Energy Conservation and Demand Management Plan – For the Corporation of the Township of Oro-Medonte

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Preface to the Energy Conservation & Demand Management Plan (CDM) for the Township of Oro-Medonte.

The intent of this CDM is that it will become a living document. Energy management is continuously evolving and effective management requires a constant focus and re-evaluation of strategies to capitalize on opportunities and address challenges. Accordingly, a great deal of flexibility has been built into the plan.

The contributions and commitment of the Township's Council, Senior Management Team and Staff, whose hard work and concern for the future have made this plan a reality. This top down commitment will ensure the CDM is integrated into Municipal operations and the Township's culture thereby aligning with the Township's strategic objectives and vision of *Excellence in Service Delivery*.

The Township of Oro-Medonte has been proactive and progressive with respect to energy management and conservation activities prior to the Provincial mandate for this plan being enacted under the Green Energy Act. It is hoped that this legislation will facilitate our continued planning and conservation activities, build our past successes and facilitate learning, collaboration and continuous improvement in the Municipal sector.

2 EXECUTIVE SUMMARY

Introduction and Background.

The Ontario Provincial Government has committed to help municipalities better understand and manage their energy consumption. As part of this commitment, Ontario Regulation 397/11 under the Green Energy Act 2009 requires municipalities to report on their energy consumption and greenhouse gas (GHG) emissions annually beginning in 2013 and to develop and implement Energy Conservation and Demand Management (CDM) plans starting in 2014 to be updated every 5 years.

This document represents the CDM for the Township of Oro-Medonte for 2014-2019. In this first CDM, a retroactive look into the energy use and initiatives undertaken from 2011 to 2013 shall form the basis of our setting energy baselines and benchmarking our facilities.

This CDM is intended to be a living document that will help develop and structure paradigms and operational procedures designed to improve energy efficiency and reduce environmental impacts of Township activities.

Summary of Progress and Achievements 2012-2014

1. Reduction in Electrical energy use from 2011 to 2012 of 205,372 kWh (6.17%) and reduction in kgCO2ee/a by 36706.7 $kgCO_2$. (8.09%).[1]
2. 2013 was the most extreme winter in the last 30 years.[2] Not only was snowfall almost double the average. So were Heating Degree Days over the winter months. This resulted in an increase in energy use from established baseline of 8.4% or 280,212 kWh. Most of this energy was due to heating and thus had a high Green House Gas impact of 10.39% over established baseline or 47,139.6 $kgCO_2e$. It is hoped that this year is an outlier and not a sign of a trend. When "normal" weather returns so should the reduction in consumption associated with improvements to facilities and processes.
3. 2012 - Installation of glycol cooling loop in Arena refrigeration plant reducing the demand on well pump.
4. Installation of variable frequency drives on pumping stations.
5. 2012- Administration Office HVAC replacement and installation of building automation system. Anticipated annual KW/H reduction 212, 876 or 48% producing a savings of approximately $17,000/year (2012 market rates).
6. 2011-2013 Lighting upgrades to more efficient lighting at a number of facilities.
7. 2013 ICF foundation and walls included in Huronia Nurse Practitioner Clinic expansion.
8. Received initial Opportunity Assessment Review from Honeywell March 22, 2013.
9. Received Opportunity Assessment Report from Honeywell August 29, 2013.
10. Received LED Street Light Proposal from Real term December 6, 2013.
11. 2013- Furnace conversions oil to gas – Edgar and Old Town Hall.
12. 2013 - New radios – digital frequency – enhancing communication.

[1] Yearly numbers produced by LAS spreadsheet for Consumption reporting, comparative done with simple mathematics with no interest of inflation calculated.

[2] Environment Canada

13. 2013-2014 Energy and building efficiency identified as project objective for Oro-Medonte Community Arena Renovation and captured in scope of renovation
14. 2012-2014 Process improvements – tablet technology launched in Environmental Services, Building and Planning, and Recreation and Community Service to streamline operations and overall efficiencies.
15. 2013- Installation of GPS in Transportation Fleet – More efficient operations and greater ability to plan and control.
16. 2013 Heating conversion at various pumping stations – electric to gas
17. 2011-2013 Staff training on energy management.
18. 2011-2014 Completed reporting requirements of the Green Energy Act.

Planned Measures for the next 5 years

Energy Data Management: 1. CDM plan. 2. Continued LAS[3] assisted reporting on yearly Energy Consumption. 3. Annual analysis with established baselines and benchmarking against similar facilities. Recommendations incorporated into annual business planning 4. Increased and more detailed auditing of resource usage. 5. Recording and reporting of outages. 6. Monthly Energy Bill tracking 7. Cost / Benefit Analysis	**Energy use in Facilities**: 1. Energy / Efficiency / Environmental Impact considered in facility management strategies. 2. Centralized Facility management function to standardize processes and energy management function. 3. Review possible strategies for reduction of facility needs such as technology for work to be completed in the field, staff scheduling and flex time.
Equipment Efficiency: 1. New more efficient well being developed for Horseshoe Valley area. 2. Conversion of Robin Crest Pump house generator diesel/gas. 3. Furnace conversions oil/gas – Jarratt and Hawkestone Community Halls 4. Arena Renovations with: a) New more energy efficient ice plant. b) Automated plant controls using surface temperature (infrared) rather than brine temperature. c) New heat recovery systems from ice plant for Olympia water heating d) New in floor radiant heating system for change rooms. e) Conversion from electric/oil water heaters to gas fired boiler system. f) Removal of electric baseboard heating systems. g) New low e ceiling over ice surface. h) New flow controls on showers and taps. i) New low flow fixtures. j) New insulation on exterior walls. k) New energy efficient doors.	**Organizational Integration**: 1. Implement a Corporate Energy Conservation Policy 2. As noted above in 2013 the Township, through the County of Simcoe's energy management consortium retained the expertise of Honeywell to develop a high level opportunity assessment for energy management. The senior management team are currently reviewing the opportunity assessment and the feasibility of proceeding with a letter of intent to undertake identified initiatives. 3. Formation of an Energy Team in order to facilitate Energy Management Corporation wide on a consistent and ongoing basis. 4. Integration of Energy Management into Township strategic and business planning and performance management program.

[3] Local Authority Service (LAS), a subsidiary of the Association of Municipalities of Ontario, is a provider of competitively-priced and sustainable business services for Ontario municipalities and the broader public sector.

l) Automated heating controls as part of building automation. Oro-Medonte Community Arena Project – Lighting, controls, mechanical/electrical – conversion of oil/electric/propane to natural gas. m) LEDLED Rink Lighting 5. Feasibility review to convert to LED Streetlights. (702 streetlights) 6. New fire hall construction 2015 Fleet review 2015.	
Energy Culture Training and Awareness: 1. Staff training on Energy Management. Township and partner agencies to facilitate energy management workshop with the Township's industrial / commercial sector.	**Renewable Energy**: 1. Continue to monitor and explore possible renewable energy opportunities. 2. Support the concept of renewable energy and plan for future utilizations.
Financial / Grant opportunities: 1. Local Authority Service (LAS), a subsidiary of the Association of Municipalities of Ontario, is a provider of competitively-priced and sustainable business services for Ontario municipalities and the broader public sector. LAS helps its customers "save money, make money, and build capacity". Over the past number of years LAS has focused energy management and provided support and resources to Municipalities through funding it has received through the Ontario Power Authority. The Township also engaged LAS to assist in energy management and they have assisted the Township in realizing a number of the initiatives listed above. **2.** Investigation of LAS energy purchasing programs. 3. Purchasing By-Law review to include provisions for energy / environmental considerations in Twp. Purchasing decisions as well as lifecycle cost / benefit analysis.	

Baseline Energy Use

Short Term Recommendations

1. Implement a clear Corporate Energy Conservation Policy tied to the Sustainability goal in the Townships's Strategic Plan.
2. Formation of an Energy Team in order to facilitate Energy Management Corporation wide on a consistent and ongoing basis.
3. Increased and more detailed auditing of resource usage.
4. Recording and reporting of outages.
5. Increased and facilitated analysis of recorded information.
6. Monthly energy bill tracking.
7. Energy conservation training as part of ongoing training initiatives.
8. Energy conservation tips added to corporate newsletters and websites.
9. Policy and Procedure creation to facilitate Life Cycle planning in purchasing and efficiency in resource use in operating procedures
10. Review feasibility of centralized facility management function and developing/ acquiring competencies in energy management.
11. Energy conservation to be incorporated into annual business planning and performance management program.

Baseline Energy Use

In 2011, the Township of Oro-Medonte used approximately 6,068,520.48 ekWh of energy from facilities and transportation sources. This energy use produced GHG emissions of approximately 1,285,009.37 $kgCO^2e$. This energy use being the first that has been reported forms the baseline from which other years reporting will be compared. In addition to comparing facilities to this established baseline facilities have also been grouped into benchmarking classes based on use and size. It is comparisons within these classes and to comparable facilities in other municipalities that clues to improved efficiencies can be gained. Due to renovations or decommissioning for some facilities it may not have been appropriate to use 2011 as the baseline year. Those exceptions are expounded in the notes on chart.

Facility	Electricity Use	Other in ekWh/yr.	Benchmarking	Notes
Carley Hall 2011	1,848 ekWh/yr.		Class C Hall	Facility to be renovated in 2012. Facility not in use and no heat on so 2012 will become baseline for this facility.
Carley Hall 2012	5,401 ekWh/yr.	8,816.22 ekWh/yr. (oil)	Class C Hall	As of 2012 only Hall in this class. Has had an oil furnace installed and structural improvements with some insulation added. Main energy driver's lights and refrigerator.
Craighurst Hall 2011	3,411 ekWh/yr.	2,004.67 ekWh/yr. (oil)	Class C Hall	Facility Decommissioned 2012 left in baseline to account for additional load on nearby halls.
Eady Hall 2011	9,867 ekWh/yr.	24,616.44 ekWh/yr. (oil)	Class B Hall	Energy use very high for use and size. Main drivers refrigerators, stoves, air conditioning and lights. Oil heating. Little Insulation.

Facility	Electricity Use	Other in ekWh/yr.	Benchmarking	Notes
Edgar Hall 2011	5,559 ekWh/yr.	32,786 ekWh/yr. (oil)	Class B Hall	Oil use very high for use and size. Main drivers, Lights, refrigerator. Heating. Very little insulation, windows poor.
Old Town Hall 2011	9,938 ekWh/yr.	71,682.99 ekWh/yr. (oil)	Class B Hall	Oil and electrical use high. Main drivers, heat, lights.
Hawkestone Hall 2011	5,849 ekWh/yr.	48,209 ekWh/yr. (Oil)	Class A Hall	Drivers, heat, Lights.
Jarratt Hall 2011	5,849 ekWh/yr.	48,209 ekWh/yr. (Oil)	Class A Hall	Drivers, heat, Lights.
Administration Office 2011	301,466 ekWh/yr.	2,157.44 ekWh/yr. (gas)	Main Administration	Drivers, heat, lights, computers.
Arena 2011	654,917 ekWh/yr.	13,402 ekWh/yr. (oil)	Arena	Drivers, Ice, Heat, Lights, Hot Water
OPP 2011	32,406 ekWh/yr.	42,829.94 ekWh/yr.	OPP/Nurse	Drivers, Heat, Lights
North Yard 2011	42,082 ekWh/yr.	163,030.10 ekWh/yr. (gas)	Yard 500m2-1000m2	Drivers, Heat, Lights
South Yard 2011	51,182 ekWh/yr.	282,192.42 ekWh/yr. (propane)	Yard 1000m2+	Drivers, Heat, Lights, wielding
Horseshoe Fire HQ 2011	52,262 ekWh/yr.	108,754.04 ekWh/yr. (gas)	Class A Fire Hall	Drivers, Heat, Lights.
Moonstone Fire Hall 2011	18,385 ekWh/yr.	90,750.59 ekWh/yr. (gas)	Class B Fire Hall	Drivers, Heat, Lights.
Hawkestone Fire Hall 2011	19,021 ekWh/yr.	31,213.78 ekWh/yr. (gas)	Class B Fire Hall	Used as drying facility for equipment.
Rugby Fire Hall 2011	5,079 ekWh/yr.	31,266.92 ekWh/yr. (gas)	Class C Fire Hall	Drivers, Heat, Lights.
Shanty Bay Fire Hall 2011	8,864 ekWh/yr.	38,631.97 ekWh/yr. (gas)	Class C Fire Hall	Drivers, Heat, Lights.
Warminster Fire Hall 2011	35,097 ekWh/yr.		Class C Fire Hall	Electric Heat Only

Facility	Electricity Use	Other in ekWh/yr.	Benchmarking	Notes
Canterbury Pump house	17,372 ekWh/yr.	797.08 ekWh/yr. (gas)	Class C Water System	Very Small System
Cedar brook Pump house	20,975 ekWh/yr.	1,572 ekWh/yr. (gas)	Class C Water System	Very Small System
Craighurst Pump house	43,845 ekWh/yr.	233.81 ekWh/yr. (gas)	Class A Water System	
Harbourwood Pump House	64,508 ekWh/yr.	2,391.25 ekWh/yr. (gas)	Class A Water System	
Horseshoe Highlands Pump House	189,459 ekWh/yr.		Class B Water System	Gravity feed only system of this class in Township
Horseshoe Highlands Tower	15,442 ekWh/yr.			Gravity feed only system of this class in Township
Maplewood Pump House	36,696 ekWh/yr.	467.62 ekWh/yr. (gas)	Class A Water System	
Medonte Hills Booster Station	9,317 ekWh/yr.		Class A Water System	
Medonte Hills Pump House	39,920 ekWh/yr.	0 ekWh/yr. (gas)	Class A Water System	
Robincrest Pump House	100,204 ekWh/yr.		Class A Water System	
Shanty Bay Pump House	83,553 ekWh/yr.	2,518.78 ekWh/yr. (gas)	Class A Water System	
Sugarbush Booster Station	65,976 ekWh/yr.	0 ekWh/yr. (gas)	Class A Water System	
Sugarbush Reservoir	906 ekWh/yr.		Class A Water System	
Sugarbush Pump House	36,997 ekWh/yr.		Class A Water System	
Sugarbush Pump house Well #2	57,345 ekWh/yr.		Class A Water System	
Warminster Booster Station	44,604 ekWh/yr.	1,859.86 ekWh/yr. (gas)	Class A Water System	
Warminster Pump house	92,617 ekWh/yr.		Class A Water System	
2011 Totals From Facilities Only	Total 3,328,153.50 ekWh/yr.	Total GHG 453,650.96 $kgCO_2e/yr.$	All systems which have to report currently under 397/11.	

Facility	Electricity Use	Other in ekWh/yr.	Benchmarking	Notes
Streetlights	448,211[4] ekWh/yr.	44,821.1 $kgCO_2e$[5]	702 Street lights of various sizes.	
Transportation	2,740,366.98[6] ekWh/yr.	831,358.41 $kgCO_2e$		

Notes: The Townships highest user of energy is the Arena with 654,917 ekWh/yr. This is on the low side of typical single pad arenas, with most consuming between 600,000 and 2,000,000 kWh/yr. depending on location, facility construction and operating profile (*Improving Efficiency in Ice Hockey Arenas* written by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers).

Although it is not yet a legislated requirement transportation costs have also been examined for this year. It only makes sense to join these costs to other facility costs and search for measures and solutions for both areas of energy use at the same time. The estimated transportation baseline level of 2,740,366.98 ekWh/yr. and 831,358.41 $kgCO_2e$. (Refer to Appendix A, Transportation Consumption & Emissions) –This transportation data has been estimated using fleet data from the Township of Oro-Medonte, fuel price information from the Ministry of Energy and conversion factors from Environment Canada.

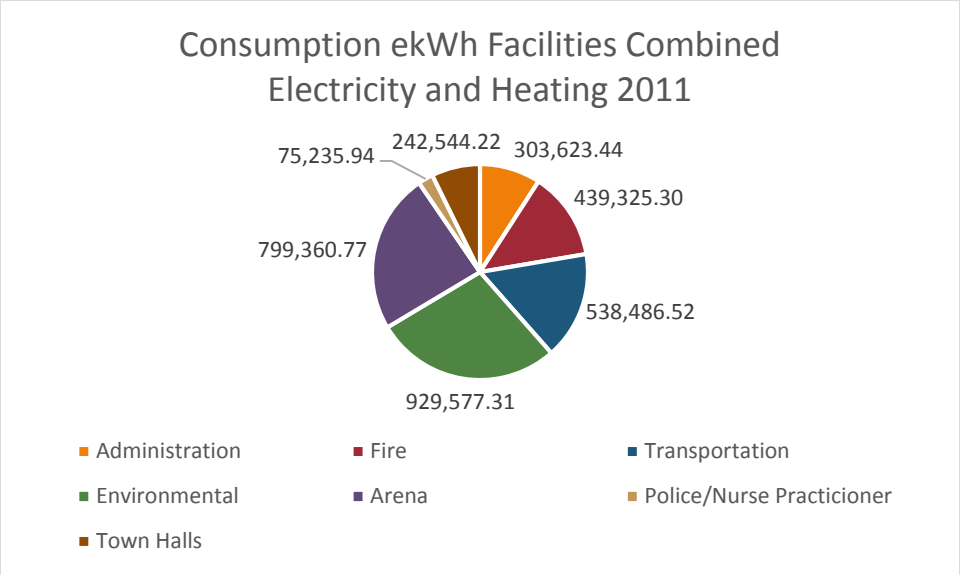
This indicates that the majority of greenhouse gas emissions by the Corporation is from vehicle sources.

This baseline may be adjusted in the future in two ways.

1) New yearly baseline established for new facilities or facilities which have changed area or function.

2) Consumption may be averaged over multiple years to produce new more accurate baseline. This is normally done with no fewer than three years data.

[4] Estimate from LED Street Light Proposal by Realterm Energy.
[5] 100g /CO_2/kWh estimated.
[6] Estimates based on $ consumption and average cost of fuel.


Consumption ekWh Facilities Combined Electricity and Heating 2011
75,235.94
242,544.22
303,623.44
439,325.30
799,360.77
538,486.52
929,577.31
Administration
Fire
Transportation
Environmental
Arena
Police/Nurse Practicioner
Town Halls

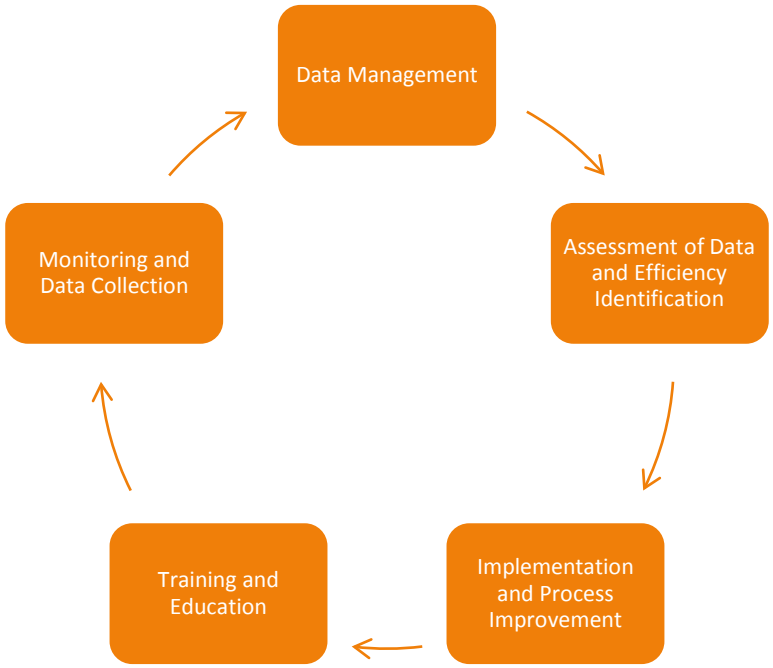
Purpose

The Energy Conservation and Demand Management Plan is a legislated requirement municipality under Ontario Regulation 397/11 made under the Green Energy Act of 1999. The intention of the Township of Oro-Medonte is to go beyond the requirements of mandated reporting and planning to a living and significant document within the operational framework of the Township of Oro-Medonte.

At this point in time the plan will define and recommend measures at a high level in areas such as:

Energy Data Management, Energy Use in Facilities, Equipment Efficiency, Organizational Integration Energy Training and Awareness and Cultural Development and Renewable Energy.

Although the intent is to make information available for sharing and communication in all directions the main areas of focus of this plan and the generalized flow of information is represented by this chart.



Data Management: Forms the backbone for meeting the reporting function which is the main legislative requirement of the Green Energy Act. The main component of data management, the annual energy consumption and GHG emission report has, and will continue to be maintained by the finance office. As energy bills come in they are input into software provided by the LAS in order to produce a report at the end of each year.

Other forms of data such as occupant and user survey results will be though the course of this CDM produced and maintained by other departments on a case by case basis.

Assessment of Data and Efficiency Identification: Each Department should be engaging in some form of this activity. As more data and more detailed information is gathered it will be possible to identify more opportunities for conservation and efficiency by comparing and contrasting results from previous years and by benchmarking activities against other municipalities engaged in similar delivery of service.

Implementation and Process Improvement: Is a task for all staff. As the Township begins to move the paradigm from a demand to a conservation culture all employees will have to buy into the concepts and initiative.

Training and Education: Is a requirement for any effective change and will improve all other processes.

Monitoring and Data Collection: Is the driving engine of the process. Yearly required consumption and emission data collection and reporting will identify suspect facilities and increased monitoring will allow a clearer picture of energy opportunities.

Background

The Township of Oro-Medonte has been active in the area of conservation and energy. As well as following all required legislation the Township has actively pursued conservation opportunities as they have become available. Using the SaveOnEnergy program lighting was updated in the administration center as well as several lighting upgrades in Arena and Community Halls. The Township has also opted to begin assessment of transportation energy use ahead of any legislated requirements.

The Drivers

Economic: Electricity and other energy prices are rising, electricity becoming more expensive and the market more volatile. Investment in energy network infrastructure is ramping up, and Average energy prices have risen 6.7% annually since 2002[7]. Natural gas prices have just been approved for a 40% increase. Current projections have electricity in the province increasing in price by over 40% in the next 5 years. Technology for using energy more efficiently is constantly improving.

Political: Canada is committed to reducing its greenhouse gas emissions as a signatory to the Copenhagen Accord in 2009. With the collapse of the much more strict (and unobtainable) Kyoto agreement the Copenhagen Accord sets a much more reasonable goal of a 17% reduction of 2005 levels by 2020. Reducing energy waste just makes good policy sense - it reduces exposure to the price of carbon, makes business more productive, helps manage energy risks, and contributes to our clean green international image. An image that is lately under constant fire by opposition to development of Canadian resources such as the Alberta Oil Sands. Provincially there is a strong drive to reduce consumption and towards alternative power generation. Ontario has just managed to shut down the last of its coal fired power generation stations.

Environmental: Reducing energy waste doesn't only reduce GHG emissions, but it reduces the need for marginal energy supply infrastructure, and all of the accompanying environmental impacts.

[7] Ministry of Energy

Social: Energy efficiency has health benefits, both in the home and at work - and getting more energy services for the same amount of energy makes it more affordable. A more productive system is generally also a more effective system.

The Barriers

Information and Skill Gaps: There are a wide range of skills needed; from understanding the benefits of improving energy use, through to the engineering skills needed to install and optimize energy using equipment. The demand for and the drive for these skills has been lacking if not entirely absent in the workforce for a number of years. Training and hiring now is in a catch up cycle as these skills will become more recognized and valued.

Manpower and Resource Gaps: Often small municipalities simply do not have the resources to explore new technology or manpower to properly research and guide decision making based on life cycle costs.

Information Asymmetries: When two parties do not have equal access to information. For example, a building owner may not be able to tell the difference between a competent and incompetent energy efficiency service provider, or the full cost implications of two different energy using plant and equipment. In order to combat this internally the Township is working to make all information on energy use available to all departments and identified staff.

Bounded Rationality: Using the old "rule of thumb" to problems that require a different structure to the decision making process. For example, an energy efficiency upgrade may save significantly on operating costs but the maintenance department's budget is the only part of the business that considers asset replacement, capital costs often take precedent and energy costs/lifecycle costs are ignored or under estimated in their decision making. The world and especially technology is changing all alternatives need to be explored even ones that have be discarded or unsuccessful in the past.

Principal-Agent Problems: Improving energy efficiency can have multiple benefits to multiple people, but the costs may not align with the benefits. For example a tenant may pay the electricity bill which doesn't directly impact on the landlord, so the landlord may not want to invest in more efficient heating, cooling, air conditioning or insulation. This problem will become more apparent in the future as the Township enters into more agreements with third parties such as has been done the nurse practitioner facility in Horseshoe Valley. The Township has made real headway in the area of customer service over the last number of years and continued and increased communications wither direct or by surveys will help with this type of problem.

Economic Externalities: As with Principal-agent problems, if someone doesn't pay for the full costs of damage they cause, or receive the full benefit from what they pay, then decision making will be inferior. In the case of municipalities often bulk buying reduces the impact of inefficient equipment or processes. Treating energy as if we have to pay full price for it is a good practice in planning operations as one day subsidies for energy for municipalities may be reduced or eliminated. It is also past time when the Township considered increased fees for services with value added. For example banquet hall rentals. Fee should be at one level for users who just are having a small party or meeting. Rentals that require huge set ups and tear downs however should be charged for this extra service which is not reflected in

the cost of rental. Rental rates in general should be adjusted to actually reflect cost of providing services.

Regulatory Problems: Capturing the full benefits of an energy efficiency improvement can run into problems when trying to reduce capacity from a supply company that has regulatory incentives to invest in maximum capacity infrastructure, and not have a primary incentive to consider the long term interests of the consumer.

Technological: By implementing energy efficient technologies into Canada's economy, we enhance the experience of Canada's workforce in working with technology, and improve the opportunities for Canadian based technological solutions. The rate at which technology is advancing is staggering and increased reliance on technologies also comes with an energy cost.

Social: Economic and Regulatory Conservation is often a political feel good and being “green” is considered to be the be all and end all for many economic plans. As such many technologies that are untested, economically unviable currently or long term unsustainable are often promoted through regulation and economic grants. This drawing of regulation and funds away from mainstream conservation and efficiency projects that potentially have greater cost/benefit ratio.

3 ENERGY CONSUMPTION ANNUAL REPORT AND ANALYSIS

Key Performance Indicators

One of the key phases of any successful plan is monitoring and data collection. Many consumption and conservation concepts are intrinsically hard to measure. The definition of key performance indicators (KPI) is an important part of planning in order to make relevant comparisons.

KPI	Units / Measurable Quality	Implementation
Energy Consumption	ekWh/yr.	Reported quantity direct for electricity. Converted for other sources with developed factors. Calculated annually.
Greenhouse gas (GHG) emissions	$kgCO_2e$ /yr.	Reported quantity calculated with annually developed factors.
GHG Intensity (GHG footprint)	$kgCO_2e/m^2$	Reported quantity based on facility greenhouse gas emissions divided by facility area.
Energy Intensity (Energy footprint)	$ekWh/m^2$	Reported Quantity based on facility energy consumption divided by facility area.

Energy Intensity Water	ekWh/ML	Reported quantity based on energy consumption divided by treated water production
Continuity	#of interruptions/yr.	Should be added into our reporting immediately and figured into yearly assessment. Manually recorded at each facility.
Reliability	#hr. of interruptions/yr.	Should be added into our reporting immediately and figured into yearly assessment. Manually recorded at each facility.
Number of Projects	#of projects/yr.	Should be added into our reporting immediately and figured into yearly assessment

2011 Summary of Energy Consumption

Refer to Appendix B (Ministry of Energy, Template for Ontario Regulation 397/11, 2011)

The first report of the Township of Oro-Medonte's Energy Consumption is used to provide a baseline for future reports and analysis. Little analysis can be done with this report on its own, other than contrasting energy use among Township facilities. For the purposes of benchmarking it is possible to use energy intensity to do some comparative analysis but buildings have unique energy requirements that do not translate across the board similar facilities. The Townships facilities against each other and against similar facilities in other municipalities the following classifications have be developed.

Benchmarking Classes:

Town Halls	**Fire Halls**	**Miscellaneous**
Class A Hall over 200 m^2 Hawkestone Hall and Jarratt Hall **Class B Hall 100 to 200m^2** Eady Hall, Edgar Hall and Old Town Hall **Class C Hall less than 100m^2** Carley Hall and (Craighurst hall before demolition)	**Class A Hall over 700m^2** Horseshoe **Class B Hall 300-400m^2** Moonstone, Hawkestone **Class C Hall 100-300m^2** Rugby, Shanty Bay, and Warminster	**Arena** Arena **OPP/Nurse** OPP/Nurse **Main Administration** Administration
Roads Yards	**Water Systems**	
Roads Yard 500-1000m2 North Yard		

Roads Yard 1000m2+ South Yard	**Class A Water System sizable system with a stand pipe or tower.** Craighurst, Harbourwood, Maplewood, Medonte Hills, Robincrest, Shanty Bay, Sugarbush, Warminster **Class B Water System gravity feed system** Horseshoe **Class C Water Systems small water systems** Canterbury, Cedar brook	

When Energy Consumption Reports become available from other municipalities facilities will be identified which are equivalent to identified classes and compared and contrasted.

Some notes on the 2011 report.

- This is the first year in which a complete energy use report has be done.
- In 2011 Township facilities used the equivalent of 3,328,153.50 kWh (Ministry of Energy, Template for Ontario Regulation 397/11, 2011).
- The electrical use for the Township this year is the equivalent of 209 homes or 483 passenger vehicles[8].
- To offset electrical use for the Township this year would require 1,880 acres of forest for one year[9].
- In 2011 the township energy use created the equivalent of 453,650.96 kgCO_2. (Ministry of Energy, Template for Ontario Regulation 397/11, 2011)
- The GHG emissions for the Township, this year are equivalent to 41.4 homes or 95.5 passenger vehicles[10].
- To offset GHG emissions for the Township this year would require 372 acres of forest for one year[11].

[8] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[9] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[10] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[11] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html

- Report includes: 2 Road yards, 1 Arena, Township Office, the OPP / Nurse Practitioner station, 7 community halls, 6 fire halls and 17 water system pump houses and towers.
- The results for Carley Hall do not indicate any oil consumption for this year as furnace had been removed and not yet replaced.
- Vehicle consumption is not a requirement for this period, however it was estimated to be 2,740,366.98 ekWh and 831,358.41 kgCO2ee.[12] This identifies that the majority of the Townships Greenhouse gas emissions are from transportation.

[12] Estimated using average energy costs Refer to Appendix D.

2012 Summary of Energy Consumption

Refer to Appendix C (Ministry of Energy, Template for Ontario Regulation 397/11, 2012)

This second report of the Township of Oro-Medonte's Energy Consumption is the first in which an analysis can be done of individual facilities.

Some notes on the 2012 report.

- In 2012 Township facilities used the equivalent of 3,122,781.64 kWh (Ministry of Energy, Template for Ontario Regulation 397/11, 2012).
- The electrical use for the Township this year is the equivalent of 195 homes or 450 passenger vehicles[13].
- To offset electrical use for the Township this year would require 1,752 acres of forest for one year[14].
- Compared to last year the Township used 205, 372 less kWh of electricity.
- This reduction in electrical use is equivalent to 12.9 homes or 29.8 passenger vehicles.[15]
- In 2012 the township energy use created the equivalent of 416,944.31 $kgCO_2$ (Ministry of Energy, Template for Ontario Regulation 397/11, 2012).
- The GHG emissions for the Township this year are equivalent to 38 homes or 87.8 passenger vehicles[16].
- To offset GHG emissions for the Township this year would require 342 acres of forest for one year[17].
- In comparison to last year the Township facilities reduced emissions by 36,706.7 $kgCO_2$.
- This reduction in GHG is the equivalent to 3.3 homes or 7.7 passenger vehicles[18].
- Report includes: 2 Road yards, 1 Arena, Township Office, the OPP / Nurse Practitioner station, 7 community halls, 6 fire halls and 17 water system pump houses and towers.
- This is the first report with the renovations at Carley Hall Completed and thus is the new baseline for this facility.
- Transportation consumption although still not a required reportable is estimated to be 2,657,355.07 ekWh and emissions of 663,752.17 kgCO2ee[19] for this period.

[13] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[14] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[15] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[16] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[17] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[18] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[19] Estimated using average energy costs Refer to Appendix D.

- Transportation consumption and emissions are slightly down from 2011.

2013 Summary of Energy Consumption

Refer to Appendix D

This third report of the Township of Oro-Medonte's Energy Consumption is the second in which widespread analysis is possible. It is the first in which a 36 month baseline could be established.

- In 2013 Township facilities used the equivalent of 3,608,365.02 kWh (Ministry of Energy, Template for Ontario Regulation 397/11, 2013). The increase 2012/2103 is largely attributable to the winter conditions and heating degree days.
- The electrical use for the Township this year is the equivalent of 227 homes or 524 passenger vehicles[20].
- To offset electrical use for the Township this year would require 2,039 acres of forest for one year[21].
- Compared to baseline the Township used 280,212 more kWh of electricity.
- This increase in electrical use is equivalent to 17.6 homes or 40.7 passenger vehicles.[22]
- In 2013 the township energy use created the equivalent of 500,790.58 $kgCO_2$ (Ministry of Energy, Template for Ontario Regulation 397/11, 2012).
- The GHG emissions for the township this year are equivalent to 45.7 homes or 105 passenger vehicles[23].
- To offset GHG emissions for the Township this year would require 410 acres of forest for one year[24].
- In comparison to baseline the Township facilities increased emissions by 47,139.6 $kgCO_2$.
- This increase in GHG is the equivalent to 4.3 homes or 9.9 passenger vehicles[25].
- Report includes: 2 Road yards, 1 Arena, Township Office, the OPP / Nurse Practitioner station, 7 Community Halls, 6 Fire Halls and 17 Water System Pump Houses and Towers.
- Transportation consumption although still not reporting requirement, is estimated to be 3,266,682.16 ekWh and emissions of 816,937.52 $kgCO_2e$[26] for this period. [27]
- Transportation consumption and emissions are up from 2012 mostly due to snow removal.

[20] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[21] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[22] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[23] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[24] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[25] From EPA Greenhouse Gas Equivalences Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html
[26] Estimated using average energy costs Refer to Appendix D.
[27] Estimated from fleet fuel use and conversion factors from Ministry of Energy and Ministry of Environment.

4 ORO-MEDONTE'S ENERGY GOALS AND OBJECTIVES FOR 5 YEAR PERIOD

In order to implement a workable and consistent Conservation and Demand Energy Plan it is recommended that an Energy Team be commissioned from existed staff. It is recommended that the team consist of:

Staff	Role in Energy Team
Paul Gravelle, Director of Finance, Treasurer and Deputy CAO	Energy data management and Project financing
Hugh Murray, Fire Chief	Energy emergency coordination and emergency services energy conservation
Jerry Ball, Director, Transportation & Environmental Services	Energy supply management and energy efficient procurement, street light and work yard energy conservation
Shawn Binns, Director, Recreation & Community Services	Primary point of contact for all energy related matters.
Jonathan Roe, Facility Operator	Facility energy use, environmental implications of energy consumption and energy awareness

Oro-Medonte has been proactive in its approach to energy management. Several major energy conservation projects have been implemented prior to this CDM as well as many energy studies and models.

Of note are:

- Township of Oro-Medonte LED Street Light Proposal December 6, 2013. This proposal by Real term Energy, LAS and Cree Canada. Township is moving forward with this proposal and street light updating should begin in 2014 replacing 702 streetlights with LED units.
- Energy Management Tool (EMT) provided by the Local Authority Service (LAS) software to track usage based on utility bills.
- Arena Renovation project. This multi-million dollar renovation of the Townships aging Arena facility contains many energy management opportunities which have be included within the scope of the project a few examples are:
    1. New more energy efficient ice plant.
    2. Automated plant controls using surface temperature (infrared) rather than brine temperature.
    3. Building Automation system (BAS).
    4. New heat recovery systems from ice plant for domestic hot water heating.
    5. New in floor radiant heating system for change rooms.
    6. Conversion from electric water heaters to gas fired boiler system.
    7. Removal of oil fired boiler system.
    8. Removal of electric baseboard heating systems.

9. New low e ceiling over ice surface.
10. New flow controls on showers and taps.
11. New low flow fixtures.
12. New insulation on exterior walls.
13. New energy efficient doors.
14. LED lighting
15. New meeting room with thought to passive solar contribution.

Year One 2014-2015 -

Objective # 1 Fourth GHG and Energy Consumption report and analysis for calendar year 2014.

Objective # 2 New Arena with enhanced building efficiency.

Objective # 3 Street Lighting updating with LED fixtures.

Objective # 4 Energy Data Management
New collection protocols are needed to prevent things like Arena not having power bill for extended periods of time.

Transportation records must be streamlined and include mileage and fuel prices and use in order to add to useful data.

Time of day energy use study needs to be done of all facilities.

Year Two 2015-2016

4.1.1 Fifth GHG and Energy Consumption report and analysis for calendar year 2015.

4.1.2 Benchmarking with similar facilities.

4.1.3 Fleet Audit by third party.

4.1.4 Renovated Shanty Bay Fire Hall.

Year Three 2016-2017

4.1.5 Sixth GHG and Energy Consumption report and analysis for calendar year 2016.

4.1.6 Benchmarking with similar facilities.

4.1.7 Renovated Hawkestone Fire Hall.

Year Four 2017-2018

4.1.8 Seventh GHG and Energy Consumption report and analysis for calendar year 2017.

4.1.9 New Horseshoe Valley Community Center.

4.1.10 Renovated Horseshoe Valley Fire Hall

Year Five 2018-2019

4.1.11 Eighth GHG and Energy Consumption report and analysis for calendar year 2018.

4.1.12 Prepare new 5 year Conservation and Demand Management Energy Plan (CDM).

5 EVALUATION OF ENERGY REDUCTION OPPORTUNITIES FOR OUR FACILITIES

Identification of reduction opportunities is possible from facility walk through "audits" and a high level analysis of consumption of various facilities. Straight comparison of annual energy use to baseline use shows increase or decrease in consumption. Determining whether those increases or decreases make sense is the challenge and opportunity. For example 2013 was the most extreme winter in 30 years and energy consumption due to it will be increased. However a facility such as the North Yard is still much smaller than the South Yard and used primary the same amount of hours for the same purposes and yet has a much higher energy consumption indicating that there is a potential for conservation or efficiency measures at that facility.

Facility	Location	Consumption 2011	Consumption 2012	Consumption 2013	Reduction Opportunities.
Administration Office	148 Line 7 S	Electricity (kWh) 301,466	Electricity (kWh) 287,066	Electricity (kWh) 249,068	New HVAC system and updated lighting has produced energy savings. 2012 the new system was being commission and electric baseboards still operational. 2013 was significantly colder and resulted in significantly higher heating degree days. Heating/cooling demand is the facility's largest variable energy factor.
		Natural Gas 203 (m^3)	Natural Gas 148 (m^3)	Natural Gas 5,023 (m^3)	

Facility	**Location**	**Consumption 2011**	**Consumption 2012**	**Consumption 2013**	**Reduction Opportunities.**
Arena/ Community Center	71 Line 4 N	Electricity (kWh) 654,917	Electricity (kWh) 653,916	Electricity (kWh) 695,318	Highest use facility undergoing major renovation in 2014 with thought energy conservation objectives Conservation[28]
		Furnace Oil (L) 13,402	Furnace Oil (L) 12,269	Furnace Oil (L) 14,376	
OPP/Nurse Practitioner	3331 Line 4 N	Electricity (kWh) 32,406	Electricity (kWh) 37,458	Electricity (kWh) 44,688	Facility has undergone major renovation in 2013-2014 nearly doubling area. 2014 will be new benchmark year.
		Natural Gas (m^3) 4,030	Natural Gas (m^3) 4,748	Natural Gas (m^3) 3,926	
North Yard	344 County RD 19	Electricity (kWh) 42,082	Electricity (kWh) 43,573	Electricity (kWh) 61,921	Unknown energy driver Renovations should have decreased energy use. Requires further investigation
		Natural Gas (m^3) 15,340	Natural Gas (m^3) 10,675	Natural Gas (m^3) 15,449	
South Yard	833 Line 7	Electricity (kWh) 51,182	Electricity (kWh) 54,012	Electricity (kWh) 58,076	
		Propane (L) 40,138	Propane (L) 27,996	Propane (L) 42,590	

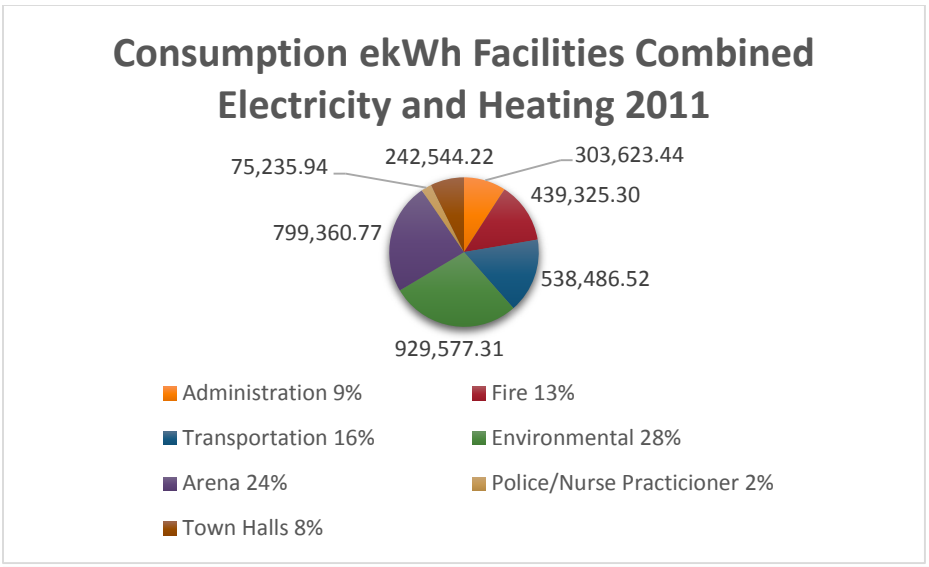
[28] New baseline will be established in 2015 for this facility.

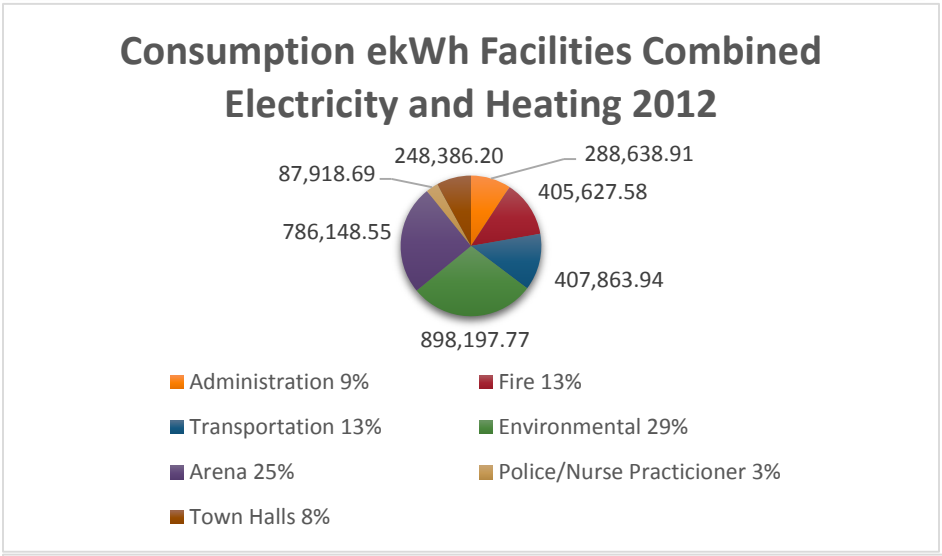
Facility	Location	Consumption 2011	Consumption 2012	Consumption 2013	Reduction Opportunities.
Carley Community Hall	396 Warminster SR	Electricity (kWh) 1,848	Electricity (kWh) 5,401	Electricity (kWh) 9,641	Underwent major renovation. Suggest Baseline be taken from 2013 data.
		(furnace non-functional to be replaced)	Furnace Oil (L) 818	Furnace Oil (L) 4,484	
Craighurst Community Hall	3352 Hwy 93	Electricity (kWh) 3,411	Electricity (kWh) 2,531	Decommissioned	
		186 Furnace Oil (L)	69 Furnace Oil (L)	Decommissioned	
Eady Community Hall	73 Eady Station Road	Electricity (kWh) 12,021	Electricity (kWh) 9,867	Electricity (kWh) 13,620	Major energy user compared to other Halls of similar size. Suspect driver heating / cooling may need service.
		Furnace Oil (L) 3,785	Furnace Oil (L) 2,284	Furnace Oil (L) 5,015	
Edgar Community Hall	1167 Old Barrie Road	Electricity (kWh) 5,825	Electricity (kWh) 5,559	Electricity (kWh) 5,786	New windows have helped with heating. New furnace should help for 2014 demand.
		Furnace Oil (L) 3,099	Furnace Oil (L) 3,042	Furnace Oil (L) 2,173	
Hawkestone Community Hall	3 Allen Street	Electricity (kWh) 14,581	Electricity (kWh) 14,320	Electricity (kWh) 15,523	
		Furnace Oil (L) 1,832	Furnace Oil (L) 1,534	Furnace Oil (L) 2,121	
Jarratt Community Hall	837 Horseshoe Valley RD	Electricity (kWh) 5,849	Electricity (kWh) 5,229	Electricity (kWh) 5,303	
		Furnace Oil (L) 4,473	Furnace Oil (L) 3,745	Furnace Oil (L) 4,072	

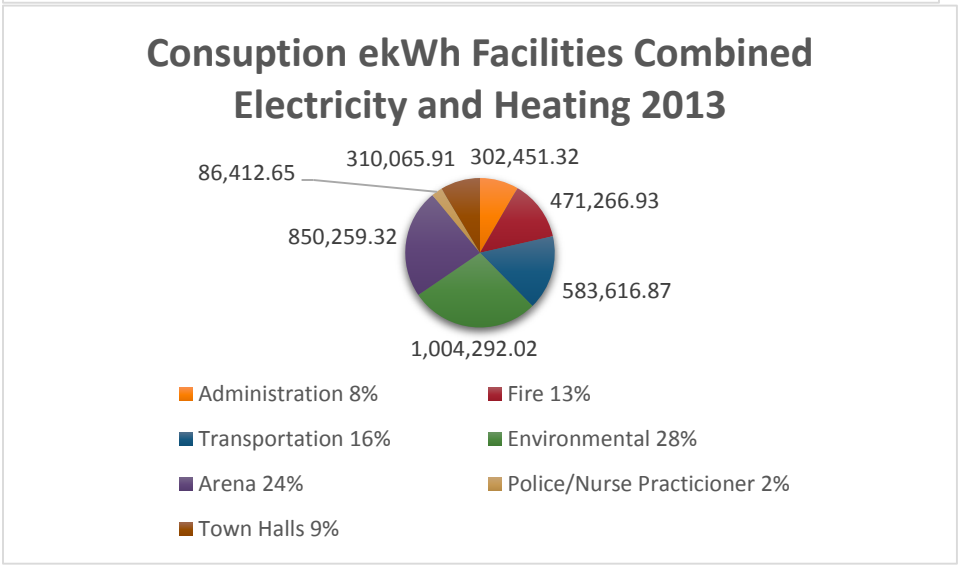
Facility	Location	Consumption 2011	Consumption 2012	Consumption 2013	Reduction Opportunities.
Old Town Hall	833 Line 7 N	Electricity (kWh) 11,034	Electricity (kWh) 9,938	Electricity (kWh) 12,686	Use for base during Arena renovation and Air Conditioner addition means 2014 will be a high outlier year. 2015 will likely be new baseline for this facility.
		Furnace Oil (L) 4,066	Furnace Oil (L) 6,651	Furnace Oil (L) 3,797	Oil Furnace Replaced with Propane
				Propane (L) 2,052	
Hawkestone Fire Station	289 Line 11 S	Electricity (kWh) 19,021	Electricity (kWh) 18,465	Electricity (kWh) 19,384	
		Natural Gas (m^3) 2,937	Natural Gas (m^3) 3,631	Natural Gas (m^3) 4,772	
Horseshoe Fire Station- Fire HQ	337 Line 4 N	Electricity (kWh) 52,262	Electricity (kWh) 47,728	Electricity (kWh) 49,786	
		Natural Gas (m^3) 10,233	Natural Gas (m^3) 9,100	Natural Gas (m^3) 9,201	
Moonstone Fire Station	5668 Line 7 N	Electricity (kWh) 18,385	Electricity (kWh) 20,074	Electricity (kWh) 20,802	
		Natural Gas (m^3) 8,539	Natural Gas (m^3) 6,360	Natural Gas (m^3) 8,845	
Rugby Fire Station	1950 Old Barrie RD. E	Electricity (kWh) 5,079	Electricity (kWh) 4,769	Electricity (kWh) 5,807	
		Natural Gas (m^3) 2,942	Natural Gas (m^3) 2,912	Natural Gas (m^3) 3,262	
Shanty Bay Fire Station	1950 Ridge RD	Electricity (kWh) 8,864	Electricity (kWh) 9,930	Electricity (kWh) 12,490	
		Natural Gas (m^3) 3,635	Natural Gas (m^3) 3,730	Natural Gas (m^3) 4,230	
Warminster Fire Station	1885 Warminster SR	Electricity (kWh) 35,097	Electricity (kWh) 31,177	Electricity (kWh) 40,870	High energy use due to electric heat opportunity for more efficient heating solution.

Facility	Location	Consumption 2011	Consumption 2012	Consumption 2013	Reduction Opportunities.
Canterbury Pump house	1 Somerset Blvd.	Electricity (kWh) 17,372	Electricity (kWh) 15,380	Electricity (kWh) 15,403	
		Natural Gas (m^3) 75	Natural Gas (m^3) 158	Natural Gas (m^3) 138	
Cederbrook Pump house	1547 Ridge RD.	Electricity (kWh) 20,975	Electricity (kWh) 18,150	Electricity (kWh) 18, 740	
		Natural Gas (m^3) 148	Natural Gas (m^3) 116	Natural Gas (m^3) 604	
Craighurst Pump house	33 Procee Circle	Electricity (kWh) 43,845	Electricity (kWh) 44,093	Electricity (kWh) 44,405	
		Natural Gas (m^3) 22	Natural Gas (m^3) 38	Natural Gas (m^3) 98	
Harbourwood Pump house	38 Shelswell Blvd.	Electricity (kWh) 64,508	Electricity (kWh) 58,970	Electricity (kWh) 55,125	
		Natural Gas (m^3) 225	Natural Gas (m^3) 239	Natural Gas (m^3) 515	
Horseshoe Highlands Pump house	1A Country Club Lane	Electricity (kWh) 189,459	Electricity (kWh) 194,034	Electricity (kWh) 212,224	
Horseshoe Highlands Tower	52A Highland Drive	Electricity (kWh) 15,442	Electricity (kWh) 13,049	Electricity (kWh) 16,512	
Maplewood Pump house	40 Maplewood Pkwy	Electricity (kWh) 36,696	Electricity (kWh) 40,196	Electricity (kWh) 40,196	
		Natural Gas (m^3) 44	Natural Gas (m^3) 33	Natural Gas (m^3) 427	
Medonte Hills Booster Station	Easement off Slalom Dr.	Electricity (kWh) 9,317	Electricity (kWh) 8,137	Electricity (kWh) 9,886	
Medonte Hills Pump house	5441 Line 7 S	Electricity (kWh) 39,920	Electricity (kWh) 51,132	Electricity (kWh) 49,867	
			Natural Gas (m^3) 5	Natural Gas (m^3) 369	
Robincrest Pump House	5464 Line 8 N	100,204 Electricity (kWh)	100,714 Electricity (kWh)	119,346 Electricity (kWh)	
Shanty Bay Pump house	38 Gowan Road	Electricity (kWh) 83,553	Electricity (kWh) 72,277	Electricity (kWh) 113,184	
		Natural Gas (m^3) 237	Natural Gas (m^3) 254	Natural Gas (m^3) 207	

Facility	Location	Consumption 2011	Consumption 2012	Consumption 2013	Reduction Opportunities.
Sugar Bush Booster Station	67 Huronwoods Drive	Electricity (kWh) 65,976	Electricity (kWh) 62,827	Electricity (kWh) 67,337	
			Natural Gas (m^3) 38	Natural Gas (m^3) 52	
Sugarbush Reservoir	6 Oneida	906 Electricity (kWh)	Electricity (kWh) 746	Electricity (kWh) 1,124	
Sugarbush Pump house	10 Huronwoods Drive	Electricity (kWh) 36,997	29,687 Electricity (kWh)	29,181 Electricity (kWh)	
Sugarbush Pump house	3310 6th Line N	57,345 Electricity (kWh)	Electricity (kWh) 39,692	Electricity (kWh) 41, 950	
Warminster Booster Station	1 Georgian Drive	Electricity (kWh) 44,604	Electricity (kWh) 42,785	Electricity (kWh) 50, 095	
		Natural Gas (m^3) 175	Natural Gas (m^3) 111	Natural Gas (m^3) 118	
Warminster Pump house	2093 Warminster Road	Electricity (kWh) 92,617	Electricity (kWh) 95,786	Electricity (kWh) 96,643	
Total	All	Electricity (kWh) 3,328,153.50	Electricity (kWh) 3,122,781.64	Electricity (kWh) 3,608,365.02	


Consumption ekWh Facilities Combined Electricity and Heating 2011
75,235.94
242,544.22
303,623.44
439,325.30
799,360.77
538,486.52
929,577.31
Administration 9%
Fire 13%
Transportation 16%
Environmental 28%
Arena 24%
Police/Nurse Practicioner 2%
Town Halls 8%


Consumption ekWh Facilities Combined Electricity and Heating 2012
87,918.69
248,386.20
288,638.91
405,627.58
786,148.55
407,863.94
898,197.77
Administration 9%
Fire 13%
Transportation 13%
Environmental 29%
Arena 25%
Police/Nurse Practicioner 3%
Town Halls 8%


Consuption ekWh Facilities Combined Electricity and Heating 2013
86,412.65
310,065.91
302,451.32
471,266.93
850,259.32
583,616.87
1,004,292.02
Administration 8%
Fire 13%
Transportation 16%
Environmental 28%
Arena 24%
Police/Nurse Practicioner 2%
Town Halls 9%

Energy Use (Hours of Operation, lighting, heating etc.)

Most of the Township's facilities have already been fairly successful at managing heating and lighting requirements for optimal efficiency. Retrofits to lighting have been performed at the majority Township facilities and most facilities have programmable thermostats programmed to building use. As technology improves efficiency this trend will continue. Lighting opportunities still exist on small (fixture by fixture) basis throughout, especially in Fire facilities. Heating has been updated in most facilities as of this date with the notable exception of Warminster Fire Hall. Energy Bills for this facility are far in excess of other facilities as heating is provided only by electric baseboard heaters. The opportunity to provide a more reliable and cheaper heat source exists in this fire hall.

Hours of operation are not easily adjustable in Township facilities. A trial period of flex time for office staff may have realized some benefits by utilizing daylight more effectively in terms of effective man hours but has had little efficiency benefit from an energy standpoint as buildings hours of operation have had to remain similar.

This noted however there is one major exception. Town halls for the most part are historic buildings which cannot be renovated to bring them up to modern standards. Winter use is very energy intensive and for value on dollar not a reasonable use these facilities with the exception of Hawkestone and Jarratt which have significant winter use, should be kept at minimal heat levels and unused during winter seasons. Long term the option of new facilities should be explored especially in the cases where multiple halls could be serviced by single facilities.

Equipment Efficiency (Hours of Operation, efficiency of equipment, life cycle costing etc.)

Hours of operation are simply not adjustable for Fire services and Environmental Services. It has however been determined that Environmental Services can at least in the situation of Horseshoe valley where the current water system with limited modifications can be made to pump only during off peak hours and still maintain required pressures. This will reduce the load on peek hydro and potentially taking advantage of off peek pricing. Efficiency of equipment is largely adjusted by replacement. Most Township equipment is run at intensive levels and thus service is done regularly in order to keep machinery running and not to promote efficient running. Life cycle costing requires the ability to compile and compare large amounts of data. For the most part this is not practical as the resources are not in place to devote needed man hours to costing research.

Organization Efficiency (Hours of Operation, Scheduling of tasks etc.)

Hours of operation have been adjusted somewhat over the last few years. The main problem is for critical services the Township is a 24/7 operation and resources need to be available at all times. Scheduling is done mainly at a customer service priority level. For example building inspections are done ASAP which may help facility construction but often results in inspectors traveling from one end of the

Township to the other to accommodate this. If this is the level of service the Township wishes to provide there will be the energy cost. However, in this case as in others, the alternative of potentially slower service combined with scheduling based on travel distances would over time save significant resources.

Green Procurement Policy (Sample based on city of Waterloo's Green Procurement Policy)

RECOMMENDATION:

1. That Council adopts the Green Procurement Policy that would establish guidelines for all Township employees to ensure we are purchasing products that minimize consumption of energy and water and that are more environmentally appropriate.

EXECUTIVE SUMMARY:

The Township of Oro-Medonte's Strategic Plan has Sustainability as one of its key focus areas. With the development of a Green Procurement Policy (GPP) we would be establishing a base for this focus area. With the implementation of this policy, the Township would reinforce the strategic imperatives of promoting, enhancing and demonstrating environmental stewardship. This policy aligns itself with the Strategic Plan, and with the requirements of the Green Energy act.

Objectives:

Increase the purchase of green products and services consistent with the demands of mission, efficiency, and cost-effectiveness;

Reduce the amount of solid waste generated

Reduce consumption of energy and natural resources;

Expand markets for green products and services;

The Township of Oro-Medonte is committed to becoming a leader in Green Procurement. This GPP will define the Township of Oro-Medonte's minimum requirements for Green Procurement Management. The responsibility for implementing GPP lies not within any single department, but with every person involved in the procurement process. This includes maintenance, management, administrative staff, as well as project managers who requisition products or services. Each person has a role to play in ensuring that the Township of Oro-Medonte complies fully with procurement preference requirements. In other words, virtually every employee has some level of responsibility.

REPORT:

The Township of Oro-Medonte is not only a service provider but also a major consumer. Several factors have been driving the Township of Oro-Medonte towards adopting a Green Procurement Policy.

The growing international movement to fight climate change.

The Township of Oro-Medonte is a large consumer of products and services, which includes the purchase of vehicles, fuel, electricity, water, computers, office equipment, chemicals (including janitorial

supplies) and road salt. As the Township of Oro-Medonte grows, the environmental consequences of this consumption will grow in proportion.

The Township of Oro-Medonte has an integral role in promoting and implementing sustainable development in society, and in promoting environmental awareness. It should be seen as a Green Purchasing role model for other municipalities, businesses and residents.

Media reports on the poor quality of air and increased frequency of smog days, which have been drawing increasing public attention to what is perceived as a growing problem.

As individual managers, we recognize the need for individual environmental responsibility. At one level or another we are all stewards of the environment, both for the immediate future and the long term future.

The Township of Oro-Medonte has developed our most recent Strategic Plan and it emphasizes the need to provide the best environment for those who live, play, do business and work here.

It is recommended that a staged approach to the implementation of this program be undertaken. It will take time for the Township of Oro-Medonte to build the expertise required to implement and manage the policy effectively. Time is required to communicate key elements of Green Purchasing and expectations to staff and suppliers as well as to develop language for our bid and legal documents. Putting the policy into practice will first require some strategic planning: organizing appropriate training for purchasing staff, ensuring access to environmental information, and setting priorities when choosing the contracts most suitable for "greening." Once this is in place, we will then be able to proceed with a staged Green Purchasing procedure by:

a) Selecting products that will have a favorable environmental impact, as compared to traditional products, and;

b) Minimizing consumption of energy, water and other services that can have negative environmental impacts

Other Green factors which will be taken into consideration include: reducing hazard materials, and low volatile organic compounds (VOCs), while improving energy conservation, recycled content, waste prevention, water conservation, and end-of-life management.

Other Canadian municipalities are experiencing the same pressures towards Green purchasing. Most Canadian cities have insufficient resources for a thorough study of Green alternatives, so the onus is being left on manufacturers or suppliers to demonstrate that they are complying with the prevailing Green purchasing policies.

As there are few formal policies and procedures on which we could model Green purchasing, the Township of Oro-Medonte, through the Green purchasing Committee, will establish their own best practices.

Three Green Purchasing Principles:

In order to enhance Green Purchasing activities staff may be guided by the following three principles.

1. Formulate their contracts and tender specifications for goods and services in a manner that allows for the recommendation of Environmentally Friendly Products (EFP's), given full consideration of the operational and financial implications.

2. Environmental benefits and costs must be considered over the product's service life cycle (i.e. not just initial cost, but maintenance and replacement cost over product lifetime, extent of that lifetime, and ultimate disposal cost).

3. Purchasing decisions must be based on accurate information about environmental performance.

Implementation Work Plan

Staff will need time and resources to build the internal capacity necessary to implement and, optimize Green Procurement. The Green Purchasing Committee recommends a step-by-step approach, beginning with one group of products and services where the environmental impact is clear or where greener alternatives are easily available and not more expensive. A staged approach builds up confidence by slowly introducing alternative Green products to the Township.

Green Purchasing is a staged purchasing process whereby the Township of Oro-Medonte will review its recommendations to:

(a) Select products that will have a favorable environmental impact, as compared to traditional products, and
(b) Have Reduced Hazards
(c) Promote Energy conservation
(d) Contain Recycled Content
(e) Aid in Waste prevention/End of Life Management
(f) Have Reduced low volatile organic compounds (VOCs)
(g) Aid in Water Conservation
(h) Help Minimize consumption of energy, water, and other services that can have negative environmental impacts.

Sample Green Purchasing Policy

The Township of Oro-Medonte strives to increase its use of Environmentally Friendly Products (EFPs) and services, i.e. products and services that are less harmful to the environment than conventional alternatives.

To increase the use of EFPs, Township of Oro-Medonte staff will:

(a) Formulate their contracts and tender specifications for goods and services in a manner that allows for the recommendation of EFPs, giving consideration of the operational and financial implications.

(b) Take environmental considerations into account when choosing between suppliers.

(c) Contribute to and reference the Green Purchasing product information database (containing alternative products and material substitutions), that will be managed by the Purchasing Division.

Analysis will be needed to ensure that the products are competitively priced, and that the EFPs would not significantly complicate the intended use.

The Township of Oro-Medonte will consider Green Purchasing options case by case; if a Green Purchasing option is not selected, traditional purchasing practices will be followed.

Evaluation of "Greener" Options

Green Purchasing alternatives might be proposed by the ultimate users (e.g. Facilities), by Purchasing, by the suppliers or by all. Periodic reviews may be valuable as circumstances, prices, and availability change.

Purchasing specifications must be written in a manner that allows for the evaluation and recommendation of EFPs. The functionality required or the problem to be solved should be specified, rather than the (traditional) product or solution. Ask suppliers what green practices are involved in the development of their products.

Green Purchasing options will be evaluated in terms of their environmental, operational, and financial impacts.

Environmental Impact

Determining and quantifying the benefits of using EFPs may require non-traditional thinking. Where possible, the Township will use established criteria to evaluate EFPs versus traditional products. Where evaluation criteria are not available, the Township may have to develop its own.

Operational Impact

As with any purchase, normal considerations such as reliability of delivery and product performance of the EFPs apply.

Financial Impact

The true cost of EFPs compared to traditional purchases should be assessed through life cycle costing where feasible. The Finance Department will establish guidelines and procedures for life cycle costing and will provide assistance as required.

It is important to log Green Purchasing decisions and consequences, documenting the alternatives considered.

Tracking requirements may vary for different goods and services. The Green Purchasing Committee will provide tracking models that reflect these differences.

Decision Criteria

Acceptable price differentials between traditional and green products will be assessed case by case.

Financing

There is no corporate budget to finance Green Purchasing. If an EFP contract results in a higher price, it will be necessary to have Council approve an appropriation.

Reporting and Tracking

The Green Purchasing Committee (or other structure) is responsible for reporting and tracking of Green Purchasing activities. They will report to Council annually. The narrative will cover the corporate initiatives taken, their costs and benefits, with as much quantification as is reasonable.

Communication with Township employees will involve newsletter articles, websites, and/or meetings addressing steps taken, efficiencies achieved, and current initiatives (in order to inform, encourage and invite input).

There may also be some communication to the Public, through periodic progress reports and/or a page on the website.

Green Purchasing Considerations

The following principles are common to green purchasing efforts:

Reduction of Hazardous Materials

Products containing hazardous chemicals, such as corrosive or highly toxic materials, can pose health risks to employees and the public, and threaten the environment. If less-hazardous alternatives are not readily available consideration is given to use the least amount of the hazardous product needed to accomplish a task.

Energy Conservation

Reducing energy use is important because most production contributes to problems such as carbon dioxide emissions and acid rain. In Canada energy-efficient products are labeled with such licenses as EcoLogo and Energy-Star.

Recycled/Regional Content

Products that have recycled-content reduce the need for energy consumption and raw resources, while also keeping waste out of landfills and incinerators. Recycled-content can consist of post-consumer content, pre-consumer content, or a mix of the two. Products made with post-consumer recycled content support our recycling programs at home and at work. The purchase of products that are extracted and/or manufactured locally helps the local economy while also reducing the product's embodied energy. Other products with rapidly renewable and/or certified wood content should also be considered.

Waste Prevention/End of Life Management

The County of Simcoe collects the Township of Oro-Medonte's waste at the curb. As the Township and the Region's population continue to grow, waste generation and collection will increase comparatively. Much of this waste comes from disposable/over-packaged products. Waste consideration must also be addressed during extensive building renovations, construction waste management and recycling of materials, and the use of new technology such as green roofs to extend the life of membranes.

Low Emitting Materials (Volatile Organic Compounds & Urea-Formaldehyde)

VOCs and urea formaldehyde evaporate ("volatilize") easily at room temperature and often have a sharp/new smell. They are contained in many products, such as office equipment, adhesives, sealants, wood, carpeting, upholstery, paints, coatings, solvents, pesticides, and cleaning products. Low-VOC and non-urea formaldehyde versions of products reduce risks to human health and the environment.

6. Water Conservation

Products and services that conserve water, such as low-flow faucets and toilets, can conserve water usage. Dry spells have reminded us that our water supply can be threatened, resulting in watering bans in some municipalities. Landscaping materials should consider vegetation resistant to drought conditions and require low maintenance and water efficient irrigation equipment.

The role of the purchasing agent would be to:

1. Assist Departments to gather and maintain information about environmentally preferable products and services, and recycled products containing the maximum practicable amount of recycled materials.

2. Inform all Township Staff of their responsibilities under this policy.

3. Produce an annual Green Procurement Report on the implementation status of the Purchasing program, including an assessment of the current procurement program's effectiveness, an evaluation of program goals, and projection of future procurement opportunities.

Budget

There is a general perception that the initial cost of purchasing Green Products or services is greater than the cost of conventional products. However, there may be reduced operating or end of life costs which may offset any initial purchase premium. In order to properly present a fully developed financial analysis, life cycle costing methodologies will have to be developed and presented during the decision making process.

Complicating any cost / benefit analysis is that some benefits, both financial and environmental, will accrue to entities that are external to the Township. For example, the use of "Green" energy could result in a reduced number of smog days, which in turn results in reduced health care costs due to fewer visits to emergency rooms or primary care physicians during these events. In this scenario, the costs of the initiative would be borne by the municipality while the ultimate savings would be realized by the public health system. These issues must be reviewed and recorded so that the full benefit of Green Procurement is realized. It is very possible and probable that the activities initiated in one department, division, municipality will benefit others within the same geographical area or jurisdiction.

At this time, Oro-Medonte's Council has not included any ongoing budget provision for Green Purchasing initiatives. In the future, decisions on Green vs. conventional purchases will be presented on a case by case basis.

As part of the ongoing monitoring process, the Green Procurement Committee with assistance from Finance will develop a process to accumulate the financial costs and benefits of green purchasing decisions. The impact of these measures will be reported to the Township Council on a periodic basis.

CONCLUSION

Implementing a Green Purchasing Program will present a considerable challenge to the Township of Oro-Medonte. Most purchases reflect a balance between price, performance and added criteria however long term sustainability should be the ultimate goal of any governing body.

6 REVIEWS OF THE APPLICATION OF COST-EFFECTIVE ALTERNATIVE TECHNOLOGIES AND RENEWABLE FUELS

Alternative energy for Facilities.

Cogeneration is the generation of heat and power from one source. Natural Gas Cogeneration, is a viable option at many of our facilities. Most notable possible opportunity is the Arena. Initial installation has a high capital cost however it has a high rate of return and the added bonus of the ability to maintain power when the grid is down. Interest by the local power authority is not high however for this idea. A major solar farm is already under construction nearby and a cogeneration plant at this point in time would further complicate an electrical system that will already be challenging to make viable.

Wind energy is the generation of electricity from the wind. Wind Turbines require much space and have to be especially tall to have constant wind flow or be near a lake. Height restrictions near lake and airport make much of the Township a no go area for this technology. Migration patterns of birds would negate most other areas of the Township that are not already restricted. Health concerns over infrasound from large wind turbines have resulted in several class action suits still before the courts. Smaller private wind generation is possible and the Township has allowed several private homes and businesses to erect small wind turbines.

Solar energy is the use of sunlight. Light can be changed into thermal (heat) energy and electric energy.

Large solar photovoltaic (PV) systems (solar farms) are being installed by private citizens incentivized by Hydro One and Ontario Power Generation. Township lands however are in short supply and other uses such as recreation negate the possibility at this time for large scale photovoltaic generation. The possible exception is small scale roof mounted systems. The feasibility of PV systems has been assessed and the size of roof tops and requirements for structural reinforcements to support the systems have negated the possibility. As new facilities are constructed the Township should assess PV opportunities.

Passive solar energy should be a consideration in all new construction and renovations in the Township, curtains or blinds should be installed on most windows.

Geothermal energy is the use of the earth's internal heat to heat water for heating buildings or generating electricity. Geothermal energy works best in areas with volcanic activity. Although heating / cooling from groundwater is feasible in is not reasonable at this time due to large initial cost and slow return on investment. This option should however be explored whenever new facilities are being constructed because grants for this technology may make it feasible economically.

Fleet Technology

Biofuel and Ethanol are plant-derived gasoline substitutes for powering vehicles. Neither is readily available in the Township at this point in time and are therefore not yet feasible for vehicle use. The county has been using biodiesel in their vehicles such as snow plows to good success. The Township for a large part of its fleet uses its own pumps. Supply of biodiesel could be made available through our own

supply links. At this time tendency for biodiesel to gel in low temperatures make it unsuitable for winter use.

Hydrogen is also not currently an option for availability and safety reasons.

Electric vehicles at present have some major drawbacks for use by Township. Ranges are still too low to be of use in a Township of this size (largest range of current electric vehicles is 100km under ideal conditions) and charging points are not yet available. Initial costs of electric vehicles and maintenance costs are also at this time highly inflated when compared to conventional technology. One exception is the Arena ice resurfacer. The current Olympia is fueled by propane. Replacing the Olympia with an electric system will improve air quality, GHG emissions and lower operating costs.

Hybrid vehicles are generally not favorably cost comparable to convention vehicles and may require specialized maintenance skills. They do however performance wise meet or exceed conventional vehicles. A hybrid pick-up truck has more HP than a conventional truck of similar design and higher fuel mileage and thus fewer emissions. As emissions become a higher priority Hybrid vehicles should remain in the scope of choices when it comes to vehicle purchases. When purchases of vehicles is driven by life cycle costs Hybrid vehicles may become a more viable purchase option.

At this time when vehicles are due to be purchased or replaced it is recommended that fuel economy and life cycles costs be a weighted factors and that hybrid vehicles be considered where feasible.

Fleet Purchasing (Sample Procedure from E3 Fleet)

Step 1

Document the truck (equipment) requirements. Complete a paper snapshot of purchase, including the function and configuration. Detail any features essential to its operation. If it is for water, for example, it will need interior shelving and bins to hold PVC pipe and fittings. For roads, trucks are required to be roomy, a covered truck that can ferry supplies between job sites in all weather. Finally, establish the price range, including a rigid maximum price.

Step 2

List potential business truck sources. In addition to visiting vehicle dealers selling larger trucks or commercial vehicles, contact business colleagues who are selling excess vehicle inventory. Finally, evaluate listings on commercial truck sales websites. Vehicles are listed by commercial truck dealers, and classified by type (e.g. light, medium or heavy duty).

Step 3

Investigate decommissioned rental trucks. Rental vehicle companies frequently sell vehicles phased out of the rental or leasing program. Depending on the inventory, you will find vans, panel trucks and moving vans. Rental vehicles are often included in the fleet maintenance program and can be inspected prior to purchase.

Step 4

Compare costs for turnkey and modified trucks. Compile your potential truck purchase candidates. Compare the price and condition for a turnkey higher-priced truck with a lower-cost vehicle that can be retrofitted with business-specific systems. Decide which vehicle represents the better value.

Step 5

Compare long term cost of ownership. Fuel efficiency, repair costs, availability of parts and service and expected value of vehicle when it is time to decommission.

Step 6

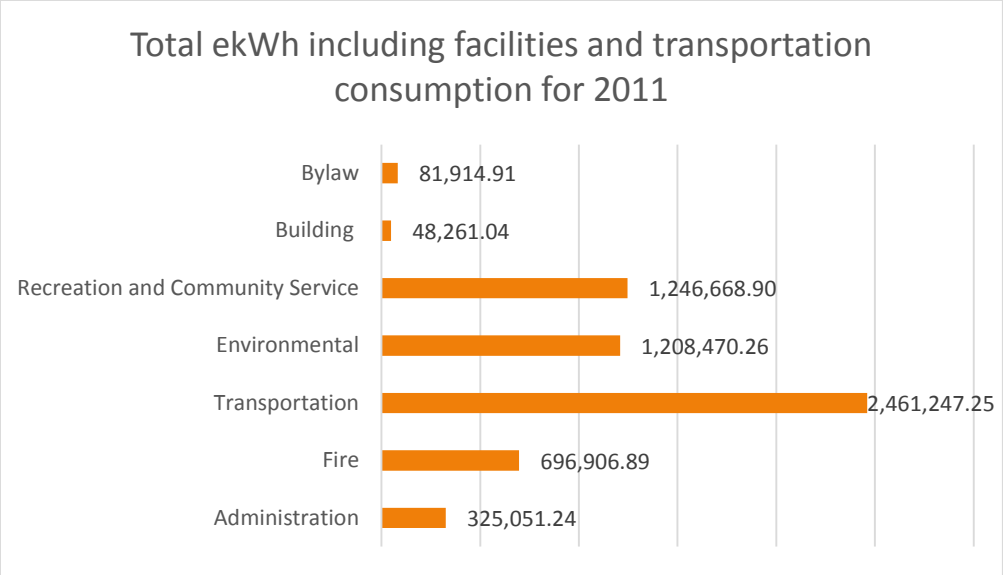
Evaluate truck payment methods. Gather information on dealer financing programs, financing through your bank or credit union and third-party financing plans. If you would prefer to pay cash, ask the dealer if he can offer a discount for reduced paperwork and processing time. Finally, consider a leasing program, if that is an appropriate option.

Step 7

Obtain guidance from finance. Assemble your vehicle price and financing information, along with costs for vehicle modifications or add-ons. Ask the finance department to select the best payment method. In addition, ask finance to select the appropriate depreciation program for the truck.

Step 8

Complete your purchase. Ensure that your vehicle salesperson has the needed documentation to complete the purchase. Before purchasing the truck from a business colleague, call your service Ontario office and get a used car package to make sure the vehicle title is free of liens or other legal obstructions. Finalize your payment arrangements, and plan to pick up the vehicle locally. If purchasing the truck from a remote location, arrange for delivery to company.


Total ekWh including facilities and transportation consumption for 2011
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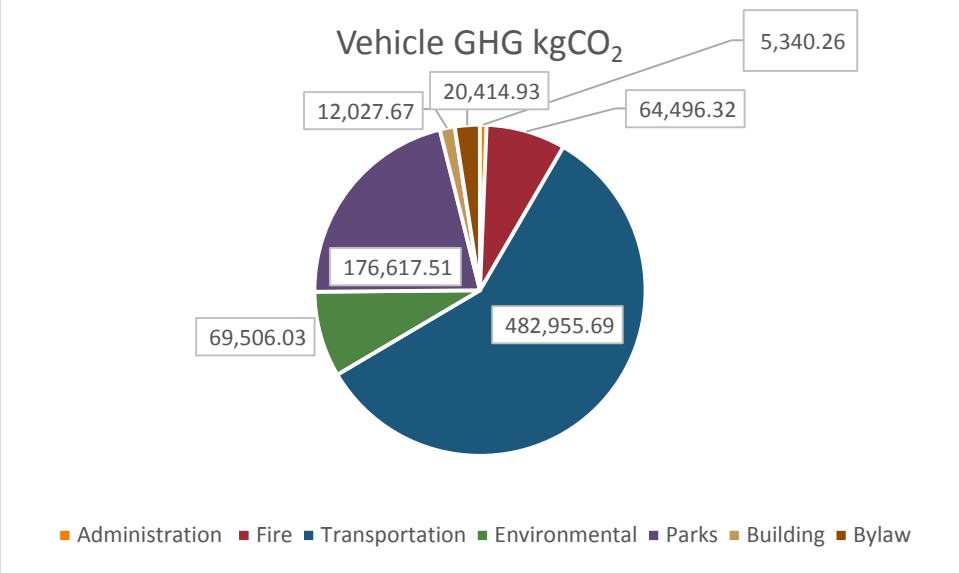
Building
48,261.04
Recreation and Community Service
1,246,668.90
Environmental
1,208,470.26
Transportation
2,461,247.25
Fire
696,906.89
Administration
325,051.24


Vehicle GHG kgCO2
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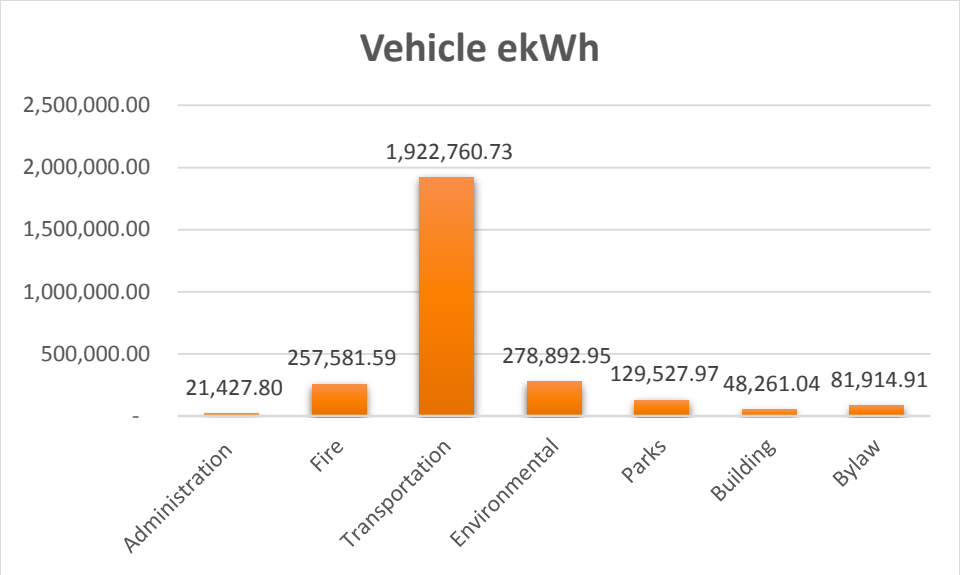
Administration
Fire
Transportation
Environmental
Parks
Building
Bylaw


Vehicle ekWh
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2,000,000.00
1,500,000.00
1,000,000.00
500,000.00
-
21,427.80
257,581.59
1,922,760.73
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129,527.97
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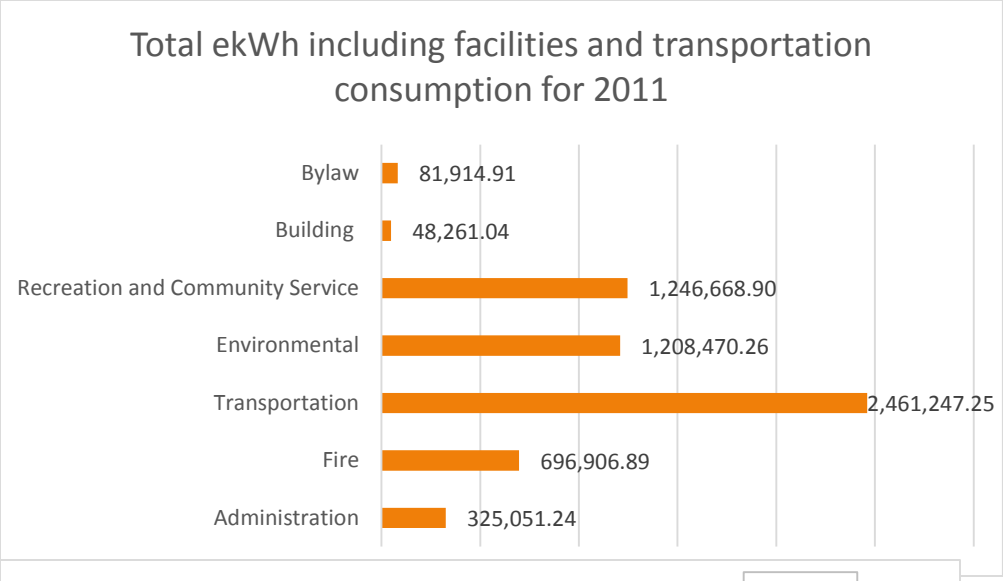
81,914.91
Administration
Fire
Transportation
Environmental
Parks
Building
Bylaw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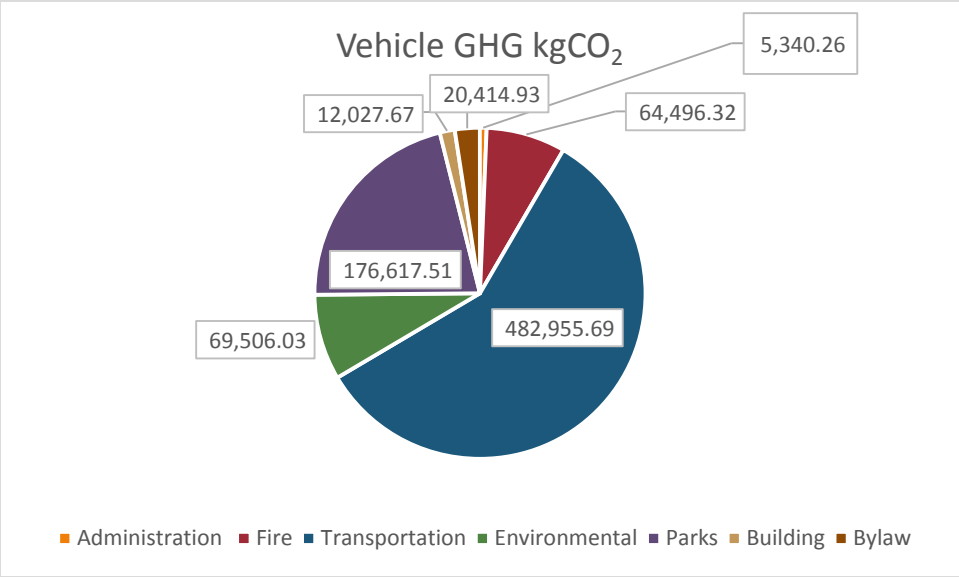
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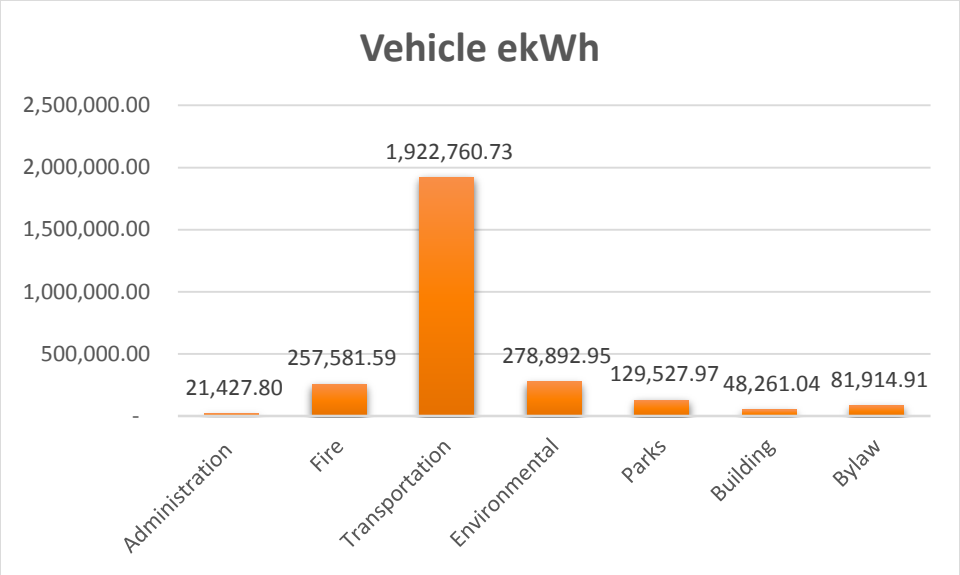

7 Assessment of the Potential to Reduce the Impact of Transportation Related Energy Use

As it is with energy use in the country as a whole, transportation is the greatest user of energy and the greatest source of emissions in the township.

Regulation and public demand has led to remarkable strides in the efficiency of vehicles. Normal replacement of the Townships aging fleet will over time lead to great reductions in the energy use by vehicles by itself. Demand for service and recent weather patterns have led to an increase in transportation requirements.

In order to satisfy our commitment to reduce our energy use and at the same time increase the level of service received by the community we will need to explore all options.

Efficient use of transportation will be required in order to reach our goal of reducing our transportation energy footprint.

The key to efficient vehicle use by a Township is twofold:

1) Use the vehicle that is appropriate for the situation.

2) Scheduling work in order to be accomplished with minimal travel.

Fleet replacement is currently loosely based on age with some consideration to repair costs and frequency. Pickup trucks are replaced about every 5 years. Plow trucks about every 15. Heavy equipment such as graders are replaced every 20 years.

Fuel efficiency is rapidly improving especially in smaller vehicles such as pickups. The general rule of thumb is that a pickup has lost half its value when it reaches 100,000 km. Our trucks tend to reach that point in about year three. From this alone life cycle wise it would seem that a three year replacement schedule for pickups would make more sense as technology would be up to date, repair cycles would not be into critical parts and value of used vehicle would still make sale worthwhile.

Refer to Appendix

8 DEVELOPMENT OF TOOLS TO MONITOR, EVALUATE AND VERIFY PROGRESS TOWARDS MEETING ENERGY AND GREENHOUSE GAS OBJECTIVES.

Process Improvement

- Established baseline. Provide comprehensive energy data to senior management, facility managers and other identified staff
- Facility budgeting. Provide benchmarking of facilities.
- Develop a communications plan to promote the Township's energy initiatives and energy use/savings to staff and the community
- Create an energy team for the Township.
- Develop and implement a corrective maintenance program for Township facilities.
- Develop and implement a facility walk-through checklist to be used by facility managers
- Purchasing tools: new vehicle evaluation, include weight to technology improvements.
- Auditing tools. Increased reporting (fuel, mileage, repair records, and vehicle usage).

Program Implementation

- Provide consumption profiling of applicable Township facilities
- Facility inspections and audits. Implement a preventative maintenance program.
- Continue to update and maintain a Conservation and Demand Energy Management Plan.
- Develop and implement operating procedures for applicable Township facilities
- Energy conservation culture. Provide ongoing energy training for Township staff.

Projects

- Implement commissioning and decommissioning into the facility maintenance program.
- Develop new construction design standards, including maintenance and retrofit specifications
- Continue to implement system upgrades.
- Implement alternative energy projects.

9 FUTURE OF CONSERVATION AND DEMAND MANAGEMENT PLANNING

Prediction of the future is often difficult. In terms of energy the future is controlled and limited by a very few factors.

Renewable Energy.

Renewable energy as a concept is adopted by every power generating nation on earth. The only viable renewable energy source is hydroelectric generation. Politics has pushed for green technology to save energy the reality is somewhat different. The Province has built Wind Turbines and Photovoltaic Solar 'farms" all over the province. Over time as knowledge spreads and the fog of misinformation and political spin lifts these technologies will be recognized as being too immature for current exploitation. Continued subsidy of this technology is unlikely beyond the length of existing contracts. The legislative structure has already been put in place in order to allow the province to unilaterally terminate any contract.

This turn of the wheel is already been seen in countries such and, Holland, Germany, Spain and the United States. "Photovoltaic systems use no fuel and modules typically last 25 to 40 years[29]. The cost of installation is almost the only cost, as there is very little maintenance required." Has been the sales pitch that has resulted in construction of photovoltaic systems worldwide. The truth tends to be much different. The numbers given by sales reps for solar farms generally assume installation in the Mediterranean with panels performing at 100% for 30 years with no night. In reality panels degrade at a rapid rate 5% over the first 12 months is typical[30]. Photo cells that have lasted 30 years or more are first generation cells which were made with incredibly expensive materials and were not very efficient to begin with. Today's photo cells are initially more efficient however degrade rapidly and most life estimates place them at about 10 years. The rate in which photo cells are increasing in efficiency is compared to most technology incredibly slow. It is however improving at a rate in which the efficiency rates of a ten year old panel mean that it is more economical to replace that panel. What this means is that far from being a "green" technology ekgCO_2 for solar generation actual exceeds ekgCO_2 for traditional generation from gas and coal[31].

"Wind farms provide no useful electricity" was the title of Richard S Courtneys 2004 paper on the subject.

The main points were:

1. Wind farms destroy the environment by covering it in concrete.
2. They are very efficient at swatting birds and bats.

[29] Contained in almost every solar company's sales brochure or website as well as Wikipedia's article on solar power, original source unknown.
[30] Centre for Alternative Technology.
[31] The Ugly Side of Solar Panels, Low-Tech Magazine March 3, 2008.

3. Wind farms add a large unnecessary cost to provision of electricity. In order to make this technology viable at all subsidies had to be placed at all ends of production.
4. Wind farms cannot provide any useful electricity to the grid at any time. Wind is not predicable enough to be fed to grid when needed.
5. The use of wind farms increases emission from conventional power systems. When wind is used other power plans must go to spinning or standby. Not feeding power but still producing it ready to take up slack when wind stops. As a spinning wind turbine produces considerable power when it stops charged batteries cannot bridge gap in power production as is sometimes possible with solar power.

Oro-Medonte does not have many suitable locations for wind generators.

In the Province of Ontario at any time about 8% of power may come from wind or 1600 MW. This is somewhat deceptive because gas production is about the same for time of day.[32] This is because gas generators must spin when wind power is collected in order to back up grid in case wind suddenly stops. Even in the Netherlands where wind generation is everywhere it is estimated that only 1% more power is generated with all the wind capacity than could have been generated anyway with back up plants[33].

Solar Power has many considerations and proponents:

1. Climate Change: The burning of fossil fuels for energy remains the world's No. 1 source of manmade carbon dioxide emissions. Solar power is sometimes described as a zero emissions or emissions-free form of energy, and it is true that greenhouse gas emissions from solar are negligible. However, the construction of new utility scale solar energy projects result in major greenhouse gas emissions. This fact is acknowledged by the fact that $kgCO_2e/kWh$ of power generated by solar is considered to be $150gCO_2/kWh$ by Environment Canada. Power consumed each year has a different conversion factor based on the mixture of generation used to produce it.
2. Water: Creating energy is a water intensive process. In the U.S., electricity production accounts for more than 40 percent of all daily freshwater withdrawals. Solar photovoltaic systems do not require any water to generate electricity. Some solar thermal systems use water, but this water can be reused. Utility scale parabolic and central tower solar energy systems use steam plants to produce power, often relying on water for cooling. There is some concern that these types of systems, when located in arid environments, could put a strain on local water resources.
3. Land: When placed on existing structured, such as the rooftop of a home or office building, solar energy systems require negligible amount of land space. Utility scale solar farms, on the other hand, do require large amounts of land to produce electricity on a commercial scale. This fact raises concerns about the potential impact of such projects on natural habitats.
4. Hazardous Waste: Solar photovoltaic panels may contain hazardous materials that could be released when a panel is damaged or disposed of improperly. Concentrating solar energy systems may also use potentially hazardous materials like oils and molten salts, creating the

[32] Where is my Electricity Coming From at this Hour? (if I live in Ontario)
[33] EWEA, European Wind Energy Association.

potential for spills. Attempts to make solar power useful (able to be added to grid) mean batteries on large scale creating even more hazardous waste and ground level ozone and hydrogen emissions.

5. Visual: One person's beauty is another person's eyesore. For some, solar panels evoke positive feelings, even when set in a natural landscape. For others, the sight of a solar panel invading a pristine environment is gut wrenching. It's largely a matter of opinion.
6. Solar panels will not produce any power unless under load area around must be browned out.
7. Solar farms add a large unnecessary cost to provision of electricity. In order to make this technology viable at all huge subsidies had to be placed at all ends of production.
8. The use of solar farms increases emission from conventional power systems. When solar is used other power plants must go to spinning or standby. Not feeding power but still producing it ready to take up slack when cloud cover starts. This effect is not as extreme as it is with wind as battery storage can bridge some of the production gaps but still requires back up generation.

The Township of Oro-Medonte is home to several large solar installations and in addition has many small installations scattered throughout the Township.

Solar energy is hugely over estimated as capacity is based on ideal conditions than never happen. The solar farm at Sarnia is one of the largest solar installations in the world with 1100 acres covered with panels with an estimated capacity of 97MW. The most power produced by all solar power in the province was less than 40MW. This is far short of the thousands of MW of supposed capacity[34].

Comparative GHG per kWh production.

Coal = 800 to 1050[35]
Natural gas (combined cycle) = 430 (average)
Nuclear = 6
Hydroelectric = 4
Wood = 1500 without planting other biomass
Photovoltaic solar = 60 to 150[36]
Wind Power = 3 to 22[37]

[34] IESO, The Independent Electricity System Operator (IESO) balances the supply of and demand for electricity in Ontario and then directs its flow across the province's transmission lines.

[35] This is for coal that has had limited processing. Washed Coal with scrubbers in stacks such as was used in Ontario has a much lower eCO_2 GHG emission rate.

[36] (this is a controversial number Environment Canada Current uses 115, many argue that this figure is for a panel lasting 30years in full production in the tropics, factoring in that panels tend to get replaced every 10 years on average and that in Canada solar intensity is much lower than what is used to calculate this number it is actually in the realm of Coal and in fact greater than the washed coal used in Canadian Generation.

[37] Although the CO_2 production in the installation and manufacture of a wind turbine is much higher even than that of a solar panel a spinning wind turbine actually produces a considerable amount of power and thus greatly reduces CO_2/kWh.

10 UNEXPLORED CONSERVATION OPPORTUNITIES

Energy Conservation is only one part of a philosophy of stewardship. There are many areas of opportunities within the scope of normal Township operation to show leadership and stewardship over the natural environment. Although the relevance is between species conservation and energy conservation is not immediately apparent it is a strong and definite. What is surprising and unexpected in the field of conservation is that current species at risk are not necessarily the species that are most effected by climate change the ultimate down side to energy consumption. What this means is that new species are rapidly being added to the list of species at risk as climate changes. Species especially the "cute" ones have a much higher political value than nebulous conservation or climate concerns. It is because of this that when particular species are threatened that it is much easier to get the public involved with conservation measures and to get funding to implement measures. Species do not exist in isolation. Conservation efforts to support one species will support others and the ecosystems of which these species are a part.

Species at risk

Many species at risk are present within the Township. For reasons of conservation specifics of these reports will not be included.

Endangered Species alone that have been recently seen in Township

Acadian Flycatcher *Ectopistes migratorius*, believed to nest in Copeland Forest.

Barn Owl *Tyto alba*, spotted on rail trail Barrie end.

Golden Eagle *Aquila chrysaetos*, seen flying over Lake Simcoe from Hawkestone Warf.

Henslow's Sparrow *Ammodramus henslowii*, believed to nest on eight-mile point.

King Rail *Rallus elegans*, spotted from rail trail between Con 11 and 12.

Loggerhead Shrike *Lanius ludovicianus*, commonly seen on rail trail between Con 15 and Woodland Dr.

Piping Plover *Charadrius melodus*, seasonally seen at Bayview Memorial Park on way to nesting grounds at Wasaga Beach.

Prothonotary Warbler *Protonotaria citrea*, believed to nest in Copeland Forest.

Yellow-breasted Chat *Icteria verens virens*, believed to nest in Copeland Forest.

Eastern Cougar *Felis concolor couguar*, sightings in Warminster resulting in children at local public school being kept inside during recess and at railtrail at 15th con.

American Chestnut *Castanea dentate*, few small surviving trees in township near Vasey.

American Ginseng *Panax quinquefolius*, scattered populations in Copeland Forest and along roadside con 5.

Bird's Foot Violet *Viola pedata*, scattered populations including wharf at Shanty bay.

Butternut *Juglans cinerea*, scattered populations including several large specimens on couchiching conservatory lands between Con 13 and 14.

Eastern Flowering Dogwood *Cornus florida*, railtrail between 15th and Woodland and along 15th con.

Drooping Trillium *Trillium flexipes*, very small population behind Big Cedar Estates.

Red Mulberry *Morus rubra*, several trees along roadside at Shanty Bay Dock.

Spotted Wintergreen *Chimaphila maclata*, found in Copeland Forest.

Spotted Turtle *Clemmys guttata*, occasional sightings railtrail con 11 to woodland.

Wood Turtle *Glyptemy insculpta*, reported sightings railtrail con 5-7.

In addition many Threatened and species of special concern are present within the Township. The presence of these species provide opportunities for access to grants and resources not generally available. Their presence however also can present restrictions to available technologies and development. It is for this reason that a species assessment should be conducted of Township Holdings in order to facilitate future planning especially in the case of parklands.

Habitat restoration

In order to provide habitat for wildlife and to reduce maintenance costs the trend in parks of all types has been the naturalization of areas. In these areas native or potential food plants for wildlife are planted and grass is not landscaped. Habitat restoration has the duel advantage of helping out wildlife and reducing the areas of parkland which require energy intensive maintenance.

As pressures of increased population density become more apparent in Ontario then the availability of programs and resources will increase.

It is estimated that natural plants provide 7.5X more food for insects and birds than landscaped gardens.[38]

In order to be able to take advantage of these programs assessment of parklands should be undertaken in order to identify the species and natural environments present within our current holdings and plan for additional parklands.

[38] Cornell University Yardmap program 2011.

Public Involvement and Education

Simple things like the Yellow Fish Road project can let the public become involved with conservation efforts within the Township and at the same time educate the public on issues of importance. The Yellow Fish Road project simply has school children paint a yellow fish on storm drains, culverts, ditches etc. in which storm water flows untreated into water bodies.

Community beautification efforts such as ditch cleanup are already ongoing in the Township coordinated by services clubs. Coordination of these projects on a larger scale and facilitating them not only gets the public involved and taking pride in our roadways, trails and parks. The ability to have some control over such projects would also allow our forces on the ground to concentrate on work which requires skill rather than wasting skilled labor on menial tasks.

Recycling

Recycling is a conservation measure that like all aspects of waste management requires considerable infrastructure. While recycling within facilities is often only a matter of providing the appropriate receptacles and placing the collected materials out at the proper times for collection. The logistics of outdoor recycling are considerable. As recyclable materials are generally not produced in huge quantities outdoor recycling containers tend not to get emptied as often as might be hoped. This allows any organic residue to attract insects and animals in a way which normal garbage may not. The quality of the recyclate is also not as high when collected from outdoor sources. Stream tends to be contaminated with other waste, especially animal waste which owners with toss in any convenient container or hiding spot wither it is for that purpose or not. This animal waste problem is the first that needs to be addressed for a successful outdoor recycle program.

Garbage Collection

The key to successful garbage management is diversion and reduction. There are many strategies available inside a facility however outside measures are still limited. In a facility levels of waste materials are generally subject to the amount of packaging on materials brought in. If these materials however are recyclable themselves diversion of this waste stream will severely reduce the amount of straight waste. The more categories of recyclable material that can be accommodated the less straight waste there will be generated. The Oro-Medonte administration center has utilized the existing county recycling programs to maximum benefit as has greatly cut back on materials going straight to landfill. This unfortunately is not the case in parks as county collection is not happening at them. The county has completed a pilot project on recycling in parks. They have determined that the contamination in outside recycling normally makes it unfeasible. Contamination rates however can be reduced by container design and signage. Provincial government has expressed an interest in this area and currently municipalities are waiting for the implementation of a provincial program.

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Education Handouts. (Appendix)

Having Staff buy in to conservation measures is sometimes a trial. Exercises with some humor go a long way into bringing energy to the forefront of minds.

Energy Conservation and Demand Quiz

Name: _____

Date: _____

Department: _____

Instructions

Please carefully read each Question and Circle the most correct answer.

Part I: Facility Energy

1) _____ **A CDM under the Green Energy Act and Reg. 397/11 is a…**

a. Energy Conservation and Demand Management Plan.
b. Clean Development Mechanism.
c. Cryptographic Distinguishability Measure

2) _____ **In 2011 the Township of Oro-Medonte used the equivalent electricity of 209 homes. In 2012 the Township of Oro-Medonte used the equivalent electricity of?**

a. 97 Homes
b. 195 Homes
c. 220 Homes

3) _____ **The most efficient Light Bulb is?**

a. Incandescent
b. Compact Fluorescent
c. LED

Part II: Vehicles

1) _____ **Most of the Townships of Oro-Medonte's vehicles are fueled by?**

   a. Gasoline.
   b. Diesel.
   c. Rage.
   d. A Self-Satisfied Sense of Superiority.

2) _____ **The Oldest Truck in the Fleet is?**

   a. A 1975 GMC Pumper.
   b. A 1985 Ladder Truck.
   c. Whatever it is the students are driving.
   d. Whichever it is Jerry is not driving it.

3) _____ **You can improve Fuel mileage by?**

   a. Keeping Truck Washed.
   b. Keeping Tires properly Inflated.
   c. A and B.
   d. Carrying a syphon hose.

4) _____ **Vehicles are refueled by?**

   a. Switching with other driver when low fuel light comes on.
   b. Going on holiday.
   c. Magical fuel fairies.
   d. Noting fuel levels and making effort to refuel vehicles at the end of shift.

Part III: Green House Gases

1) _____ **The Main Source of GHG emission in the Township is?**

   a. Facility Heating.
   b. Vehicle Use.
   c. The Lunch Room at North Yard.
   d. Solar Farms.

e. Cattle.

2) _____ **Which is <u>not</u> a Green House Gas?**

a. Water Vapor
b. Carbon Dioxide
c. Methane
d. Ozone
e. Oxygen

3) _____ **Burning one liter of gasoline which weighs less than one kg produces____CO_2?**

a. 0.05kg
b. 0.5kg
c. 1kg
d. 1.5g
e. 2.3kg

4) _____ **A leaking faucet at one drop per second uses how much extra water in a month?**

a. 1 gallon
b. 2 gallons
c. 10 gallons
d. 50 gallons
e. 165 gallons

5) _____ **For a normal household energy bill how much is wasted energy?**

a. 10%
b. 20%
c. 30%
d. 40%
e. 50%

Answers: part I: a,b,c part ii: b,b,c,d part iii: b,e,e,e,b

Eye Openers educate about energy and provide a fun distraction in newsletters.

All the little things add up here are a few.

20 Common Household Products

Plugged-in Costs*	Watts (plugged in)/day	kWh (plugged in)/year	Annual Cost
LCD Television	1.92	16.8	$2.27
Plasma Television	9.59	84	$11.34
DVD player	1.55	13.58	$1.83
Digital Cable box with DVR	43.46 (Off by remote)	380.71	$51.40
Desktop computer	2.84 (Off)	24.87	$3.36(Off)
	73.97 (Idle)	647.98	$87.48 (Idle)
	21.13 (Sleep)	185.1	$24.99 (Sleep)
Desktop LCD computer monitor	1.13 (Off)	9.9	$1.34 (Off)
	1.38 (Sleep)	12.09	$1.63 (Sleep)
Laptop computer	8.9	77.96	$10.52
	4.42 (power cord only)	38.72	$5.23 (power cord only)
Inkjet Printer	1.26	11.04	$1.49
	4.93 (On)	43.19	$5.83 (On)
Laser Printer	1.58	13.84	$1.87
Flatbed Scanner	2.48	21.72	$2.93
Inkjet Fax Machine	5.31	46.52	$6.28
DSL Modem	1.37	12	$1.62
Cable Modem	3.84	33.64	$4.54
Game Console	1.01	8.85	$1.19
CD Player	5.04	44.15	$5.96
Surge Protector	1.05	9.2	$1.24
Central Furnace	4.21	36.88	$4.98
Coffeemaker	1.14	9.99	$1.35
Cell phone charger	0.26	2.28	$0.30
Irrigation Timer	2.75	24.09	$3.25

Based on $0.135/kWh; 1 watt = 8.76kWh (kWh = kilowatt hour)
Source: Lawrence Berkeley National Laboratory.

Appendix A

Transportation Consumption & Emissions

Fleet Analysis for Consumption and Demand Management.

	Type	Make	Model	Year	Call Sign	Vehicle #	Fuel Type	2011 Fuel Use ($)	2011 ekWh	2011 ekg/CO_2	2012 Fuel Use ($)	2012 ekWh	2012 ekg/CO_2	2013 Fuel Use ($)	2013 ekWh	2013 ekg/CO_2
1	Car	Ford	Taurus	2005		914	Gasoline Regular	$ 1,039.81	8,068.79	2,010.91	$ 1,300.32	9,922.41	2,472.87	$ 1,470.59	11,151.01	2,779.07
2	Car	Mazda	3	2007		915	Gasoline Regular	$ 1,721.55	13,359.01	3,329.35	$ 793.04	6,051.49	1,508.16	$ 687.45	5,212.71	1,299.12
3	Truck	Ford		2013	Support 1	917	Gasoline Regular	$ -	-	-	$ -	-	-	$ 1,318.63	9,998.75	2,491.90
3a	Truck	Chevy	Silverado	2003	Car 4	704	Gasoline Regular	$ 827.75	6,423.23	1,600.81	$ -	-	-	$ -	-	-
4	Truck	Chevy	Silverado	2006	Car 3	705	Gasoline Regular	$ 4,884.07	37,899.75	9,445.42	$ 5,473.07	41,763.60	10,408.37	$ 6,363.06	48,249.03	12,024.68
5	Truck	Ford		2010	Car 2	707	Gasoline Regular	$ 5,801.53	45,019.12	11,219.72	$ 4,869.58	37,158.52	9,260.69	$ 6,956.54	52,749.20	13,146.22
6	Truck	Ford		2010	Car 1	706	Gasoline Regular	$ 3,661.46	28,412.46	7,080.99	$ 4,538.52	34,632.29	8,631.10	$ 6,585.88	49,938.60	12,445.76
7	Pump	Spartan	Diamond	1991	Pump # 1	711	Diesel Fuel	$ 1,289.29	11,113.14	2,793.81	$ 1,940.53	16,633.11	4,181.51	$ 1,342.69	11,301.32	2,841.12
8	Tank	International		2005	Tank # 1	712	Diesel Fuel	$ 563.35	4,855.84	1,220.74	$ 896.76	7,686.51	1,932.36	$ 823.11	6,928.06	1,741.69
9	Rescue	Ford		2000	Rescue #2	721	Diesel Fuel	$ 1,975.28	17,026.09	4,280.30	$ 1,923.29	16,485.34	4,144.36	$ 1,970.13	16,582.44	4,168.77
10	Tank	GMC		1999	Tanker #2	722	Diesel Fuel	$ 744.58	6,417.97	1,613.46	$ 1,321.53	11,327.40	2,847.67	$ 1,382.41	11,635.65	2,925.16
11	Pump	Rosenbauer	Centurion	2004	Pumper #2	723	Diesel Fuel	$ 1,788.42	15,415.43	3,875.39	$ 1,465.78	12,563.83	3,158.50	$ 1,467.06	12,348.14	3,104.28
12	Airboat	Airboat	Rescue		Airboat	734	Gasoline Marine	$ -	-	-	$ 172.17	1,313.79	327.42	$ 166.69	1,263.96	315.00
13	Pump	International		1998	Pumper #3	731	Diesel Fuel	$ 1,251.27	10,785.43	2,711.42	$ 2,248.45	19,272.43	4,845.02	$ 1,829.69	15,400.37	3,871.60
14	Tank	MetalFab	Tanker	2007	Tanker #3	736	Diesel Fuel	$ 956.37	8,243.51	2,072.39	$ 2,291.41	19,640.66	4,937.60	$ 1,600.56	13,471.80	3,386.76
15	Ladder	Aerial	Truck	1985	T3	738	Diesel Fuel	$ 1,402.13	12,085.78	3,038.32	$ 987.74	8,466.34	2,128.41	$ 858.30	7,224.25	1,816.15
16	Pump	International		1996	Pumper #4	741	Diesel Fuel	$ 647.78	5,583.59	1,403.70	$ 1,201.20	10,296.00	2,588.38	$ 726.67	6,116.33	1,537.62
17	Tank	Freightliner		1995	Tanker #4	742	Diesel Fuel	$ 431.93	3,723.06	935.96	$ 985.81	8,449.80	2,124.25	$ 644.92	5,428.25	1,364.64
18	Pump	GMC	Topkick	1999	Pumper #5	751	Diesel Fuel	$ 999.91	8,618.81	2,166.74	$ 1,054.81	9,041.23	2,272.93	$ 711.40	5,987.80	1,505.31
19	Rescue	Chevy	Van	1987	Rehab Unit	752	Gasoline Regular	$ 157.23	1,220.08	304.07	$ 98.75	753.54	187.80	$ 326.97	2,479.31	617.90
20	Tank	MetalFab	Tanker	2007	Tanker #5	754	Diesel Fuel	$ 651.12	5,612.38	1,410.93	$ 958.38	8,214.69	2,065.14	$ 589.36	4,960.60	1,247.08
21	Rescue	Rescue			Rescue 7	761	Diesel Fuel	$ 690.97	5,955.87	1,497.29	$ 1,835.84	15,735.77	3,955.92	$ 1,618.01	13,618.67	3,423.69
22	Pump	International		2007	Pumper #6	762	Diesel Fuel	$ 896.02	7,723.32	1,941.62	$ 1,071.30	9,182.57	2,308.47	$ 1,006.12	8,468.44	2,128.94
23	Tank	GMC		2002	Tanker #6	763	Diesel Fuel	$ 896.01	7,723.23	1,941.59	$ 1,418.78	12,160.97	3,057.23	$ 959.49	8,075.96	2,030.27
24	Rescue	International		2010	Rescue truck #6	764	Diesel Fuel	$ 896.04	7,723.49	1,941.66	$ 1,109.35	9,508.71	2,390.46	$ 1,026.15	8,637.03	2,171.32
25	Truck	Ford	Ranger	2005		916	Gasoline Regular	$ 1,388.59	10,775.28	2,685.43	$ 1,233.81	9,414.89	2,346.39	$ 1,857.17	14,082.32	3,509.61
26	Truck	Jeep	Patriot	2009		918	Gasoline Regular	$ 1,681.11	13,045.20	3,251.14	$ 2,042.62	15,586.71	3,884.54	$ 2,687.44	20,377.99	5,078.63
26a	Truck	Jeep	Patriot	2009		919	Gasoline Regular	$ 3,149.61	24,440.57	6,091.11	$ 3,140.11	23,961.38	5,971.68	$ -	-	-
27	Truck	Hyundai	Tucson	2013		919	Gasoline Regular	$ -	-	-	$ -	-	-	$ 2,456.45	18,626.47	4,642.11
28	Truck	Ford	F150	2008		908	Gasoline Regular	$ 5,791.19	44,938.89	11,199.72	$ 7,292.90	55,650.26	13,869.22	$ 7,200.12	54,596.19	13,606.53
29	Truck	Chevy		2006		909	Gasoline Regular	$ 4,765.03	36,976.02	9,215.21	$ 3,709.15	28,303.58	7,053.85	$ 1,622.27	12,301.15	3,065.71
30	Truck	Ford	Transit	2012		911	Gasoline Regular	$ -	-	-	$ -	-	-	$ 2,367.90	17,955.02	4,474.77
31	Truck	Chevy		2007	12	812	Gasoline Regular	$ 5,659.37	43,915.98	10,944.79	$ 4,772.21	36,415.52	9,075.52	$ 4,317.11	32,735.25	8,158.32
32	Truck	Ford		2010		907	Gasoline Regular	$ 3,876.31	30,079.67	7,496.49	$ 4,388.58	33,488.13	8,345.95	$ 4,057.65	30,767.85	7,668.00
33	Truck	Chevy	Silverado 2500	2010		901	Gasoline Regular	$ 5,373.27	41,695.88	10,391.50	$ -	-	-	$ 1,141.00	8,651.83	2,156.22
	Truck	Chevy		2007		902	Gasoline Regular	$ 8,597.60	66,716.27	16,627.11	$ 4,655.86	35,527.68	8,854.25	$ -	-	-
34	Van	Chevy	Cargo Van	2010		903	Gasoline Regular	$ 7,004.02	54,350.29	13,545.24	$ 8,394.84	64,058.88	15,964.83	$ 8,110.98	61,502.94	15,327.84
35	Truck	Ford	F150	2012		904	Gasoline Regular	$ -	-	-	$ 4,516.96	34,467.77	8,590.10	$ 7,663.48	58,109.69	14,482.17
36	Truck	Chevy	Silverado	2009		913	Gasoline Regular	$ 2,547.78	19,770.44	4,927.21	$ 2,864.83	21,860.79	5,448.17	$ 2,444.65	18,536.99	4,619.81
	Van	Ford	Van	2005		915	Gasoline Regular	$ 438.41	3,402.01	847.85	$ -	-	-	$ -	-	-
37	Truck	Chevy	Silverado	2011		920	Gasoline Regular	$ 1,940.41	15,057.33	3,752.61	$ 7,338.02	55,994.56	13,955.03	$ 7,083.60	53,712.65	13,386.33
38a	Truck	Chevy	Silverado	2010		837	Gasoline Regular	$ 6,162.61	47,821.06	11,918.02	$ 5,952.77	45,424.07	11,320.64	$ -	-	-
38	Truck	GMC	Sierra	2013	Parks # 1	837	Gasoline Regular	$ -	-	-	$ -	-	-	$ 5,045.28	38,256.73	9,534.39
39	Ice Resurfacer	Olympia	Millennium	2006		910	Propane	$ 7,656.06	65,007.74	13,928.49	$ 7,510.34	60,372.23	12,857.84	$ 7,609.91	58,265.94	12,409.25
40	Truck	Chevy	Silverado	2009	1	801	Gasoline Regular	$ 8,058.13	62,530.05	15,583.81	$ 9,103.69	69,467.94	17,312.88	$ 10,273.46	77,900.33	19,414.41
42	Dump	Sterling		2005	2	802	Diesel Fuel	$ 10,163.80	87,607.71	22,024.29	$ 10,610.80	90,949.71	22,864.45	$ 12,239.67	103,020.42	25,898.99
43	Dump	Sterling	LT9500	2007	3	803	Diesel Fuel	$ 12,875.73	110,983.42	27,900.86	$ 11,236.34	96,311.49	24,212.38	$ 20,306.89	170,921.63	42,969.12
44	Truck	Chevy	Silverado 3500	2004	4	804	Diesel Fuel	$ 6,003.65	51,748.96	13,009.51	$ 5,761.50	49,384.29	12,415.04	$ 5,050.29	42,507.93	10,686.35
45	Truck	Chevy	Silverado	2009	6	806	Diesel Fuel	$ 8,694.05	74,939.08	18,839.43	$ 9,527.24	81,662.06	20,529.57	$ 9,874.49	83,112.87	20,894.30
46	Dump	Sterling	LT9511	2004	7	807	Diesel Fuel	$ 7,389.29	63,692.60	16,012.11	$ 7,345.83	62,964.26	15,829.00	$ 13,216.69	111,243.93	27,966.35
47	Loader	Cat	Loader	1999	8	808	Dyed Diesel	$ 2,603.93	24,403.32	6,134.91	$ 1,302.76	12,134.99	3,050.70	$ 1,523.46	13,913.23	3,497.74
48	Pump	GMC	Pumper	1975	9	809	Diesel Fuel	$ 4,028.27	34,722.01	8,729.00	$ 3,896.23	33,396.26	8,395.71	$ 1,489.75	12,539.12	3,152.29
49	Truck	Chevy	Crew cab 1-ton	2002	10	810	Diesel Fuel	$ 4,945.46	42,627.80	10,716.49	$ 4,463.33	38,257.11	9,617.71	$ 3,011.84	25,350.44	6,373.02
50	Truck	Chevy	Silverado	2011	11	811	Gasoline Regular	$ 11,815.36	91,685.67	22,850.01	$ 12,284.30	93,738.36	23,361.58	$ 15,323.35	116,192.02	28,957.51
51	Dump	Freightliner	M2112V	2009	14	814	Diesel Fuel	$ 10,328.45	89,026.93	22,381.07	$ 10,627.27	91,090.89	22,899.94	$ 13,205.04	111,145.87	27,941.70
52	Sweeper	Elgin	Pelican Sweeper	2008	15	815	Dyed Diesel	$ 1,567.41	14,689.34	3,692.85	$ 3,659.87	34,091.07	8,570.38	$ 4,038.01	36,877.74	9,270.94
53	Tandem	International	7600	2011	16	816	Diesel Fuel	$ 10,297.26	88,758.08	22,313.48	$ 9,079.02	77,820.17	19,563.73	$ 16,563.06	139,410.08	35,047.23
54	Dump	Volvo		2000	17	817	Diesel Fuel	$ 4,577.89	39,459.50	9,919.99	$ 3,581.60	30,699.43	7,717.73	$ 5,677.42	47,786.43	12,013.35
55	Dump	Volvo		2002	18	818	Diesel Fuel	$ 7,333.39	63,210.76	15,890.97	$ 8,878.28	76,099.54	19,131.17	$ 14,242.57	119,878.68	30,137.10
56a	Dump	Freightliner		1999	19	819	Diesel Fuel	$ 4,356.61	37,552.16	9,440.49	$ -	-	-	$ -	-	-
56	Dump	Freightliner		2011	19	819	Diesel Fuel	$ -	-	-	$ 3,760.27	32,230.89	8,102.74	$ 9,114.96	76,719.96	19,287.14
57	Tandem	Freightliner		2003	20	820	Diesel Fuel	$ 10,077.58	86,864.53	21,837.45	$ 8,955.02	76,757.31	19,296.53	$ 12,748.05	107,299.42	26,974.71
58	Dump	Sterling	LT9511	2004	21	821	Diesel Fuel	$ 7,202.73	62,084.53	15,607.84	$ 10,191.07	87,352.03	21,960.01	$ 15,565.22	131,011.33	32,935.81

59	Grader	Caterpillar	160H	2007	22	822	Dyed Diesel	$	8,181.09	76,670.95	19,274.82	$	4,222.38	39,330.76	9,887.62	$	6,643.95	60,676.89	15,253.97
60	Tandem	Freightliner		2007	23	823	Diesel Fuel	$	8,331.59	71,814.83	18,054.01	$	6,641.92	56,930.74	14,312.20	$	12,451.86	104,806.41	26,347.98
61	Backhoe	Caterpillar	M430E	2009	24	824	Dyed Diesel	$	5,261.83	49,312.44	12,396.98	$	2,529.69	23,563.63	5,923.82	$	2,824.35	25,793.81	6,484.48
62	Dump	Freightliner	M2112V	2009	25	825	Diesel Fuel	$	11,250.89	96,977.98	24,379.94	$	12,305.19	105,473.06	26,515.57	$	23,510.11	197,882.90	49,747.10
63	Grader	Caterpillar	160H	2007	26	826	Dyed Diesel	$	15,278.09	143,182.10	35,995.50	$	9,620.83	89,616.40	22,529.26	$	12,011.88	109,700.33	27,578.30
64	Loader	Caterpillar	Loader	1998	28	828	Dyed Diesel	$	1,145.80	10,738.13	2,699.53	$	3,149.78	29,339.67	7,375.89	$	7,494.07	68,440.74	17,205.77
65	Backhoe	John Deere	310	1998	29	829	Dyed Diesel	$	4,341.44	40,686.79	10,228.52	$	1,998.07	18,611.68	4,678.92	$	1,577.66	14,408.22	3,622.18
66	Tractor	New Holland	TN65D	2000	30	830	Dyed Diesel	$	1,439.88	13,494.16	3,392.39	$	1,240.75	11,557.38	2,905.49	$	1,691.90	15,451.54	3,884.46
	Dump	Volvo	White	1997	32	832	Diesel Fuel	$	1,558.91	13,437.15	3,378.06	$	-	-	-	$	-	-	-
67	Chipper	Brush Chipper	South		34	834	Dyed Diesel	$	675.91	6,334.44	1,592.46	$	713.40	6,645.20	1,670.58	$	671.39	6,131.57	1,541.46
68	Chipper	Brush Chipper	North		35	835	Dyed Diesel	$	1,263.21	11,838.46	2,976.15	$	764.17	7,118.11	1,789.47	$	331.23	3,025.01	760.48
69	Sweeper	Sweeper			36	836	Dyed Diesel	$	1,139.19	10,676.18	2,683.96	$	283.06	2,636.66	662.85	$	386.87	3,533.15	888.22
70	Bulldozer	John Deere	450		38	838	Dyed Diesel	$	1,058.98	9,127.97	2,494.98	$	3,371.60	31,405.88	7,895.33	$	1,399.78	12,783.71	3,213.78
71	Truck	Chevy	Silverado	2010	51	851	Gasoline Regular	$	11,203.22	86,935.54	21,666.18	$	11,161.58	85,171.17	21,226.46	$	11,011.93	83,499.91	20,809.95
72	Dump	Freightliner	M2112V	2009		852	Diesel Fuel	$	12,881.27	111,031.17	27,912.86	$	11,602.23	99,447.69	25,000.81	$	17,987.17	151,396.71	38,060.63
33	Truck	Chevy	Silverado 2500	2006		901	Gasoline Regular	$	-	-	-	$	355.07	2,709.45	675.25	$	724.40	5,492.89	1,368.94
73	Truck	Ford	F150	2002		971	Gasoline Regular	$	2,490.75	19,327.90	4,816.92	$	-	-	-	$	-	-	-
74	Truck	Chevy	Silverado	2006 Parks #2		972	Gasoline Regular	$	4,220.17	32,747.98	114,399.76	$	5,084.21	38,796.31	9,668.86	$	-	-	-
75	Truck	Chevy	Silverado	2011 Parks #3		973	Gasoline Regular	$	1,693.68	12,444.35	43,472.33	$	3,643.95	27,806.05	6,929.86	$	3,230.89	24,498.80	6,105.62
76	Truck	Chevy	Silverado	2010 Parks #4		974	Gasoline Regular	$	-	-	-	$	-	-	-	$	2,192.03	16,621.46	4,142.42
								Total		2,740,366.98	831,358.41	Total		2,657,355.07	663,752.17	Total		3,266,682.16	816,937.52
								$	325,850.13			$	320,721.71			$	397,702.58		

Year	Average fuel costs from Ministry of Energy		
	2011	2012	2013
Gaso	124.1	126.2	127
Diese	124.6	125.3	127.6
Dyed	114.6	115.3	117.6
Propa	83.5	88.2	92.6

Estimated Emissions based on Average fuel costs from Ministry of Energy and Emission conversions from Ministry of the Environment.

From Facilities	3,328,153.50	453,650.96		3122781.64	416944.31
	6,068,520.48	1,285,009.37		5,780,136.71	1,080,696.48

Appendix B

2011 Consumption & Emissions

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Appendix C

2012 Consumption & Emissions

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Appendix D

2013 Consumption & Emissions