

Energy Conservation & Demand Management Plan

April 7, 2014 (Updated October 7, 2014)

The Township of Bonnechere Valley

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1.0 INTRODUCTION

The Township of Bonnechere Valley (TBV) has undertaken the development and implementation of an Energy Conservation and Demand Management Plan (the Plan) in accordance with Ontario Regulation 397/11. This 5 year Plan runs from 2014 to 2019, and a revised and updated Plan will be required by July 1, 2019.

The Township is a small, picturesque municipality located in Renfrew County in eastern Ontario. It was formed in 2001 through the amalgamation of the South Algona, Sebastopol and Grattan, and the Village of Eganville. TBV has a population of approximately 3,800 people, with Eganville being the largest residential area at a population of 1,200.

The area is rich in natural beauty, known for its lake and rivers, especially the Bonnechere River which flows directly through the village of Eganville. TBV is also a popular destination with astronomers for star gazing, due to the vivid dark sky and high altitude. The municipality lays claim to the highest populated point in Ontario, with Foymount/Sebastopol being approximately 500 metres above sea level. Beyond tourism, key economic drivers include farming and agriculture, forestry, and aggregate resource mining.

1.1 PLAN STRUCTURE

The structure of this Plan follows the framework laid out by Local Authority Services' Energy Planning Tool. Local Authority Services (LAS) is a subsidiary of the Association of Municipalities of Ontario. The LAS framework involves 5 key steps: Commitment, Understanding, Planning, Execution, and Evaluation. Each step is outlined, in order, below

2.0 COMMITMENT

2.1 DECLARATION

The Township of Bonnechere Valley will use existing resources and leverage outside agencies where appropriate to reduce our energy consumption and its related environmental impact.

2.2 VISION

We are continually reducing our total energy consumption and associated carbon footprint through wise and efficient use of energy and resources, while still maintaining an efficient and effective level of service for our clients and the general public.

2.3 GOALS

To maximize the efficient use of the Township's fiscal resources.

To minimize negative environmental impact of Township operations.

2.4 OVERALL TARGET

By 2019 we will reduce the energy consumption per square foot of our municipal facilities by 15%, versus our 2012 figure.

2.5 OBJECTIVES

To improve the energy efficiency of our facilities by utilizing best practices to reduce our energy consumption and mitigate the impact of energy cost increases.

To create a culture of energy conservation among Township staff.

To improve municipal staff knowledge in energy consumption and energy conservation.

To reduce greenhouse gas emissions associated with our energy use.

3.0 UNDERSTANDING

3.1 MUNICIPAL ENERGY SITUATION

The Township of Bonnechere Valley uses three types of energy in its facilities: electricity, fuel oil, and propane. Electricity is currently purchased through Local Authority Services' (LAS) bulk purchase program. LAS, is a subsidiary of the Association of Municipalities of Ontario (AMO). The LAS program is intended to provide municipalities with a hedge against price fluctuations, and therefore save them money on electricity. Between July 2010 and June 2013 the Township has saved approximately \$29,000 by using the LAS program.

Fuel oil and propane are currently purchased from McCarthy Fuels located in Killaloe, Ontario.

3.2 HOW WE MANAGE ENERGY TODAY

The Township of Bonnechere Valley has a solid history in energy conservation initiatives. In 2006 the Township performed energy audits on nine of its facilities, most of which were the highest energy use buildings. Since that time the Township has used those audit recommendations as a strategy for energy conservation projects at each facility.

In addition, the Township has in place an LED streetlight replacement program, which began in 2010. As streetlights need to be replaced, they are upgraded from high pressure sodium technology to much more efficient LED technology.

Energy conservation projects completed since 2006 have fallen into the categories of lighting, heating/cooling/ventilation, insulation, windows, and motors/pumps. Examples of specific projects completed to date are outlined below:

Lighting Upgrades:

- Eganville Arena – replaced ice surface lights (2006)
- Library – switched to T-5 fluorescent lighting (2007)
- Sebastopol Firehall – switched to T-8 fluorescent lighting (2007)
- Storage/Martial Arts – switched to T-8 lighting (2007)
- Grattan Garage/Office – switched to T-8 lighting (2007)
- Sewage Treatment Plant – switched to T-8 lighting (2008)
- North Pump Station – switched to T-8 lighting (2008)
- Water Treatment Plant – switched fifty T-12's to T-8 (2008)
- Dewatering Plant – switched to T-8 (2008)

Heating & Cooling Equipment:

- Community Centre – installed new air conditioner (2009)
- Community Centre – replaced three hot water tanks (2009)
- Ice Plant - 2nd dehumidifier added (2008)
- Water Treatment Plant – installed motor driven dampers on fans (2013)
- Grattan Garage – changed to propane tube heaters (2007)
- Grattan Garage – changed to propane hot water tank (2007)

Equipment:

- Water Treatment Plant – replaced existing low lift/high lift pumps (2013)
- Water Treatment Plant – installed insulated motor driven damper fans (2013)
- Pumphouses (Queen St., Southside, Mill St.) – replaced pumps and controls (2011)

Insulation:

- Queen St. pumphouse – upgraded insulation in walls to R20 and roof to R40 (2011)
- Library – reinsulated walls (2007)
- Sewage Treatment Plant – upgraded roof insulation to R40 (2011)

Windows:

- Storage/Martial Arts – upgraded 2 windows to thermo pane (2012)

Roof Upgrades:

- Arena – new front entrance roof and insulation (2007)
- Grattan Garage – installed R22 steel roof and insulation (2007)

3.3 SUMMARY OF ENERGY CONSUMPTION, COST, AND GHGS

Township of Bonnechere Valley's energy consumption is driven mainly by the town of Eganville, due to the concentration of several high energy use facilities (i.e. Eganville Arena, Sewage Treatment and Water Filtration Facilities).

In order to track total energy consumption, the various energy types have been converted into equivalent kilowatt hours (ekWh). In order to track total greenhouse gas emissions, the emissions derived from the use of various energy types have been converted into equivalent kilograms of carbon dioxide (ekgCO₂). For the calendar year

2013, the Township used 1,721,784 ekWh of energy, at a total cost of \$234,407, and generating 230,395 ekgCO₂ of greenhouse gas emissions.

The associated 2013 consumption amounts and costs for the three energy sources are outlined below.

2013 Energy Consumption		
Energy Source	Energy Amount	Cost
<i>Electricity</i>	1,019,614 kWh	\$192,069
<i>Oil</i>	14,752 L	\$17,664
<i>Propane</i>	49,418 L	\$24,674
<i>Source: Township of Bonnechere Valley data</i>		

Based upon 2013 data, the existing energy rates and associated greenhouse gas emissions are as follows:

Energy Source	Cost per Unit Purchased*	Cost per ekWh of Energy**	GHG Emissions (kg) per ekWh of Energy**
<i>Electricity</i>	\$0.188 / kWh	\$0.188	0.110
<i>Fuel Oil (#2)</i>	\$1.197 / litre	\$0.111	0.255
<i>Propane</i>	\$0.535 / litre	\$0.075	0.218
* Calculated using the Township's total annual cost / total annual consumption for each energy source			
** Calculated using conversion factors from Natural Resources Canada (NRCan).			
<i>Source: Township of Bonnechere Valley data, Natural Resources Canada conversion factors</i>			

GHG Emissions

Each energy source has a different amount of greenhouse gas emissions associated with its use. The greenhouse gas emissions associated with electricity are derived from the way in which the electricity is generated. In Ontario, those emissions are derived from the portion of electricity generated through the burning of coal. As the percentage of Ontario's electricity generated from coal decreases, the greenhouse gases associated with Ontario's electricity use also decreases. The provincial government is phasing out coal as a source of electricity. There is only one operational coal burning plant remaining in Ontario, the Nanticoke Generation Station, and it is scheduled to be decommissioned by the end of 2014.

The greenhouse gas emissions associated with combustible fuels such as fuel oil and propane are derived from the actual combustion of those fuels.

3.4 TRENDS IN ENERGY CONSUMPTION

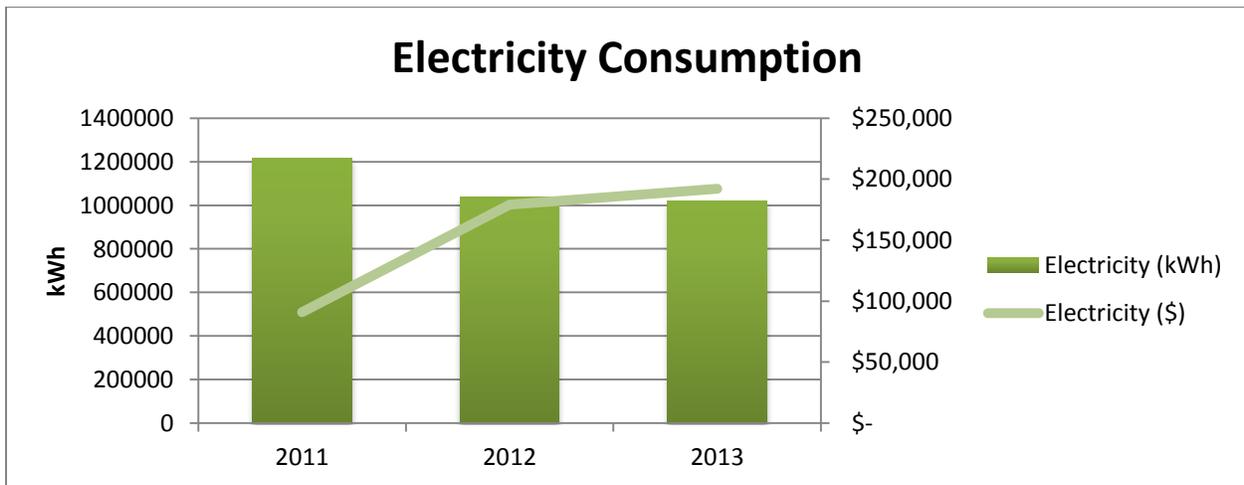
3.4.1 OVERALL TOWNSHIP TREND

Overall, the Township’s energy use, energy cost, and associated greenhouse gas emissions have risen over the past 3 years. The table below provides a summary.

Year	Energy Use (ekWh)	Cost	GHG Emissions (kgCO2e)
2011	1,616,345	\$129,031	210,050
2012	1,692,865	\$219,218	217,950
2013	1,721,784	\$234,407	230,395

3.4.2 ELECTRICITY CONSUMPTION TREND

The Township’s electricity consumption has decreased over the past three years, decreasing 14.5% and 1.8% respectively in 2012 and 2013. The associated electricity consumption figures were 1,214,644 kWh in 2011, 1,038,289 kWh in 2012 and 1,019,614 kWh in 2013. The resulting electricity costs were approximately \$91,033 (2011), \$178,985 (2012), and \$192,069 (2013), representing a 97% increase in 2012 and 7% increase in 2013.



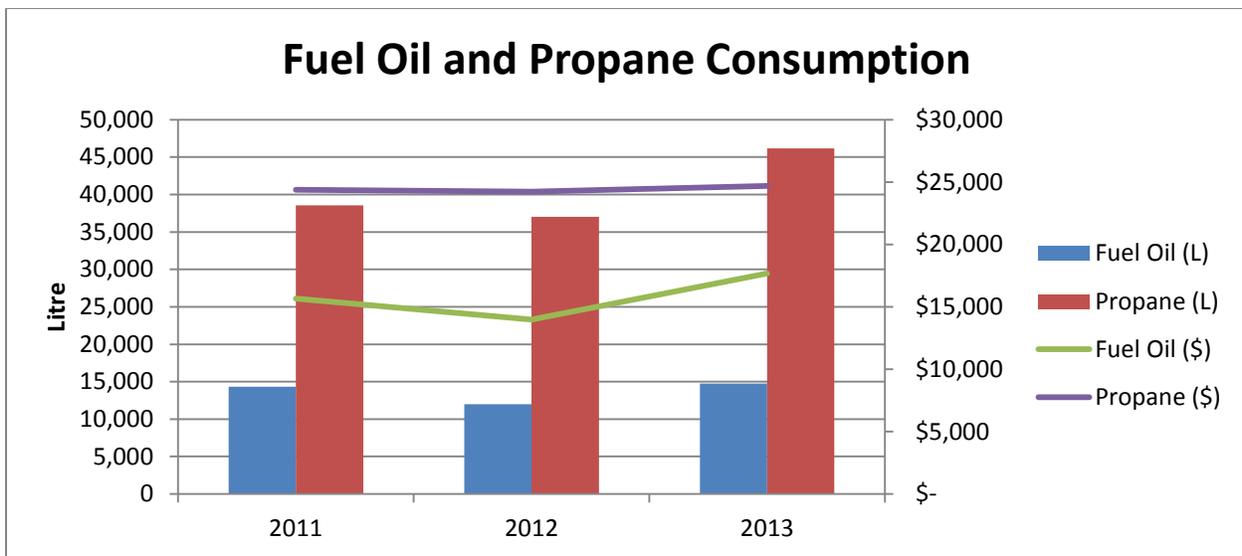
*Source: Energy Consumption and Cost Data from Township of Bonnechere Valley

3.4.3 FUEL OIL AND PROPANE CONSUMPTION TREND

Many of the Township’s Facilities also use fuel oil and propane for heating during the winter months. Consumption of these fuels is directly impacted by fluctuations of temperature from year-to-year. The consumption figures noted below are based upon annual purchased amounts.

Total fuel oil use decreased by -16% in 2012 and increased by 23% in 2013, with the resulting consumption figures being 14,347 L in 2011, 11,992 L and 14,752 L in 2013. The associated fuel oil costs have seen fluctuations of -11% in 2012 and 26% in 2013, with the corresponding costs being \$15,653 (2011), \$13,971 (2012), and \$17,664 (2013).

Total Propane use decreased by -4% in 2012 and increased by 25% 2013, with the resulting consumption figures being 38,533 L in 2011, 37,017 L in 2012 and 46,152 L in 2013. The resulting propane costs have seen fluctuations of -0.5% in 2012 and 2% in 2013, with the corresponding cost being \$24,369 (2011), \$24,240 (2012), and \$24,674 (2013).



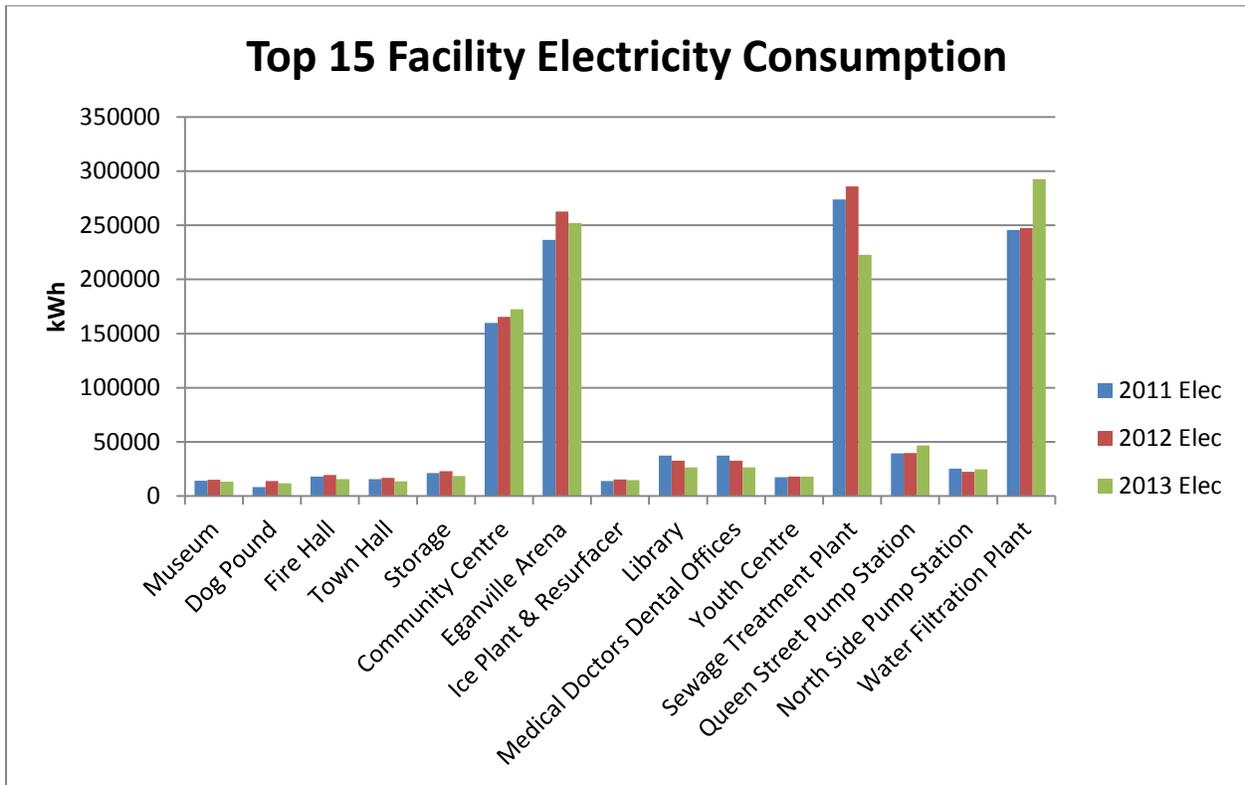
*Source: Energy Consumption and Cost Data from Township of Bonnechere Valley

3.4.4 GREENHOUSE GAS EMISSIONS TREND

The Township GHG emissions have increased 3.3% and 6.0% respectively in 2012 and 2013, with the resulting GHG emission in CO₂e/year being 210 tonnes in 2011, 217 tonnes in 2012 and 230 tonnes in 2013. [Note: 1 Tonne equals 1000 kg]

3.4.5 ENERGY TRENDS OF TOP 15 BUILDINGS

Below is a graph showing the three year energy trend of TBV's top 15 buildings in terms of total energy consumption.



*Source: Energy Consumption and Cost Data from Township of Bonnechere Valley

3.4.6 STREETLIGHT ENERGY CONSUMPTION TREND

The Township of Bonnechere Valley has initiated a streetlight replacement program. The program consists of the replacement of older High Pressure Sodium lamps being replaced with much more efficient LED lamps. The replacement occurs when the local contractor is performing maintenance.

The electricity consumption and corresponding cost over the past two years is outlined below.

Year	Consumption (kWh)	Cost
2011	261,627	\$17,045
2012	191,274	\$13,692

Source: LAS Streetlight Account Data

3.5 RENEWABLE ENERGY UTILIZED OR PLANNED

The Township of Bonnechere Valley owns the Eganville Generating Corporation, which operates the Eganville Dam. The hydroelectric dam has a capacity 750kW. All electricity generated feeds into the Hydro One electricity grid for which the Township is paid an average rate of 12.5 cents/kWh. The dam is located on the Bonnechere River and is part of a larger hydroelectric system in Renfrew County. The dam has cultural and historic value for Eganville, and generates a significant amount of electricity for the Region. The total electricity generated in recent years is as follows:

Hydroelectricity Production	
Year	Amount Produced
2011	3,400,794 kWh
2012	2,543,056 kWh
2013	3,713,651 kWh
Source: Eganville Generating Corporation	

The Township plans to continue to own and operate the dam.

4.0 PLANNING

4.1 STRUCTURE PLANNING

The 5-year Energy Conservation and Demand Management Plan includes both short term and mid-term strategies. Short-term is defined as years one through three of the Plan. Short-term focus areas will be:

- Establishment of an Energy Management Team;
- Developing tracking and reporting process;
- Completing training and education of Township staff;
- Implementing no cost & low cost programs, processes, and projects; and
- Planning for larger expenditures in coming years

Mid-term is defined as years four and five of the Plan. Mid-term focus areas will be:

- Higher cost programs, processes, and projects

4.2 ENERGY LEADER

TBV will develop a more focused effort on energy management through the creation of an energy management team. This team will be responsible for the implementation of the Plan and review of the corporate energy management strategies. The team will meet on a quarterly basis to review energy consumption reports, provide updates on energy initiatives, and discuss successes and challenges.

4.3 ENERGY TRAINING

TBV will train staff on energy use and energy conservation. General training will be offered for all staff, while additional, more technical training will be offered for operations staff. Natural Resources Canada Dollars to Sense energy workshops will be considered as a training option where applicable.

4.4 ENERGY PURCHASING

TBV will continue to purchase electricity through Local Authority Services' Electricity Program. Other energy sources (propane, oil) will be purchased through our local suppliers.

4.5 PROGRAMS/PROCESSES/PROJECTS

Energy conservation initiatives will take the form of programs, processes, and projects. Below is a list of initiatives to be considered over the duration of this Plan.

4.5.1 PROGRAMS

- Continue with the ongoing implementation recommendations from the 2006 energy audits – update cost and payback as necessary particularly for larger expenditure items. See *Appendix A for a summary of Energy Audit Recommendations*.
- Utilize 2006 energy audit recommendations to develop similar initiatives in un-audited buildings. See *Appendix A for a summary of Energy Audit Recommendations*.
- Investigate use of LAS free energy audit services for unaudited buildings.
- Continue with streetlight replacement program – upgrade to LED as streetlights require replacement.
- Host quarterly Lunch & Learn sessions for Township staff to support the creation of a culture of conservation
- Investigate the possibility of participation in a demand management program to conserve energy and save money by reducing demand on the provincial electricity grid during peak periods.
- Develop stories/case studies of successful Township energy initiatives and share with entire Township staff and community.

4.5.2 PROCESSES

- Implement a process to track on a monthly basis energy use and cost for each building, and provide year over year comparative results to the operations team.
- Implement regular review of energy consumption data by appropriate TBV staff members.
- Utilize the *LAS Audit++* and *Energy Performance Benchmark Best Practice Reports* as reference materials for best practices.
- Implement building start-up and shut-down schedules, where appropriate, and add into standard work procedure for key building personnel to eliminate waste and maximize equipment efficiencies.
- Vending machines: ensure no build-up of dirt and dust on backside coils. Renegotiate with suppliers for motion activated lighting. Unplug during off-season if possible.
- Use power bars on PCs and turn off at night, where possible.
- Make use of ‘free’ cooling in summer by programming building control system to bring in 100% outdoor air at night.
- Turn off printers and copiers at night and on weekends, where possible.

4.5.3 PROJECTS

- Investigate the increase in energy consumption for the water filtration plant, the community centre, the Foymount Fire Hall, the Foymount municipal garage, and the Eganville arena.

- Complete an internal review of all Township buildings not audited, to confirm: type of lighting, type of heating/cooling, type of thermostats, presence of exhaust fans, presence/type/age of pumps, presence/condition of weather stripping and floor sweeps, other equipment that utilizes energy.
- Continually investigate and pursue, where possible, energy conservation funding opportunities, including Save ON Energy Small Business Lighting program. Potential sources of funding can be found at: <http://www.nrcan.gc.ca/energy/funding/4943>
- Complete an analysis of energy demand for the various Township buildings – including drivers of demand and associated costs.
- Investigate the possibilities of renewable energy projects (i.e. solar, small-scale wind) at Township owned facilities and properties.
- Install a system to automatically turn off heating/cooling when overhead doors are left open
- Investigate using free computer programs like “Edison” to automatically shut down computers when not in use
- Talk to all major vendors regarding equipment efficiencies and collect their ideas for improvement
- Install occupancy (motion) sensors for lights and heating, where appropriate.
- Enhance building envelope by replacing caulking, weather-stripping, and insulation where appropriate.
- Install separate meters or sub-meters for facilities that are shared to allow for accurate division of energy consumption.
- Investigate re-commissioning of buildings that have experienced significant change in use, space configuration, or expansion since their construction.
- Review and upgrade/remove/replace baseboard heaters
- Install remote thermostats for baseboard heaters
- Invest in plug-load power monitors to be shared between facilities

5.0 EXECUTION

5.1 MUNICIPAL LEVEL

On an annual basis the Township's Energy Team will develop an Energy Action Plan, made up of a variety of programs, processes and projects. Action Plan items will be limited to one year for completion. Larger action items can be broken down into smaller steps to meet the one year timeline. Each year a new Energy Action Plan will be developed. By limiting actions to a single year, it facilitates forward movement on many projects simultaneously and allows for the incorporation of new information or technologies that may come available during the term of the Energy Management Plan.

The Energy Team will implement and monitor the energy projects of the Township and will report annually to municipal council on its successes and challenges in implementing the Energy Action Plan.

The Energy Team will also review and update the Energy Conservation and Management Plan every 5 years as legislated by the Green Energy Act.

5.2 ASSET LEVEL

Once the annual Energy Action Plan is completed, it will be the responsibility of the operations team to implement the various action items. In particular, the individual with responsibility for the specific buildings will be responsible for the implementation of the initiatives associated with those buildings. Tracking and reporting will be included in the implementation to allow for measurement of the impact of the actions. Facility energy use will be tracked and communicated on a regular basis to those responsible for the various assets.

In addition, the department heads will review current practices of the facilities to ensure consistency across the Township.

6.0 EVALUATION

6.1 ENERGY PLAN REVIEW

The Energy Management Team will review progress towards the goals and objectives of the Energy Conservation and Demand Management Plan on an annual basis.

In addition, progress on the annual Energy Action Plan initiatives will be tracked and reviewed by the Energy Management Team on a quarterly basis. The regularly tracked energy consumption data will be used to evaluate the success of the implemented energy initiatives. To the extent possible, the costs and resulting energy and greenhouse gas savings of each energy initiatives will be calculated as part of the evaluation. The actions that were not completed by year's end will be re-evaluated for the potential inclusion in the following year's Energy Action Plan. By creating single-year Energy Action Plans, the Township will be able to adjust speed, size, and complexity of energy project based on current and future internal and external conditions.

6.2 ENERGY CONSUMPTION

The total energy consumption of the municipality is represented in total equivalent kilowatt hours (kWh). The Fuel Oil and Propane consumption has been converted into equivalent kWh (ekWh) and then added to the Electricity consumption, which is already stated in kWh.

The total 2013 consumption is 1.72 eGWh, which has grown from 1.69 eGWh in 2012, and 1.62 eGWh in 2011.
[1 eGwh = 1,000,000 ekWh]

Appendix A
Recommendations from 2006 Energy Audits

Summary of Initiatives from 2006 Energy Audits				
Completed (X) or Incomplete (O)	Action Item	Cost	Annual Savings	Payback (Years)
Eganville Arena / Eagle's Nest Hall				
<u>Eagle's Nest</u>				
O	Add new R24 roof membrane to Eagle's Nest roof	\$ 100,000	\$ 1,300	77
O	Implement ice temperature monitoring system to allow ice temperature to rise during off-hours and then chilled to appropriate hardness prior to occupied periods			
<u>Eganville Arena Lighting:</u>				
X	Replace arena light with energy efficient, metal halide fixtures	\$ 15,200	\$ 2,600	6
O	Replace all incandescent lights with T-8 fluorescent	\$ 780	\$ 288	3
O	Replace T-12 fluorescent with T-8 fluorescent	\$ 8,350	\$ 1,128	7
O	Replace all incandescent exit lamps with LED type lamps	\$ 500	\$ 108	5
<u>Eganville Arena Heating, Ventilation, and Air Conditioning:</u>				
O	Install low-emissivity (low-E) ceiling in arena to reduce ice surface heat gain	\$ 44,000	\$ 5,500	8
X	Insulate weather-stripping on south-facing overhead door	\$ 500	\$ 350	
O	Replace two (2) exterior overhead doors in arena with new R20 insulated doors	\$ 4,000	\$ 700	6
O	Install insulated motorized dampers on air intake/exhaust louvres in services areas	\$ 4,000	\$ 250	16
X	Replace bathroom exhaust fans with heat recovery ventilator with electric coil	\$ 10,000	\$ 1,400	7
O	Install programmable thermostats for temperature setback on baseboard heaters (3) in Eagle's Nest	\$ 300	\$ 200	0.5
O	Ventilation - install three 48" x 48" motorized dampers to prohibit outdoor air infiltration	\$ 3,000	\$ 100	30
O	Service area ventilation - install insulated motorized damper	\$ 1,000	\$ 150	7
Municipal Office / Bonnechere Museum/Library/Grattan Garage/Sewage Treatment Plant/Water Treatment Plant				
<u>Lighting upgrades</u>				
O	Municipal Office - replace T-12 with T-8 / replace exit lights with LED	\$ 4,227	\$ 1,012	4
X	Bonnechere Museum - replace T-12 with T-8 / replace incandescent with CFL	\$ 951	\$ 304	3
X	Library / Senior's Centre - replace T-12 with T-8	\$ 3,748	\$ 1,920	2
X	Grattan Garage/Office - replace T12 with T-8 / replace incandescent with CFL	\$ 1,563	\$ 368	4
X	Sewage Treatment Plant - replace T-12 with T-8	\$ 501	\$ 115	4
40% Complete	Water Treatment Plant - replace T-12 with T-8 / replace exit signs with LED	\$ 4,384	\$ 957	5
<u>High Efficiency Motors</u>				
X	Water Treatment Plant - replace 3 high lift pumps/motors	\$ 18,120	\$ 11,462	2
<u>Weather Stripping and Sealing</u>				
O	Old firehall - replace weather stripping and install floor sweeps	\$ 600	\$ 600	1
O	Sewage Treatment Plant - replace weather stripping/caulking	\$ 400	\$ 300	1
<u>Thermostats</u>				
O	Library - replace line type thermostats with programmable type	\$ 750	\$ 700	1
O	Grattan Garage/Office - replace line type thermostats with programmable type	\$ 600	\$ 600	1
O	Municipal Office - replace line type thermostats with programmable type	\$ 300	\$ 300	1