2016

Brockton Energy Conservation Demand Management Plan Update

Barry Randall

Grey Bruce Sustainability Network

10/31/2016

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Brockton Energy Conservation and Demand Management (ECDM)Plan Update *Final Report (draft)*

Executive Summary

In May 2016 The Grey Bruce Sustainability Network (GBSusNet) was contracted to assist the Municipality of Brockton with the implementation of its Energy Conservation and Demand Management Plan (ECDM) which was adopted by Council in 2015. This "update" is limited to an examination of the municipally owned or "corporate" energy users and does not extend into the residential, commercial, industrial or institutional sectors of Brockton. The five task areas of the project include:

1. Energy and Greenhouse Gas Data Management and Analysis
    a. Buildings and waste water treatment
    b. Solid Waste
    c. Streetlights
    d. Vehicle Fleet
2. Identification of Data Anomalies and Interpretation
3. Review current targets and Implications specifically 10% reduction in energy use per unit between 2013-16
4. Identification of past and future actions to meet targets.
5. Staff engagement

The methodology to complete the above tasks included:

1. Accessing and analyzing the energy consumption data which is being collected by the municipality and reported to the province on an annual basis;
2. Interview senior staff responsible for the various "energy intense" departments i.e., Colin Saunders, Wayne Meyer, John Strader, Deb Roth, Marilyn Al (data gathering)
3. Research and report on "best practices" related to recommendations.

Summary of Conclusions and Recommendations

Although the municipality adopted the ECDM Plan in 2014, the absence of strong "corporate" leadership for the plan's implementation has resulted in few of the plan's recommendation being considered or implemented. Staff changes, other staff and organizational priorities, shifting provincial directives and incentives, as well as limited time and budgets are additional reasons for neglect of the ECDM Plan.

Generally speaking, the details of which can be found within this document, current staff have done well over the past 8 years (data period) in managing energy use at the arena/community centre as well as the waste water treatment plant. Increasing costs of electricity, per kwHr, have been the main factor resulting in increased over all operational costs. This report has focussed on the several large energy consumers in the municipality. A renewal of "corporate leadership" as well as significantly increase staff

or consultant input would be required to fulfil the recommendations of the 2014 EDCM Plan as well as those suggested within this report.

The following is a summary of the recommendations presented in more detail throughout the report.

1. Take advantage of the provincial and federal commitments to emission reduction by sourcing funds to pay for energy efficiency and green energy technologies i.e., solar PV panels, solar thermal units, LED Lighting conversions, etc.,

2. Partner with local organizations and agencies to expand the capacity of the municipality to source funding and deliver GHG reduction initiatives.

3. Increase the rate at which the "gas plant" at the WWTP is equipped to handle increase amounts of leachate/sludge and generate and increased amount of electrical energy to offset grid supplies. Support the exploration of an organic compost collection system for residential and commercial generators.

4. Establish a staff "committee" responsible for ensuring the "culture of conservation" and other aspects of the ECDM Plan are implemented.

5. Establish targets for future energy efficiency and GHG reduction; waste reduction, vehicle efficiency

6. Expand the ECDM Plan to include community – residential, commercial, industrial and institutional sectors

Introduction and Background

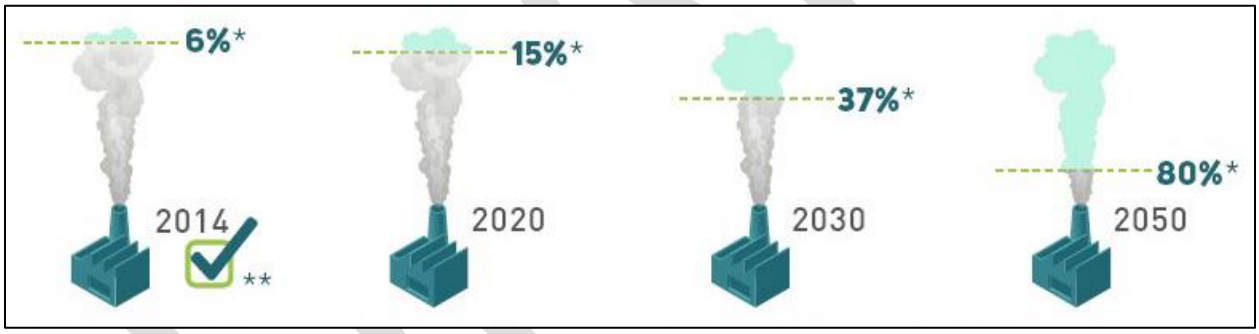
The Grey Bruce Sustainability Network (GBSusNet) was contracted in Spring 2016 to assist the Municipality of Brockton update their Energy Conservation and Demand Management Plan (ECDM) and to report on progress toward the stated goal of *"10% reduction in energy use intensity from 2013 to 2016."* The contract is an example of a "public, private partnership" (P3) that expands the capacity of a small, rural municipality (10,000 pop'n) and combines the support of local, private sector agencies and businesses to deliver programs that benefit the whole community.

Provincial Climate Change Action Targets

In Ontario, overall GHG emissions have been reduced in line with provincial and global objectives, mainly as a result of the elimination of coal fired power plants. Ontario's plan states the following:

"Ontario's reduction targets are ambitious yet achievable, in line with actions taken by other provinces and states and in line with global objectives. Ontario is doing its part with reductions from 1990 emissions levels of 15 per cent in 2020, 37 per cent in 2030 and 80 per cent in 2050. Based on greenhouse gas reporting data, Ontario has met its 2014 target of six per cent below 1990 levels. The province achieved this goal by taking bold steps, including closing all of Ontario's coal-fired electricity-generating stations. This remains one of the single largest greenhouse gas reduction actions implemented to date in North America." (Ontario's Climate Change Action Plan (CCAP) Pg. 1.)

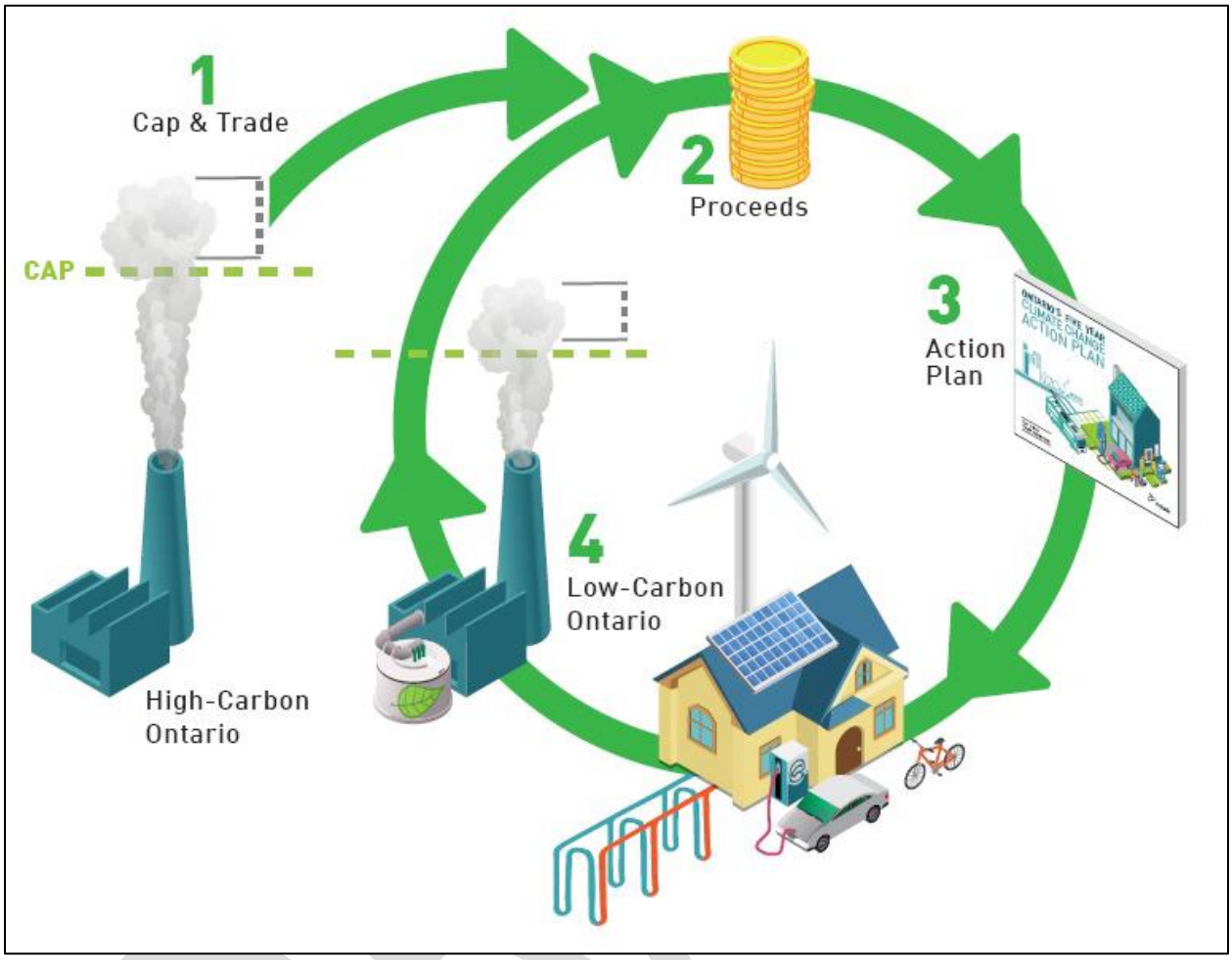
Figure 1 Provincial Targets for GHG Reduction, Source - CCAP



Ontario's Cap and Trade System

The Province of Ontario has also made the case that a "Cap and Trade" system will encourage economic develop in areas that will also reduce the intensity of GHG emitted into the environment. The incentives generated in the system will be invested in these initiatives. (See Figure 2)

Figure 2 - Ontario's Cap and Trade System



Brockton's Sustainable Strategic Plan

Description: Recent legislation is requiring public entities to further examine energy use in all facilities and opportunities for conservation. Such a plan will help Brockton comply with legislation and identify opportunities for energy conservation.

Theme(s) Supported: Natural Resources Outcome: Reduce energy demand, cost and fossil fuel consumption.

Measures of success:

- Energy Management Plan prepared.
- Energy consumption in municipal buildings decreased by _%. (10% approved in 2014)

Potential Lead: Municipality of Brockton Potential Partners: Environmental Advisory Committee (Note: to be confirmed)

Where have we been?

- 2009 – Brockton joins the PCP program. To date, none of the 5 Milestones have been achieved.
- 2014 – Energy Audit of the Walkerton Arena is performed by LAS.
- 2015 - The Draft Brockton Energy Conservation and Demand Management Plan (ECDM) was approved by Council.
    - Brockton Council approves a proposal by the Grey Bruce Sustainability Network (GBSusNet), in association with the Environmental Advisory Committee (EAC) to move forward on a program to blend the ECDM Plan with the PCP Protocol, conditional on matching funds. ($7500 total cost)
    - In consultation with municipal and provincial staff, application for matching funds is delayed to better understand the funding sources for plan completion and future updates
- 2016 – Funds allocated for 2015 project (3500) are unspent.
    - February – Meeting is held with Deb Roth (CAO), Brandy Patterson (Deputy Clerk and Sustainability Co-ordinator), Trish Baglole (CFO) and Barry Randall (GM GBSusNet) to bring everyone up to speed and plan next steps.
    - A proposal to conduct an ECDM Plan Update is approved by Council – See App. #3.

Brockton's Energy Conservation and Demand Management Plan (ECDM) 2014

The following are the Goals and Objectives adopted in 2014. The progress made on these points as well as the specific action items noted in the 2014 document was not addressed in this report.

Goals

The goals of the Brockton Energy Conservation and Demand Management Plan are;

• ***To encourage a culture of energy conservation*** within the corporation that has the result of creating a forum for discussion of new ideas and methods on how to save energy and how we can use what energy is needed, wisely.

• ***To improve the energy efficiency of our facilities*** by utilizing best practices to reduce our operating costs, energy consumption and greenhouse gas emissions.

• ***Maximize fiscal resources and minimize cost increases*** through direct and indirect energy savings.

• ***Demonstrate sound operating and maintenance practices*** to compliment energy efficiencies thereby improving the reliability of municipal equipment.

Objectives

The objectives of the Brockton Energy and Demand Management Plan are;

• Improve the management of the municipality's energy consumption.

• ***Complete energy audits on the top three (3) energy consuming facilities*** existing as of July 2014.

• Improve the efficiency of energy use through low cost opportunities by implementing the following:

- Sound operating and maintenance practices.
- Employee training and staff awareness.
- Monitoring and tracking energy use.

• ***Reduce the energy intensity (energy required per square metre or cubic Meter of water) for all municipal facilities and operations by 10 percent by 2016 compared to 2013.***
• Identify and investigate ***renewable energy generation opportunities*** where economically feasible.
• Design new facilities to be equivalent to, at least, the silver standard under the Leadership in Energy and Environmental Design (LEED) program.

Complete version of the Brockton ECDM Plan can be found HERE.

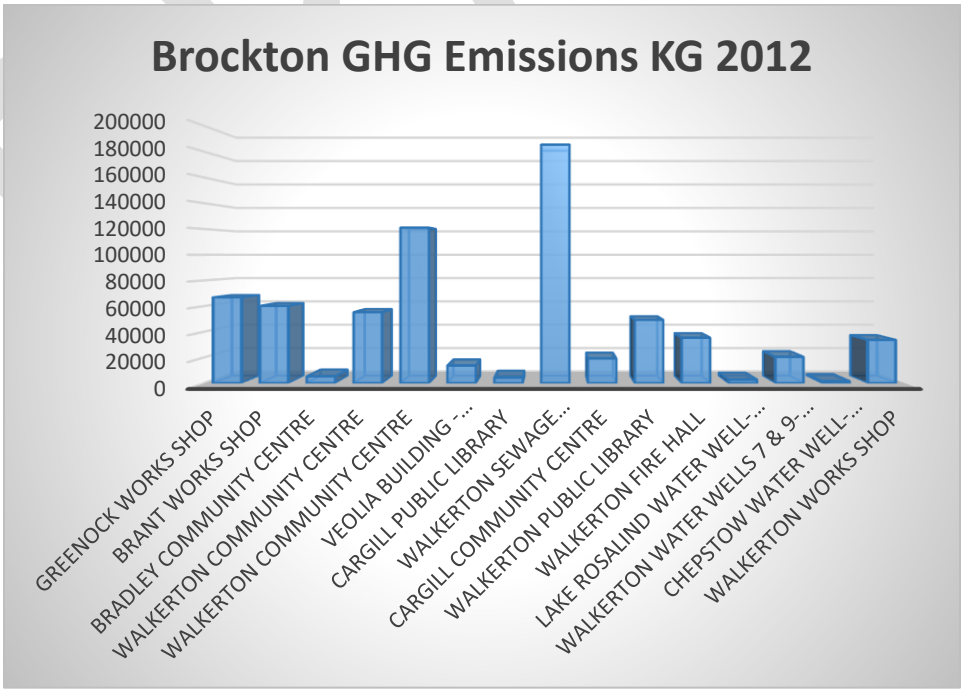
See Appendix 7 for a summary review of the ECDM Plan 2014

Sector Focus

In Ontario, community energy planning (CEP) focuses on 2 general areas. These include municipally owned and operated facilities or ***"Corporate sector"*** such as waste water treatment plants, community centres, arenas, vehicle fleets, streetlights and solid waste as well as the ***"community"*** sector which would include residential, commercial, industrial and institutional energy users such as hospitals and government operations. For the purpose of this report, the focus has been strictly on "municipally owned" or corporate facilities and operations. An initial analysis of energy use across this sector reveals that the leading energy users and greenhouse gas (GHG) producers include the waste water treatment plant and the community centre/arena complex. (See Figure 3)

Brockton's "Corporate" Greenhouse Gas Emissions – Buildings and Waste Water Treatment

Figure 3 - Brockton GHG Emissions 2012; Source, Province of Ontario, Ministry of Energy



Although energy consumption data is available for all municipally owned facilities, this report will focus on the larger consumers (Community Centre, Ice Pads and Waste Water Treatment Plant) as well as a look at the Cargill Community Centre.

Waste Water Treatment Plant (WWTP)

The following charts represent the energy use that occurred at various facilities in Brockton between 2008 and 2015. Figure 4 shows the trend in natural gas use at the Waste Water Treatment Plant as well as the related cost for the 7 year period leading up to 2015.

Figure 4 - WWTP Union Gas 2008-15

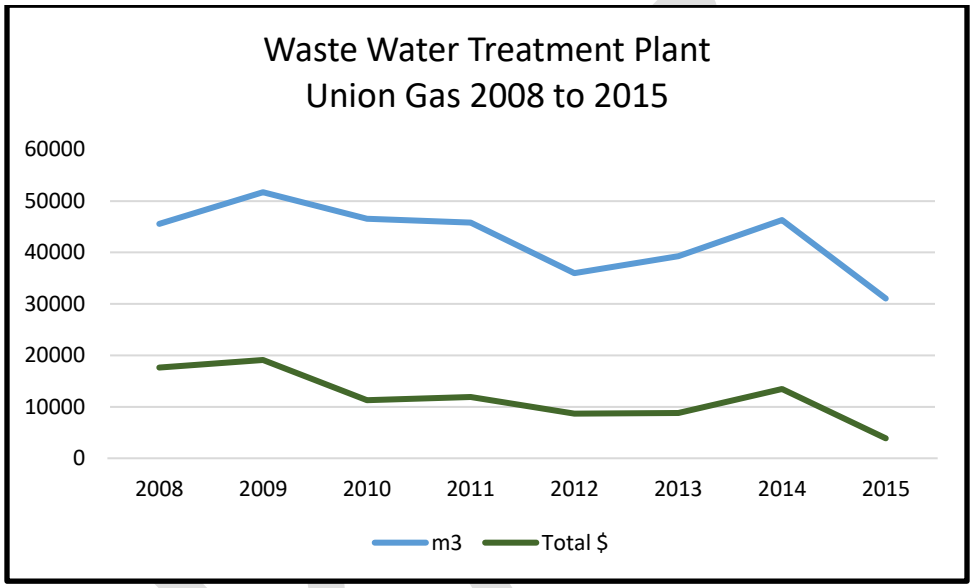
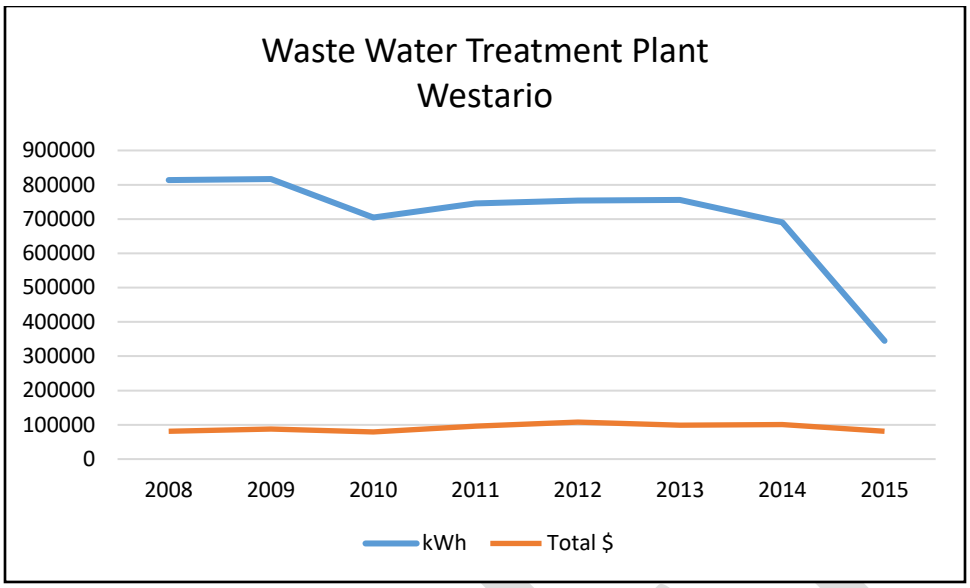


Figure 5, below, shows the historic electricity use at the WWTP for the 7 years leading up to 2015. The decline in kWh consumption can likely be attributed to the displacement provided by the gas plant. The less dramatic reduction in cost, is due to the continued increase in cost per kWh, especially for “on peak” use of electricity. (See Figure 13)

Figure 5 - Electricity use at WWTP



Community Centre and Ice Pads

The combination of the Community Centre Auditorium and the ice pad represent the single largest energy consumer in the municipality, depending on the year. The walk though audit was conducted with Wayne Meyer, the facility manager.

Figure 6 Walkerton Community Ctr Union Gas 2008-15

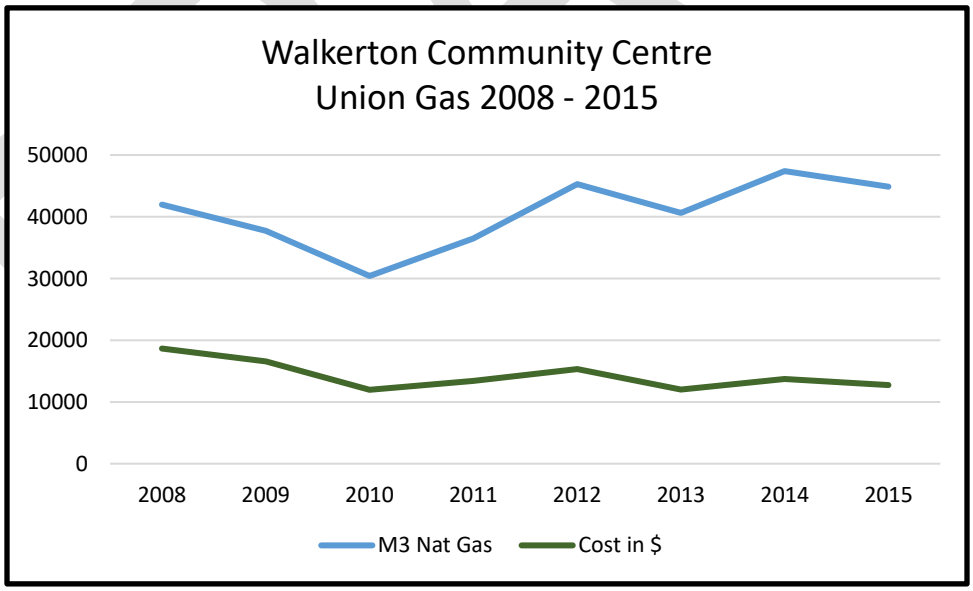


Figure 7 – Ice Pad electricity consumption in kwhr

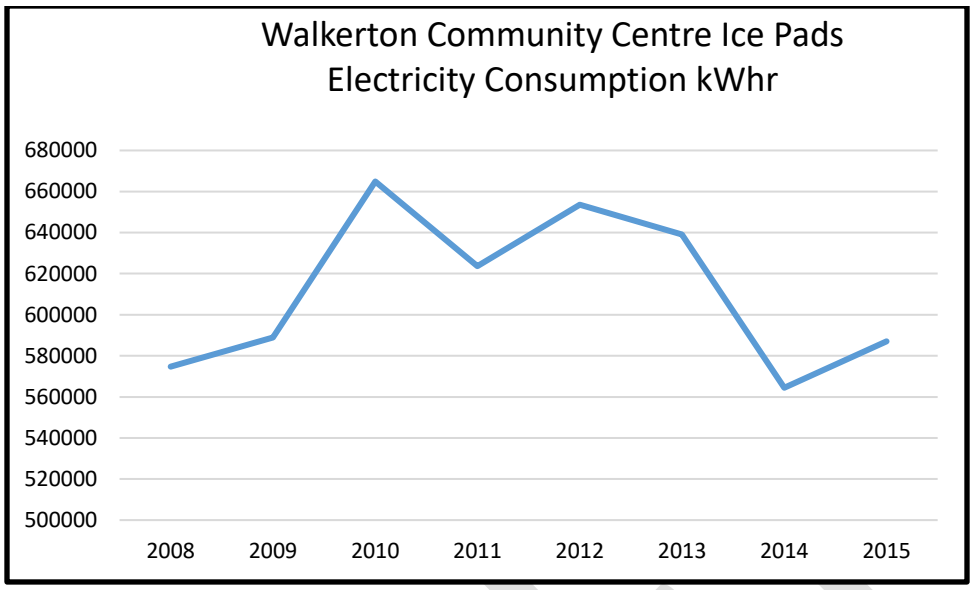


Figure 7, above, shows the historic kWhr electricity consumption over the past 7 years. The peaks and valleys in this graph, directly relate to the historic temperature changes over the same years (see Figure 10). Colder temperatures outside, require less energy to make and keep ice in good condition.

Figure 8 – Ice Pad Electricity Consumption History ($$$)

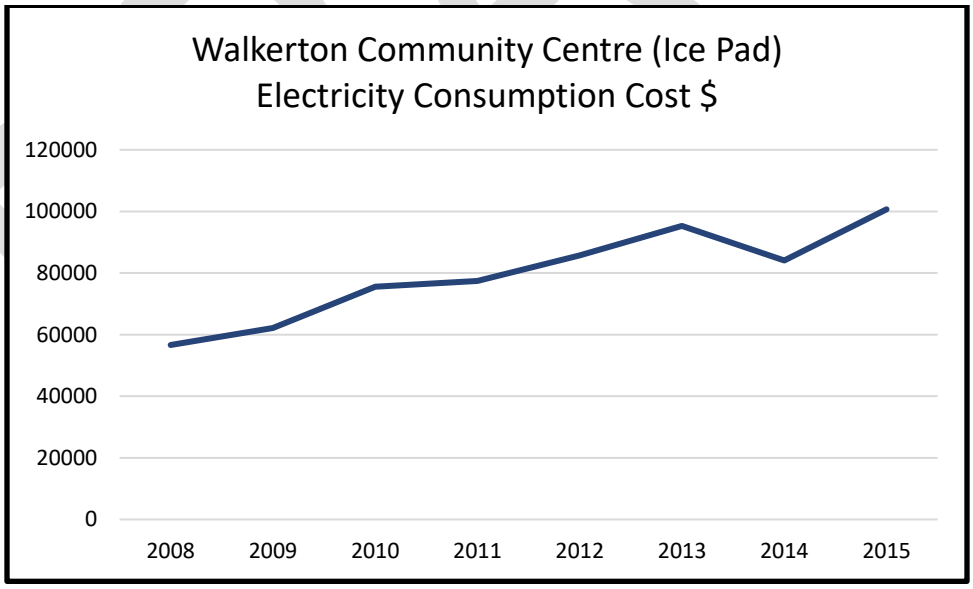
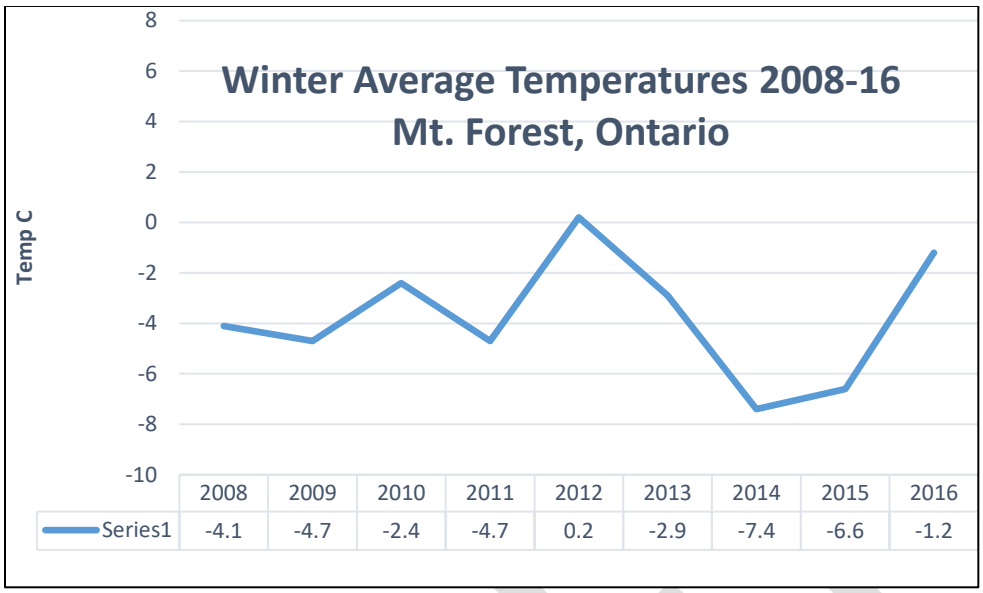


Figure 8, above, once again shows the general trends in cost of electricity, even when the overall consumption is significantly reduced, as in 2014.

Figure 9 – Winter Average Temps 2008-15 (Source – Government of Canada



Cargill Community Centre

Figure 10 and 11 below show the historical cost and energy use for the Cargill Community Centre from 2008-15. The increasing unit cost of electricity results in a continuous increase in energy cost even though the volume of electricity used has gone down over the past five years.

Figure 10 – Cargill Community Ctr Electricity Costs 08-15

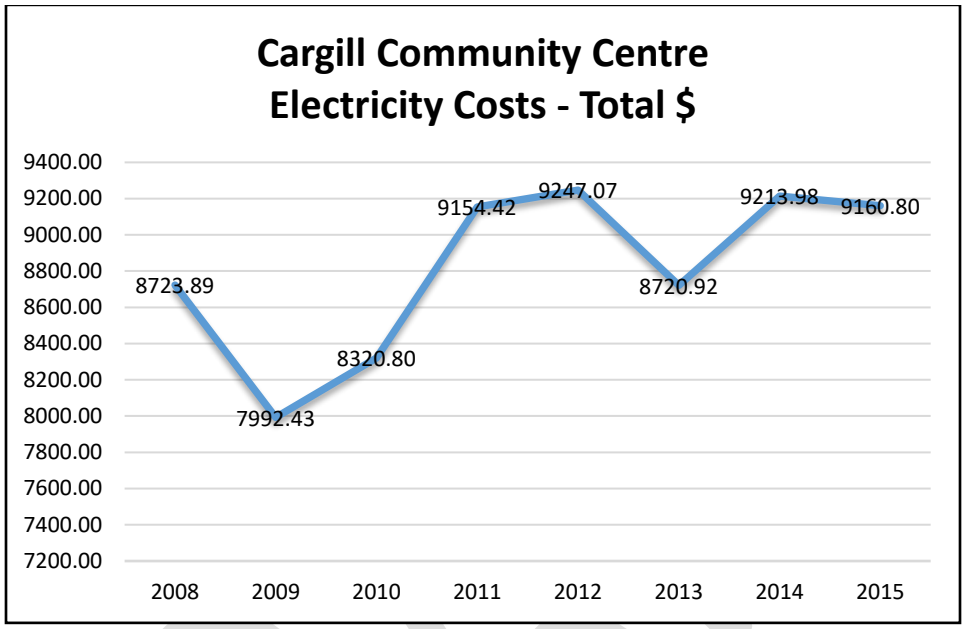
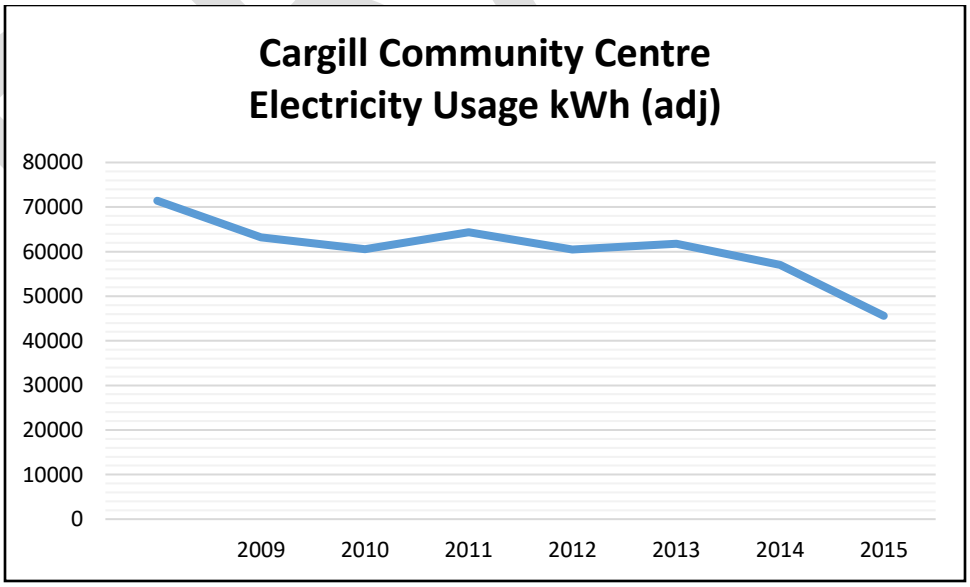


Figure 11 – Cargill Community Centre Kwh 2008-15



Walkerton Swimming Pool

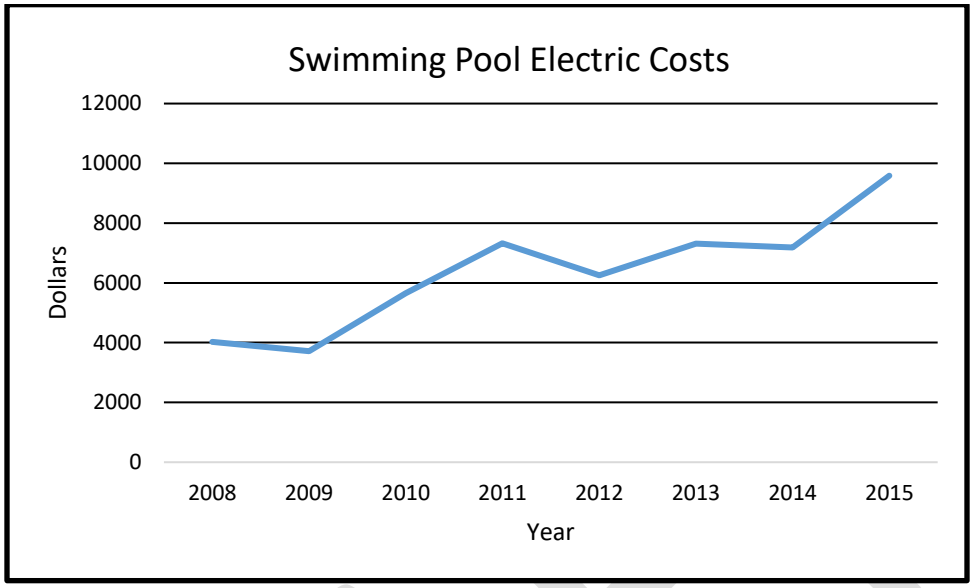


Figure 12 - Swimming Pool Electricity Costs

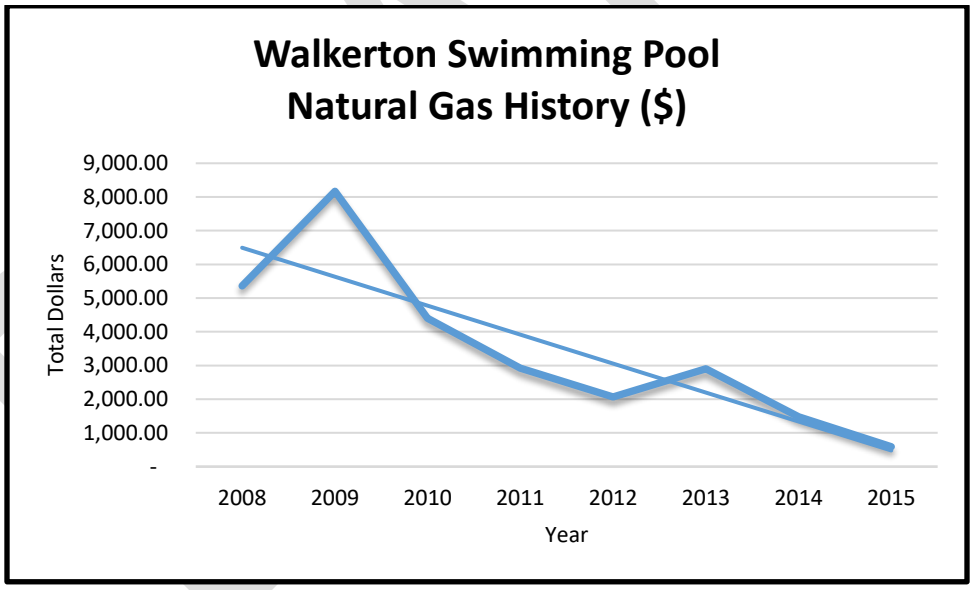
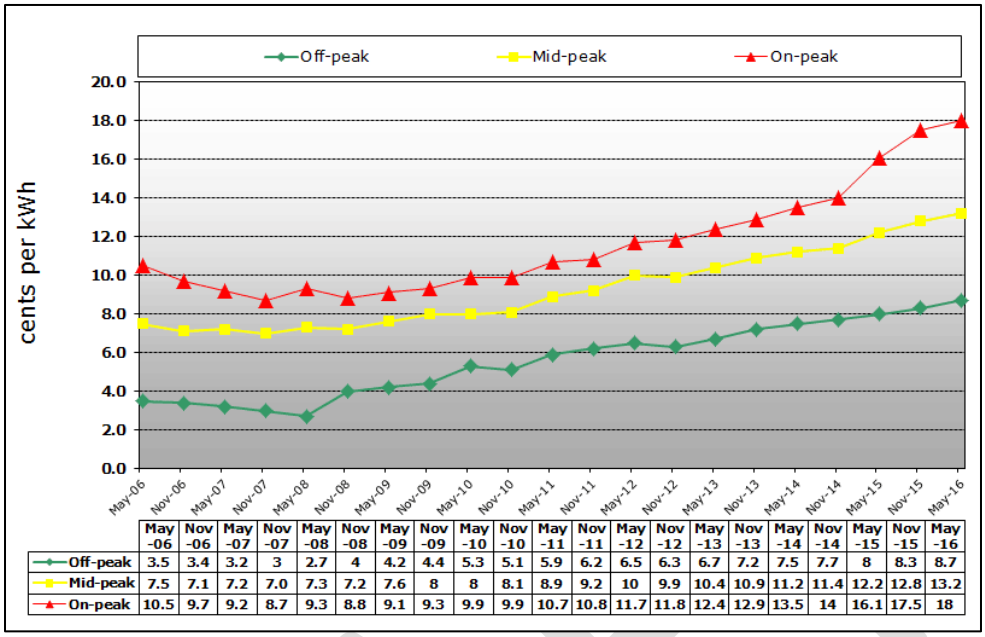


Figure 13 - Swimming Pool Natural Gas Cost

Increased use of “solar blankets” as well as the addition of a solar thermal heating unit has reduced the demand for natural gas heating over the past years. A slight reduction in actual pool open times has also contributed to the general decline in demand.

Figure 14 – Trends in Ontario electricity costs and time of use



	May -06	Nov -06	May -07	Nov -07	May -08	Nov -08	May -09	Nov -09	May -10	Nov -10	May -11	Nov -11	May -12	Nov -12	May -13	Nov -13	May -14	Nov -14	May -15	Nov -15	May -16
Off-peak	3.5	3.4	3.2	3	2.7	4	4.2	4.4	5.3	5.1	5.9	6.2	6.5	6.3	6.7	7.2	7.5	7.7	8	8.3	8.7
Mid-peak	7.5	7.1	7.2	7.0	7.3	7.2	7.6	8	8	8.1	8.9	9.2	10	9.9	10.4	10.9	11.2	11.4	12.2	12.8	13.2
On-peak	10.5	9.7	9.2	8.7	9.3	8.8	9.1	9.3	9.9	9.9	10.7	10.8	11.7	11.8	12.4	12.9	13.5	14	16.1	17.5	18

Figure 14, above, shows the current trends in cost of *"grid sourced"* electricity in Ontario. The trend explains why reduction in kWh consumption may not also result in dollar savings. The concept of "carbon credits" and the idea of rewarding consumers for reducing consumption and the related GHGemissions is meant to compensate for the fact that direct costs will not necessarily go down.

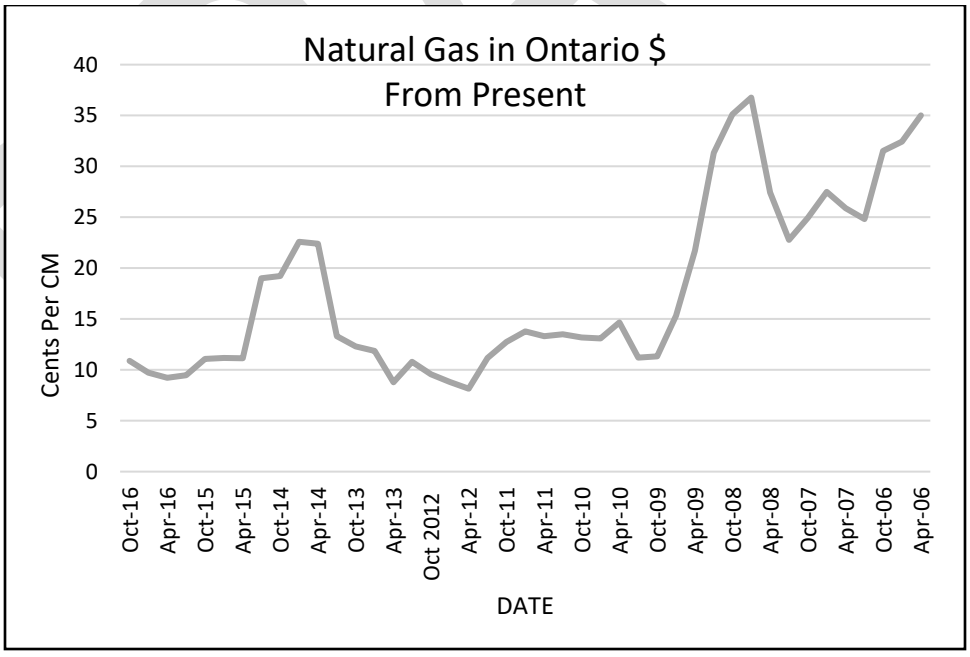


Figure 15 - Historical Natural Gas Costs in Ontario

Since 2006 the general trend in cost per unit of natural gas has gone down. (Dates are reversed)

Streetlights

In 2015 Brockton upgraded a number of streetlights from to LED lighting. Current plans include ongoing conversion of sections of town to these energy efficient lights. At the time of publishing this report, the data reflecting the energy use related to the various streetlight accounts was not in a form that could be translated in to graphs and charts.

Waste Management

Currently, there is no formal diversion program, in Brockton, for organic (food waste) from landfill. A small number of residents use backyard composters but a large majority of the organic material goes straight to landfill. As this material breaks down in the landfill, methane gas is released into the atmosphere. Methane is a greenhouse gas that is 25 times more potent than carbon dioxide (Co2).

The County of Bruce Waste Management Report for 2015[1] includes a recommendation to ***"promote the use of backyard composters"*** as the singular reference to the need to divert more organic material from landfill. Alternatively, an October 2015 report by OWMA, Compost Council of Canada and the Canadian Bio Gas Association identifies close to 30% of material, by weight, currently entering landfills as "organic" and has the potential to be diverted and used to create soil compost and/or methane gas for electricity generation. [2]

Vehicle Fleet

As of February 2015 there are 63 vehicles in the municipal fleet. Vehicle types range from single and double axel pick-ups to loaders, snow plows, back hoes, dump trucks, tractor mowers and floats. At the time of this report, the fuel consumption data for all these vehicles exists only on the separate bills for each fuel purchase. It is not clear whether kilometer records are kept for daily use.

In order to measure the overall GHG emissions related to vehicle fleet an additional amount of work is required to summarize the information on the invoice as well as track kilometre use per vehicle.

Implications of Reduction Target

Interviews with Brockton Department Heads has revealed clearly that the targets established in the ECDM Plan, that is – "**• *Reduce the energy intensity (energy required per square metre) for all municipal facilities and operations by 10 percent by 2016 compared to 2013",*** although adopted by Council as a draft document, was not shared directly with staff and there was no program in place to establish a plan to meet the targets.

The "common sense" approach of staff at the major municipal facilities (arena, wwtp) as well as their progressive approach to energy management has resulted in a relatively stable demand for electricity and natural gas over the past 8 years. Increased "per unit" costs of electricity has been the biggest factor in some of the cost increases in these facilities.

Establishing a future "reduction target" would provide staff with motivation and direction to explore energy saving options for their departments. Requirements to report on measures and results would be essential in tracked the impact of and changes made. With some additional labour, the data generated

[1] County of Bruce Waste Management Report 2014

[2] http://www.compost.org/English/PDF/Rethink%20Organic%20Waste%20Oct%202015%20web.pdf

as part of the annual reporting on energy use, can provide a view of the impact of changes on both energy use, GHG emissions and costs.

Greenhouse Gas Conversion Co-Efficients, Ontario

The charts below describe the various conversion co-efficients for various Ontario fuels. The low levels of emissions related to the use of electricity need to be considered against the relative amounts of energy required to achieve the same objectives using other fuels.

2012 Electricity	tCO2e/kWh	0.00011
2013 Electricity	tCO2e/kWh	0.00008
2014 Electricity (estimate)	tCO2e/kWh	0.00008
Natural Gas	tCO2e/m3	0.00189
Gasoline (mobile/road)	t eCO2/L	0.00244
Diesel (stationary)	t eCO2/L	0.002790

The chart below calculates the total amounts of GHG or CO2 equivalent generate by the energy use at the arena. Calculating the total GHG emitted by the municipality was beyond the scope of this particular project, however, as is presented in Figure. 3, once Brockton's data is submitted to the province, the annual totals will be calculated and made available to the public. This is particularly useful in tracking trends over the years towards established reduction targets.

Arena Electricity Use and GHG equivalent

Year	KwHr	tCO2e/kwh	tC02e
2008	574653	0.00008	45.97224
2009	588919	0.00008	47.11352
2010	664886	0.00008	53.19088
2011	623719	0.00008	49.89752
2012	653493	0.00008	52.27944
2013	639102	0.00008	51.12816
2014	564446	0.00008	45.15568
2015	587045	0.00008	46.9636
		Total	391.701 tC02e

"Walkthrough" Audits of Facilities and Operations

As prescribed in the Brockton ECDM Plan, "walkthrough" energy audits of the 3 major energy consumers within the municipality were conducted. Walk-through (or) preliminary audit is defined as follows: *"The preliminary audit (alternatively called a simple audit, screening audit or walk-through audit) is the simplest and quickest type of audit. It involves minimal interviews with site-operating personnel, a brief*

review of facility utility bills and other operating data, and a walk-through of the facility to become familiar with the building operation and to identify any glaring areas of energy waste or inefficiency".[3]

Community Centre and Ice Pads

App. #4 contains the full photo and text report on the Community Centre walkthrough audit. The following are the priority findings and recommendations based on the energy data, preliminary audit and the Manager interviews.

1. Current management has made changes over the years which have resulted in measureable impacts on energy use. Conversion to energy efficient lighting, reduced and ultimate elimination of inefficient overhead lighting systems; replacement of water with glycol in cooling systems.
2. Warmer winter temperatures, thicker ice surface, longer ice pad seasons have all contributed to greater energy demand to maintain the arena services.
3. Heat loss is significant through main exterior doors.

Recommendations

4. Complete the replacement to energy efficient lighting in all dressing rooms as well as motion sensors to increase "time of use" efficiency.
5. Explore best options to create more air tight entrance doors to increase building envelope efficiency.

Waste Water Treatment Plant

(See App. #4 for the full Walkthrough audit) The following are the priority findings and recommendations for the Waste Water Treatment Plant.

1. Significant reductions in energy consumption (both natural gas and electricity) are seen between the years 2014-15. This can likely be attributed to the utilization of electricity generated by the methane fired gas generator. Recent reports state that there is little realistic potential to for additional organic material to be added to this organic waste stream to generate additional methane fired electricity.
2. Increasing the capacity of the existing facility to accommodate greater amounts of leachate and methane rich sludge to generate more gas fired electricity and offset grid power and natural gas use.

Cargill Community Centre

(See App. #5 for the full Walkthrough Audit)

1. Serious air leakage through a number of exterior door access points significantly reduces the building's ability to retain heat.
   a. Complete replacement of exterior doors or at minimum upgrading the seals is recommended.
2. A review of the building's use is underway with the aim of a more efficient use of space at various times throughout the year.

[3] https://en.wikipedia.org/wiki/Energy_audit)

3. The electric baseboard heaters should be inspected by an electrician to ensure safety and energy efficiency.

Conclusions, Recommendations and Actions

The following are the list of conclusions and recommended actions to assist the municipality in moving the current ECDM forward.

Conclusions and Recommendations

1. The "culture of energy conservation" and commitment to Greenhouse Gas reduction as a response to Climate Change (Goals - ECDM Plan 2014) has not been made a priority in the municipality.

Recommendation #1 – On behalf of the Brockton community, make a council commitment to support the basic Goals of the ECDM Plan.

1.1 Establish a staff "committee" responsible for ensuring the "culture of conservation" and other aspects of the ECDM Plan are implemented.

1.2 Take advantage of the provincial and federal commitments to emission reduction by sourcing funds to pay for energy efficiency and green energy technologies i.e., solar PV/Net Metering panels, solar thermal units, LED Lighting conversions, etc., Partner with local organizations and agencies to expand the capacity of the municipality to source funding and deliver GHG reduction initiatives.

2. Brockton does not currently have the internal resources to manage the implementation and monitoring of their ECDM Plan.

Recommendation #2 - Clearly identify a staff person who has the responsibility for implementation and management of the ECDM Plan.

   a. data gathering and analysis;
   b. staff engagement;
   c. setting milestones and reporting on progress -
   d. Providing bi-annual reports on corporate energy use and GHG emissions.

3. The current "mindset" of facility and public works managers is *"we replace things when they are broken or the wear out"*. This sensible approach may miss some opportunities to replace or update systems or products that still appear to be "working" but have not kept pace with new emerging technologies or practices.

Recommendation #3 – Move towards a "full cost accounting" system which includes assessments of the future impacts: financial, social and environmental, of actions taken or not taken.

4. Improved operational practices at the arena over the years re: seat heating phase out, glycol replacement, ceiling upgrades, building envelope have reduced energy demand significantly.

Recommendation #4 - Continue with current technology adjustments i.e., LED and sensor lighting as well as building envelope upgrades.

5. There is not enough “data” available to assess the efficiency of the “vehicle fleet” and the total energy use and GHG produced by this sector.

Recommendation #5 - Instruct all vehicle operators to maintain a “log book” to record kilometers travelled, purpose of trip and fueling records. This data will assist in determining fuel efficiencies as well as ensuring that vehicle type matches staff needs.

6. Diversion of organic material from landfill has huge potential to extend landfill life as well as eliminate the production of methane, a greenhouse gas 25 times more potent than CO2.

Recommendation #6 – Continue and endorse the process of establishing a residential and commercial organic waste collection and processing system for the municipality.

6.1 Increase the rate at which the “gas plant” at the WWTP is equipped to handle increase amounts of leachate/sludge and generate and increased amount of electrical energy to offset grid supplies.

7. Energy use in municipalities has been managed effectively in recent years. Increased costs for electricity have resulted in increased overall costs, especially at peak times, even though kwHr increases have been minimal.

Recommendation #7 – Explore potential for shifting use in all facilities off peak times, examine Phantom Load reduction opportunities, efficient space and time use of facilities.

Appendices

App. #1 Terminology

Energy Conservation and Demand Management Plan (ECDM): A mandatory Provincial requirement under ON. Reg. 397/11 that municipalities in Ontario develop an ECDM and annually submit energy data from municipally owned facilities to the Province. ECDM's are required for schools, hospitals, and all government facilities.

Municipal Energy Plan (MEP)/Community Energy Plan (CEP): Two names for the same Province of Ontario program which extends the ECDM Plan to include all community sources of energy use (residential, industrial, commercial and Institutional). Matching funds ($90,000) are available over a 2 year period to complete a MEP/CEP and ($25,000) to complete updates after 2 years.

Partners for Climate Protection Protocol (PCP) – 20 year old program of the Federation of Canadian Municipalities (FCM) which provides funding and a 5 Milestone template to reduce Greenhouse Gas Emissions in municipally owned (corporate) and community facilities including buildings, transportation, water and wastewater facilities, solid waste, transportation, residential and industrial, institutional and commercial operations.

App. #2 Funding Opportunities

Funding Opportunities for Municipalities and Residential and Industrial, Commercial and Institutional (ICI) Sectors.

Programs

Ontario SaveONEnergy Program

Local Contacts in Grey Bruce are Westario and Hydro-One

Home Programs: https://saveonenergy.ca/Consumer.aspx

ICI Programs: https://saveonenergy.ca/Business.aspx

TD Friends of the Environment (municipalities, schools and charities)

https://fef.td.com/funding/

Ontario Municipal Energy Plan Program

http://www.energy.gov.on.ca/en/municipal-energy/

Federation of Canadian Municipalities Partners for Climate Protection (PCP) Program
http://www.fcm.ca/home/programs/partners-for-climate-protection.htm

Local Providers

Energy Audits – what do I need to do and what will the impact be

System Upgrades

Troy's Heating and Cooling

http://www.troysplumbingandheating.com/

Emke Schaab http://emkeschaab.com/

Building Envelope (Insulation, Exterior and Interior)

Water, Appliances – http://www.rainbarrel.ca

Grey Bruce Utility Assistance Program

The United Way of Bruce Grey's Utility Assistance Program provides grants, of up to $500 per funding source or utility, to low-income residents. The accounts need to be in arrears or are at risk of disconnection, or are already disconnected.

Visit: http://unitedwayofbrucegrey.com/services-offered/utility-assistance-program/

Ontario's Feed in Tarrif Program

http://fit.powerauthority.on.ca/sites/default/files/2017-FIT-Price-Schedule.pdf

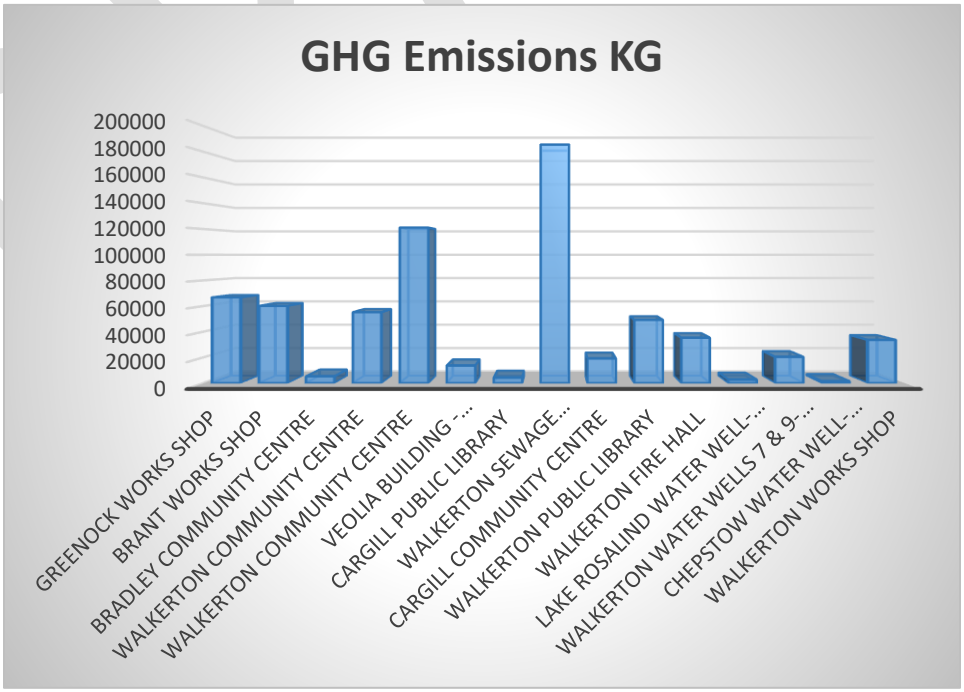
App. #3 ECDM Plan Update Proposal

Brockton Energy Conservation and Demand Management Plan (ECDM) *Implementation and Update*

The following is the list of tasks that will be performed by contractors with the Grey Bruce Sustainability Network (GBSusNet) as the initial steps in implementing the Brockton ECDM, as approved by Council in 2015. A partnership facilitated by GBSusNet has garnered support from Bruce Power and Brockton's Environmental Advisory Committee (EAC) in addition to support from the Municipality. Discussions with EAC and Debra Roth, Brockton's CAO have resulted in the decision to start small, with local funds, to work with the approved ECDM and achieve the stated objectives.

Task 1 - Energy Data Management and Analysis

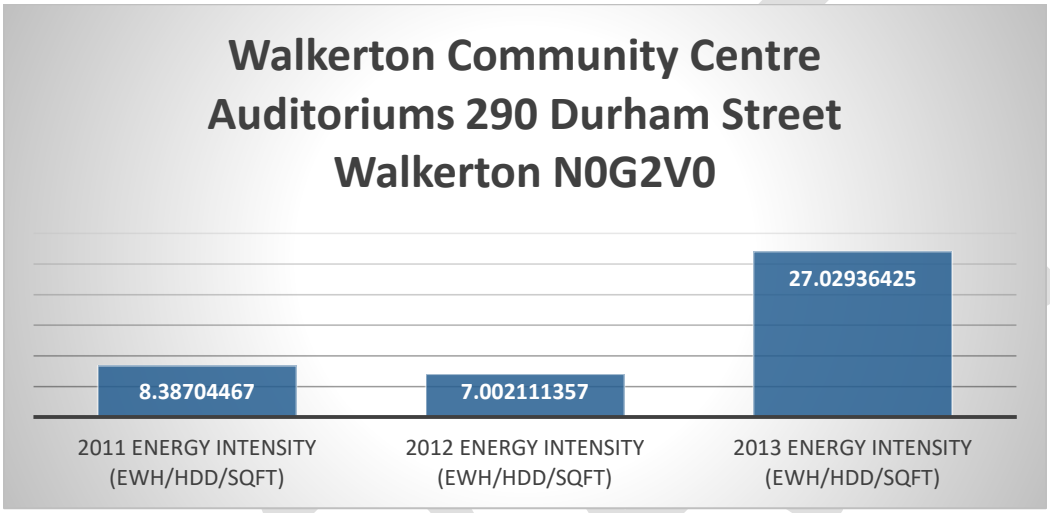
- Review the current plan and produce a summary of objectives, milestones and current state for largest energy consumers;
- Analyse the available energy data and produce graphic representation of the 3-4 largest energy consumers; Compare to best practices. Figure 1 shows 2012 GHG emission for municipally owned facilities and operations.
    - Wastewater Treatment Plant
    - Community Centre (Ice Pads and Auditorium)Brant and Greenock Works Shops



- Review and update waste management data and targets (2011 diversion rate was 26%)
- Review and update water consumption data per capita and energy use per m3
- Summarize Streetlight energy consumption data
- Investigate the potential for savings in Vehicle Fleet operations

Task 2 Identification of Data Anomalies

Example below Figure Two: What happened in 2013 that more than tripled the energy use per square ft. at the Community Centre?



- Review the September 23, 2014 Audit Report on the Walkerton Community Centre

Task 3 Review Current Target and Implications

"Reduce the energy intensity (energy required per square meter) for all municipally owned facilities and operations by 10 % by 2016".

Task 4 Identification of Past and Future Actions to meet target

Review the range of "Activities" and "Objectives" in the current plan and report on the success of each initiative based on the measures provided. The following is an initial list of actions to be reviewed. They include:

- Solar Heating for the Walkerton Pool
- Lighting Retrofit at arena and LED streetlights
- Biogas generation at Walkerton Wastewater Treatment Plant
- Review Community Centre Audit
- Lighting upgrades at the Community Centre
- Other actions or opportunities?

Task 5 Staff Engagement

- Establish a regular protocol for reporting on ECDM targets and current practices for staff.
- Develop a process for timely review of processes and practices to ensure energy targets are addressed;
- Raise awareness among key staff as to their responsibility regarding the ECDM Plan implementation.

Budget and Timeline

Brockton ECDM Plan Update

Expenses	Amt
GBSusNet Contractor Expense	8500
Revenue	
Municipal Budget	3500
EAC Budget	1500
Bruce Power support through GBSusNet	3500
Total Revenue	**8500**

Contractor Tasks	Hours		Task Timeline
			2016
1- Energy Data Mgt and Analysis	50		*May-June*
2- Identification of Data Anomolies	30		*June*
3- Review Current Target and Implications	30		*June*
4- Review of Actions and Impact	30		*Sept*
5- Staff Engagement	50		*May-June and Sept*
Final Report Writing	31		*Oct*
Total Hours	220		
Total Cost at $35.00/hour	7700		
Administration 10%	770		
Total Expenses	**8470**		

App. #4 Community Centre Walkthrough Audit Photos

App. #5 Waste Water Treatment Plant Walkthrough Audit Photos

App. #6 Cargill Community Centre Walkthrough Audit Photos

App. #7 – Brockton ECDM Plan 2014 Summary

Review of Brockton Energy Conservation and Demand Management (ECDM) Plan

In 2014, as required by the provincial government in Ontario, Brockton CAO Dick Radford prepared a draft version of an ECDM plan for the municipality.

The following is a summary of the recommended "Action Plan" and a status report on the extent to which actions have been implemented. The chart is organized according to future processes, programs and projects and the related activity, objective, metrics and status. Details of the Action Plan can be found on the municipality's website.

Processes	Activity	Objective	Metrics	Current Status
Data Management	- Energy Tracking - Key performance indicators (KPI) - Bill Optimization - Bill Verification	- supports energy conservation programs; ensures accurate billing processes, better understanding of costs	- energy management software and database installed - exceed local authority benchmarks - identify anomalies in consumption - improve billing accuracy and	- required data is being collected and reported; -
Energy Supply Mgt	Establish energy reserve acct.	- accumulate earnings from renewable energy and conservation projects.	- amt of funds from energy conservation initiatives	- no revenue is being rec'd (other than gas plant).
Energy Use in facilities	- Develop Municipal Building Standard - Equipment Inventory - Maintenance and tracking; - Shutdown Procedures	- set example for community - enhance knowledge of equipment upgrades - reduce energy consumption and prolong equip life - reduce overnight and weekend baseload consumption.	- new builds exceed Ontario Building Code - replace equip when fiscally and environmentally sensible. - extend equipment life - reduce on-peak electricity consumption.	- arena, wwtp streetlight programs are keeping pace.
Equipment Efficiency	- establish energy efficient procurement standards and	- consider energy costs over the life of equip rather than just up front capital costs.	- use energy efficiency standards in equipment procurement	- informal policies in place

	Life Cycle accounting		- Life cycle instead of "first cost" evaluation.	
Organization Integration	- Track Incentives - Energy Reporting and feedback.	-establish incentive database - provide data to department heads to assist with conservation planning	- Incentive Database is available - energy management will be a regular part of staff meetings.	- this is done in an informal setting

Programs	Activity	Objectives	Metrics	Current Status
Data Management	Load mgt	- shift energy use from peak demand periods	- shift energy consumption to off peak periods	- some action in this area.
Energy Supply Mgt.	- solar rooftop leasing - renewable electricity procurement - management awareness	- evaluate leasing feasibility - renewable electricity certificates - increase energy awareness and purchasing practices.	- do cost benefit of solar potential - criteria for "certificate" purchase - regular staff meetings and energy awareness newsletter.	- little action here
Energy use in facilities	- conservation incentive programs - Phantom Power program	- annual facility and individual energy conservation competitions - raise awareness around Phantom Power issue and options.	- 70% reduction in evening and weekend Phantom Power loads - 70% staff participation rate in conservation meetings and programs.	- no awareness of action here.
Equipment Efficiency	Interior Lighting	- reduce excessive lighting while maintaining safe levels.	- staff and residents are comfortable with adjusted light levels.	- Interior lights at arena have been upgraded
Organizational Integration	- Energy Awareness Campaign - Building Automation Systems (BAS)	- raise staff awareness of their energy use and options - review potential for BAS to reduce energy consumption	- include energy awareness in job training - expand use and comport with BAS	- No awareness of action in these areas.

Projects	Activity	Objectives	Metrics	Current Status
Data Mgt	- opportunities with energy services and supply companies	- evaluate potential to partner with westario, LAS, Hydro One, Union Gas, etc., on conservation projects	- cost benefit of financing with energy services company.	- more work required to determine status
Energy Supply	Solar FIT projects	- generate 40 KW of solar to demonstrate leadership	- complete contract with OPA	- no action here
Equipment Efficiency	- recreation lighting retrofits - LED streetlight pilot - Daylight sensor controls - Waste Heat recovery project	- remove T12s and replace with upgrades in all facilities - create business case for LED conversion - natural light options at all facilities - assess potential to capture waste heat from all systems i.e., hot water discharge.		- rec centre lighting upgrades are happening; - LED streetlight conversion in progress;
Organizational Management	Training	- increase internal capacity to reduce energy costs.	Staff attends regular energy related internal and external training.	- no knowledge of action here.

App. #4 Walkthrough Audit - Brockton Community Centre and Ice Pads

Arena Heating System – These are the panels that controls the upper units. 10-12 units have been reduced to 4 units. Warmer weather means less demand. Only turned on for games when required; they used to just run all the time. These will likely be phased out in the future, reducing electricity use to zero.

Hot Water Heating - Year 2000 control system for hot water use in dressing rooms, thermostat controlled and gas fired. Baseboard heaters were removed in 2000.

Refrigeration Units for the Ice Plant – increased hydro consumption as operation has moved from 6 month to 9 month of ice which goes in earlier. Outside weather has got warmer. We now flood with hot water rather than cold water; ice thickness has increased.

Main 600 volt panel

Brine Pump – pumps coolant onto ice surface. No soft start, does not start gradually but kicks in all at once. General policy is to repair or replace when broken. Upgrade could be an opportunity safe energy and money over time.

Refrigeration Compressors – 2001 for Ice now uses glycol rather than town water.

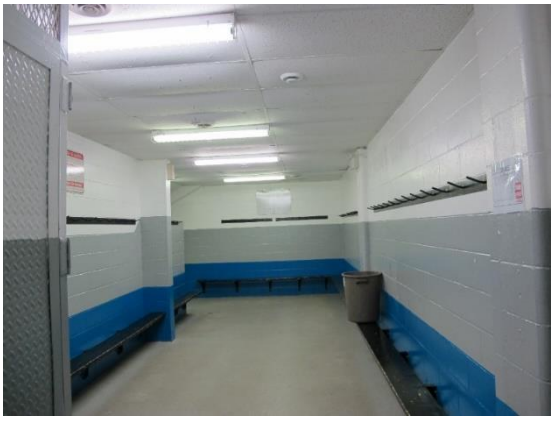
Water Treatment for the cooling tower outside. Town water is hard so de-lyme, anti-scaling system keeps system clean.

Exterior Doors – this door is used for access by special needs people. It is scheduled to be upgraded to increase its accessible qualities and to increase its energy efficiency. Currently, most exterior doors are poorly insulated at lack appropriate “sealing” technology to form air tight building envelope.

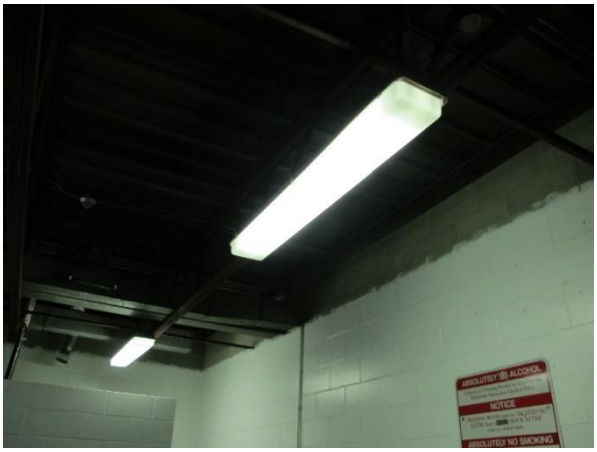
All exit signs have been converted to LED lights.

Ceiling and roof insulation has been upgraded to align with building code standards.

Most upper lights have been converted from T12s and attention is being paid to only using the lights when really necessary. All staff is on board with this process.



North Dressing Rooms – Still with T12s should be converted to T5's.



App. #5 - Waste Water Treatment Plant – Walkthrough Audit

Aeration pumps to facilitate aerobic digestion are one of the main users of electricity at the WWTP.

Circulation pumps move waste stream through the plant into the aeration chambers. Sewage from homes and business are gravity fed to the plant.

Circulation Pump

Air Blower

Air Blower

Final Settling Tanks

The main use of electricity at the WWTP is the constant pumping of water through the plant as well as the blowing of air in order to increase the rate of breakdown of waste materials. Natural gas at the plant is used to keep water temperatures at a level that supports the bacteria required to carry out the breakdown of the waste materials.

The Digester is the final stage of anaerobic digestion that produces methane for use in the gas generator.

Gasification Generator – this unit converts methane gas to electrical energy that is then available for use by the plant; any excess energy is then fed into the electricity grid. This “offsetting” accounts for the reduced electricity consumption that is shown in the years 2014-15 (See Figure 5)

App. #6 – Walkthrough Audit of the Cargill Community Centre.

Ensuring all exterior access doors and windows are well sealed to prevent heat loss is a priority

Cleaning and potentially upgrading the electric heating system.

Explore ways of limited use of areas within the main hall to avoid having to heat the whole area.