Town of Midland
Energy Conservation and Demand Management Plan
For the Period 2014 to 2019

July 2014

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Introduction:

The Town of Midland spends more than $1.2 million dollars per year on energy costs.[1] Each year the Town uses more than thirty-nine thousand gigajoules of energy and produces more than one million kilograms of greenhouse gases. We receive this information in the form of more than 700 energy invoices yearly for 46 different facilities.

This document presents the Town of Midland Energy Conservation and Demand Management Plan for the period of 2014 through to 2019. This plan is prepared as a requirement of Ontario Regulation 397/11 under the *Green Energy Act (2009).* The regulation requires that public agencies report on energy consumption and greenhouse gas emissions annually starting with 2011. Public agencies are also required to prepare Energy Conservation and Demand plans starting in 2014.

[1] 2012 Midland Energy Data

ENERGY MANAGEMENT COMMITMENT

Declaration of Commitment:

The Town of Midland is committed to adhering to the requirements of Ontario Regulation 397/11 of the *Green Energy Act*. It is our intent to allocate the resources necessary to develop and maintain a strategic energy management plan. Further to that, we intend to reduce our energy consumption and its related environmental impact by actually implementing energy saving and demand management initiatives on a yearly basis.

Vision:

Our vision is that the Town of Midland will exercise stewardship in our use of finite energy resources. We will demonstrate energy management leadership by routinely looking to optimize our delivery of services and the maintenance of our facilities.

Goal:

Our goal is to continually improve the energy efficiency of our facilities and processes year over year in order to reduce our operating costs, our energy consumption and the greenhouse gas emissions.

CURRRENT ENERGY CONSUMPTION – *WHERE WE ARE*

The *Green Energy Act* requires that in July 2014 we report our 2012 energy consumption information. In July of 2013 we reported our 2011 energy consumption information. Based on these audits of our energy bills for these two calendar years we are able to get a sense as to the current energy consumption position for Town of Midland facilities. A copy of the overall energy reports for both 2011 and 2012 are included at the end of this Plan.

Cost:

At the Town of Midland, we spend more than $1,200,000.00 annually on energy for the operation of our facilities.

- 2012 Energy bills cost: $1,207,734.00
- 2011 Energy bills cost: $1,127,612.00

Greenhouse Gas Emissions:

We produce more than one million kilograms of greenhouse gasses per year.[2]

- 2012 Green House Gas emissions: 1,183,203 kgCO2e
- 2011 Green House Gas emissions: 1,199,830 kgCO2e

Energy Consumption:

We consume more than thirty nine thousand gigajoules of energy per year. [3]

- 2012 Energy Consumed: 39,633 Gigajoules
- 2011 Energy Consumed: 38,496 Gigajoules

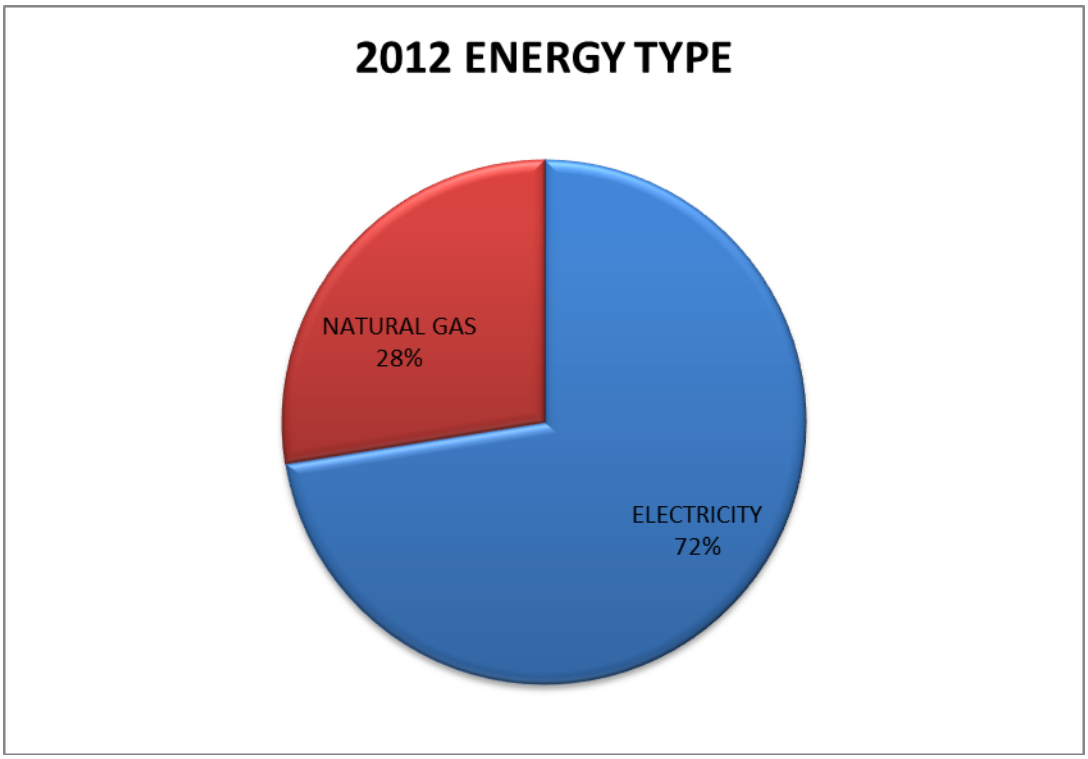
[2] Emission Factors used: 1.897 kgCO2/m3 Natural Gas, 0.08 kgCO2e/kwh(weighted average provided by LAS)
[3] Conversion Factors used: 1 kwh=0.0036 Gj, 1 m3 Natural Gas= 0.038 Gj

2012 Consumption by Energy Type:

The energy to operate our municipal facilities is supplied either as electricity or as natural gas. Our quantities of each type consumed for 2012 were:

- Electricity Consumed: 28,720 GJ (7,977,865 kWh)
- Natural Gas Consumed: 10,913 GJ (287,188 m3)

Figure 1



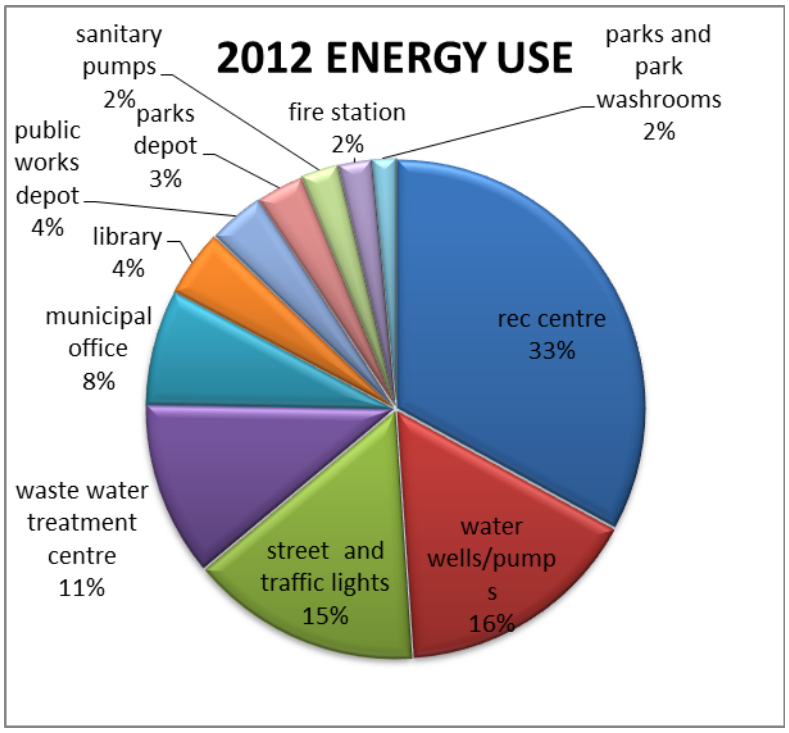
2012 Consumption by Facility Type:

The Town of Midland receives energy bills for a total of 46 locations. To make this data easier to understand we have grouped the bills by general facility type of use. A summary of the energy consumed by location is shown in Table 1 and Figure 2 below:

Table 1

Facility	ENERGY (GJ)
rec centre	13063.9
water wells/pumps	6320.9
street and traffic lights	5955.2
waste water treatment centre	4492.2
municipal office	2957.8
library	1725.2
public works depot	1441.5
parks depot	1232.0
sanitary pumps	970.5
fire station	864.2
parks and park washrooms	605.3

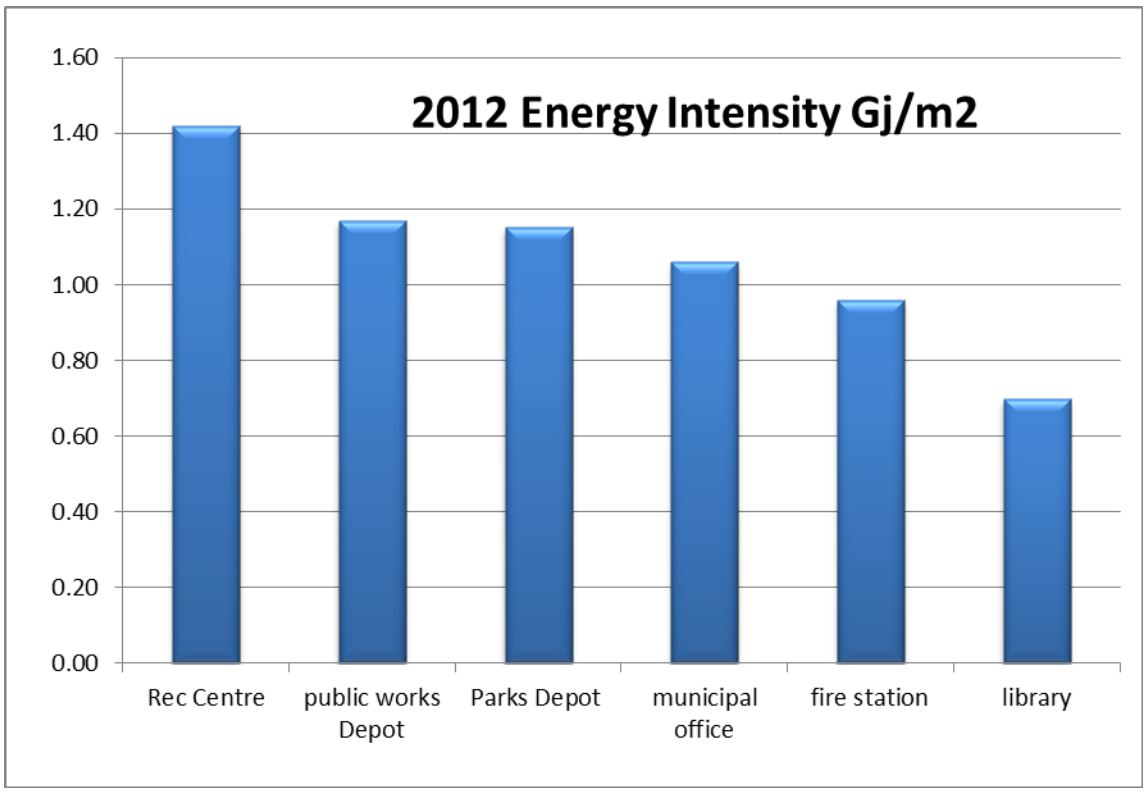
Figure 2



Energy Intensity by Building:

In a closer look at buildings only, it is worthwhile to consider the energy intensity by building. A chart of the energy use per m2 of building space is shown in Figure 3 below:

Figure 3



Typical Building Energy Intensities[4]:

Canadian Average:	1.58 Gj/m2
Ontario Average:	1.72 Gj/m2
Government Average:	1.38 Gj/m2

[4] Natural Resources Canada – Commercial and Institutional Energy Use – Summary Report December 2003

FUTURE ENERGY CONSUMPTION – *WHERE WOULD LIKE TO BE*

Ontario Regulation 397/11 requires public agencies to develop goals and objectives for conserving and otherwise reducing energy consumption as part of the Energy Conservation and Demand Management Plan.

Overall Target:

There is considerable debate over placing specific percentage reduction targets in energy plans. One theory is that there are too many variables to make any reduction targets meaningful. Changes in weather, assets, a decrease over time in the number and return of savings projects available and a myriad of other factors make accurate predictions of reductions difficult. On the other hand, by putting a specific percentage reduction goal in place, it gives something to strive for and measure against.

If we implemented *each* of the energy management initiatives (except cogeneration) that have been identified and investigated on a preliminary level in two energy audits conducted of Town Facilities in 2014 (see page 16), we could anticipate achieving a 2.7% decrease in energy consumption from the 2012 levels. This, coupled with the ongoing initiatives such as the LED streetlight replacement program, lead us to believe that a 5% reduction in energy consumption by 2017 from our 2012 levels seems a reasonable goal. Therefore:

Our target reduction of energy consumption in municipal facilities is 1% per year.

Objective:

Perhaps more importantly, our objective is to incorporate into normal municipal operations a process of continually identifying, examining and implementing initiatives to reduce energy consumption, demand and cost.

PLANNING - *HOW DO WE GET THERE?*

To achieve our target of overall energy production we have assigned a team of Town of Midland management staff to carry forward the planning and implementation of energy reduction initiatives.

Energy Team:

- Jamie Galloway, Town Engineer (Lead)
- Carolyn Tripp, Chief Administrative Officer
- Marc Villeneuve, Director of Finance/Treasurer
- Brian Peter, Director of Parks and Recreation
- Shawn Berriault, Director of Public Works
- Wes Crown, Director of Planning and Building Services
- Kevin Foster, Fire Chief
- Bill Molesworth, C.E.O. Midland Public Library
- Blaine Osmond, Energy Services Manager M.P.U.C.

Energy Initiative Planning:

The intent is that, prior to budgets being set for the following year, energy reduction initiatives would be proposed. From this proposed list, the viability of these projects would be researched and a short list of the most viable projects would be put forward to be included in the following year's capital budget. The selected projects would then be implemented as part of the following year's capital projects program.

The list of possible initiatives would be a live document. As ideas are identified they will be added to the list to determine viability.

ENERGY MANAGEMENT INITIATIVES - Completed or Ongoing
(Data is approximate)

In recent years staff has implemented a number of energy savings initiatives:

Changes to arenas ice flooding process (2009)
Description: floodwater conditioning system (reverse osmosis) and IR camera temperature schedule control
Cost: $31,423
Energy Savings/Year: 543 Gj
Cost Savings/Year: $10,867
Time to Payback: 2.9 years

Reduce floodwater temperature (2009)
Description: reduce floodwater temperature
Cost: $0
Energy Savings/Year: 86 Gj
Cost Savings/Year: $1,025
Time to Payback: 0 years

Replace lighting over arena ice surfaces (2009)
Description: Replace High Intensity Discharge (HID) lighting with T5 lights
Cost: $37,770
Energy Savings/Year: 201 Gj
Cost Savings/Year: $5,238
Time to Payback: 7.2 years

Replace lighting over gymnasium floor (2010)
Description: Replace High Intensity Discharge (HID) lighting with T5 lights
Cost: $7,974
Energy Savings/Year: 39 Gj
Cost Savings/Year: $903
Time to Payback: 8.8 years

Arena arcade machines removed (2011)

Description:	Arcade machines removed from arena lobby
Cost:	0
Energy Savings/Year:	15 Gj
Cost Savings/Year:	$540
Time to Payback:	0

Well #7 - Installation of a Variable Frequency Drive (2012)

Description:	Equipment to increase efficiency of pump operations.
Cost:	$28,551
Energy Savings/Year:	169 Gj
Cost Savings/Year:	$5,154
Time to Payback:	5.5 years

Operate water system pumps at night (2012)

Description:	water reserves are replenished at time of lowest energy cost
Cost:	$0
Energy Savings/Year:	0 Gj
Cost Savings/Year:	$40,000
Time to Payback:	0 years

Participate in LAS Natural Gas Procurement program (2012)

Description:	reduce long term cost of natural gas commodity price
Cost:	$0
Energy Savings/Year:	0 Gj
Cost Savings/Year:	$10,000
Time to Payback:	0 years

Reduce Power Factor on pump billings (2013)

Description:	Operate one pump at a time to reduce billing power factor
Cost:	$0
Energy Savings/Year:	0 Gj
Cost Savings/Year:	$5,000
Time to Payback:	0 years

Well #15 - Installation of a Variable Frequency Drive (2013)

Description:	Equipment to increase efficiency of pump operations.
Cost:	$5,742
Energy Savings/Year:	39 Gj
Cost Savings/Year:	$1,188
Time to Payback:	4.8 years

Vindin Flume - Installation of a Variable Frequency Drive (2013)

Description:	Equipment to increase efficiency of pump operations.
Cost:	$12,266
Energy Savings/Year:	72.5 Gj
Cost Savings/Year:	$2,209
Time to Payback:	5.6 years

Replace rec centre parking lot lights with high efficiency LED Streetlights (2013)

Description:	Increase efficiency of parking lot light operations
Cost:	$13,247
Energy Savings/Year:	74 Gj
Cost Savings/Year:	$2,240
Time to Payback:	5.9 years

Sustainability on reports (2014)

Description:	Increased awareness through notation on staff reports
Cost:	$0
Energy Savings/Year:	unknown
Cost Savings/Year:	unknown
Time to Payback:	0 years

Replace rec centre old change room and common area T12 lights with LED (ongoing)

Description:	Increase efficiency of change room light operations
Cost:	$10,000
Energy Savings/Year:	55 Gj
Cost Savings/Year:	$1680
Time to Payback:	6 years

NSSRC exit sign assemblies changed to LED (ongoing)

Description:	Incandescent exit signs changed to LED
Cost:	$440
Energy Savings/Year:	7 Gj
Cost Savings/Year:	210
Time to Payback:	2 years

Traffic Light assemblies changed to LED (ongoing)

Description:	Incandescent traffic lights changed to LED
Cost:	$25000
Energy Savings/Year:	140 Gj
Cost Savings/Year:	$4,237
Time to Payback:	6 years

Further Town Initiatives that have already been completed:

- A ‘green roof’ was installed at new library
- At Fire Hall when built in 1995:
    - in-floor heating at apparatus bay
    - low flush toilets
    - T8 lighting in offices
- At Fire Hall since 1995:
    - High efficiency boiler installed for apparatus bay in-floor heating
    - T12 lighting at offices replaced with T8
    - All exit signs converted to LED
    - High usage areas on motion sensor light switches
    - Outside lighting changed to light sensor activation

LED STREETLIGHTS PROGRAM UPDATE

Starting in 2012 the Town committed to a program of replacing the HPS streetlights with LED streetlights. These lights are being installed as part of the routine light maintenance and replacement carried out by PUC. Typically this means that a few lights are switched each Friday. Over time we are incurring the costs of this project and receiving the increased benefit. In total the expected project is as follows:

Replace 1,501 HPS Streetlights with high efficiency LED Streetlights (ongoing)

Description:	Increase efficiency of streetlight operations
Cost:	$1,177,220
Energy Savings/Year:	3,300 Gj
Cost Savings/Year:	$90,882
Time to Payback:	12.9 years

From an analysis of our 2012 vs 2013 Streelights Main Electricity Account

2012	4,608 Gj	$256,026
2013	3,221 Gj	$216,534
Savings	1,386 Gj	$39,492

These results are generally in line with what we would expect through 2013.

From M.P.U.C. information as of end of May 2014

As of the end of May 2014 we have installed 670 LED lights or roughly 45% of the total project.

Cost Incurred to Date	$616,643 or roughly 52% of the total project
Energy Savings to Date	967 Gj or roughly 30% of the total expected
Cost Savings to Date	$29,025 or roughly 32% of the total expected

Note: further savings of 541 Gj energy and $16,245 are expected in the rest of 2014

These results are generally in line with what we would expect at this point. There is a 'lag' from when the costs are incurred in full to when we see a full year's worth of benefit.

ENERGY MANAGEMENT INITIATIVES - Contemplated or Proposed
(Data is approximate)

The following possible initiatives have been identified and investigated on a preliminary level in two energy audits conducted of Town Facilities in 2014:

WWTC 'cogeneration' unit to burn methane produced at treatment plant

Description:	generate heat and electricity from methane produced
Cost:	TBD - $55,000 funding available for investigation/design
Energy Savings/Year:	900 Gj
Cost Savings/Year:	TBD
Time to Payback:	TBD

Well #1 Variable Frequency Drives on high lift pumps

Description:	VFD's optimize pump speed based on flow required
Cost:	$10,000 less $3,980 available funding
Energy Savings/Year:	180 Gj
Cost Savings/Year:	$5,400
Time to Payback:	1.5 years

WWTC Variable Frequency Drives on aerator motors

Description:	VFD's optimize aerator speed based on oxygen required
Cost:	$20,000 less $5,350 available funding
Energy Savings/Year:	433 Gj
Cost Savings/Year:	$12,990
Time to Payback:	1.5 years

WWTC Variable Frequency Drives on pump station 2 pumps

Description:	VFD's optimize pump speed based on flow required
Cost:	$3,500 less $1,610 available funding
Energy Savings/Year:	61 Gj
Cost Savings/Year:	$1,800
Time to Payback:	1 year

NSSRC lighting replacement at the rinks and the gymnasium

Description:	replace F54T5H0 fixtures with LED
Cost:	$80,000 less $7,040 available funding
Energy Savings/Year:	317 Gj
Cost Savings/Year:	$9,530
Time to Payback:	8 years

NSSRC Variable Frequency Drives on brine pumps at rink heat exchange systems

Description:	VFD's optimize pump speed based on brine temperature
Cost:	$8,500 less $2,940 available funding
Energy Savings/Year:	72 Gj
Cost Savings/Year:	$2,166
Time to Payback:	3 years

NSSRC building recomissioning

Description:	optimize performance of existing HVAC system
Cost:	$15,000 less $7,500 available funding
Energy Savings/Year:	unknown
Cost Savings/Year:	unknown
Time to Payback:	2 years typical

Library lighting replacement

Description:	replace various halogen and incandescent fixtures with LED
Cost:	$1,500 less $1,500 available funding
Energy Savings/Year:	10 Gj
Cost Savings/Year:	$300
Time to Payback:	0 years

Library building recomissioning

Description:	optimize performance of existing HVAC system
Cost:	$5,000 less $2,500 available funding
Energy Savings/Year:	unknown
Cost Savings/Year:	unknown
Time to Payback:	2 years typical

The following possible initiatives have been identified but not yet investigated in terms of viability:

Energy Consumption Savings initiatives:

- Insulation pipes at pumphouse number 7
- Dehumidification/return brine heat recovery at rinks
- Rewire to adjust lighting levels in lobby
- Install controls on heat trace wires at rec centre
- Paint ceiling a low emissivity paint at new rink at rec centre
- Insulate south wall of new rink at rec centre
- Private controls company review (Thermostopper Johnson Honeywell)
- Change exit light assemblies to LED at all buildings
- Reduction of light levels at municipal office
- Upgrade outdoor wall packs to LED
- Ensure seals proper at windows and doors
- Ensure outdoor air dampers working properly
- Consider LEED standard on all new municipal construction
- Install heat recovery ventilators (HRV's) at arena exhaust fans

Energy Demand Savings initiatives:

- Participate in Demand Response program for pump at well 7
- Participate in Demand Response program for NSSRC

Energy Cost Savings initiatives:

- Top up tanks just before daily rate change
- Participate in LAS Electricity Procurement program
- Get streetlights billing to 'variable' billing

Renewable Energy Utilized or Planned:

The Town of Midland aspires to show leadership in the promotion and development of renewable energy systems that are compatible with our Asset Management Plan and land use planning objectives. As a result, we have investigated the potential to develop solar photovoltaic systems on the rooftops of corporate facilities with sound, south-facing roofs and in traffic sign power.

Through 2012 and 2013, staff researched rooftop solar panels through a lease agreement with 'Moose Power'. Specifically, the possibility of placing solar panels on the roof of the NSSRC was investigated. Unfortunately, a structural investigation revealed that the rooftop could not carry the additional load of the panels and any snow load accumulation due to the panels.

When the new library facility was constructed in 2012 the structure was constructed to be able to receive future solar panels on the roof of the new portion. It was built with excess structural capacity and there are empty conduit running to the roof ready to receive the cabling required for these panels.

By the end of 2014 Midland will have ten 'school zone flashing light' signage assemblies in place. Eight of these ten assembles will run entirely on solar power.

REVIEW AND EVALUATION

Annual Energy Plan Review:

We will review and evaluate this Energy Conservation and Demand Management Plan annually, focussing on specific initiatives to advance in the following years budget and capital program. The list of potential energy management initiatives will serve as an ongoing live document.

5 Year Energy Evaluation and Plan Revision:

The *Green Energy Act* requires that each municipality revise and bring up-to-date its Energy Plan every 5 years. In 2019 the Town of Midland will be revising and resubmitting its energy plan. It will include a comparison of our progress towards our 2012 to 2017 targets. At this 5 year mark the intent would be to re-evaluate our goals and our program of achieving them based on new technology, funding programs and any other resources available at the time, including a review of our energy consumption, GHG's and $'s spent. It is expected that in the 2019 plan fleet fuel energy consumption will also be included.

2011 Energy Consumption Data

Facility	ELECTRICITY (kWh)	NATURAL GAS (m3)	COST ($)	ENERGY (GJ)	GHG EMISSIONS (kgCO2e)
55 wilson road	215	0	156	0.8	17
BIA lighting	1072	0	312	3.9	86
carpenter park	1344	0	503	4.8	108
dock office	75060	1047	10263	310.0	7992
Dominion Ave. water storage	112259	0	20186	404.1	8981
Everton water tank and pump	12145	0	2166	43.7	972
fire station	104665	13105	18045	874.8	33242
Fountain	12672	0	1586	45.6	1014
Golf Link Estates Street Lighting	7392	0	1050	26.6	591
library	319700	19434	48632	1889.4	62454
Little Lake Park - Bandstand Washroom	4211	0	668	15.2	337
Little Lake Park 646	2687	0	528	9.7	215
little lake park tennis courts	1403	0	421	5.1	112
Little Lake Park Washroom - 608	8074	0	1307	29.1	646
Little Lake Park washroom - 700	1619	0	388	5.8	130
Midland Point Street Lights - 1	15411	0	2237	55.5	1233
Midland Point street lights - 2	14061	0	2014	50.6	1125
Montreal Street booster and tower	109500	0	17885	394.2	8760
municipal office	395472	37298	65551	2841.0	102415
old sunnyside pumphouse	21371	0	3458	76.9	1710
Parks Depot - A	80311	11272	14887	717.5	27815
Parks Depot - B	0	15365	6095	583.9	29157
Petterson Park	14401	0	1746	51.8	1152
police garage	9671	0	1846	34.8	774
public works maintenance	111542	31965	25372	1616.2	69581
public works new service	14466	0	1906	52.1	1157
Rec Centre	1709076	182985	267468	13106.1	483962
sewage pump station #4	32687	0	4093	117.7	2615
sewage pump station number 1	134016	0	21033	482.5	10721
sewage pump station number 3	8625	1418	2512	84.9	3381
sewage pump station number 6	21413	0	2750	77.1	1713
sewer pump station #7	0	1114	846	42.3	2114
soccer park	0	0	0	0.0	0
street lighting	1231222	0	242340	4432.4	98498
Sundowner Road pump house	0	0	0	0.0	0
Sunnyside street lights	31635	0	4696	113.9	2531
Tiffin Park	16355	0	6241	58.9	1308
traffic lights	181702	0	23882	654.1	14536
vindin street flume pumphouse	361063	0	47773	1299.8	28885
Vindin well field	52509	60	7392	191.3	4315
waste water treatment centre	1062182	11904	127803	4276.2	107564
well 15	192395	0	23147	692.6	15392
well 7	516713	0	65490	1860.2	41337
well 9 - booster station	239824	0	30940	863.4	19186
William Street shop	0	0	0	0.0	0
	7242141	326967	1127612	38496	1199830

2012 Energy Consumption Data

Facility	ELECTRICITY (kWh)	NATURAL GAS (m3)	COST ($)	ENERGY (GJ)	GHG EMISSIONS (kgCO2e)
55 wilson road	9547	0	1429	34.4	764
BIA lighting	1303	0	422	4.7	104
carpenter park	1344	0	503	4.8	108
dock office	93021	800	12329	365.3	8960
Dominion Ave. water storage	149173	0	22821	537.0	11934
Everton water tank and pump	35049	0	5756	126.2	2804
fire station	111919	12140	20254	864.2	31991
Fountain	12672	0	1586	45.6	1014
Golf Link Estates Street Lighting	10472	0	1551	37.7	838
library	304262	16576	46845	1725.2	55796
Little Lake Park - Bandstand Washroom	5569	0	891	20.0	446
Little Lake Park 646	2687	0	528	9.7	215
little lake park tennis courts	1403	0	421	5.1	112
Little Lake Park Washroom - 608	8688	0	1231	31.3	695
Little Lake Park washroom - 700	1784	0	513	6.4	143
Midland Point Street Lights - 1	16812	0	2585	60.5	1345
Midland Point street lights - 2	15192	0	2326	54.7	1215
Montreal Street booster and tower	111859	0	17546	402.7	8949
municipal office	368766	42093	61729	2927.1	109378
old sunnyside pumphouse	21371	0	3458	76.9	1710
Parks Depot - A	84018	10753	15340	711.1	27127
Parks Depot - B	0	13709	5835	520.9	26014
Petterson Park	14513	0	1794	52.2	1161
police garage	8525	0	1288	30.7	682
public works maintenance	129697	23852	26080	1373.3	55638
public works new service	18959	0	2510	68.3	1517
Rec Centre	1958132	158280	278512	13063.9	457006
sewage pump station #4	46740	0	5880	168.3	3739
sewage pump station number 1	167674	0	24190	603.6	13414
sewage pump station number 3	10421	999	2737	75.5	2729
sewage pump station number 6	25340	0	3287	91.2	2027
sewer pump station #7	0	839	1108	31.9	1592
soccer park	1678	0	455	6.0	134
street lighting	1407489	0	275162	5067.0	112599
Sundowner Road pump house	55041	0	9843	198.1	4403
Sunnyside street lights	28739	0	4542	103.5	2299
Tiffin Park	16339.44	0	7805	58.8	1307
traffic lights	175526	0	25234	631.9	14042
vindin street flume pumphouse	337987	0	46181	1216.8	27039
Vindin well field	69145	91	9362	252.4	5704
waste water treatment centre	1173102	7056	136188	4491.3	107238
well 15	244176	0	29661	879.0	19534
well 7	528263	0	63923	1901.7	42261
well 9 - booster station	193224	0	25873	695.6	15458
William Street shop	244	0	222	0.9	20
	7977865	287188	1207734	39633	1183203