price-Data.aspx

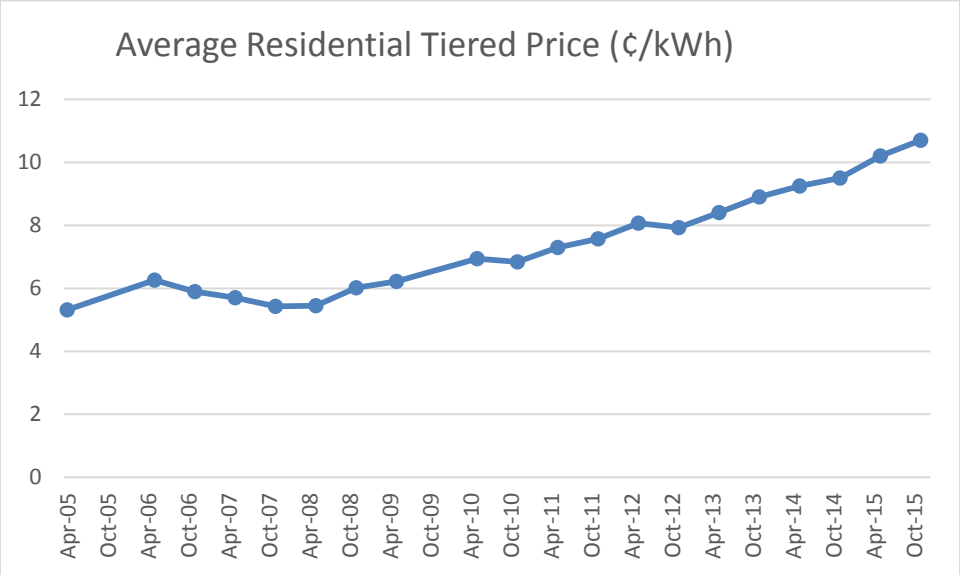
Figure 3-2 IESO Ontario Supply Mix[10]



As Ontario has attempted to correct its electricity pricing to better reflect true market value, the costs of residential electricity has been steadily rising. These rising costs have been compounded by the decision to purchase renewably produced electricity at a premium over more traditionally produced electricity. Historical residential electricity prices are shown in the table below.

[10] http://www.ieso.ca/Pages/Power-Data/2014-Electricity-Production-Consumption-and-Price-Data.aspx

Figure 3-3 Residential Electricity Pricing[11]

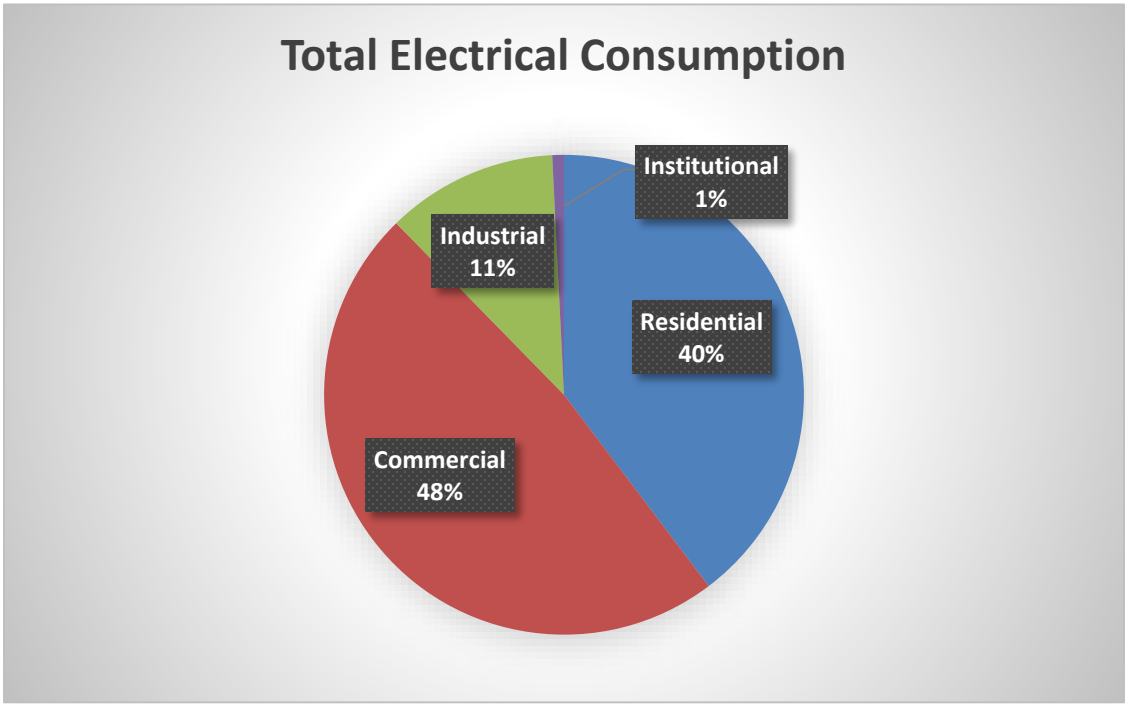


The City has three large solar plants within its borders, Liskeard 1, 3 & 4, totalling 30 MW of power generation. These plants are directly tied to the grid and represent 1.2% of the total contracted generation capacity in Ontario[12]. These large solar installments reflect the City's commitment and openness to improving and growing the sustainability of Ontario's energy supply.

Within the City of Temiskaming Shores, electricity consumption accounts for 28% of the total energy used and totalled approximately 99,000 MWh in 2014. The table below further defines where the electricity was consumed and this data is also presented geographically in ***Section 5.1.2:*** *Energy Mapping* of the MEP. The majority of electrical consumption is being used by the Commercial and Residential Sectors. A small percentage of electricity consumption is exhibited by industrial and institutional facilities.

[11] http://ontarioenergyboard.ca/OEB/Consumers/Electricity/Electricity+Prices/Historical+Electricity+Prices
[12] IESO Supply Overview http://www.ieso.ca/Pages/Power-Data/Supply.aspx

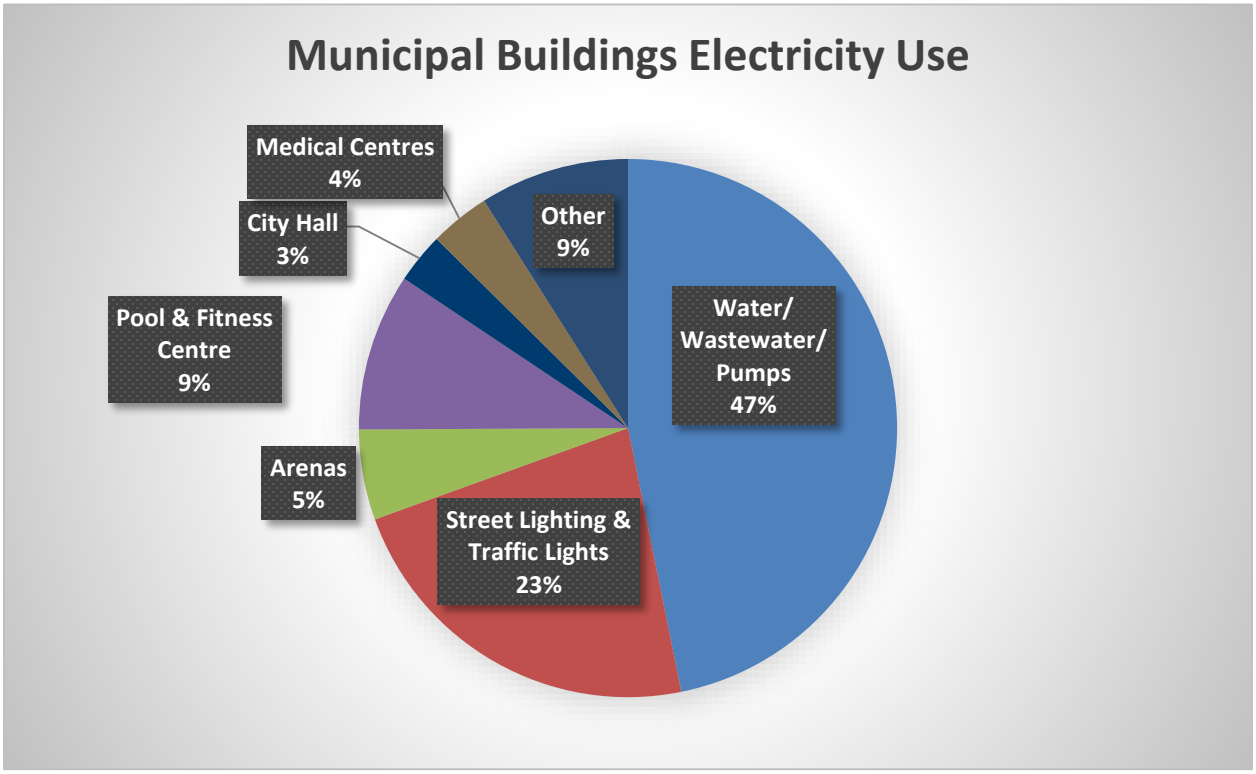
Figure 3-4 Electrical Consumption Distribution[13]



Municipal buildings represent about 7% of the total electrical consumption, and 15% of electricity consumed in the Commercial sector. This highlights the significant role that City facilities play in the electrical profile of the Municipality and the amount of positive impact the conservation measures outlined in this MEP will have in the largest consumption sector. Half of the City's electricity is used in water supply and wastewater treatment facilities and over a quarter is used in street lighting. Consumption distribution among municipal facilities is shown below. These high consumption categories actually bode well for the municipality as they are areas in which energy efficient retrofits are popular and decreasing in price. LED lighting is becoming more and more popular and prices are dropping, allowing for cities to take advantage of the large electrical savings that can be achieved with high efficiency lighting systems. Pumping stations can reduce their consumption through re-commissioning and higher efficiency motors, although these projects tend to have longer payback periods. In any case, the data below will help to guide the City's decisions on energy conservation measures as we move through the MEP.

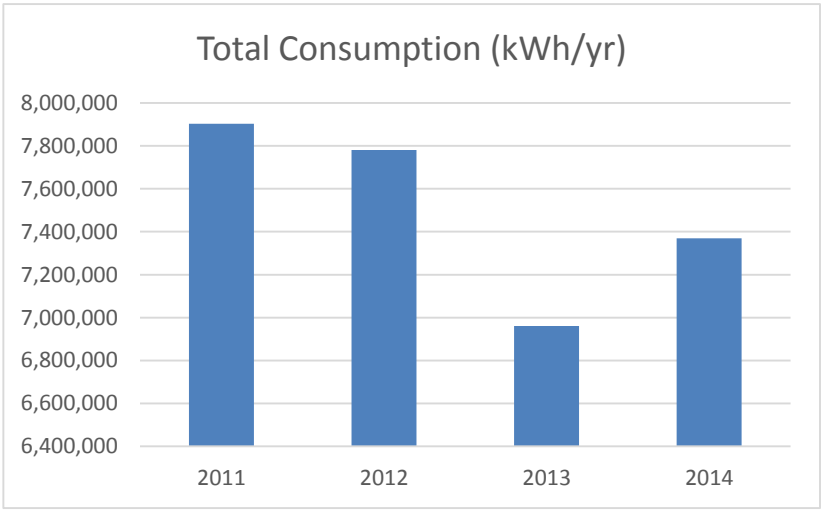
[13] H1 supplied Billing Data

Figure 3-5 Electricity Use by Municipal Building Type[14]



Historically, the City has seen a reduction in electrical consumption by municipal facilities over the last 4 years. 2013 saw the largest reduction from the previous year, largely helped by the City's work at its indoor recreational facilities in New Liskeard, which resulted in large consumption reductions. These gains were somewhat negated by the addition of new street lighting in 2014, however the City continues in a downward trend of electrical consumption.

Figure 3-6 Total Yearly Electrical Consumption



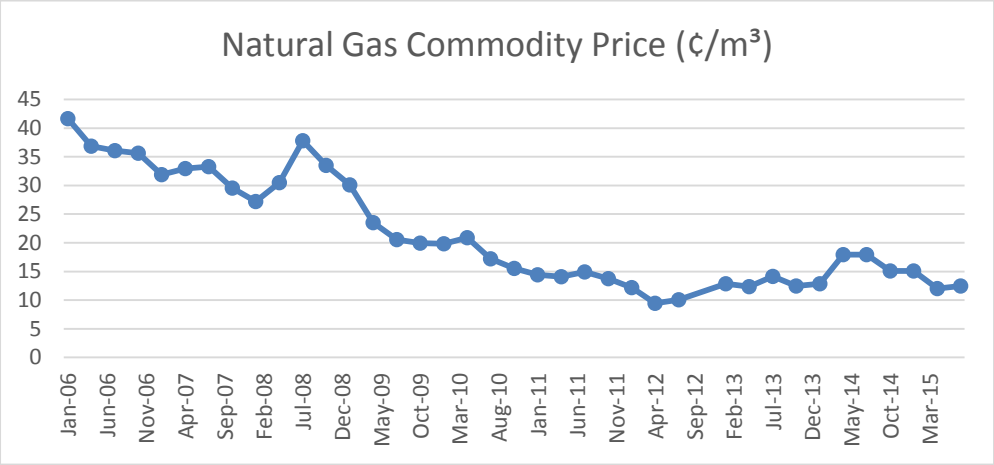
[14] Hydro One supplied Billing Data

3.1.2 Natural Gas

Union Gas is one of Ontario's largest providers of natural gas, with pipelines stretching across the province. Union gas serves 1.4 million residential commercial and industrial customers in more than 400 communities across northern, southwestern and eastern Ontario. Union Gas's storage and transmission business offers a variety of storage and transportation services to customers at the Dawn Hub, the largest integrated underground storage facility in Canada and one of the largest in North America. The Dawn Hub offers customers an important link in the movement of natural gas from Western Canadian and U.S. supply basins to markets in central Canada and the northeast U.S.

Historically, natural gas prices have been dropping in Ontario. This is largely due to the influx of supply from non-traditional natural gas reserves being exploited through new hydraulic fracturing techniques. This increase in supply has reduced consumer pricing and made natural gas heating and electricity generation more attractive. This trend is worrisome in the context of carbon emissions as natural gas is a relatively high GHG producer when compared to electricity produced in Ontario. One kWh of electricity from the provincial power grid generates approximately 0.096 kg of GHG emissions while 1 *e*kWh produced via natural gas will generate approximately 1.02 kg GHG[15]. It is also counter-productive to conservation efforts as the low prices will cause projects which displace energy consumption away from natural gas will have increased payback periods.

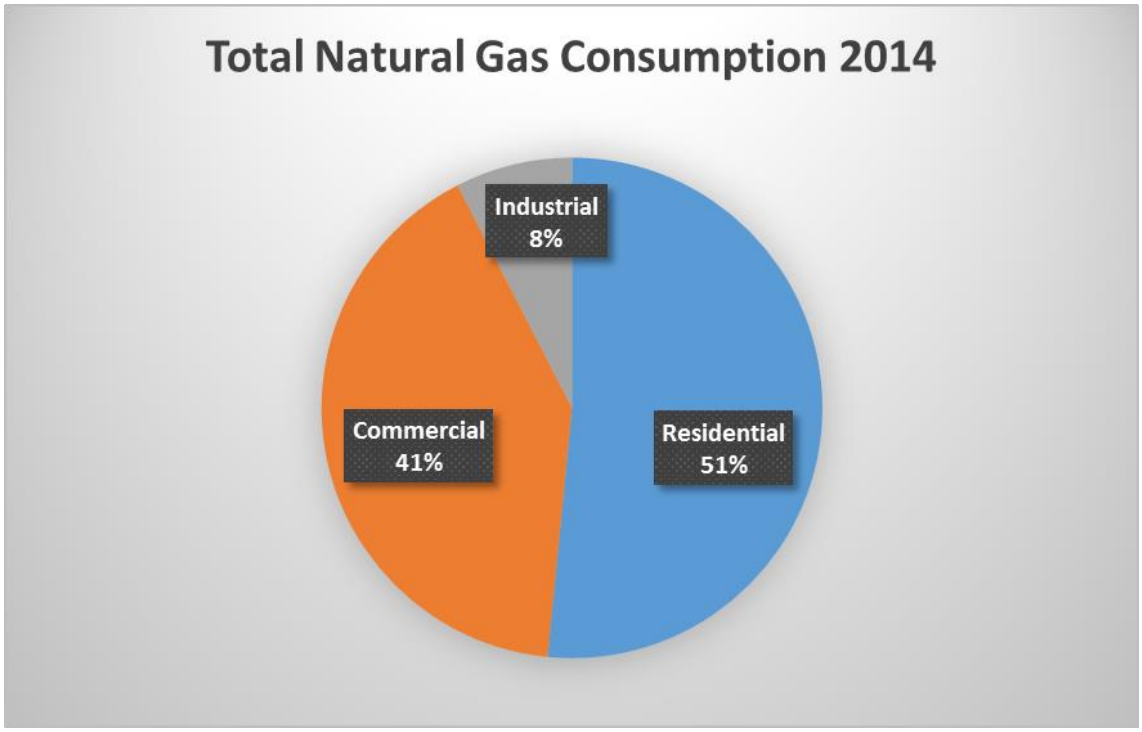
Figure 3-7 Natural Gas Pricing[16]



[15] When using conversion rates used in the Ministry of Energy Emissions Template
[16] http://www.ontarioenergyboard.ca/OEB/Consumers/Natural+Gas/Natural+Gas+Rates/Natural+Gas+Rates+-+Historical

In Temiskaming Shores natural gas use accounts for 200 million ekWh or 58% of the total energy use. This use is distributed into the different zoning types as shown in the figure below.

Figure 3-8 Natural Gas Consumption Distribution[17]

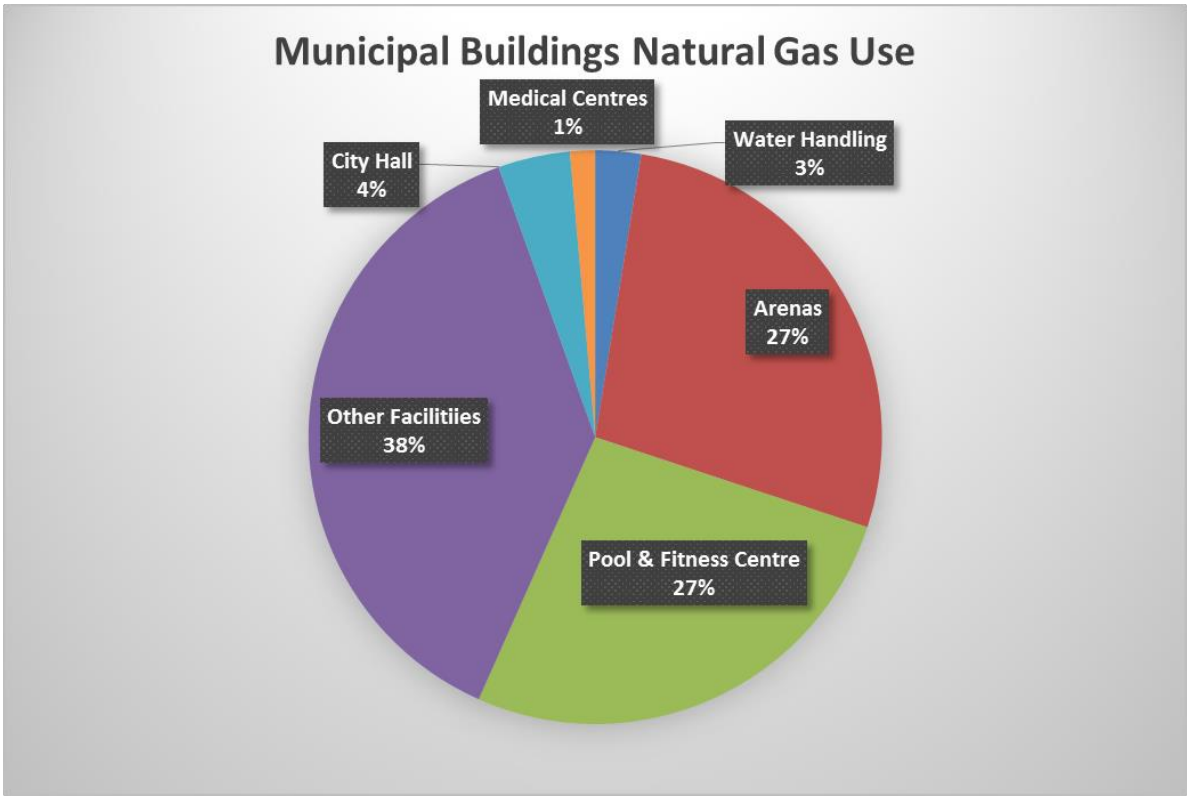


Natural gas consumption is primarily located in the commercial and residential sectors with only minimal contribution from industry. This is largely due to the increased heating requirements of the local climate and residential and commercial natural gas burning furnaces. This offers opportunity for the City to invest in greater thermal efficiencies of buildings and boilers to help reduce natural gas use.

The municipal buildings in Temiskaming Shores only account for approximately 5% of this total consumption. This use is distributed into the facility categories shown in the figure below. With Arenas, Pools, and Fitness Centres accounting for over 50% of the total, there is significant room for improvement in these process heavy facilities. Boiler upgrades, operational changes and the incorporation of solar water heating for pools can all have significant impact on the overall usage at these facilities.

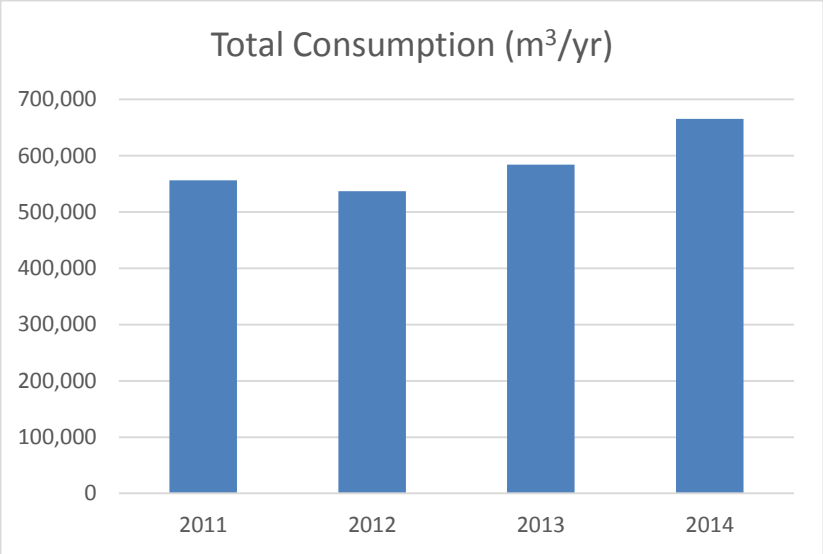
[17] Union Gas supplied bill data

Figure 3-9 Natural Gas Use at Municipal Buildings[18]



Looking at the historical natural gas usage of municipal facilities, we can see that consumption levels have been on the rise. This is in line with the dropping commodity prices and the reduction in payback periods for commodity switching projects. While this is a financially appealing trend in the short term, caution must be taken when placing so much stock in a low commodity price. As with any commodity, price will fluctuate, and placing too much energy inventory into natural gas could backfire if prices were to return to historical levels. From an environmental stand point, this trend is also worrisome as natural gas combustion generates much more GHG on a

Figure 3-10 Total Yearly Natural Gas Consumption



[18] Union Gas supplied bill data

per kW basis than does electricity from Ontario's electrical grid. Going forward the City will need to carefully balance the financial incentives of cheaper fossil fuel energy sources with the social responsibility of reducing GHGs.

3.1.3 Transportation

In Canada, transportation accounts for approximately 31% of total energy use and 37% of greenhouse gas emissions[19]. In Ontario, transportation is the single largest contributor of GHG emissions, accounting for over 30% of totals[20]. Transportation includes vehicles used for public transportation, personal use and industrial uses. This large fraction of total energy usage in Canada is not reflected in the data for Temiskaming Shores, with transportation accounting for only approximately 15% of the total energy use, around 50 million *e*kWh annually, and only 23% of total emissions.

Historically, transportation trends have seen little change in the City over the last 20 years, with public transit never accounting for more than 2% of total transportation methods. According to Statistics Canada, Temiskaming Shores' vehicle ownership rates have also been relatively constant with approximately one third of all residents reporting vehicle ownership in 2011. This number has held relatively stable since 2001, showing only a slight downward trend. Compared to the provincial average of 0.84 vehicles/capita[21], the City's average of only 0.29 vehicles/capita is substantially less and contributes to the much smaller overall energy usage of this sector. In fact, the slight downward trend of vehicle ownership per capita is counter to provincial trends. While Ontario saw per capita ownership rise from 0.53 to 0.84 over the past ten years[22], the City's per capita rate has been slowly declining. Yet even with these characteristics, transportation energy still accounts for nearly one quarter of all emissions, highlighting the harmful effects of Canadian driving culture and the need for cleaner, more efficient vehicles.

Year	Vehicles per Capita
2011	0.29
2006	0.33
2001	0.33

[19] Energy Efficiency Trends in Canada, 1990 to 2010
[20] Driving Down Carbon. Pembina Institute. 2009
[21] Statistics Canada, 2014
[22] Canadian Vehicle Survey, Natural Resources Canada, 2005

Figure 3-11 Temiskaming Shores Modal Transportation Distribution[23].

Mode of Transportation to Work					
	Car, truck or van - as a driver	Car, truck or van - as a passenger	Public transit	Walked or Biked	Other methods
2011	76%	8%	2%	11%	2%
2006	73%	9%	2%	15%	1%
2001	76%	8%	2%	14%	1%
1996	79%	8%	2%	11%	0%

Provincially, primary drivers account for 70% of transportation to work modes with 13% using Public Transit. While these provincial numbers are buoyed by the large populations using public transportation to and from the GTA, the above data does highlight the need from improved public transportation within Temiskaming Shores. Efforts to improve public transport are already underway however, with the City forming a transit committee to modernize the City's transit system. The City has also purchased four new buses which are replacing the older school bus style transit buses that were previously in use. These purchases, combined with the expansion of transit routes and additional stops should increase ridership within the City. This progress can be tracked through the Census program in the coming years.

The median distance travelled to work in the City of Temiskaming Shores grew 43% from 2006 to 2011 to 10.5 km, which is higher than the Canadian median of 7.6 km and the Ontario median of 8.7 km. This can partially be attributed to the geography of the municipality, with many residents living outside of the city centers.

3.2 Carbon Footprint

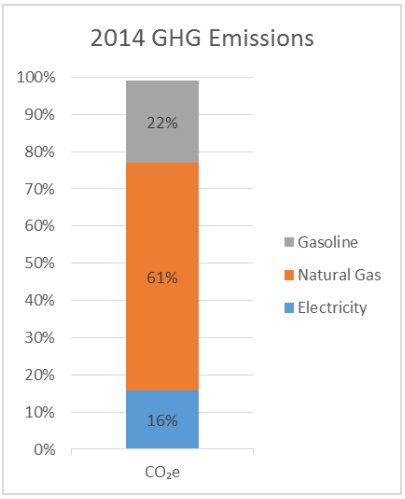
One of the most important steps toward sustainability is the understanding of our current energy usage patterns and carbon footprint. In order to allow the City to quantify its environmental impact, we look at our resource consumption and contribution to global warming through greenhouse gas emissions. These factors create a measure known as our carbon footprint.

[23] Statistics Canada, Census Data, 1996, 2001, 2006, 2011

What is the importance of tracking CO_2 Equivalent?

The dominant man-made greenhouse gas, Carbon dioxide (CO_2), is emitted when fossil fuels are burned in homes, vehicles, factories, or power stations. But there are other greenhouse gases such as Methane (CH_4) and Nitrous oxide (N_2O). These are much more potent than CO_2 but are less prevalent.

In order to simplify the estimation of the City's carbon footprint for an activity or product, and compare data in a meaningful way, all carbon footprint estimates are written in terms of Carbon dioxide equivalent or CO_2e. This means that the total climate change impact of all the greenhouse gases caused by an item or activity are combined and expressed in terms of the amount of Carbon dioxide that would have the same impact. CO_2e is expressed in tonnes (tCO_2e). For the purposes of this MEP 2016, the emissions related to natural gas, transportation and electricity consumption are reported.

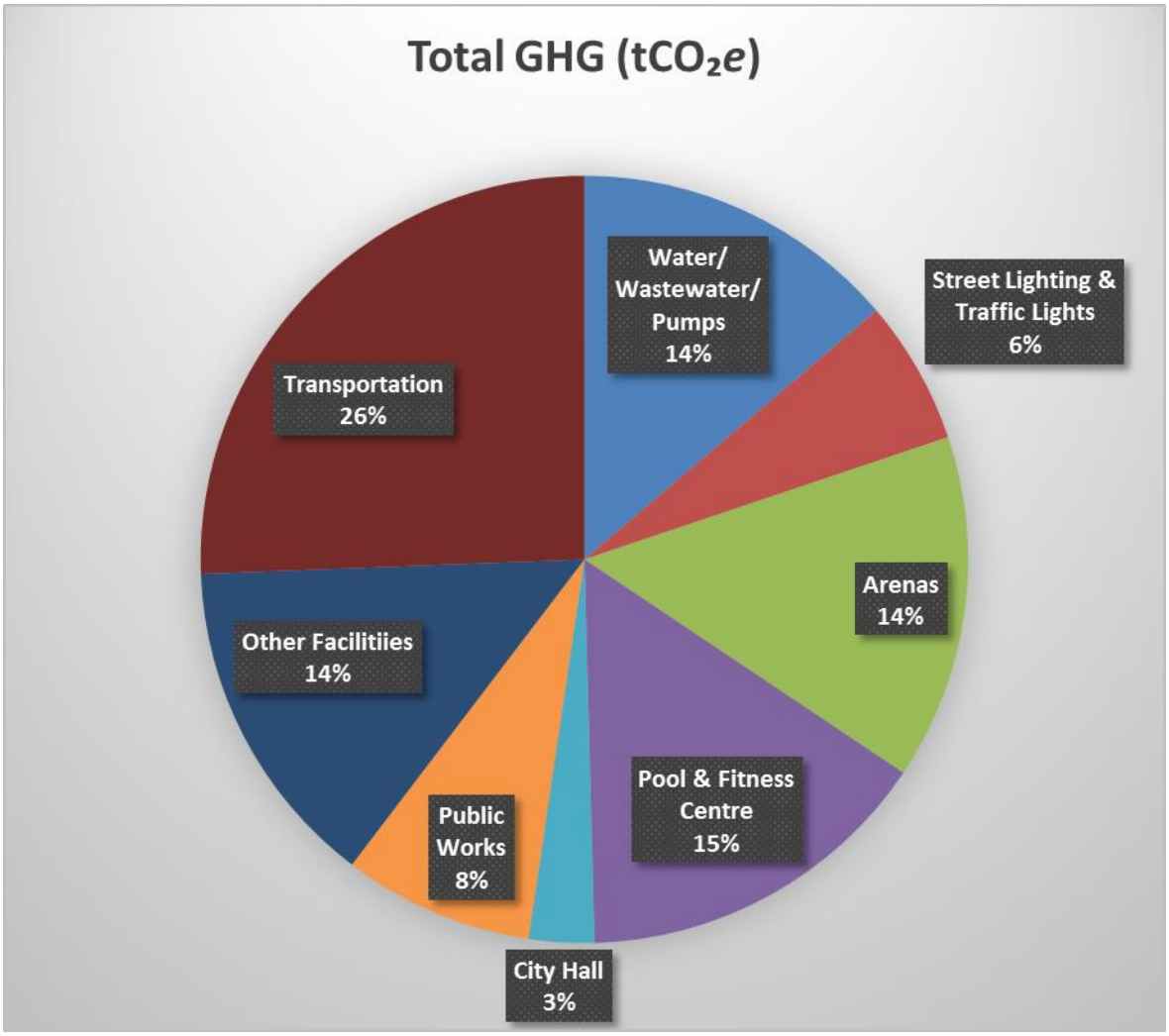


A complete inventory of all direct sources is still a necessary step towards the understanding and reductions of CO_2e created by all of the City and its community. We anticipate that such a study will be an important part of future updates to our Sustainability Plan. "Scope 3" sources such as waste and business travel accounting are still to be considered ("Scope 1" includes gas heating, refrigeration, and fleet vehicle usage. "Scope 2" is concerned with utility consumption)[24]. Taken as a whole, we find that the City was responsible for 60,000 tonnes CO_2e total, or 5.65 tCO_2e/Capita, for the year 2014. Knowing this, we will be able to evaluate our performance going forward and measure the success of our MEP 2016 as we monitor and compare our tCO_2e/capita in future years.

Based on the energy audits conducted, and billing and consumption data gathered by VIP Energy Services, Inc. (VIP Energy), we have been able to obtain estimates of the carbon footprint of each of our facilities and other Community buildings.

[24] As defined by the World Resources Institute, GHG Protocol Corporate Accounting and Reporting Protocol. (ghgprotocol.org)

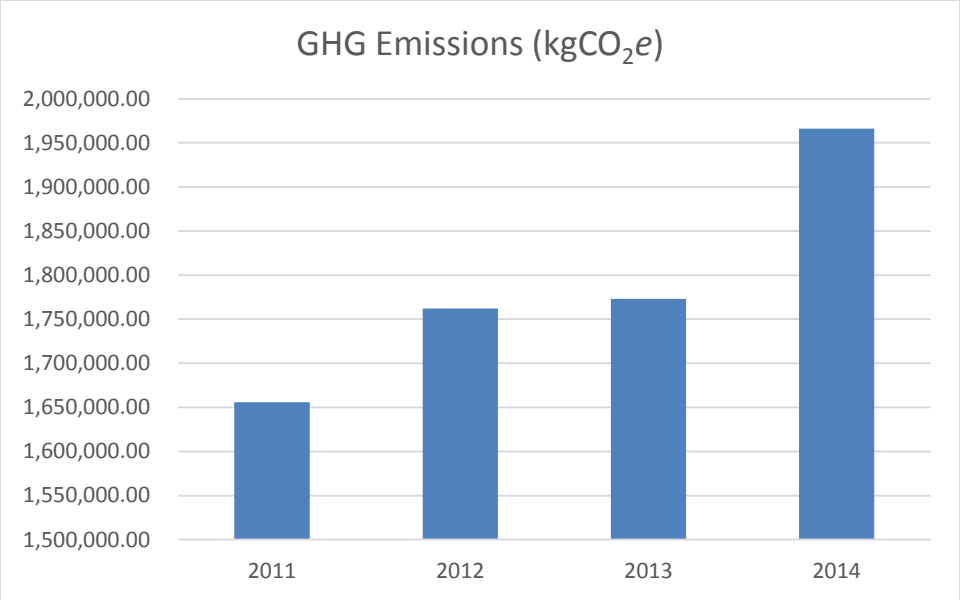
Figure 3-12 Temiskaming Shores Municipal Emissions



The data has shown that transportation and high energy consuming facilities like Arenas and Pools & Fitness Centers are the largest contributors to GHG production from City activities. Water treatment facilities also consume the majority of the electricity in the City facilities and so it also makes sense that they contribute largely to the GHG totals. The large transportation amounts are in line with what has been seen in Ontario's distribution.

Historically, the amount of GHG produced by the City have been on the rise. The graph below shows that GHG levels have risen 16% since 2011 and coincides with both the rise in natural gas usage and the drop in electricity usage. Between 2011 and 2013, natural gas usage was rising steadily and electricity usage was dropping. This translated into a slight rise in GHG emissions due to the higher emissions levels from natural gas combustion compared to energy produced through the grid. Then, in 2014, we can see the combined effect of the continued rise in natural

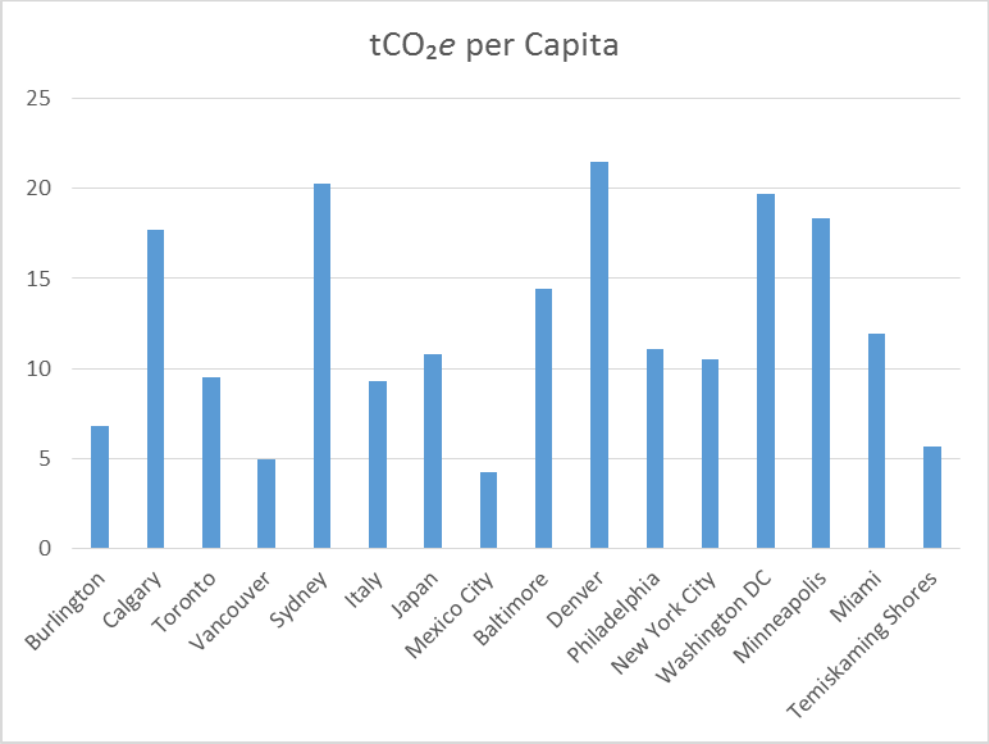
gas and the increased electricity use, resulting in much higher GHG emissions. As discussed above, street lighting was a large contributor to the high 2014 electricity usage and represents a large opportunity for the City to reduce its GHG emissions.



3.3 Comparison with Other Cities

Benchmarks provide representative values against which we can compare the City and its Community's actual energy performance. Comparison with benchmarks of annual energy use per square metre of floor area, or cost per capita, will enable an assessment of energy efficiency to be made and remedial action to be taken. This provides an opportunity for the City. Ultimately, Cities and their communities are in the position to support the objectives of the Government of Ontario.

The following figure represents a comparison of cities from around the world on their carbon footprint. The data was collected by the World Bank for a research paper intended to discern the roles cities and urban areas have in worldwide GHG emissions. Levels are represented on a kg CO_2e per capita basis. The study showed that emission levels can vary greatly across the world and that larger cities tend to have a lower per capita impact on GHG emissions than previously thought.



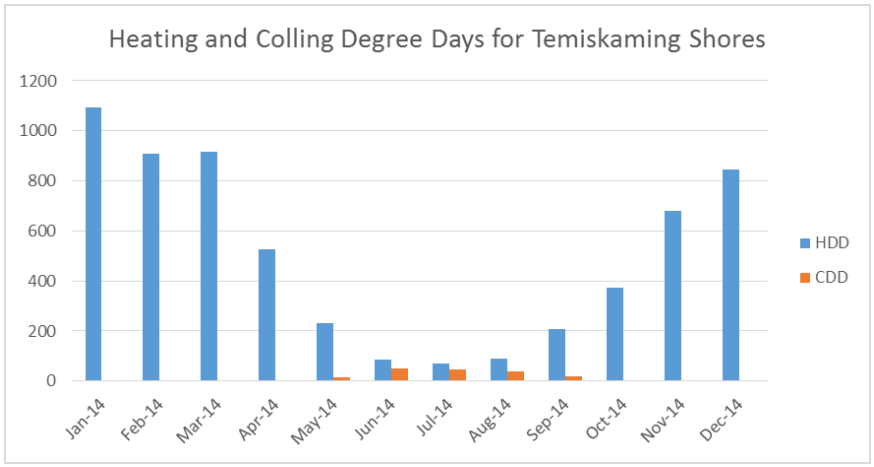
Temiskaming Shores comes in at 5.65 tCO_2e/Capita, well below the larger cities cited above and similar to smaller municipalities within Ontario. While it is unexpected that the City would have a below average emissions per capita amount while having an above average energy usage per capita, it makes sense when we consider the amount of transportation used in the City. In Canada, transportation contributes to approximately 30% of energy consumption. Comparing this to the 15% in the City, and considering that transportation fuels contribute more GHG per *e*kWh than electricity or natural gas, it is reasonable to think that the City would have lower average emissions than other, high transportation areas.

3.3.1 Climate

Benchmarking involves finding out where energy is being used and determining the main areas that can be improved. It also requires considering how and why energy is being used. Therefore the above comparisons alone would not give the whole picture if we want to understand how energy efficient a community is, either with regard to its design, operations, or the behaviour of its residents and employers. This is because the climate varies greatly across the provinces and territories. Of course, a northern Ontario community is going to use more energy to heat a building than a community in southern Ontario. Heating and cooling degree days are a measure

of the degree to which buildings need heating or cooling to maintain a specified level of temperature comfort.

A summary of both the City's heating and cooling degree days by month as an indicator of climate is shown in the figure below. As illustrated, the City is predominately a heating environment with an annual average of approximately 6,032 heating degree days (referenced to an average outdoor temperature of 18 degrees Celsius) which indicated a high heating demand. This analysis is reinforced by the findings of ***Section 3.1:*** *Energy Consumption*. Which showed that natural gas combustion accounted 60% of all energy used. Without any natural gas electrical generation within the City, it can be assumed that the vast majority of this consumption was used in some form of heating processes.



Cooling degree days average approximately 169 days per year (referenced to an average outdoor temperature of 18 degrees Celsius), which indicates a small cooling demand. Historically, cooling would have been seen as a luxury. However, with the increased use of air conditioning throughout the affluent developed world, cooling load is becoming more significant and must be incorporated into energy planning.

The MEP puts high priority on minimizing the heat demand and creating an efficient, flexible approach to sourcing and distributing heat.

The City strives to analyze our consumption data and compare our performance to what other Municipalities and provinces are doing. Advances in Measurement and Verification and general protocol are pushing the models and data that we generate to new levels of accuracy and detail. Linear regression and cumulative sum modeling are being investigated to improve statistical accuracy in our reports and in estimation of actual savings to ensure we keep vendors to their guarantees.

3.3.2 Benchmarking Summary

The value of benchmarking and comparison is that it allows the City to understand the opportunities and the pitfalls of Energy Conservation and Sustainability Planning as experienced by other public agencies. Through this exposure, the City is able to focus on strategies that are both proven to be successful elsewhere and can be tailored to the unique nature of our community.

It is apparent that energy conservation is being considered and implemented in most Municipalities across Ontario and Canada. While the Ontario government, in particular, has set guidelines for what they consider a 'Green' Municipality to be, there are opportunities for the City to mold these definitions into a strategy to achieve a Sustainable Future. Environmental strategies for green communities encompass both operational and policy improvements as well as environmental education. Many Municipalities are taking their understanding of environmental issues and conservation beyond energy consumption and recycling, addressing the more complex issues of water management, heat island effect, and light pollution, to name a few.

Ongoing professional development is also a key factor in the success of our MEP 2016 to ensure that staff understand their role in the greater goal. The MEP 2016 and accompanying education should be a continuous process, a living document that is updated and changed as the needs of the community change and as the City progresses to a more sustainable and efficient future.

It will be key for the City to share our experiences and successes as we carry out our MEP 2016, so that they may be used as a tool and a beacon for other Municipalities beginning the process. While realities of budget restrictions are an important factor for the City to consider in any planning activity, it is possible to achieve a green Community while adhering to the financial constraints of a publicly-funded Municipal system. It is clear that new technology and ideology changes have produced continued operational cost reductions while improving indoor comfort and environmental sustainability. These cost saving projects can essentially fund themselves by avoiding the use of previously allocated funds. As long as the savings are reinvested, these improvements can continue for the foreseeable future, ensuring a sustainable process.

In terms of new builds, many organizations are now working within LEED™ standards to guide the design and construction of the new built environment. This is an important consideration for the City to ensure that new development is properly planned to achieve long-term sustainability.

British Columbia has emerged as the Canadian leader in such efforts to make public buildings carbon neutral, and provides an excellent resource in this area.

From the performance indicators set out by the Ministry for Municipalities, we have learned that for our MEP 2016 to be successful we must:

- Identify opportunities to form community partnerships for environmental education purposes,
- Expand on and plan for professional development,
- Support energy conservation practices,
- Assess community groups that could support environmental education now, and
- Document the current level of participation by stakeholders and the outside community to identify opportunities and areas for improvement.

4 CITY ENERGY CONSERVATION MEASURES

To date, the City has embarked on our conservation journey by implementing several energy-saving measures as identified in energy audits completed in 2009 and 2014. The following section highlights some of the more intensive energy conservation measures implemented to date.

4.1 The Start of the Journey: Energy Audits

Once the overall energy consumption is measured for any organization, the next level and natural progression is to develop an understanding of the nature of utilities consumption to create a focus on waste reduction and target systems that consume the most resources based on specific criteria. For the City, some of our facilities were audited by industry expert Consultants in 2009 and 2014. From these audits, Energy Conservation Measure themes were created in order to allow for efficient and cost effective implementation. A description of the opportunities found by the auditors, as well as simple paybacks and available incentives, are listed below. Once identified, these Energy Conservation Measure themes were then considered, along with our capital investment plan, to create a short, medium and long-term investment strategy. Remediation measures and ongoing capital planning will be implemented based on these audits in order to reduce or eliminate causes of negative performance. Long term strategies will include additional audits and re-commissioning of these facilities both to track the progress of implemented conservation initiatives and to identify new areas of focus.

City of Temiskaming Shores							
Simple Payback	Savings ($)	Implementation Cost ($)	Consumption Savings (*e*kWh/yr)	Demand Savings (kW)	Measure Description	Audit Date	Location
0.2	$970	$200	23,010	0	Low Flow Shower	2009	Pool and Fitness Centre
0.8	$6,800	$5,500	226,060	0	Recommission Dectron Unit	2009	Pool and Fitness Centre
1	$630	$615	8,100	0	Occupancy Sensors	2009	Pool and Fitness Centre
1.3	$6,700	$9,000	159,283	0	Optimize Pool Zone Conditions	2009	Pool and Fitness Centre
2.6	$3,125	$8,000	74,335	0	Outdoor Air Ventilation Lock Out	2009	Pool and Fitness Centre
2.9	$14,000	$40,000	100,000	20	VFD on High Lift and Low Lift Pumps	2014	Haileybury WTP
3	$15,000	$45,000	100,000	20	VFD on High Lift and Low Lift Pumps	2014	New Liskeard WTP
3.3	$2,485	$8,100	31,878	0	VFD with turbidity meter for filtration	2009	Pool and Fitness Centre
3.9	$16,875	$65,400	401,286	0	Atmospheric to condensing Boiler	2009	Pool and Fitness Centre
4.3	$105	$445	1,317	0	Incandescent Exit Signs to LED	2009	Pool and Fitness Centre
6	$1,055	$6,300	10,381	18	T12 to T8 Lighting Upgrade	2009	Pool and Fitness Centre
7.1	$25,530	$180,000	195,000	35	Replace Blower#1 with High Efficiency	2014	Haileybury WWTP
11	$8,355	$92,000	207,000	0	Solar Domestic Hot Water System	2009	Pool and Fitness Centre
11.4	$11,800	$135,000	401,722	0	Water Source Heat Pump	2009	Pool and Fitness Centre
11.6	$740	$8,600	7,224	13	HID to T5 Lighting Upgrade	2009	Pool and Fitness Centre
35.4	$710	$25,000	16,134	0	Controls Pneumatic to DCC Upgrade	2009	Pool and Fitness Centre

By identifying all accessible mechanical systems, we were able to breakdown rough consumption of all three major utilities: electrical, natural gas and water. The identification of these usage points allowed the City to create not only a detailed opportunity list of procedural and capital intensive projects, but to also detect trends and themes of where major efforts should be focused.

In all, sixteen opportunities were identified with an overall cost savings potential of approximately $115,000 and an associated implementation cost of nearly $630,000. This list was intended to facilitate in the prioritization of funds from federal grants, as well as identify other opportunities to be undertaken once those funds have been disbursed. In general, these audits showed that the greatest opportunities lie in the areas of heating, lighting and core process such as pumps and fans. These areas will guide our focus as we plan conservation measures for the short, medium and long term.

4.2 Energy Conservation Measures Implemented

Prior to the completion of the MEP 2016, the City has already taken significant steps towards reducing its energy consumption. Below is a list of measures that have been implemented following the audits conducted at city facilities.

City of Temiskaming Shores

Energy Conservation Projects Implemented prior to 2016

Location	Year	Description
Public Works #2	2013	Lighting Upgrade
Public Works #2	2013	Heating Upgrade
New Liskeard WTP	2013	Lighting Upgrade
New Liskeard WTP	2013	Heating Upgrade
New Liskeard Arena	2013	Ice Surface Lighting Upgrade
Haileybury WTP	2013	Lighting Upgrade
Riverside Place	2014	HVAC Upgrade
City Hall	2014	HVAC Upgrade
Pool and Fitness Centre	2015	Dectron Dehumidification System

4.3 Energy Conservation Measured Planned

While the City recognizes that we have already completed a substantial amount of work towards energy efficiency and conservation, there is still much to do in order to reach our Sustainability goals. ***Section 3.1.1:*** *Electricity* detailed the impact that City facilities have within the Commercial sector and ***section 3.2***: *Carbon Footprint* used this energy data to show how the overall GHG emissions of those facilities are growing. With this in mind, the City has put together the following short, medium and long-term plans to act as a roadmap to our continued operational improvement. These goals are divided in 1-2 years, 3-7 years and 8-20 years. It is very important to realize that this is a 'living' plan. There are many key influences that can affect the plan and cause a change in direction. These include: new or altered incentives, equipment failure, and unforeseen changes to funding or budget restrictions are just a few of the potential drivers.

4.3.1 Short Term Conservation Strategies

The following details some of the short-term targets and focus areas for the City over the next 1 - 2 years.

4.3.1.1 Lighting Upgrades and Standards for New Construction and Renovations

Lighting is a substantial source of electrical energy used in municipal facilities, approximately 25% of totals. Lighting is such a high source of consumption for many reasons including the age of the buildings and the pricing and availability of high efficiency alternatives at the time of construction. Traditionally, more emphasis is placed upon initial capital rather than long term operation costs, leading many facilities and streetlights to be equipped with inefficient high wattage lighting systems. The City will reduce the energy consumed by lighting systems by incorporating the following actions into a new standard for lighting systems in the City' facilities.

Proposed Target:

Implement new standards for lighting replacements and renovations that result in all new lighting installations being of either high efficiency or LED equivalents.

The City will take the following actions to achieve this target:

1. Where feasible, implement a replacement by attrition policy in all municipal buildings that replaces any defective lighting fixture with either a high efficient or LED equivalent.

2. Generate plans and budgets for future street lighting projects to be comprised of primarily LED fixtures.

3. Take advantage of IESO provided incentives to help fund these initiatives.

4. Collaborate with neighboring regions to plan and advocate for high efficiency lighting in regional street lighting projects.

4.3.1.2 Improving Efficiency and Making Wiser Use of Natural Gas

While overall energy usage of City facilities has been trending down, its natural gas consumption and GHG emissions have been rising (20% and 19% increases respectively from 2011 to 2014). High heating demands have led to high natural gas consumption in facilities, and this translates into greater emission levels. The best methods to combat these increases and bring natural gas consumption rates down is to improve the thermal efficiency of buildings and reduce unnecessary heating.

Proposed Target:

Halt the annual increases in natural gas consumption from municipal facilities by 2018. A ±5% year to year variation would be considered halted. Natural gas data reported to the ministry of Energy will serve as the metric by which this target is measured.

The City will take the following actions to achieve this target:

1. Implement maintenance procedures at all municipal buildings that include inspection, repair and replacement of doors and window seals on a bi-monthly basis.

2. Ensure all thermostats are upgraded to programmable models wherever feasible and provide training and guidance on acceptable scheduling and temperature setpoints. Implement routine checks to ensure these schedules are not being manually overridden.

3. Begin a systematic approach to upgrading the heating systems at high consumption facilities as identified through energy audits previously conducted.

4. Investigate the feasibility of using solar water heating to reduce the natural gas consumption of pool water heating.

5. Investigate the feasibility of installing heat pumps at municipal office buildings and small libraries.

6. Take advantage of incentive programs from Union Gas for retrofits and gas saving measures.

4.3.2 Medium Term Conservation Strategies

The following details some of the medium-term targets and focus areas for the City over the next 3 - 8 years.

4.3.2.1 Increase the Share of Public Transportation in the City's Modal Distribution

Although transportation does not immediately come to mind when thinking of energy conservation, this sector consumes 15% of the total energy in the City and 25% of its GHG emissions. The City will work to reduce our reliance on this energy source by increasing sustainable forms of transportation through infrastructure improvements to support cycling and walking, ensuring development is transit friendly and planning our communities to be complete and healthy.

Proposed Target:

Achieve a 5% modal split in transit and a 3% total increase in walking, biking or other mode of transport by 2024, as reported by the federal census data.

The city will take the following actions to achieve this target:

1. Continue to support Urban Development as detailed in the Official Plan by promoting local work opportunities and reducing outbound commuting.
2. Emphasize the importance of sustainable transportation measures, such as transit and active transportation.
3. Consider feasibility of car share and bike programs.
4. Support/encourage school oriented programs to increase active transportation initiatives.
5. Ensure new and reconstructed arterial and collector roads are built as *Complete Streets*[25] that are safe and accessible for pedestrians and cyclists of all ages where feasible

[25] A Complete Street is designed for all ages, abilities, and modes of travel. On Complete Streets, safe and comfortable access for pedestrians, bicycles, transit users and the mobility-impaired is not an afterthought, but an integral planning feature. http://completestreetsforcanada.ca/

6. Continue to expand and modernize the local transit system by improving bus shelters, ticketing systems, routes, and online accessibility.

7. Ensure new development is transit friendly.

8. Work with neighboring regions to develop and promote inter-region public transportation options.

4.3.2.2 Install VFD's in Water Handling Facilities

As detailed in the Energy Audits performed at our water handling facilities, energy used in pumping water represents a significant portion of the total facilities energy demand. When we consider that nearly half of all electrical energy used by the City's facilities come from these types of facilities it will be imperative that we focus our conservation efforts at reducing this high demand process. Older pumps and motors are typically over-designed for their general usage and therefore consume more energy than is required. By installing a variable frequency drive (VFD) the total demand and consumption of these pumps can be reduced by up to 20%, while maintaining the capability of meeting peak or full load conditions.

Proposed Targets:

a) Investigate and install where feasible, VFD's at 30% of wastewater facilities (6 of 18 total) by 2024.

b) Reduce energy consumption at these facilities by 12% by 2024.

The City will take the following actions to achieve these targets:

1. Initiate 2 Detailed Engineering Studies (DES) every two years to determine the feasibility, payback, and energy conservation levels of VFD installations at the water treatment facilities, beginning with those already identified through Energy Audits as high conservation opportunities.

2. Pursue IESO funding for the DES's.

3. Implement the findings of the DES's where feasible and initiate measurement and verification practices to quantify the success of the measures.

4.3.2.3 Energy Audits, Retro-commissioning and New Building Commissioning

Programs like energy audits and commissioning practices are cyclical processes that can be key tools in identifying deficiencies and increasing returns on investments in energy conservation. Technological advancements are only a part of the energy puzzle, and ensuring that conservation programs are being properly implemented and functioning properly can be as effective as mechanical improvements. Instituting a schedule of both energy audits and retro-commissioning of large consumption facilities will help the City to both identify new conservation opportunities and to track the effectiveness of past measures.

Proposed Targets:

a) *Develop and institute an approved schedule of Energy Audits at each of the facilities operated by the City. Energy Audits will occur at a minimum of once every 5 years.*

b) *Develop and institute a scheduled program of re-commissioning existing major HVAC equipment at high consumption facilities such as Arena, Pool, and Fitness and Recreation Centers.*

The City will take the following actions to achieve this target:

1. Work with Council to plan, organize and budget for a schedule of Energy Audits at all of the Cities facilities.
2. Work with Council to plan, organize and budget for a schedule of re-commissioning activities at its high consumption facilities.
3. Educate staff and the community on the benefits of recurring Energy Audits
4. Support and include commissioning practices during new construction and renovations at City operated facilities.
5. Lobby provincial governments to extend incentive programs for Energy Audits and Commissioning.
6. Develop budgets and schedules for implementing the findings of the Energy Audits.

4.3.3 Long Term conservation Strategies

The following details some of the long-term targets and focus areas for the City over the next 8 - 20 years.

4.3.3.1 Provide the Energy Needed for Projected Growth through Improved Energy Efficiencies

Target – Use efficiency to create at least all the energy needs to support the growth of the building inventory

The City is entering a period where at least 1,540 new homes will be added by 2031. These will add approximately 58 *e*GWh annual energy consumption per year. Over the same time period, significant portions of the residential sectors will undergo renovations and upgrades, providing opportunities for increasing efficiencies. To support the new population, commercial, industrial and institutional buildings will also undergo significant expansion.

Proposed Target:

Use efficiency improvements to create at least all the energy needs to support the growth of the building inventory through 2031.

The first step is to target the existing building stock and take the following actions:

1. Target conservation programs to older building stock and encourage commercial and industrial sectors to participate in Energy Audits and Retro-Commissioning programs. Develop standards for recurring use of these programs over specific time periods, based on building age and energy intensity.

2. Develop lighting standards for renovations that include options for LEDs and other high-efficiency lighting types. Include operational standards such as light and motion sensors, and automatic timers.

3. Consider incentives or financing programs to accelerate meeting efficiency standards of new Ontario Building Codes.

4. Encourage building owners to improve the thermal efficiency of their facilities through measures such as increased insulation and weather stripping. Develop window replacement and maintenance programs, including window sealing and caulking.

5. All major renovations will be expected to achieve at least a 20% energy efficiency increase from today's overall city-wide average of 462 *e*kWh/m^2/yr starting from 2017. Moving forward, this target will be improved by a net 3% per year through at least 2031.

6. Encourage regional partners to adopt these new standards.

Next, we will focus on encouraging new building construction to embrace higher energy efficiency standards than are currently used in the Ontario Building Code by:

1. Encouraging builders to improve energy efficiency and sustainability of new buildings by utilizing third party programs such as LEED™ certification, BOMA BESt, or ENERGY STAR® for new homes, and celebrating these successes.

2. Develop policy for energy efficient guidelines and equipment specifications for new construction projects that reduce average energy efficiency by 1.5% per year for ongoing new construction from 2017 to 2031.

And finally, we will decrease consumption of appliances and electrical equipment by:

1. Increasing participation rates and awareness of recycling and replacement programs for refrigerators and electronics equipment.

2. Educate people on the benefits of the ENERGY STAR® program, particularly when purchasing new appliances and electronics and the impact of phantom loads.

4.3.3.2 Retrofit All Municipal Buildings and Streetlights with High Efficiency Lighting Systems

As previously mentioned. Lighting opportunities within the City's facilities are substantial. Lighting accounts for 25% of all electricity consumed and is one of the most reliable energy conservation measures we can implement. As we continue to work towards sustainable energy practices, lighting will remain a key area of focus. While the City has already outlined a short-term plan to being this process, many existing lighting systems, particularly exterior, park and arena lighting require significant renovations to install LED or high efficiency options. Because of this, we will be instituting the following actions to provide an economically responsible and realistic long term plan.

Proposed Target:

Reduce energy consumption from lighting by 50% from 2014 levels by 2031.

The City will take the following actions to achieve this target:

1. Use information gathered through Energy Auditing to plan and budget for scheduled replacement of major lighting systems.

2. Work with consultants and industry representatives to determine the most cost-effective energy efficient options on a continuing basis.

3. Pursue lighting retrofit incentives from IESO and lobby for the renewal of such programs.

4. Begin a staged implementation of this plan with the aim of all lighting being retrofitted by 2031.

4.3.3.3 Building Envelope Upgrades – Reducing Thermal Losses

Thermal losses through building envelopes can be substantial. In some cases as high as over 20% of the total energy used to condition a building is lost through the envelope. Increasing the efficiencies of the methods used to condition our facilities is a great conservation method, but if 20% of our energy is still being lost to the environment we are still fighting a losing battle. Upgrades to doors, windows, and insulation improvements are some of the most common and effective means of decreasing the thermal losses of buildings. Due to the high usage of natural gas in our facilities, these losses directly translate into higher emission levels. The primary constraint on these projects however is that they can be cost prohibitive, especially when done in a retrofit scenario. To improve the thermal efficiency of our buildings the City will look to incrementally improve our building envelopes and use incentive funding as an important resource in achieving our targets.

Proposed Target:

Improve the thermal efficiency of existing building stock and increase standards for new construction building envelopes.

The City will take the following actions to achieve these targets:

1. The City will make use of 3rd party programs such as LEED™ and BOMA BESt® in its new construction buildings which place emphasis on increasing the effectiveness of building envelopes

2. The City will take steps to plan and implement a window replacement program for its older existing building stock, using information gathered through Energy Auditing to determine the highest priority facilities.

3. The City will investigate the feasibility of instituting a program of spray-foam insulation in ceiling and attic cavities in existing building stock, using information gathered through Energy Auditing to determine the highest priority facilities.

4. During any significant renovation to existing building stock consideration will be given to the feasibility of combining insulation improvements with existing project plans, so as to reduce retrofit costs.

5. The City will implement such retrofit measures as deemed feasible to improve the building envelope including but not limited to; Air Curtains, Automatic Doors, Reflective E-film Window Coverings, Window Roller Shades, etc.

4.4 Operational Efficiency Improvements

Despite the need for additional capital investments, many conservation opportunities within the City have been put in place with simple operational changes. Changes in focus, or simply considering the big picture, enables us to continuously improve on existing systems. It is always a preferable green and economic policy to save a watt rather than to generate a watt, and the cheapest watt of electricity is the one not used. The following documents the many and varied measures taken to improve our energy efficiency through operational changes. These measures are not categorized under our capital intensive strategies above as these measures generally require low investment and are more of a philosophical change than specific measures. Many of these items were identified directly from the energy audits completed by the City.

4.4.1 Green Purchasing

Green purchasing involves identifying, selecting and purchasing products (i.e. goods or services) with significantly less adverse environmental impacts than competing products. Further it involves considering the costs and environmental characteristics and performance of a product in all stages of its life-cycle, from product design, development and production/provision, through product use, to the ultimate handling (i.e. recovery, recycling, re-use and/or waste disposal) of whatever remains of the product at the end of its useful lifespan.

Ideally, while green purchasing considers multiple environmentally preferable aspects and associated reduced impacts of products through entire life-cycles, where possible and appropriate, it should target and give greatest preference to those products that are environmental leaders from a cumulative and full life-cycle perspective.

Within the City, green purchasing needs to be a grass roots initiative. Reports and requests for purchases reaching Purchasing should already embody environmental issues and green

alternatives. The city of Temiskaming Shores is committed to increasing the proportion of recycled, recyclable, and other environmentally preferred products and services in our acquisitions. While maintaining this commitment, the City will also recognize that the need for quality and fiscal responsibility are needed to be taken into consideration.

There are three guiding principles to aid staff in enhancing the green purchasing initiative:

1. When formulating contracts and tenders specifications for goods and services, do so in a manner that allows for the recommendation of environmentally responsible and sustainable products, given full consideration of the operational and financial implications.

2. A products full life-cycle environmental benefits and costs need to be considered over the products service life (i.e. consider not only initial costs, but maintenance and replacement costs, product lifetime and disposal costs and waste stream).

3. Base purchasing decisions on accurate information about environmental performance.

4.4.2 Green Cleaning

Green cleaning policies reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment. Such policies are part of the LEED certification program and will be implemented throughout the municipality. Contained within ***Appendix B*** of this report is a sample template of the green cleaning policy to be used and tailored to each specific municipal facilities. This policy will ensure that the health and safety of the buildings occupants and maintenance personnel is of the upmost priority while reducing the impact on the environment and maintaining cost effectiveness.

4.4.3 Electronics Recycling Program

The Ontario Electronic Stewardship (OES) is an industry-led, not-for-profit organization that operates the regulated recycling program in Ontario. They ensure that end-of-life electronics are handled in a safe, secure and environmentally-sound manner. There are currently three electronic drop-off locations registered with OES within the City, located at the city's landfill, recycling center and JPL storage. While these location are a good start, they only allow collections

at limited hours or by appointment. These inconveniences can increase the risks of electronics entering the landfills through traditional waste streams.

Through the recycleyourelectronics.ca program OES is offering free storage bins and collection of electronics to municipalities and businesses. The City can take advantage of this program and set up electronics collections at its municipal buildings, with outdoor collection bins allowing for 24 hour drop-off accessibility. OES will list the drop-off locations on its website at no charge and also provide promotional material which will be used at the designated collection areas. Additionally, the program offers a payment on a per tonne collected basis.

4.4.4 Fuel Efficiency and Emission Reductions

Promoting fuel efficient or zero emission vehicles is another operational measure that can help to reduce emission generated within the municipality. The City will investigate the feasibility of electric charging stations at City facilities, including downtown parking lots. Due to the lack of charging stations within the near vicinity of the City, this measure could help to bring more electric vehicles into Temiskaming Shores, increasing public awareness and bringing more tourists through the city centre. There are also many third-party not-for-profit companies, such as Plug 'N' Drive that have developed programs to help municipalities and small businesses in installing charging stations.

The adoption of sustainable vehicle fleets by local private and institutional organizations can also be encouraged through local promotion and by using local examples to encourage the change. Adding preferred parking spaces for electric or hybrid vehicles will also positively influence the move to more sustainable vehicles.

4.4.5 Indoor Environment Quality

When occupants are comfortable and satisfied with their indoor environment, personal satisfaction with their surroundings is facilitated. A Municipal building is one of the variables in the provision of public services that is wholly within the control of the Municipality, especially in such areas as air quality, acoustics, lighting, infection control, and supporting a healthy active lifestyle.

4.4.5.1 Air Quality

Many Canadian jurisdictions have specific legislation that deal with indoor air quality. These regulations are generally concerned with amount of contaminants in the air and the amount of fresh air intake into a given area. These regulations are put in place by organizations such as ASHRAE[26] and Health Canada, amongst others. Indoor air quality is of concern for a variety of reasons, and occupants who work or live in facilities with poor indoor air quality can suffer from some or all of the following symptoms; headache, dryness and irritation of the eyes, nose and throat, fatigue, sinus congestion, coughing and sneezing, nausea and dizziness. These symptoms can be caused by a lack of or too much humidity, insufficient outdoor air intake, or indoor air contaminants. Contaminants such as CO_2, VOCs (Volatile Organic Compounds from cleaners, solvents and disinfectants) and dust are the leading causes of poor indoor air quality. Air filters and proper maintenance practises are often the best safeguard against these contaminants and proper operational practises must be in place to ensure adequate fresh air is reaching the occupants. The City will continue to work with its maintenance personnel to ensure that adequate fresh air intake levels are maintained at its facilities and that filters are both properly in place (to avoid unfiltered air from entering the space) and changed periodically. Note that timely maintenance practices of filter changes need to be maintained to reduce the risks of increasing pressure on supply fans, which would increase electrical consumption. As filters become blocked they restrict air flow.

4.4.5.2 Lighting

Whether in industrial or office settings, proper lighting makes all work tasks easier. People receive about 85 percent of their information through their sense of sight. Appropriate lighting, without glare or shadows, can reduce eye fatigue and headaches; it can prevent workplace accidents by increasing the visibility of moving machinery and other safety hazards. Good quality lighting also reduces the chance of accidents and injuries from "momentary blindness" (momentary low field vision due to eyes adjusting from brighter to darker, or vice-versa, surroundings). Poor lighting can cause several problems such as: insufficient light, glare, improper contrast, poorly distributed light and flicker. As the City moves to improve its lighting efficiency through the installation of LED lighting, the design and ergonomics of the lighting systems will be implemented in such a way as to avoid the above mentioned problems.

[26] American Society of Heating, Refrigerating and Air-conditioning Engineers

4.4.5.3 Supporting a Healthy, Active Lifestyle

The City has made a commitment to the social health of its residents through proactive physician recruitment, wellness programs, and adequate parks and playgrounds. The City has also set forth several initiatives to take place within the next five years to ensure the health and wellness of the community is proactively maintained and improved throughout its coming growth. Some short term initiative being undertaken by the City are;

1) Enrolling as a member of the Ontario Healthy Communities Coalition

2) Build in recognition of candidate programs and activities for a healthy community including programs against tobacco, substance abuse and exposure

3) Continue the program for physician recruitment

4) Where feasible, utilize best practice strategies for an age-friendly city

5) Supporting food growing and sharing in neighbourhoods through urban agricultural activities (e.g. farmer's markets, planting fruit trees in public areas, small-scale greenhouses on residential properties)

6) Planning, encouraging and facilitating the integration of active travel systems including;

    a) Safe routes to school, public facilities and services, retail areas, workplaces, places of worship and recreation and cultural areas

    b) Providing infrastructure to support active travel (e.g. sidewalks, off-street trails, dedicated bikeways, bicycle parking facilities, pedestrian crosswalks and transit shelters)

    c) Provision or public transit services and facilities that accommodate pedestrians, cyclists, and people with disabilities

    d) The City will endeavour to maintain active transportation routes on a year-round basis and where demand warrants

4.5 Water Efficiency

The first step in sustainable water management is to reduce or limit our demand on water resources. There are several easy steps we can take to achieve this through operational changes and retrofit installations. Since large retrofits can be cost prohibitive, the City will take a passive retrofit strategy. This means that as facilities age and equipment requires replacement or repair, water efficient equipment will be installed when equipment has reached its end of life or during other subsequent major renovations. In this manner, the city can avoid large cost projects while still incrementally improving its water use and conservation.

4.5.1 Dual Flush and Low Flow Toilets

Toilets manufactured prior to 1992 typically use over 13 litres of water per flush and toilets that were manufactured after the Energy Policy Act of 1992 that are not considered high efficiency will use approximately 6 Litres per flush. While the Energy Policy Act is an American standard, it has been widely accept across North America. So it is easy to see that replacing ageing toilets can drastically reduce water usage from toilets, which can account for up to 30% of a home's water consumption[27]. Dual Flush toilets can further reduce this consumption to an average of 4 litres per flush. When completing renovation to bathrooms or when replacing toilets in municipal buildings, every effort will be made to incorporate dual flush or high efficiency models. The City will also promote and encourage new residential buildings that are equipped with high efficiency or dual flush models.

4.5.2 Automatic Faucets

A motion sensor activated faucet ensures that a minimal amount of water is lost per use. The majority of water usage by sinks occurs in the washroom when washing our hands. The average time a faucet is on is 30 seconds. By installing a motion sensor faucet, run time can be reduced to an average of only 12 seconds, and does not require manual shutoff. These faucets eliminate the risk of occupants leaving taps running and can greatly reduce water consumption at public facilities.

[27] Alliance for Water Efficiency http://www.home-water-works.org/indoor-use/toilets

4.5.3 Rainwater Collection

The purpose of rainwater collection or harvesting is to limit disruption of the natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from storm water runoff and eliminating contaminants. Runoff that would normally immediately leave the site through the storm sewer system can be stored in a rainwater harvesting system. This stored rainwater can then be used in a variety of ways, but is commonly used as a water source for irrigation of on-site landscape features. Rainwater harvesting reduces the pollution from storm water runoff by drastically reducing the quantity of runoff immediately leaving the site. This stored runoff is more slowly filtered through vegetation and the ground via irrigation--thereby increasing on-site infiltration--or is used to reduce potable water demand in graywater (non-potable) applications. The harvested rainwater can supply treated rainwater to applications such as custodial uses, toilet and urinal flushing, or for local irrigation.

5 COMMUNITY ENERGY CONSERVATION MEASURES

In the previous section we discussed some of the more specific measures the City has undertaken, as well as those it will implement in the future. Now, we move on to the more broad influence that our community has on our energy landscape. While the previous section outlined very specific targets, this section of the report will focus on more intangible elements such as culture and perspective, which have significant impacts on how we consume energy. Due to the nature of these measures, the targets outlined herein are broader and more open to interpretation than those previously proposed in the MEP. This does not imply that these measures are any less important, and in fact are likely more impactful than the specific targets set above as the community as a whole can have a much greater impact than the City alone. We begin this discussion with a brief review of some of the actions that City has taken in the build up to the formation of this report, a review of the community's energy maps, and an outline of goals and actions to be taken on a Community wide level.

5.1 Energy Conservation Measures Implemented

In 2014 the City began working with VIP Energy to form a team that would be responsible for planning, creating and executing the MEP. Below lists some of the steps undertaken in the journey towards the formation of this report.

5.1.1 Workshops and Advisory Stakeholder Group

The City, in cooperation with VIP Energy has developed a roster of Key MEP Stakeholders to form a committee to provide ideas and feedback on the development process as well as the Municipal Energy Plan itself. To assist in garnering support and gathering ideas from the group, materials were developed to encourage open discussions among attendees. These forums consisted of:

- Project Kick-off and Stakeholders Workshop #1,
- Key Stakeholders Workshop #2, and
- Key Energy User Meetings and Interviews.

The Key Energy User Meetings were designed to raise awareness of the MEP process as well as broaden our understanding of the energy use characteristics of some of the larger energy users in the community. Feedback was also acquired through two open forums as well as the interviews described above. Questions surrounding the energy conservation plans, constraints and needs

were also posed as well as a request to receive their individual energy use data for inclusion in the MEP and Energy Map. Many of the Community Stakeholders were able to provide us with key information regarding the restraints and opportunities with regards to their own energy management and conservation programs.

5.1.2 Energy Mapping

Energy mapping can provide valuable geographical information as to where the community is expanding, where high energy intensive activities are taking place, and can help to plan new development and energy infrastructure. The following Energy Maps, which display the energy intensity of the buildings within the City at a postal code granularity, will be used when making decisions on zoning, infrastructure, growth planning, and energy conservation measures.

The Energy Maps begin with a macro view of the City. This shows not only where energy use is most intense, but also gives a good sense of both the size of the municipality and the density of its buildings and populations. The subsequent Energy Maps display the energy intensity dispersal by postal code, adding granularity to the map and providing more detailed information as to where the majority of the energy conservation measures should be focused. The maps clearly show that the city centres have much higher intensities than the rural areas and the City will focus on these sectors when considering future projects. For reference, detailed maps of Haileybury, New Liskeard and Dymond are contained in ***Appendix B*** to give a better understanding of the zoning of the areas displayed on the Energy Maps.

Figure 5-1 Temiskaming Shores Energy Map

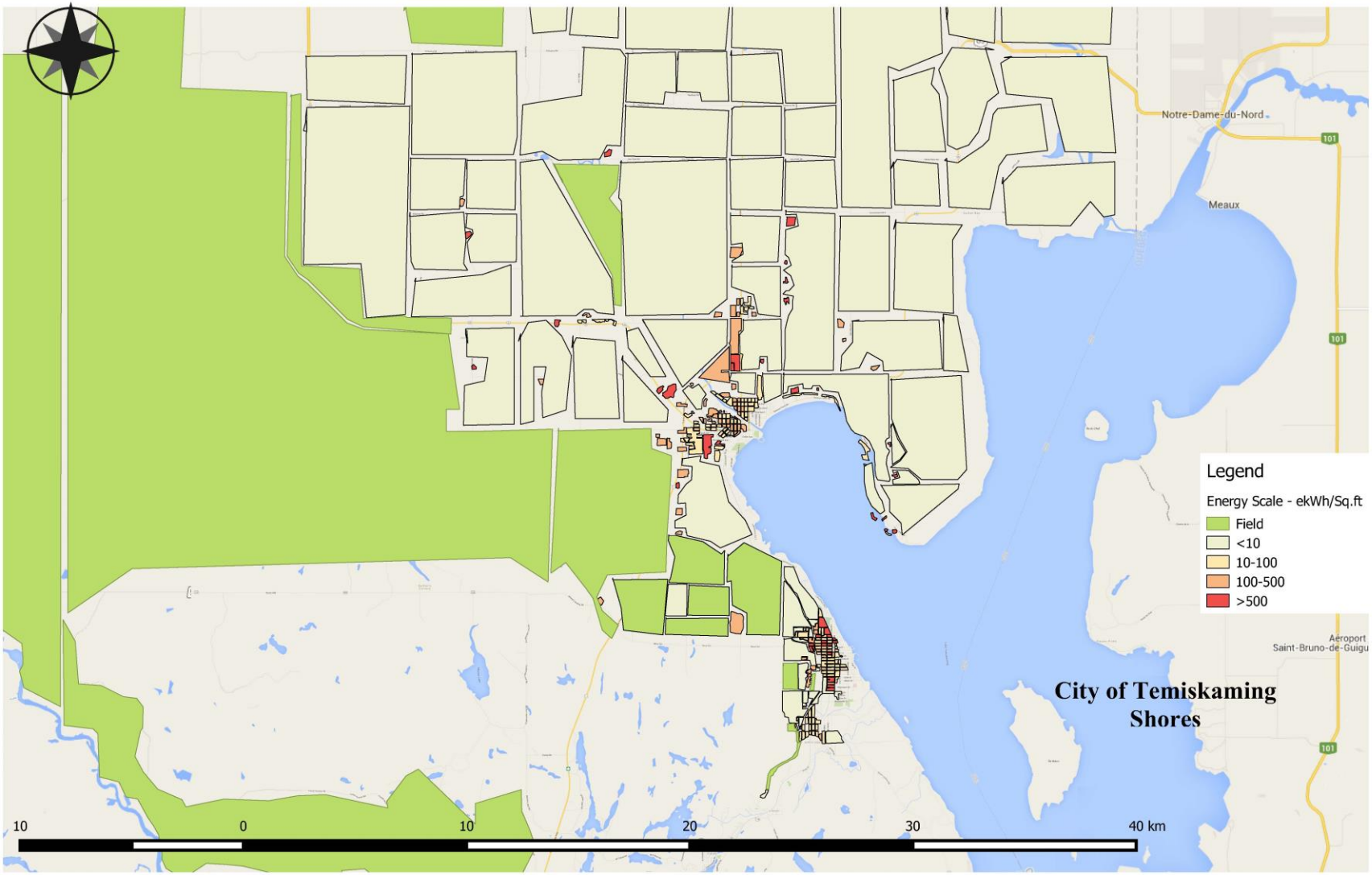


Figure 5-2 Postal Code P0J1R0, Intersecting Haileybury

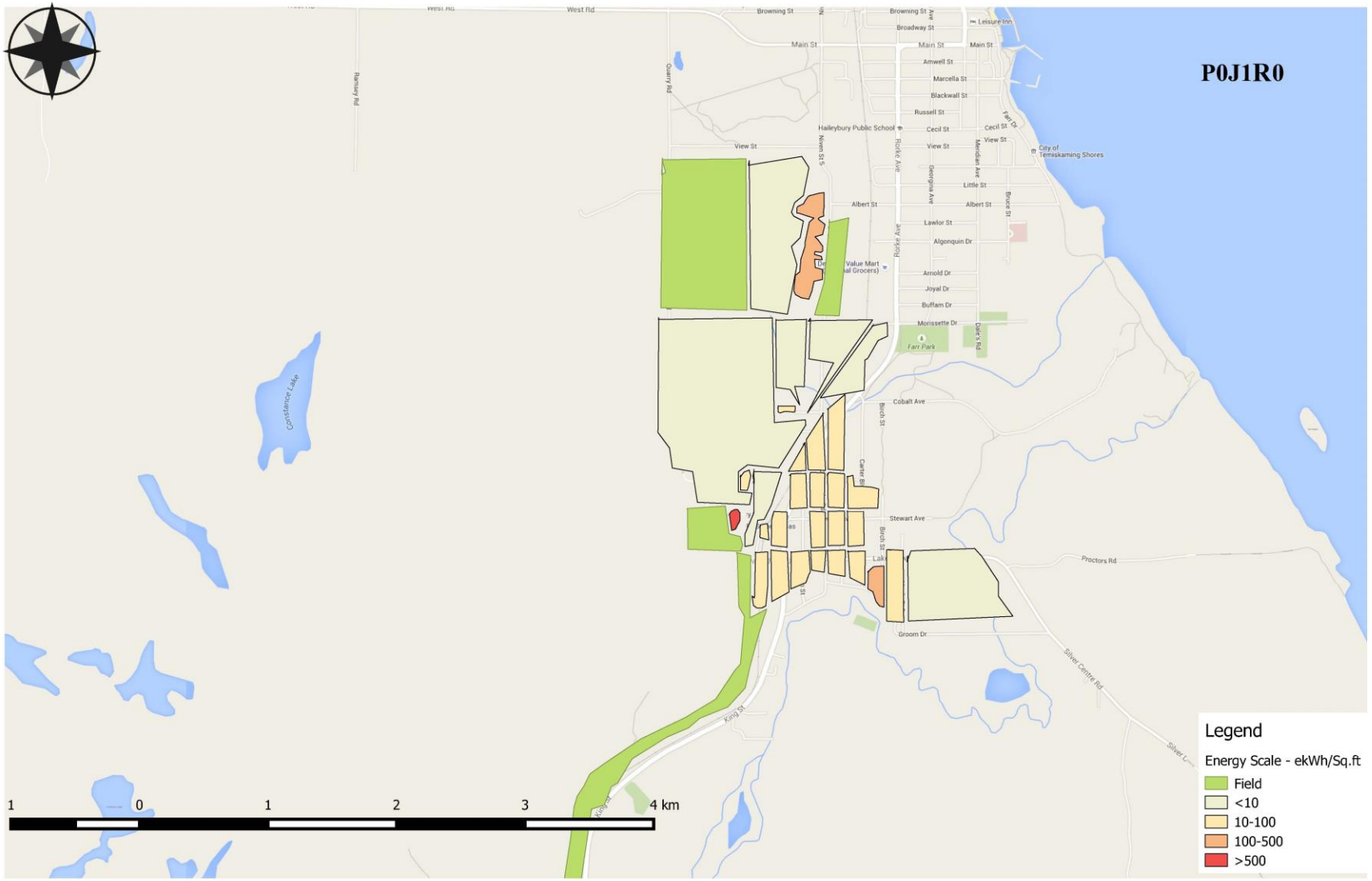


Figure 5-3 Postal Code P0J1K0, Haileybury

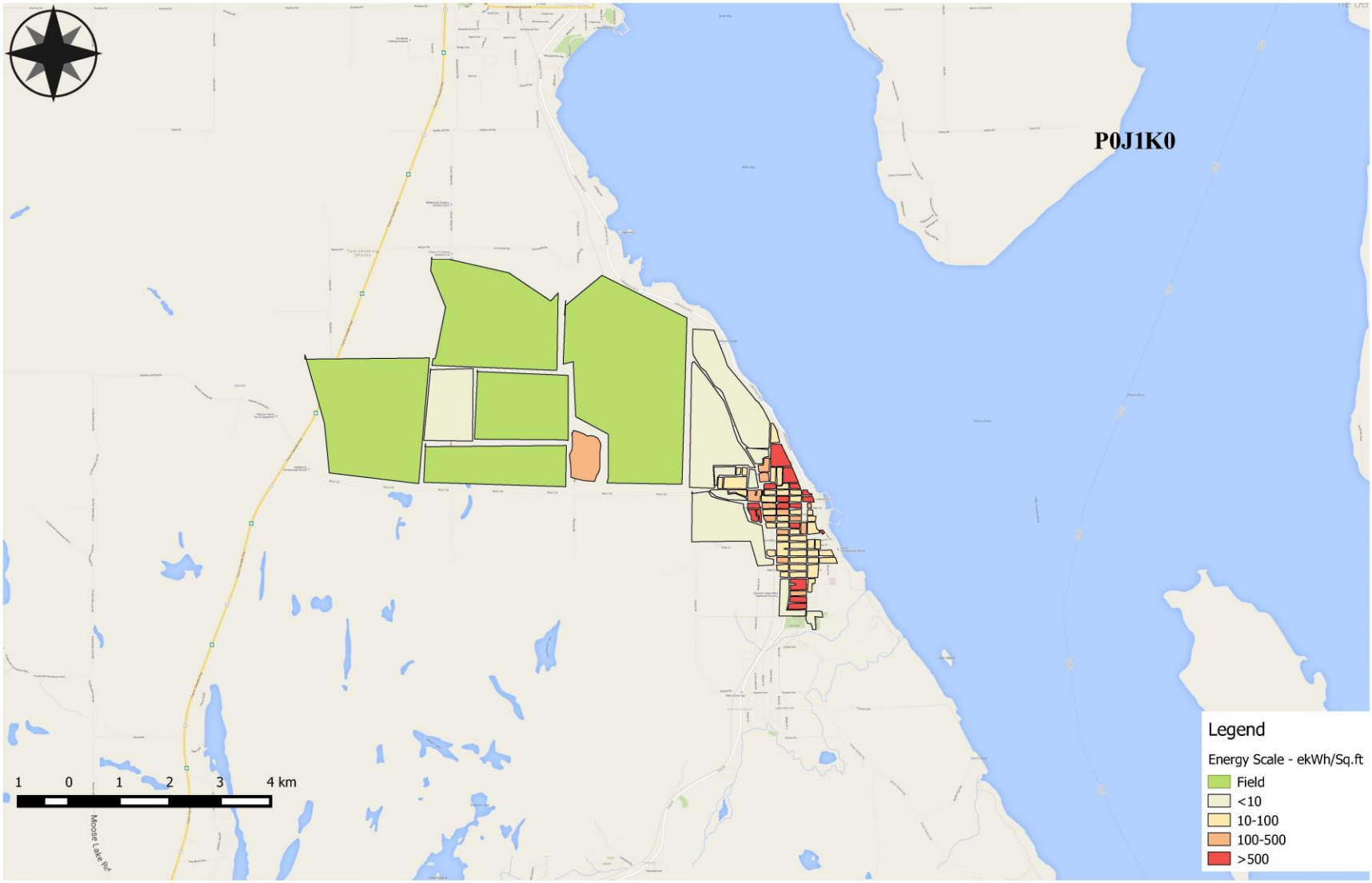


Figure 5-4 Postal Code P0J1P0, New Liskeard and Dymond

5.1.3 Community Engagement

The City, in cooperation with the VIP Project Team also provided marketing pieces to build awareness and support for both the MEP development process as well as energy conservation in general. These items include posters, informational handouts, materials for newspaper articles and other more general information pieces. Some of the highlights include:

- Earth Hour Messaging (Posters and Newspaper),
- Promotional Information for the April Lifestyles Show (Posters and Handouts for the General Public), and
- Various visual marketing pieces including energy conservation related posters and news articles.

This marketing program was directed at maintaining momentum for both the MEP process as well as energy management as a whole and was augmented by direct interaction with the public at a local trade show (listed above). Examples of material generated for community engagement can be found in ***Appendix C***.

5.2 Energy Conservation Measures Planned

A community's ability to generate change within itself is largely dependent upon the amount of buy-in its residents have for an idea, cultural perspective or habit. To ensure that the community is promoting and actively working towards attaining its conservation and sustainability goals, the City will be undertaking the following action items. These areas of focus are designed to help positively influence the community's perception of conservation, and provide education on the merits of efficiency and sustainability. They will allow for the City to continue to play a leading role in conservation efforts in the region and increase its attractiveness to investment and industry through measures that both benefit the environment and are economically viable.

5.2.1 Community Conservation Culture

In order to achieve successful implementation of this MEP, a culture of conservation needs to be fostered within the community. This culture can than grow into meaningful behavior changes from the residents of the City which will ensure that the conservation efforts being put forth can reach their full potential. Technological improvements can only take us so far, but if the equipment and processes are not run or implemented efficiently, it can all be for naught. How do we get people to adopt a culture of conservation? Early adopters will always be a part of any new cultural movement, just as there will always be detractors on the other end of the spectrum. Getting those in the middle ground to shift towards positive action is where the real success or failures of such movements lie. Community engagement and stakeholder buy-in will be key in achieving success, as will communication and awareness.

The City will create leading edge community engagement in energy initiatives (conservation, retro-fits, and efficiency programs) in order to enhance our implementation effectiveness and support a sustained quality of life in the City.

The community conservation culture will be created by:

1. Creating a dedicated interactive community internet site on community energy.
2. Leveraging available funding to promote conservation and demand management programs.

3. Help organizations (commercial, industrial and institutional) rationalize longer-term payback periods by identifying conservation opportunities and behavior-based programs that can reduce energy consumption.

4. Work with local stakeholders to educate the community on the financial and environmental benefits of energy conservation.

5. Implement an energy conservation or climate change recognition program.

6. Use gamification, contests or reward programs to increase participation in conservation programs.

7. Educate people on the benefits of the ENERGY STAR® program, particularly when purchasing new appliances and electronics and the impact of phantom loads.

8. Continue to promote province wide initiatives like Earth Hour and recycling programs.

9. Supporting school programs to engage community on conservation initiatives.

10. Work with regional partners to expand conservation culture beyond our borders

5.2.2 Energy Efficiency

Improving energy efficiency is always a key part of any energy plan as efficiency improvements are often the most cost-effective and easily implemented retrofits to pursue. In addition to the efficiency recommendations made in previous sections of this report, the City will work with the community and key stakeholders to create new standards of efficiency in both new and existing buildings in ways that contribute to the City's overall economic competitiveness.

This will be achieved by:

1. Targeting conservation programs to older residential and commercial buildings, in areas identified as high consumption through the energy mapping process.

2. Consider incentives or financing programs to assist residents to finance retrofits.

3. Lobby provincial governments to extend conservation programs.

4. Encourage building owners to benchmark energy usage of building and help develop an existing energy usage database for the community. This data could then be used to further improve the community's culture of conservation.

5. Continuing to encourage building owners/managers to consider 3rd party energy efficiency programs such as LEED™ and BOMA BESt.

6. Encourage builders to improve energy efficiency and sustainability of new buildings beyond Ontario Building Code, using third party programs.

7. Ensuring that all new commercial, industrial and institutional buildings are evaluated for energy and water efficiency improvements and conservation opportunities. This will apply to any such facilities undergoing any major renovations.

8. Encourage regional partners to follow suit and adopt similar standards.

5.2.3 Energy Generation and Security

Currently the City has three substantial solar farms within its borders. Liskeard 1, 3, and 4 which have a combined 30 MW capacity. There are also several small residential solar projects throughout the municipality and there are no large sources of thermal, wind or biofuel generation. While the City has taken advantage of the solar resource in its area there are other renewable sources that will be explored in an effort to expand the generating capacity of the City. A strong energy infrastructure has many components, and security through redundancies and distributed generation are key elements. By expanding the amount of energy generated within the community, the City not only benefits from reduced operational costs, but also becomes more attractive to investments and industry by laying the groundwork for these emerging technologies. In addition to the need for increased local generation, decreasing the overall energy demand of the community is another major concern. Growing demand levels will require increased expansion of the existing electrical infrastructure and decrease the reliability of the grid.

The City will take steps to increase the capacity for integrated community energy utility infrastructures through the following actions:

1. Encourage residential and commercial facilities to utilize solar water heating for pools and domestic hot water use by educating and providing support for these projects.

2. The potential for wind generation is average to poor, but increases along the shoreline. Preliminary investigations will be undertaken to determine the merits and environmental impacts of small scale wind generation for facilities along the shorelines.

3. Provide education and support to industry and commercial facilities with high energy demand, as identified through the Energy Maps, on co-generation systems. These systems are capable of making the most efficient use of input fuel by generating both electricity and converting waste heat into a useable energy source.

4. Work with local industry and businesses to reduce peak demand by implementing a demand management program that will work with stakeholders to encourage them to shift high demand process away room peak periods.

Several other technologies exist that may be examined for their feasibility for integration into the City's energy infrastructure, however the above-mentioned areas of focus are best suited to the City's geography and energy demands. Other technologies that may be considered include: Deep Water Lake cooling to substitute summer AC demands, Wastewater micro-turbines and heat recovery, biofuel co-generation and landfill gas capture. These technologies have been designated as lower priority options due to both the building density of the City and its climate.

5.2.4 Land Use and Growth

Traditionally, energy planning is not a large part of community planning, but how we plan our communities can have a significant effect on how we use energy. The City has already committed to many green building and architecture principles in its Official Plan, and the following actions will expand on these initiatives to help us build a complete and healthy community, where mixed-use areas support active transportation measures and a local transit system.

The City will optimize our integrated community energy systems and efficiency opportunities in land use planning by:

1. Promoting pedestrian-friendly design through:

    a. Planning for convenient walking distances to transit and parks

b. Creating dedicated walkways and pathways/trails to link activity nodes (e.g. home-to-work

c. Encouraging compact, efficient mixed-use areas that optimize redevelopment and integrate residential, office and retail commercial developments

2. Creating opportunities for energy conservation through:

a. Orienting new buildings to take advantage of solar gain

b. Retain/plant and maintain shade trees for summer cooling and winter shelter

c. Encourage pedestrian and bicycle usage over vehicle travel

d. Encourage the use of green infrastructure and systems (e.g. use of permeable surfaces, green facades, green/grass roofs and passive design landscaping, solar shading, use of recycled building and construction materials)

e. Enhancing the capacity of municipal staff to consider passive energy and sustainable building measures to conserve energy through the planning approvals process where feasible.

6 IMPLEMENTATION PLAN

The following table is a concise summary of the goals and objectives for the MEP2016. Initiatives for each objective are identified with an indication of their priority, estimated implementation timing, what resources will be required, and who will take the lead.

Initiative	Priority	Timing	Lead	Resources
City of Temiskaming Shores Led Measures				
Target: Lighting Upgrades and Standards for New Construction				
1. Where feasible, implement a replacement by attrition policy in all municipal buildings that replaces any defective lighting fixture with either a high efficient or LED equivalent.	High	Short-Term	City	Staff resources; funding required
2. Generate plans and budgets for future street lighting projects to be comprised of primarily LED fixtures.	Medium	Short-Term	City	Staff resources
3. Take advantage of IESO provided incentives to help fund these initiatives.	High	Short-Term	City, Hydro One	Staff resources
4 Collaborate with neighboring regions to plan and advocate for high efficiency lighting in regional street lighting projects.	High	Short-Term	City, Hydro One, Union Gas	Staff resources
Target: Halting the Rise in Natural Gas Usage				
1. Implement maintenance procedures at all municipal buildings that include inspection, repair and replacement of doors and window seals on a bi-monthly basis.	High	Short-Term	City	Staff resources
2. Ensure all thermostats are upgraded to programmable models wherever feasible and provide training and guidance on acceptable scheduling and temperature setpoints. Implement routine checks to ensure these schedules are not being manually overridden.	High	Short-Term	City	Staff resources

Initiative	Priority	Timing	Lead	Resources
3. Begin a systematic approach to upgrading the heating systems at high consumption facilities as identified through energy audits previously conducted.	Low	Short-Term	City, Union Gas	Staff resources; funding required
4. Investigate the feasibility of using solar water heating to reduce the natural gas consumption of pool water heating.	Medium	Short-Term	City, Union Gas, External Consultants	Staff resources
5. Investigate the feasibility of installing heat pumps at municipal office buildings and small libraries.	Low	Short-Term	City, Union Gas, External Consultants	Staff resources
6. Take advantage of incentive programs form Union Gas for retrofits and gas saving measures.	High	Short-Term	City, Union Gas	Staff resources
Target: Increase the Share of Public Transportation in the City's Modal Distribution				
1. Continue to support Urban Development as detailed in the Official Plan by promoting local work opportunities and reducing outbound commuting.	Medium	Medium-Term	City, community partners	Current resources
2. Emphasize the importance of sustainable transportation measures, such as transit and active transportation.	Medium	Medium-Term	City, community partners	Staff resources
3. Consider feasibility of car share and bike programs.	Medium	Medium-Term	City	Staff resources
4. Support/encourage school-oriented programs to increase active transportation initiatives.	High	Medium-Term	City, community partners	Staff resources
5. Ensure new and reconstructed arterial and collector roads are built as *Complete Streets* that are safe and accessible for pedestrians and cyclists of all ages where feasible	High	Medium-Term	City	Staff resources; potential funding required

Initiative	Priority	Timing	Lead	Resources
6. Continue to expand and modernize the local transit system by improving bus shelters, ticketing systems, routes, and online accessibility.	Medium	Medium-Term	City, Tri-Town Transit Committee	Current resources
7. Ensure new development is transit friendly.	High	Medium-Term	City	Staff resources
8. Work with neighboring regions to develop and promote inter-region public transportation options.	Low	Medium-Term	City	Staff resources
Target: Installing VFD's at Water Handling Facilities				
1. Initiate 2 Detailed Engineering Studies (DES) every two years to determine the feasibility, payback, and energy conservation levels of VFD installations at the water treatment facilities, beginning with those already identified through Energy Audits as high conservation opportunities.	High	Medium-Term	City, Hydro One, External Consultants	Requires funding and external resources
2. Pursue IESO funding for the DES's.	High	Medium-Term	City, Hydro One	Staff resources
3. Implement the findings of the DES's where feasible and initiate measurement and verification practices to quantify the success of the measures.	Medium	Medium-Term	City	Requires funding and external resources
Target: Energy Audits, Retro-commissioning and New Building Commissioning				
1. Work with Council to plan, organize and budget for a schedule of Energy Audits at all of the Cities facilities.	High	Medium-Term	City	Staff resources
2. Work with Council to plan, organize and budget for a schedule of re-commissioning activities at its high consumption facilities.	High	Medium-Term	City	Staff resources
3. Educate staff and the community on the benefits of recurring Energy Audits	Low	Medium-Term	City, Hydro One, Union Gas	Staff resources and external resources

Initiative	Priority	Timing	Lead	Resources
4. Support and include commissioning practices during new construction and renovations at City operated facilities.	Low	Medium-Term	City	Staff resources, requires funding and external resources
5. Lobby provincial governments to extend incentive programs for Energy Audits and Commissioning.	Low	Medium-Term	City, Hydro One, Union Gas	Staff resources
6. Develop budgets and schedules for implementing the findings of the Energy Audits.	Medium	Medium-Term	City, Hydro One, Union Gas	Staff Resources, funding required
Target: Provide the Energy Needed for Projected Growth through Improved Energy Efficiencies				
1. Target conservation programs to older building stock and encourage commercial and industrial sectors to participate in Energy Audits and Retro-Commissioning programs. Develop standards to for recurring use of these programs over specific time periods, based on building age and energy intensity.	Medium	Long-Term	City, Hydro One, Union Gas	Staff resources, requires funding and external resources
2. Develop lighting standards for renovations that include options for LEDs and other high-efficiency lighting types. Include operational standards such as light and motion sensors, and automatic timers.	High	Long-Term	City, community partners	Staff resources
3. Consider incentives or financing programs to accelerate meeting efficiency standards of new Ontario Building Codes.	Low	Long-Term	City	Staff Resources, funding required
4. Encourage building owners to improve the thermal efficiency of their facilities through measures such as increased insulation and weather stripping. Develop window replacement and maintenance program, including window sealing and caulking.	Medium	Long-Term	City, Hydro One, Union Gas	Staff resources

Initiative	Priority	Timing	Lead	Resources
5. All major renovations will be expected to achieve at least a 20% energy efficiency increase from today's overall city-wide average of 462 *e*kWh/m^2/yr starting from 2017. Moving forward, this target will be improved by a net 3% per year through at least 2031.	High	Long-Term	City, Hydro One, Union Gas	Staff resources and external resources
6. Encouraging builders to improve energy efficiency and sustainability of new buildings by utilizing third party programs such as LEED™ certification, BOMA BESt, or ENERGY STAR® for new homes, and celebrating these successes.	High	Long-Term	City, Hydro One, Union Gas	Staff resources and external resources
7. Encourage regional partners to adopt these new standards	Medium	Long-Term	City, community partners	Staff resources
8. Develop policy for energy efficient guidelines and equipment specifications for new construction projects that reduce average energy efficiency by 1.5% per year for ongoing new construction from 2017 to 2031.	High	Long-Term	City, Hydro One, Union Gas	Staff resources and external resources
9. Increasing participation rates and awareness of recycling and replacement programs for refrigerators and electronics equipment.	Medium	Long-Term	City, community partners	Staff resources and external resources
10. Educate people on the benefits of the ENERGY STAR® program, particularly when purchasing new appliances and electronics and the impact of phantom loads.	Medium	Long-Term	City, community partners	Staff resources and external resources
Target: Retrofit All Municipal Buildings with High Efficiency Lighting Systems				
1. Use information gathered through Energy Auditing to plan and budget for scheduled replacement of major lighting systems.	High	Long-Term	City, Hydro One	Staff resources

Initiative	Priority	Timing	Lead	Resources
2. Work with consultants and industry representatives to determine the most cost-effective energy efficient options on a continuing basis.	Low	Long-Term	City, External Consultants	Staff resources and external resources
3. Pursue lighting retrofit incentives from IESO and lobby for the renewal of such programs.	Medium	Long-Term	City, Hydro One	Staff resources
4. Begin a staged implementation of this plan with the aim of all lighting being retrofitted by 2031.	Medium	Long-Term	City	Staff resources, funding required
Target: Building Envelope Upgrades				
1. The City will make use of 3rd party programs such as LEED™ and BOMA BESt® in its new construction buildings which place emphasis on increasing the effectiveness of building envelopes	Medium	Long-Term	City, Hydro One, Union Gas	Staff resources
2. The City will take steps to plan and implement a window replacement program for its older existing building stock, using information gathered through Energy Auditing to determine the highest priority facilities.	Medium	Long-Term	City, Hydro One, Union Gas	Staff resources
3. The City will investigate the feasibility of instituting a program of spray-foam insulation in ceiling cavities of existing building stock, using information gathered through Energy Auditing to determine the highest priority facilities.	Low	Long-Term	City, External Consultants	Staff resources, funding may be required
4. During any significant renovation to existing building stock consideration will be given to the feasibility of combining insulation improvements with existing project plans, so as to reduce retrofit costs.	High	Long-Term	City	Staff resources, funding may be required

Initiative	Priority	Timing	Lead	Resources
5. The City will implement such retrofit measures as deemed feasible to improve the building envelope including but not limited to; Air Curtains, Automatic Doors, Reflective E-film Window Coverings, Window Roller Shades, etc.	High	Long-Term	City	Staff resources, requires funding and external resources
Community Focused Measures				
Community Conservation Culture				
1. Creating a dedicated interactive community internet site on community energy.	Medium	Short-Term	City, External Consultants, Hydro One, Union Gas	Staff resources, funding required
2. Leveraging available funding to promote conservation and demand management programs.	High	Medium-Term	City	Staff resources
3. Help organizations (commercial, industrial and institutional) rationalize longer term payback periods by identifying conservation opportunities and behavior-based programs that can reduce energy consumption.	Medium	Medium-Term	City, community partners	Staff resources
4. Work with local stakeholders to educate the community on the financial and environmental benefits of energy conservation.	Medium	Medium-Term	City, community partners	Staff resources
5. Implement an energy or climate change recognition program.	High	Short-Term	City, community partners	Staff resources
6. Use gamification, contests or reward programs to increase participation in conservation programs.	Low	Medium-Term	City, community partners	Staff resources
7. Educate people on the benefits of the ENERGY STAR® program, particularly when purchasing new appliances and electronics and the impact of phantom loads.	Medium	Medium-Term	City, community partners	Staff resources

Initiative	Priority	Timing	Lead	Resources
8. Continue to promote province wide initiatives like Earth Hour and recycling programs.	Low	Medium-Term	City, community partners	Staff resources
9. Supporting school programs to engage community on conservation initiatives.	Low	Medium-Term	City, community partners	Staff resources
Energy Efficiency				
1. Targeting conservation programs to older residential and commercial buildings, in areas identified as high consumption through the energy mapping process.	High	Short-Term	City, community partners	Staff resources
2. Consider incentives or financing programs to assist residents to finance retrofits.	Low	Medium-Term	City	Staff resources, funding required
3. Lobby provincial governments to extend conservation programs.	Medium	Medium-Term	City	Staff resources
4. Encourage building owners to benchmark energy usage of building and help develop an existing energy usage database for the community. This data could then be used to further improve the community's culture of conservation.	Medium	Medium-Term	City, community partners	Staff resources, funding may be required
5. Continuing to encourage building owners/managers to consider 3rd party energy efficiency programs such as LEED™ and BOMA BESt.	High	Long-Term	City, community partners	Staff resources
6. Encourage builders to improve energy efficiency and sustainability of new buildings beyond Ontario Building Code, using these 3rd party programs.	High	Long-Term	City, community partners	Staff resources

Initiative	Priority	Timing	Lead	Resources
7. Ensuring that all new commercial, industrial and institutional buildings are evaluated for energy and water efficiency improvements and conservation opportunities. This will apply to any such facilities undergoing any major renovations.	Medium	Long-Term	City, External Consultants	Staff resources, funding required
Energy Generation and Security				
1. Encourage residential and commercial facilities to utilize solar water heating for pools and domestic hot water use by educating and providing support for these projects.	Low	Long-Term	City, External Consultants	Staff resources, funding required
2. The potential for wind generation is average to poor, but increases along the shoreline. Preliminary investigations will be undertaken to determine the merits and environmental impacts of small scale wind generation for facilities along the shorelines.	Medium	Short-Term	City, External Consultants	Staff resources, funding required
3. Provide education and support to industry and commercial facilities with high energy demand, as identified through the Energy Maps, on co-generation systems. These systems are capable of making the most efficient use of input fuel by generating both electricity and converting waste heat into a useable energy source.	High	Medium-Term	City	Staff resources
4. Work with local industry and businesses to reduce peak demand by implementing a demand management program that will work with stakeholders to encourage them to shift high demand process away room peak periods.	Medium	Long-Term	City, Hydro One	Staff resources, funding may be required

Initiative	Priority	Timing	Lead	Resources
Land Use and Growth				
1. Promoting pedestrian friendly design	High	Medium-Term	City	Staff resources
2. Encouraging compact, efficient mixed-use areas that optimize redevelopment and integrate residential, office and retail commercial developments	Medium	Medium-Term	City, community partners	Staff resources
3. Creating opportunities for energy conservation through; Orienting new buildings to take advantage of solar gain, Retain/plant and maintain shade trees for summer cooling and winter shelter	High	Medium-Term	City, community partners	Staff resources, funding may be required
4. Encourage the use of green infrastructure and systems (e.g. use of permeable surfaces, green facades, green/grass roofs and passive design landscaping, solar shading, use of recycled building and construction materials)	High	Medium-Term	City, Hydro One	Staff resources, funding may be required
5. Enhancing the capacity of municipal staff to consider passive energy and sustainable building measures to conserve energy through the planning approvals process where feasible.	Medium	Medium-Term	City	Staff resources

6.1 Monitoring and Reporting

Energy monitoring and tracking is one of the cornerstones of good energy management. The reporting we utilize reveals the annual consumption of energy, as well as the costs associated with the purchase of these utilities. By monitoring the energy use from year to year, the City can track the results of the energy conservation efforts.

Information gleaned from municipal reporting and utility provided data has highlighted key performance indicators that provide us with a baseline of energy consumption and costs, both within the City's asset portfolio and in the Region as a whole. This baseline is useful in establishing a strategy for conservation initiatives and will also serve as a method of measuring our success when new consumption and costs are compared with the baseline.

The tracking of our utilities also allows for us to engage the community by highlighting conservation progress as well as the impact of their efforts on Greenhouse Gas Emissions.

Targets have been set for each objective as previously noted and performance measures and indicators will be used for reporting and monitoring progress. The actions will be reviewed and reported on semi-annually. This MEP2016 will be reviewed and updated in 2021.

6.2 Governance

The MEP 2016 is about an active community. The City has an important role to play as a role model displaying leadership in energy conservation, energy efficient operations and the coordination of planned activities. The success of the plan will be driven by the community stakeholders. In isolation, the City would only be able to achieve a portion of the goals and objectives set within this MEP 2016 document.

The structure of the Team/Teams guiding the implementation of the MEP2016 will consist of an Oversight Committee to provide guidance on the implementation of the MEP and a MEP Implementation Taskforce to actually implement the plan.

The Oversight Committee will be comprised primarily by members of the initial stakeholder groups to ensure continuity throughout the MEP. The committee will be responsible for monitoring and reporting on the progress of the Taskforce, while also providing guidance and enhancing communication between stakeholders. The Oversight Committee will also share the successes and challenges of the MEP with regional neighbors. In this way, the committee will act

as both a resource for other communities and as an advocate for creating a culture of conservation in the surrounding areas. Additionally, the committee will act as representative for the City in the context of regional planning, and ensure that the values of the MEP are communicated and represented in this process.

The Taskforce will ideally be comprised of representatives from the City, Hydro One and Union Gas. It will be responsible for developing the implementation plans and processes necessary to achieving the goals of the MEP. It will support, and report to, the Oversight Committee and manage the administrative budget. The Taskforce will have three sub-areas of focus; City Energy Conservation Measures, City Operational and Water Efficiency Improvements, and Community Energy Conservation Measures. Membership of the groups responsible for these areas will be determined based on the skills required for each team, as determined by the Taskforce. Additional consulting expertise may be required to help support implementation.

6.3 Regional Engagement

Members of the Governance teams will be expected to help in spreading the information within this MEP with neighboring regional municipalities and townships. In this way a greater culture of conservation can be fostered within the surrounding areas and greater communication between governments can be attained. An understanding that all communities in the area will be similarly focused on energy conservation, reduction, local generation and efficiency improvements will allow for integrated efforts between the communities. This can help to expand transit projects, further encourage renewable energy projects and plan and implement larger scale projects.

Appendix A – Energy Data

Electricity

Hydro One Supplied Consumption by Postal Code				
Market Segment	Rate Class	Postal Code	Total KWH 2014	Total Uplifted KWH 2014
Commercial	GSD	P0J1P0	21,146,774	22,438,716
Commercial	GSD	Unknown	5,955,491	6,318,779
Commercial	GSE	P0J1K0	4,581,889	5,003,423
Commercial	GSE	P0J1P0	12,666,701	13,832,033
Commercial	GSE	P0J1R0	633,781	692,089
Commercial	GSE	Unknown	970,474	1,059,764
Commercial	SNL	Unknown	39,382	42,965
Commercial	STR	Unknown	1,306,493	1,426,693
Commercial	UGE	Unknown	42,279	46,169
Commercial	USL	Unknown	289,011	317,307
Industrial		P0J1P0	5,679,540	6,103,866
Industrial		Unknown	5,775,214	6,114,662
Residential	R1	P0J0A7	114,874	124,639
Residential	R1	P0J0A9	117,570	126,769
Residential	R1	P0J1C0	52,823	57,313
Residential	R1	P0J1K0	11,051,574	11,847,502
Residential	R1	P0J1P0	20,263,204	21,907,653
Residential	R1	P0J1R0	3,382,471	3,662,973
Residential	R1	Unknown	374,718	381,589
Residential	R2	P0J1C0	511,086	546,196
Residential	R2	P0J1K0	436,363	470,755
Residential	R2	P0J1P0	2,848,947	3,090,608
Residential	R2	P0J1R0	157,108	170,931
Residential	R2	Unknown	55,920	60,029
Residential	SR	P0J1	39,459	42,729

City of Temiskaming Shores Facilities 2014 Energy									
Building Name	City	Postal Code	Total Floor Area (ft2)	Total Floor Area (m2)	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m3)	GHG Emissions (kg)	Energy Intensity (ekWh/ft 2)	Energy Intensity (GJ/m2)
Water Treatment / Reservoir / Well Pump	Dymond	P0J1P0	600	56	132,668	1,580	15,728	249.1	9.65
PW Complex / Community Hall / Offices / Fire Hall	Dymond	P0J1P0	17,060	1,585	65,663	29,738	62,531	22.4	0.87
Sewage Pumping Station	Dymond	P0J1P0	48	4	57,331		5,506	1,194.4	46.28
Arena / Community Center	Haileybury	P0J1K0	35,004	3,252	399,897	73,810	177,954	33.8	1.31
Farr Sewer Pumping Station	Haileybury	P0J1K0	200	19	72,146		6,929	360.7	13.98
Groom Sewage Pumping Station (North Cobalt)	Haileybury	P0J1K0	50	5	11,778		1,131	235.6	9.13
Cemetery Vault	Haileybury	P0J1K0	947	88	102		10	0.1	0.00
Small Office Food Bank & Park Washroom	Haileybury	P0J1K0	1,098	102	10,608		1,019	9.7	0.37
Fire Station	Haileybury	P0J1K0	8,697	808	17,321	17,612	34,961	23.5	0.91
Building Maintenance Shop/Office & Public Works Carpenter's Shop	Haileybury	P0J1K0	15,715	1,460	28,373	13,481	28,212	10.9	0.42
Public Works Garage - Main Shop	Haileybury	P0J1K0	8,300	71	40,388	29,186	59,059	42.2	1.64
Sewage Lagoon Filtration Station	Haileybury	P0J1K0	48	4	116,887		11,226	2,435.1	94.36
Haileybury Library Building	Haileybury	P0J1K0	17,200	1,598	28,972	15,688	32,443	11.4	0.44
Medical Center	Haileybury	P0J1K0	26,598	2,471	131,040	9,375	30,310	8.7	0.34
Sail Boat Office (club)	Haileybury	P0J1K0	1,798	167	4,130	3,165	6,381	21.0	0.81
Pool and Fitness Center	New Liskeard	P0J1P0	21,302	1,979		109,290	206,626	54.5	2.11

City of Temiskaming Shores Facilities 2014 Energy									
Building Name	City	Postal Code	Total Floor Area (ft2)	Total Floor Area (m2)	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m3)	GHG Emissions (kg)	Energy Intensity (ekWh/ft 2)	Energy Intensity (GJ/m2)
Cedar Pumping Station	New Liskeard	P0J1P0	0		4,551		437		
Cemetery Chapel	New Liskeard	P0J1P0	1,905	177	320		31	0.2	0.01
Public Works Main Garage	New Liskeard	P0J1P0	10,065	935	84,685		8,133	8.4	0.33
Quonset Hut Public Works Yard	New Liskeard	P0J1P0	4,800	446	8,383		805	1.7	0.07
Whitewood Pumping Station	New Liskeard	P0J1P0	625	58	96,508		9,269	154.4	5.98
Montgomery Sewage Station	New Liskeard	P0J1P0	48	4	35,941		3,452	748.8	29.01
Niven Sewage Station	New Liskeard	P0J1P0	1,200	111	182,323		17,510	151.9	5.89
Water Filtration Plant and Well Pumps	New Liskeard	P0J1P0	2,605	242	541,365	6,533	64,345	234.5	9.09
NL Reservoir (177102 Shepherdson)	New Liskeard	P0J1P0	1,200	111	221,916		21,313	184.9	7.17
Cemetery Caretaker Building	New Liskeard	P0J1P0	248	23	2,755		265	11.1	0.43
Sewage Lagoon	New Liskeard	P0J1P0	48	4	389,437		37,402	8,113.3	314.39
Public Works Garage	New Liskeard	P0J1P0	5,705	530	45,266	59,076	116,038	118.0	4.57
Medical Center	New Liskeard	P0J1P0	12,799	1,189	135,201		12,985	10.6	0.41
Fire Station	New Liskeard	P0J1P0	6,598	613	18,584	11,868	24,224	21.9	0.85
Library Building	New Liskeard	P0J1P0	10,204	948	44,935	11,264	25,612	16.1	0.63
Riverside Place	New Liskeard	P0J1P0	11,744	1,091	65,694	19,200	42,609	23.0	0.89
Dump Garage / Office	New Liskeard	P0J1P0	500	46	233		22	0.5	0.02
Arena / Community Center	New Liskeard	P0J1P0	45,295	4,208	691,942	176,922	400,947	56.8	2.20

City of Temiskaming Shores Facilities 2014 Energy									
Building Name	**City**	**Postal Code**	**Total Floor Area (ft2)**	**Total Floor Area (m2)**	**Total Electricity Consumption (kWh)**	**Total Natural Gas Consumption (m3)**	**GHG Emissions (kg)**	**Energy Intensity (ekWh/ft 2)**	**Energy Intensity (GJ/m2)**
Community Hall / Office Building	New Liskeard	P0J1P0	38,696	3,595	35,392	41,750	82,333	12.4	0.48
Goodman Pumping Station (132 Jaffray)	Temiskaming Shores	P0J1P0	320	30	70,652		6,785	220.8	8.56
Water Reservoir / Pump House	Temiskaming Shores	P0J1K0	1,300	121	226,699		21,772	174.4	6.76
Harbour Building	Temiskaming Shores	P0J1K0	5,705	530	88,869		8,535	15.6	0.60
Mechanical Sewage Treatment Plant	Temiskaming Shores	P0J1K0	1,800	167	449,949		43,213	250.0	9.69
Station Sewage Pumping Station (North Cobalt)	Temiskaming Shores	P0J1K0	2,800	260	28,549		2,742	10.2	0.40
Water Treatment / Low & High Pump	Temiskaming Shores	P0J1K0	700	65	808,561	9,028	94,722	1,292.1	50.07
City Hall / Provincial Court / Council / Art Gallery	Temiskaming Shores	P0J1K0	15,210	1,413	223,574	27,038	72,590	33.6	1.30
Brewster Pumping station	Temiskaming Shores	P0J1K0	20	2	3,489		335	174.5	6.76
Lighting									
Street Lighting									
Street Lighting	Dymond				37,584				
Baseball Park / Street Lighting Zetta	Dymond				10,692				
Park Lighting	Dymond				9				
Festival Lighting	Haileybury				74				

City of Temiskaming Shores Facilities 2014 Energy									
Building Name	City	Postal Code	Total Floor Area (ft2)	Total Floor Area (m2)	Total Electricity Consumption (kWh)	Total Natural Gas Consumption (m3)	GHG Emissions (kg)	Energy Intensity (ekWh/ft 2)	Energy Intensity (GJ/m2)
Street Lighting	Haileybury				2,699				
Street Lighting	Haileybury				4,855				
Marina Dock Power	Haileybury				3,476				
Downtown Decorative and Street Lighting	Haileybury				26,228				
Street Lighting	Haileybury				15,252				
Street Lighting	Haileybury				23,919				
Ball Park Buildings and Lights	Haileybury				564				
Bucke Park	Haileybury				962				
Sand Salt Storage Building	Haileybury				5,582				
451 Meridian Lighting	Haileybury				52,0872				
Marina Dock Power (South)	Haileybury				30,092				
Street Lighting	Haileybury				10,842				
Street Lighting	Haileybury				3,980				
Traffic Lights	New Liskeard				2,832				
Pool and Fitness Center Sign	New Liskeard				4,752				
Decorative Lighting	New Liskeard				11,640				
Spurline Con / Band Power / Pedestal Power	New Liskeard				10,467				
Street Lighting Quonset Hut	New Liskeard				2,255				
Building / Soccer Club / Baseball Diamond Lights	New Liskeard				7,056				

City of Temiskaming Shores Facilities 2014 Energy									
Building Name	**City**	**Postal Code**	**Total Floor Area (ft2)**	**Total Floor Area (m2)**	**Total Electricity Consumption (kWh)**	**Total Natural Gas Consumption (m3)**	**GHG Emissions (kg)**	**Energy Intensity (ekWh/ft 2)**	**Energy Intensity (GJ/m2)**
Street Lighting	New Liskeard				439,096				
Traffic Lighting	New Liskeard				66,660				
Decorative Lighting	New Liskeard				18,540				
Street Lighting	New Liskeard				476,784				
Tennis Courts	New Liskeard				686				
Spoke Transfer Station	Temiskaming Shores				7,744				
New Liskeard Marina Boat Slips	Temiskaming Shores				24				
Lions Barn Rental Space	Temiskaming Shores				314				
	Totals		**336,805**	**31,290**	**7,369,607**	**665,605**	**42.9**	**3,427**	**3.6**

Appendix B – Green Cleaning Template

This policy example meets the requirements LEED v4 O+M EQ Prerequisite Green Cleaning Policy Option 1. The contents of this policy, including but not limited to the policy scope and goals, roles and responsibilities, standard operating procedures, implementation strategies, performance measurement and schedule for reassessment, and quality assurance, will vary by project based on the building's circumstances. Be sure to customize this policy example, tailoring it to your project's specifics. It will be reviewed as a part of your project's documentation submission.

Green Cleaning Policy for Building A

Effective date: May 1, 2012

i. Scope

This policy applies to all cleaning procedures, cleaning material purchases, cleaning equipment purchases, and cleaning services that occur inside and on the building site and grounds for Building A. Specifically, this policy covers the following:

1.
2. Cleaning strategies for:
   - Hard floor and carpet cleaning and maintenance
   - Protection of vulnerable occupants during cleaning
   - Disinfectant and sanitizer selection and use
   - Safe storage and handlings of cleaning chemicals, including spill management

   Performance metrics and strategy development:
   - Reductions in water use, energy use, and chemical toxicity
   - Green cleaning products purchasing
   - Green cleaning equipment purchasing

   Staffing and training plans:
   - Staffing requirements and contingency for staffing shortages
   - Timing and frequency of staff training
3.
4. **ii. Goals**
5.
6. This policy will be fully implemented starting on the effective date.
7.

Category	**Goal**	**Performance measurement unit**
Cleaning products and materials purchases	85% meet sustainability criteria	Cost
Cleaning equipment purchases	100% meet sustainability criteria	Number of equipment items
Cleaning equipment inventory	40% of equipment in the project inventory will meet the applicable sustainability criteria	Number of equipment items in the overall inventory for the project
Toxic chemical usage (applies to all cleaning chemicals, including those not addressed by EQc Green Cleaning – Products and Materials)	Toxic chemicals will only be used in situations where products meeting the requirements of EQ Credit Green Cleaning – Products and Materials are unable to sufficiently clean the area, the area cannot be replaced (such as a floor tile), and represents a hazard to human health	Number of uses

23.

iii. Roles and Responsibilities

The responsible party for this policy is John Smith, the Property Manager. He is responsible for ensuring that this policy is executed and that any contracted cleaning vendors under management's control are aware of and fully trained on the procedures outlined in this policy. Further, the Property Manager is responsible for sharing this policy with the building tenant representatives and encouraging policy adoption accordingly. He is responsible for reviewing this policy for any significant changes on the interval specified in the quality assurance section. If at any time updates are required to this policy, he will ensure that the appropriate individuals are informed of the updates.

iv. Procedures and strategies for implementation

Hard floor and carpet cleaning and maintenance

- Hard floors, including tile, concrete, and wood surfaces, will be cleaned once a week with only sustainable cleaning products. No stripping or coatings will be applied to hard floor surfaces.
- Carpets will be vacuumed daily with vacuum cleaners that meet the sustainability criteria listed later in this policy.
- One per month, the carpets will be inspected for stains and other damages. If feasible, the necessary areas will be spot cleaned with sustainable carpet cleaning materials. If damaged, the carpet tiles will be replaced.
- When carpet extraction equipment must be used, methods to reduce chemical usage will be implemented.

Protection of vulnerable occupants during cleaning

- Vulnerable occupants include women who are pregnant, children, elderly occupants, and individuals with asthma, allergies, or other sensitivities.
- As much as possible, only sustainable cleaning products will be used. Please refer to the goals and tracking sections of this policy for additional information.
- Any cleaning that involves the use of carpet cleaners, or if at any point the use of a non-sustainable cleaning product is required, this cleaning will be performed after regular business hours.

Disinfectant and sanitizer selection and use

- Only hand soaps and hand sanitizers that meet the at least one of the sustainability criteria listed under the purchasing guidelines will be considered to meet the requirements of this policy.
- Hand sanitizers will be placed throughout the building for the use of occupants
- Only disinfectants meeting the purchasing sustainability criteria listed below will be considered to meet the requirements of this policy. Disinfectants will be kept locked in the janitorial closets and may only be used by the cleaning staff.
- Cleaning staff will be required to follow all dilution strategies for disinfectants.

Safe storage and handlings of cleaning chemicals, including spill management

- Cleaning chemicals will be stored in the janitor closets to prevent access for other occupants.
- Cleaning staff will receive training on the various hazards of different toxic chemicals and how to address spills.
- Spills will be cleaned and handled according to the manufacturer safety data sheets provided by the manufacturer.
- All spills will be handled carefully. As soon a spill of a non-sustainable product occurs, the responsible party must be notified. If the spill occurs in an area to which typical building occupants have access, the area will be roped off and building occupants will be informed to stay clear of the area.

- Material safety data sheets for all of the cleaning chemicals used in the building will be retained and hazard information will be highlighted. This information will be clearly displayed in all janitor closets.

Strategies for reducing the toxicity of the chemicals used for laundry, ware washing, and other cleaning activities

- Cleaning staff and building occupants will be supplied with safe cleaning chemicals that meet the sustainability criteria described in the purchasing guidelines listed below.
- Dish soaps and laundry detergent meeting the EPA Design for the Environment will be supplied for ware washing and laundry.
- For surface cleaning, ionized water cleaning devices (using only water) will be used as much as possible.

Strategies for conserving energy, water, and chemicals used for cleaning

- Manual-powered equipment and cleaning strategies will be used whenever possible to reduce the energy and water used by powered equipment and typical cleaning strategies.
- Cold water will be used for any necessary disposal to reduce energy used to heat hot water.
- The filters in vacuums and other applicable equipment will be changed frequently to enable air flow and reduce the energy consumption of the equipment.
- When cleaning chemicals are necessary, the operating procedures for chemical dilution will be followed to ensure that the minimum amount of cleaning chemicals necessary is used.

Strategies for promoting hand hygiene

- All restrooms will be equipped with hands-free soap dispensers, faucets, hand dryers, and towel dispensers.
- Hand sanitizers meeting UL EcoLogo 2783 standard for Instant Hand Antiseptics (formerly Environmental Choice CCD 170) will be placed throughout the building.

Tracking plan for staffing and overall performance

- Regular APPA audits will be conducted to evaluate cleanliness. As a part of the audits, the auditors will interview cleaning staff to ensure that the cleaning and hard floor and carpet maintenance system is being consistently used.
- The audits will be conducted once every sixth months and will be led by the responsible party for this policy. The responsible party is responsible for recording the results of the audits in the management records, following up with any cleaning staff to provide additional training and/or guidance and recording these actions.
- All cleaning staff are required to check in each day when they arrive at work. The responsible party will retain these records to ensure that the building is sufficiently staffed with trained professionals.
- The responsible party will log all training that is provided to the cleaning staff and will ensure that the training plans described above are met.
- When new staff come on board, the responsible party will record the initial training and orientation provided to the staff.

Tracking plan for water, energy, and toxic chemical usage

- Every time a toxic chemical is used, it must be reported to the responsible party. The responsible party will record which chemical was used, where it was applied, and the reason for its use. This information will be used to track against the goal for using toxic chemicals only when strictly necessary.
- All vacuum filters will be replaced on a regular basis. The responsible party will record maintenance performed on all cleaning equipment, including filter replacement, to ensure that they are regularly replaced to reduce energy usage.

Tracking plan for cleaning product and cleaning equipment purchases

- All cleaning product and cleaning equipment purchases, made by either by the cleaning vendor for use in the building or made by the building management, will be recorded in the purchasing log.
- On a quarterly basis, the responsible party will review all purchases and compare against the policy goals. If the policy goals are not being met, the responsible party will take corrective action, typically in the form of providing education to the individuals in charge of procurement on the goals and sustainability criteria outlined in this policy.

Staffing and training plans

- To sufficiently clean the building requires at least one hour of cleaning per day for each 5,000 square feet. As this building is 100,000 square feet, it requires a minimum 20 hours of cleaning time per day. The cleaning staff typically works 5 hours per day; therefore a cleaning staff of at least 4 people daily. Typically 5 to 6 people are maintained on the cleaning staff.
- In the event of staffing shortages (only 3 staff are available from the regular vendor), the building maintains a contact with a backup cleaning vendor who can supply additional staff.
- Requirements for maintenance personnel.
- All cleaning staff, including backup personnel, are required to receive at least 8 hours of training per year. The responsible party will record the training attended by each staff member.
- Trainings are held once a month and are one hour long. Topics vary each month, and cover standard operating procedures for cleaning different surfaces, proper toxic chemical usage and spill management, hazards of toxic chemicals, cleaning to protect vulnerable occupants, cleaning equipment maintenance, and conservation of energy and water usage during cleaning.
- The responsible party coordinates and hosts all of the trainings.

v. Purchasing guidelines

Sustainability Criteria for Cleaning Products and Materials

Cleaning products must meet one or more of the following standards [or a local equivalent for projects outside the U.S.]:

- Green Seal GS-37, for general-purpose, bathroom, glass and carpet cleaners used for industrial and institutional purposes;
- UL EcoLogo 2792 (formerly CCD 110), for cleaning and degreasing compounds;
- UL EcoLogo 2759 (formerly CCD 146), for hard-surface cleaners;
- UL EcoLogo 2795 (formerly CCD 148), for carpet and upholstery care;
- Green Seal GS-40, for industrial and institutional floor care products;
- UL EcoLogo 2777 (formerly CCD 147) , for hard-floor care;
- EPA Design for the Environment Program's Standard for Safer Cleaning Products; and/or
- Cleaning devices that use only ionized water or electrolyzed water and have third-party-verified performance data equivalent to the other standards mentioned above (if the device is marketed for antimicrobial cleaning, performance data must demonstrate antimicrobial performance comparable to EPA Office of Pollution Prevention and Toxics and Design for the Environment requirements, as appropriate for use patterns and marketing claims).

Disinfectants, metal polish, or other products not addressed by the above standards must meet one or more of the following standards [or a local equivalent for projects outside the U.S.]:

- UL EcoLogo 2798 (formerly CCD 112), for digestion additives for cleaning and odor control;
- UL EcoLogo 2791 (formerly CCD 113), for drain or grease trap additives;
- UL EcoLogo 2796 (formerly CCD 115/107), for odor control additives;
- Green Seal GS-52/53, for specialty cleaning products;
- California Code of Regulations maximum allowable VOC levels for the specific product category;
- EPA Design for the Environment Program's standard for safer cleaning products; and/or

- Cleaning devices that use only ionized water or electrolyzed water and have third-party-verified performance data equivalent to the other standards mentioned above (if the device is marketed for antimicrobial cleaning, performance data must demonstrate antimicrobial performance comparable to EPA Office of Pollution Prevention and Toxics and Design for the Environment requirements, as appropriate for use patterns and marketing claims).

Disposable janitorial paper products and trash bags must meet the minimum requirements of one or more of the following programs [or a local equivalent for projects outside the U.S.]:

- EPA comprehensive procurement guidelines, for janitorial paper;
- Green Seal GS-01, for tissue paper, paper towels and napkins;
- UL EcoLogo 175 Sanitary Paper Products, for toilet tissue and hand towels
- Janitorial paper products derived from rapidly renewable resources or made from tree-free fibers;
- FSC certification, for fiber procurement;
- EPA comprehensive procurement guidelines, for plastic trash can liners; and/or
- California integrated waste management requirements, for plastic trash can liners (California Code of Regulations Title 14, Chapter 4, Article 5, or SABRC 42290-42297 Recycled Content Plastic Trash Bag Program).

Hand soaps and hand sanitizers must meet one or more of the following standards [or a local equivalent for projects outside the U.S.]:

- no antimicrobial agents (other than as a preservative) except where required by health codes and other regulations (e.g., food service and health care requirements);
- Green Seal GS-41, for industrial and institutional hand cleaners;
- UL EcoLogo 2784 (formerly CCD 104), for hand cleaners and hand soaps;
- UL EcoLogo 2783 (formerly CCD 170), for hand sanitizers;
- EPA Design for the Environment Program's standard for safer cleaning products.

[For projects outside the U.S., a local equivalent is any Type 1 eco-labeling program as defined by ISO 14024: 1999 developed by a member of the Global Ecolabelling Network may be used in lieu of Green Seal or UL standards.]

Sustainability Criteria for Cleaning Equipment

All powered equipment must have the following features:

- safeguards, such as rollers or rubber bumpers, to avoid damage to building surfaces;
- ergonomic design to minimize vibration, noise, and user fatigue, as reported in the user manual in accordance with ISO 5349-1 for arm vibrations, ISO 2631–1 for vibration to the whole body, and ISO 11201 for sound pressure at operator's ear
- as applicable, environmentally preferable batteries (e.g., gel, absorbent glass mat, lithium-ion) except in applications requiring deep discharge and heavy loads where performance or battery life is reduced by the use of sealed batteries.

Vacuum cleaners must be certified by the Carpet and Rug Institute Seal of Approval/Green Label Vacuum Program and operate with a maximum sound level of 70 dBA or less in accordance with ISO 11201.

Carpet extraction equipment, for restorative deep cleaning, must be certified by the Carpet and Rug Institute's Seal of Approval Deep Cleaning Extractors and Seal of Approval Deep Cleaning Systems program.

Powered floor maintenance equipment must be equipped with such as vacuums, guards, or other devices for capturing fine particulates and must operate with a maximum sound level of 70 dBA, in accordance with ISO 11201.

Propane-powered floor equipment must have high-efficiency, low-emissions engines with catalytic converters and mufflers that meet the California Air Resources Board or EPA standards for the specific engine size and operate with a sound level of 90 dBA or less, in accordance with ISO 11201.

Automated scrubbing machines must be equipped with variable-speed feed pumps and either (1) on-board chemical metering to optimize the use of cleaning fluids or (2) dilution control systems for chemical refilling. Alternatively, scrubbing machines may use tap water only, with no added cleaning products.

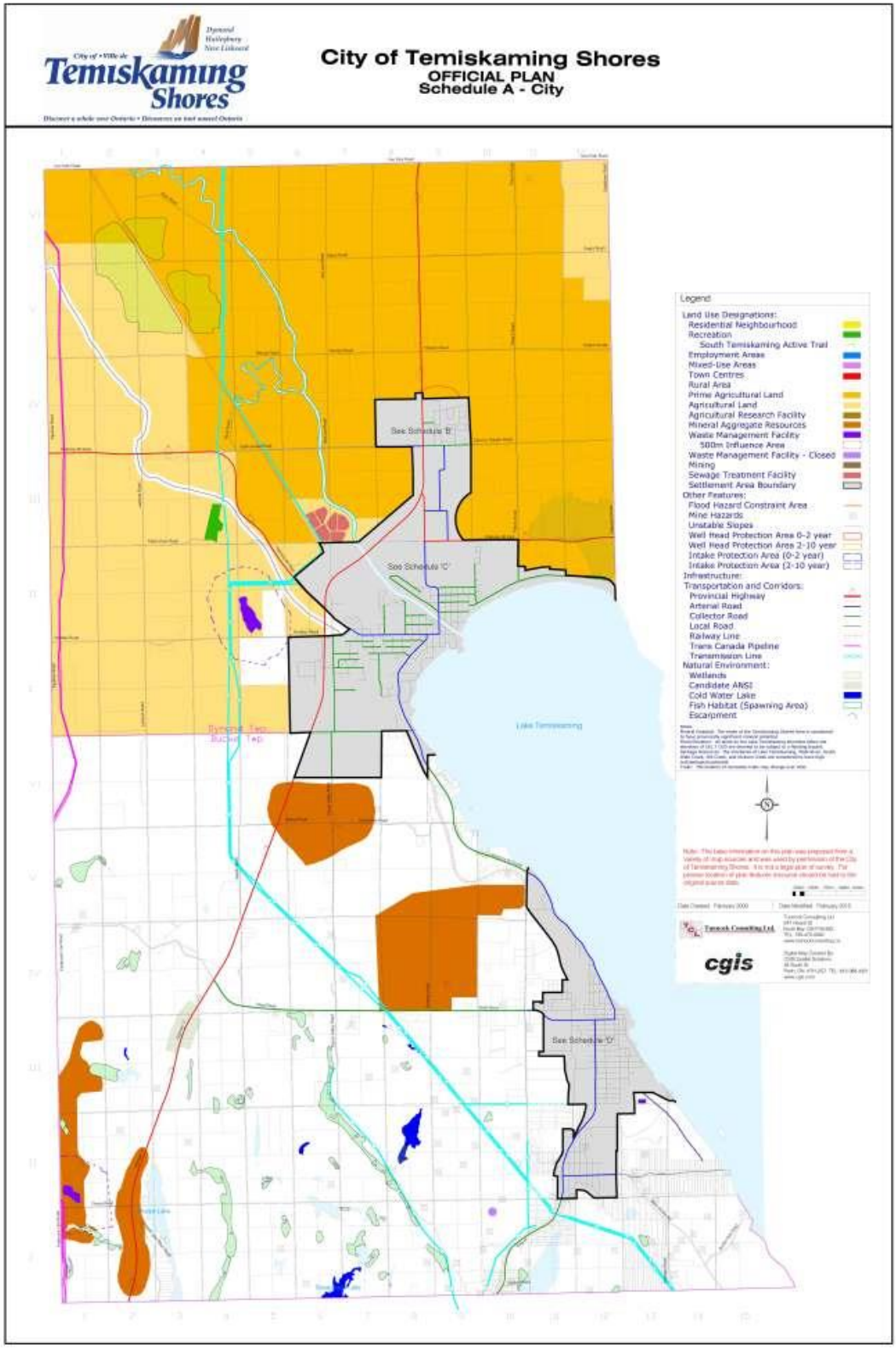
vi. Quality Assurance/Quality Control Processes

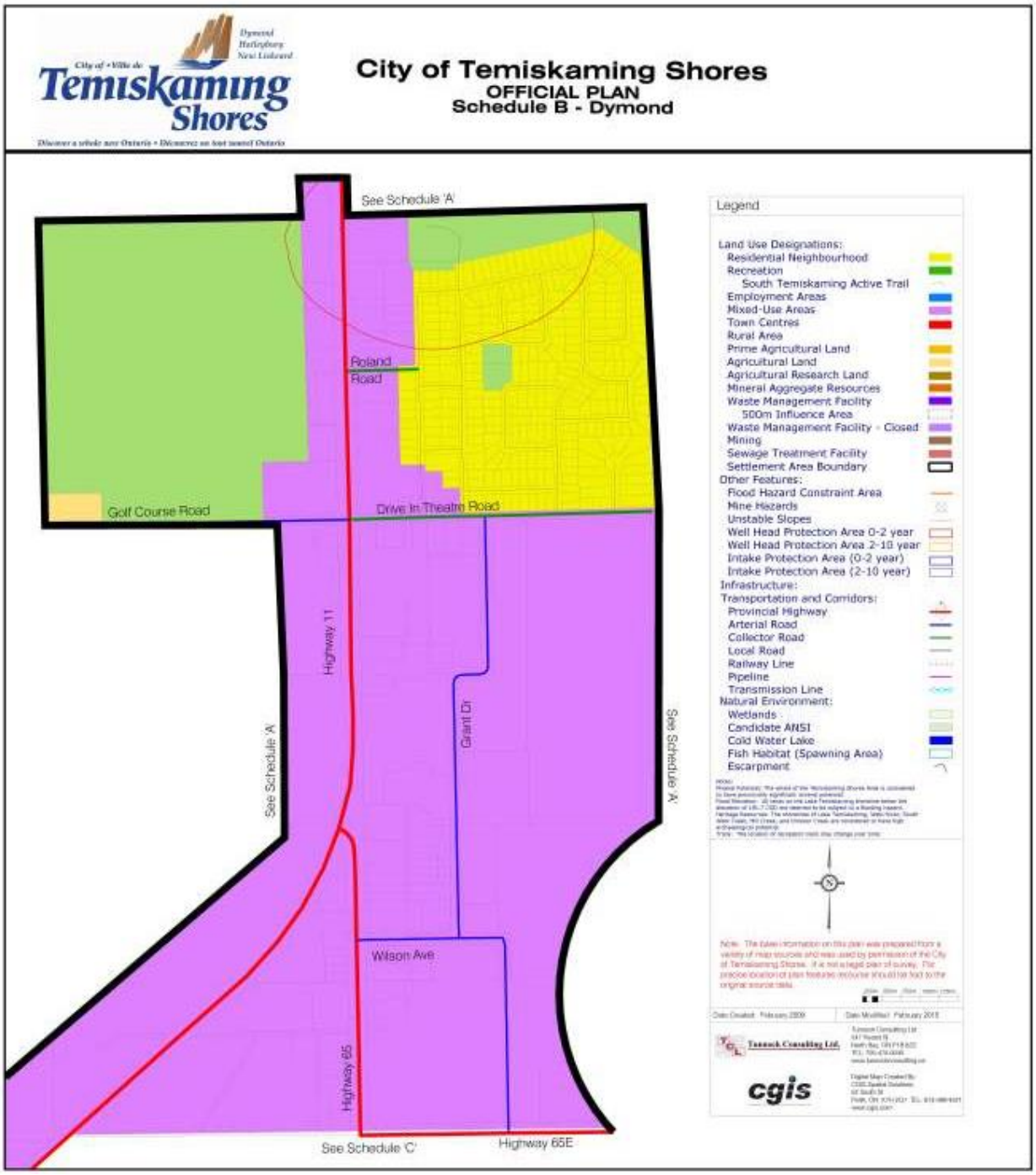
The responsible party will evaluate the green cleaning policy on a quarterly basis to evaluate progress towards the implementation goals. If any cleaning product or equipment purchases are not being recorded properly, the responsible party will inform the appropriate individuals to ensure that activities are recorded moving forward. The responsible party will evaluate the results of the cleaning audits to determine whether the building is being sufficiently cleaned and whether the standard cleaning procedures are being properly executed. As necessary, the responsible party will revise the green cleaning policy to include additional cleaning strategies or modify existing cleaning strategies.

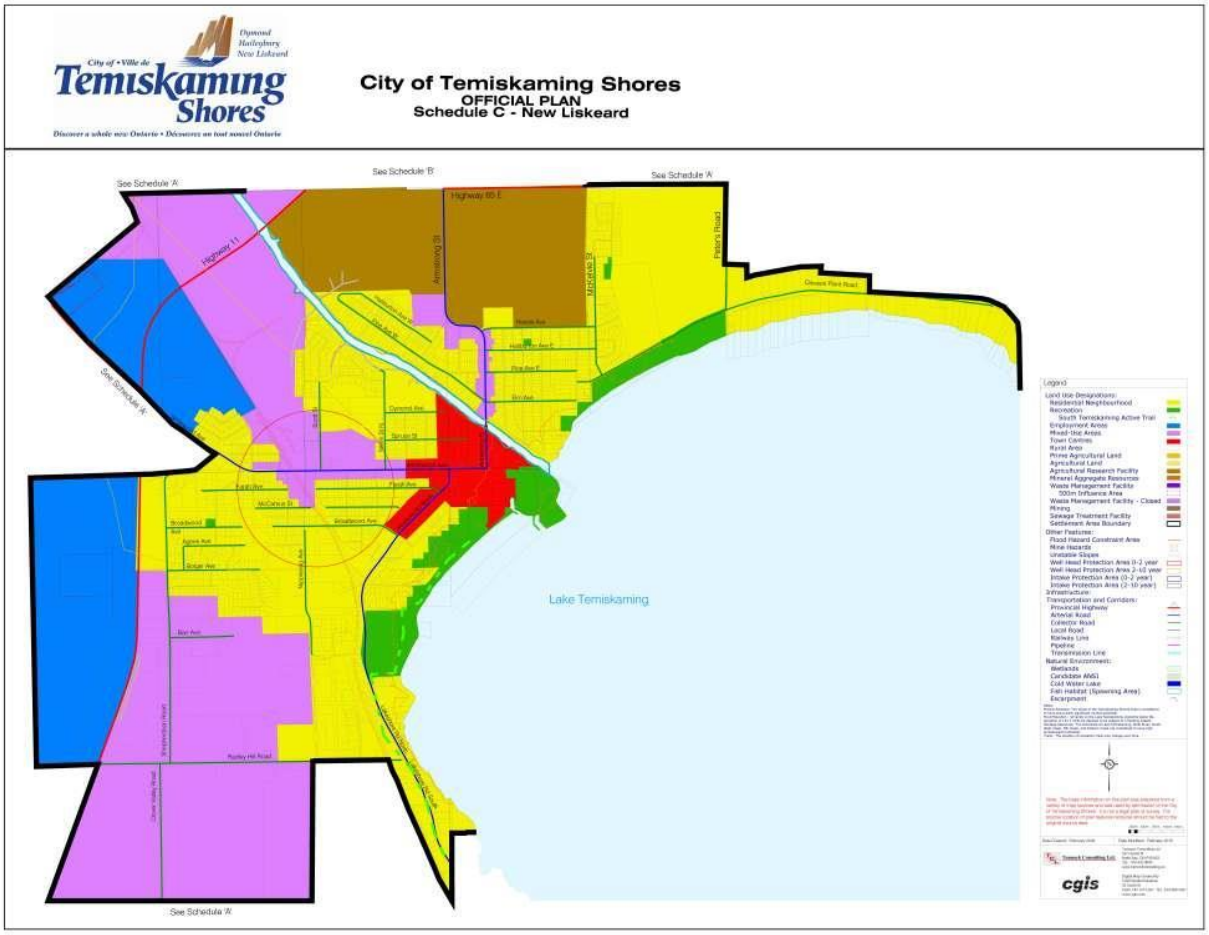
In addition, if any implementation goals are not being met, the responsible party will investigate the situation and will work with the individuals purchasing the materials and equipment or using the equipment. The responsible party will evaluate whether updates are necessary to the in order to achieve the implementation goals.

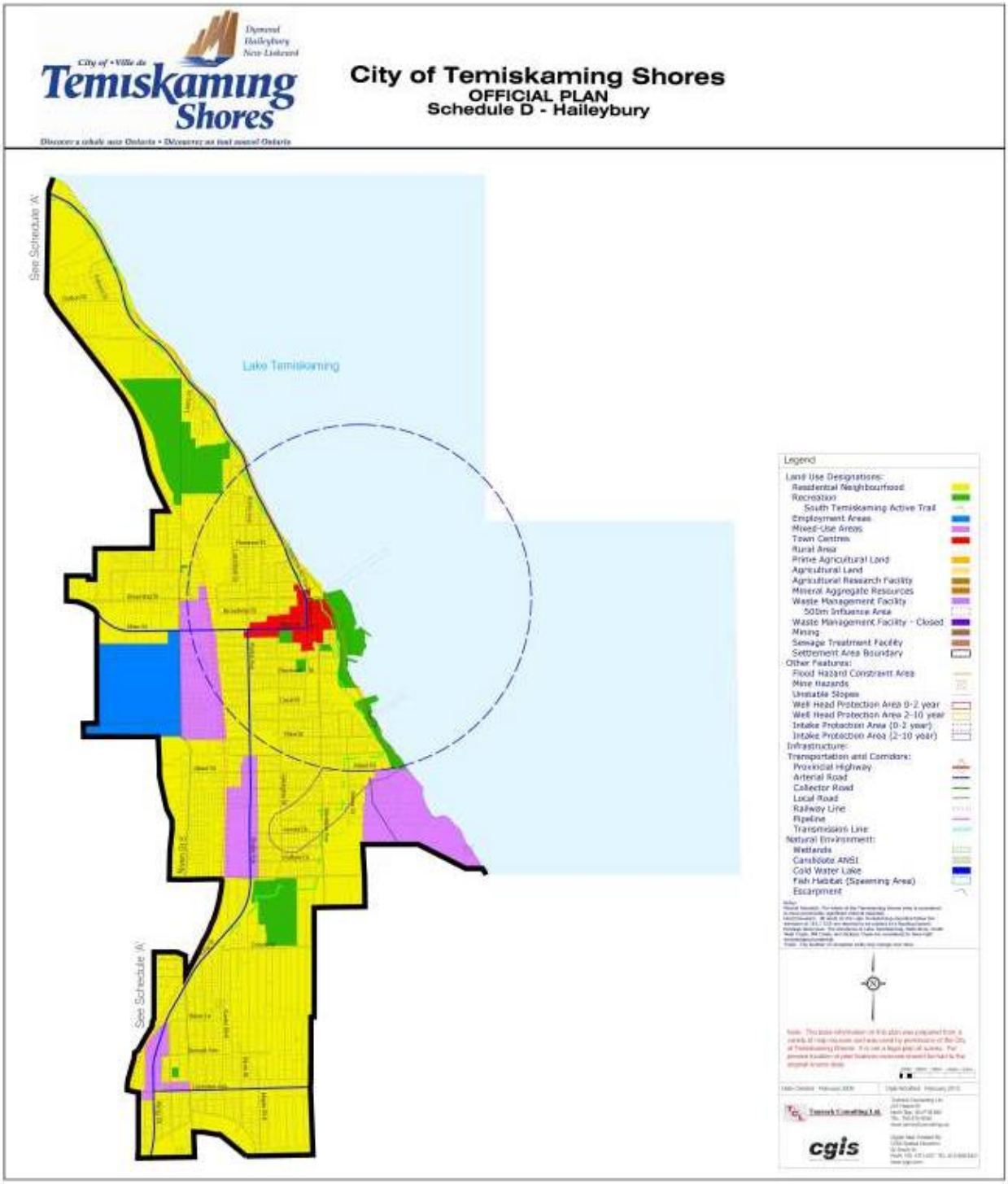
Any revisions that are made to the policy will be incorporated into the next training cycle for the cleaning staff.

Appendix C – City Maps




City of Temiskaming Shores
OFFICIAL PLAN
Schedule B - Dymond
See Schedule 'A'
Roland Road
Golf Course Road
Drive In Theatre Road
Highway 11
Grant Dr
See Schedule 'A'
See Schedule 'A'
Wilson Ave
Highway 65
See Schedule 'C'
Highway 65E
Legend
Land Use Designations:
Residential Neighbourhood
Recreation
South Temiskaming Active Trail
Employment Areas
Mixed-Use Areas
Town Centres
Rural Area
Prime Agricultural Land
Agricultural Land
Agricultural Research Land
Mineral Aggregate Resources
Waste Management Facility
500m Influence Area
Waste Management Facility - Closed
Mining
Sewage Treatment Facility
Settlement Area Boundary
Other Features:
Flood Hazard Constraint Area
Mine Hazards
Unstable Slopes
Well Head Protection Area 0-2 year
Well Head Protection Area 2-10 year
Intake Protection Area (0-2 year)
Intake Protection Area (2-10 year)
Infrastructure:
Transportation and Corridors:
Provincial Highway
Arterial Road
Collector Road
Local Road
Railway Line
Pipeline
Transmission Line
Natural Environment:
Wetlands
Candidate ANSI
Cold Water Lake
Fish Habitat (Spawning Area)
Escarpment
cgis


City of Temiskaming Shores
OFFICIAL PLAN
Schedule C - New Liskeard
See Schedule 'B'
See Schedule 'A'
See Schedule 'A'
See Schedule 'A'
See Schedule 'A'
Highway 65 E
Highway 11
Armstrong St
McCamus St
Rivers Road
Lake Temiskaming
Legend
cgis


City of Temiskaming Shores
OFFICIAL PLAN
Schedule D - Haileybury
Lake Temiskaming
See Schedule 'A'
See Schedule 'A'
Legend
Land Use Designations:
Residential Neighbourhood
Recreation
South Temiskaming Active Trail
Employment Areas
Mixed-Use Areas
Town Centres
Rural Area
Prime Agricultural Land
Agricultural Land
Agricultural Research Facility
Mineral Aggregate Resources
Waste Management Facility
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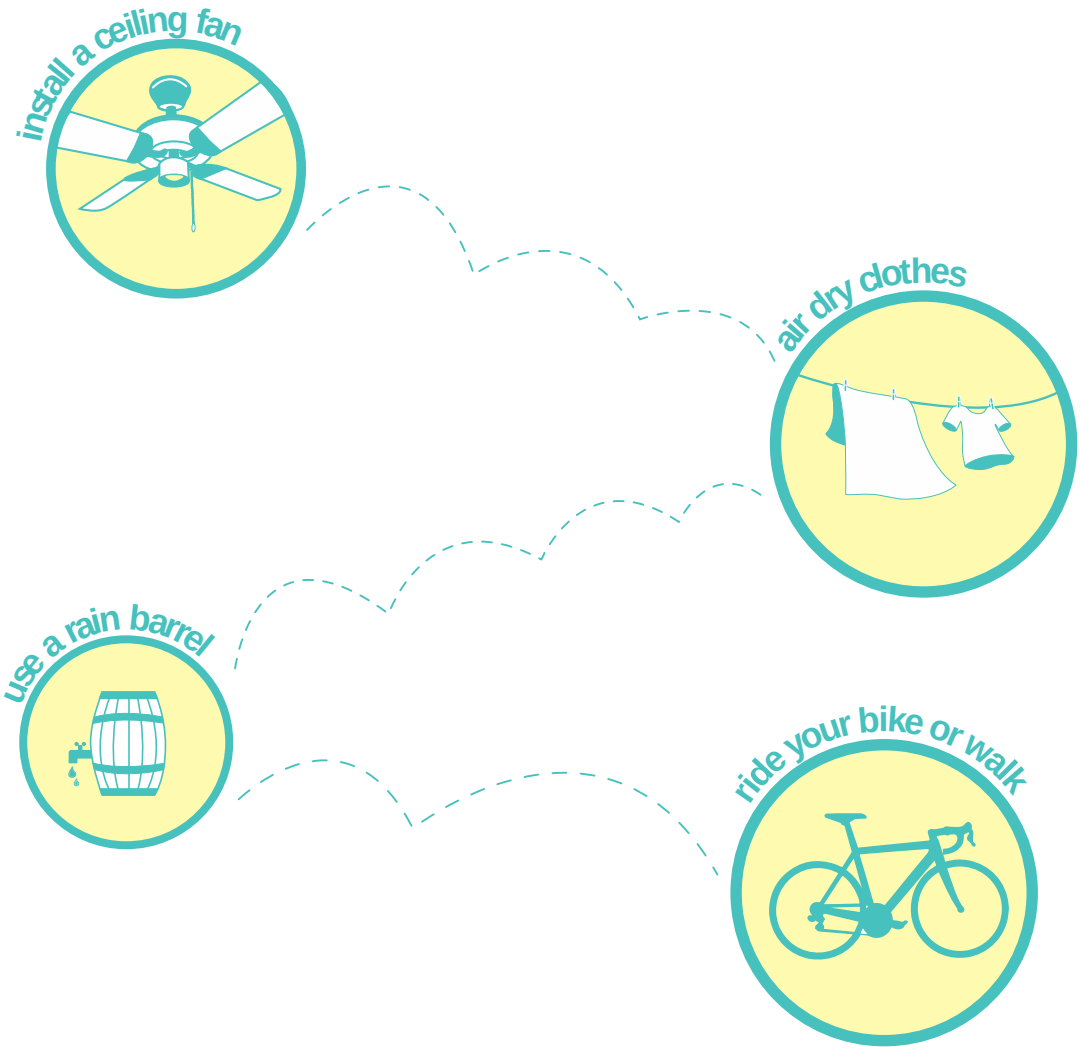
cgis

Appendix D – Promotional Material

Sample of Project Communications – Energy Mapping

Sample of Project Communications – Summer Energy Conservation

Save Energy this Summer!



After a winter of sealing our windows and adjusting our thermostats for great energy savings, let's not forget there are just as many ways to save energy in the summer!

Questions, comments, ideas? E-mail mlafreniere@temiskamingshores.ca

Supported by the Government of Ontario

Appendix E – Key Stakeholders

The City would like to thank the members of the Stakeholder Advisory Group who provided input and guidance to the development of the Municipal Energy Plan over several months. Members of the Stakeholder Advisory Group included;

- Bluewave
- Boart Longyear
- Bumstead Trucking
- City of Temiskaming Shores
- Extendicare
- Grants Transport
- Hydro One Ltd.
- New Liskeard Non-Profit Housing Corp.
- Northdale Manor
- Ontario Clean Water Agency (OCWA)
- Temiskaming Hospital
- Temiskaming Lodge
- Three H Furniture Systems Limited
- Union Gas
- VIP Energy Services, Inc.
- Wabi Iron & Steel

Glossary

Acronyms

AHU:	Air Handling Unit
BAS:	Building Automation System
BHR:	Blowdown Heat Recovery
CD:	Cold Deck
CDD:	Cooling Degree Days
CFM:	Cubic Feet per Minute
DDC:	Direct Digital Control
DES	Detailed Engineering Study
DHW:	Domestic Hot Water
DWH:	Domestic Water Heater
EMIS:	Energy Management Information System
EMS:	Energy Management Strategy
FIT:	Feed-in Tariff
GHP:	Geothermal Heat Pump
HD:	Hot Deck
HDD:	Heating Degree Days
HOEP:	Hourly Ontario Electricity Price
HVAC:	Heating Ventilation and Air Conditioning
HWH:	Hot Water Heating
HX:	Heat Exchanger
kW:	Kilowatt (demand)
kWh:	Kilowatt-hour (consumption)
LDC:	Local Distribution Company
M&V:	Monitoring and Verification
MAT:	Mixed Air Temperature
MSDHP:	Multi-split Ductless Heat Pump
OAT:	Outside Air Temperature
PF:	Power Factor
PM:	Preventative Maintenance
RAH:	Return Air Humidity
RAT:	Return Air Temperature
RH:	Relative Humidity
SA:	Supply Air
SAT:	Supply Air Temperature
SCADA:	Supervisory Control and Data Acquisition
SP:	Set point
tCO2e:	Tonnes of Carbon Dioxide Emissions Equivalent
VFD:	Variable Frequency Drive