The City of Woodstock's 2020-2024 Conservation and Demand Management Plan

city of Woodstock

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1.0 Introduction

The City of Woodstock's Conservation and Demand Management (CDM) plan has been developed to help better understand, track, manage and reduce energy consumption. The Ontario Provincial Government requires public agencies, including municipalities, to report on their energy consumption and greenhouse gas (GHG) emissions annually and to develop and implement CDM plans every five years. This 2020-2024 CDM plan is Woodstock's second plan under the legislation. The previous 2014-2019 CDM plan as well as the required annual energy consumption and GHG emissions reporting can be found on the City's website.

Woodstock's 2020-2024 CDM plan aims to provide the next phase for implementing improvements to facilities which reduce energy consumption, greenhouse gas emissions, and their associated costs. This plan establishes goals and objectives for the next five (5) years in conjunction with the capital budget and planning process.

2.0 The 2015-2019 CDM Plan

The City focused on RTU replacements and installation of building automation systems (BAS). RTU replacements help to conserve energy by using high efficiency electric motors and variable frequency drive, adding ventilation control which cuts down the intake of fresh air when it is not needed, including programmable thermostats for set-back times, and improving efficiency for the natural gas burners. BAS computer control systems of all HVAC equipment in a building ensures maximum system efficiency and performance levels are obtained.

Action Items

The following outlines the measures and actions the City of Woodstock planned to put in place at various facilities from 2015-2019 in order to conserve and reduce energy consumption.

Community Complex

Action Item	Forecast of the expected results	Savings estimate	Estimated time	Complete?
RTU #5 and RTU #7 replacement (estimated cost of $4,375)	2,364 kWh reduction per year *per unit* 811 m^3 reduction per year *per unit*	$2,094 per year ($236 per unit for electrical savings and $811 per unit for natural gas savings)	20 years	RTU #5 complete 2016 RTU #7 not complete
RTU #9 replacement (estimated cost of $8,750)	4,893 kWh reduction per year 1,281 m^3 reduction per year	$909 per year ($489 per unit for electrical savings and $420 per unit for natural gas savings)	20 years	Complete
RTU #10 and RTU #11 replacement	16,975 kWh reduction per year *per unit*	$6,592 per year ($1,697 per unit	20 years	RTU #10 complete 2018

Action Item	Forecast of the expected results	Savings estimate	Estimated time	Complete?
(estimated cost of $33,500)	4,877 m^3 reduction per year *per unit*	for electrical savings and $1,599 per unit for natural gas savings)		RTU #11 not complete
Building Automation System (estimated cost of $43,000)	37,785 kWh reduction per year 19,548 m^3 reduction per year	$10,229 per year ($3,778 for electrical savings and $6,451 for natural gas savings	25 years	Complete 2016 - front area includes Goff Hall, lobby and gym club

Police Station

Action Item	Forecast of the expected results	Savings estimate	Estimated time	Complete?
Energy efficient lighting replacement	93,900 kWh reduction per year	$9,390 per year	25 years	Partially complete - underway

Southgate Centre

Action Item	Forecast of the expected results	Savings estimate	Estimated time	Complete?
Southgate Center RTU replacement – every year until 2018	2,200 kWh reduction per year *per unit* 900 m^3 reduction per year *per unit*	$450 per year *per unit*	20 years	Complete

Above and Beyond the Plan

In addition to the above noted energy conservation measures, the City also completed the following items over the course of the last five (5) years:

- Market Centre – installed west end HVAC building control system (2018)
- 447 Hunter Street – window replacement (2018)
- Police Station – RTU HVAC replacement (2018)
- Police Station – HVAC building control system (2018)

Community Complex

One of the goals and objectives of the 2014-2019 CDM plan was to:

> *Use the information obtained by the comprehensive energy audit conducted at the Woodstock District Community Complex in 2013 to reduce the energy consumption of the facility by 5%.*

The majority of the planned items for 2014-2019 were focused on the Community Complex. In comparing the 2012 normalized data with the 2016 data (the last year for which normalized data is available) as shown in the comparison chart below, the measures taken have helped to reduce GHG consumption by 40% and the energy intensity by 24%.

	2012		2016	
Community Complex	GHG (kg)	Energy Intensity (eWh/HDD/sqft)	GHG (kg)	Energy Intensity (eWh/HDD/sqft)
Goff Hall	36932.50	11.067	22233.20	8.422
Gym Club/Dance Studio	66893.91	11.067	40269.83	8.422
Arena	656381.50	11.042	396298.06	8.422

Bus Storage Facility and Fire Halls

One of the goals and objectives of the 2014-2019 CDM plan was to:

> *Reduce energy consumption by 10% in the top 3 facilities identified in the benchmark comparison and conduct energy audits on each facility to help identify areas for conservation and reduction.*

The facilities to be audited were the Bus Storage, the Parkinson Road Fire Hall and the Vansittart Avenue Fire Hall. An energy audit was performed at each facility in 2015. The audits were meant to help gain a better understanding of energy consumption and identify opportunities for savings and efficiency improvements to work towards the goal of a 10% reduction in consumption in each facility. The recommendations of the energy audits were as follows:

Bus Storage

- An interior and exterior lighting retro fit (complete)
- Setback/programmable thermostats (complete)
- Lowering the hot water temperature on the power washer (complete)
- Replacement of the electrical heating with heat pumps (not complete and not currently in the 5 year capital budget)

Parkinson Road Fire Hall

- An interior and exterior lighting retro fit (completed as part of the 2016 capital budget)
- Setback/programmable thermostats (complete)
- Replacement of the electrical heating with heat pumps (not complete and not currently in the 5 year capital budget)

Vansittart Avenue Fire Hall

- An interior and exterior lighting retro fit (completed as part of the 2016 capital budget)
- Setback/programmable thermostats (complete)
- Replacement of the AC unit (currently in capital budget for 2020)

The implemented recommendations of the audits had no significant impact on energy and GHG savings and reductions, as can be seen in the 2012 to 2016 comparison chart below. As such, energy audits on facilities will not be included as goals and objectives in the 2020-2024 CDM plan. However, energy audits will be considered in the future if major renovations are performed on a facility.

	2012		2016	
	GHG (kg)	Energy Intensity (eWh/HDD/sqft)	GHG (kg)	Energy Intensity (eWh/HDD/sqft)
Bus Storage	86386.89	13.000	89000.81	12.440
Fire Hall – Parkinson Rd	45385.44	7.637	35144.58	7.473
Fire Hall – Vansittart Ave	29719.05	9.873	31155.07	10.557

3.0 Energy Consumption

A requirement of the legislation is to include the annual energy consumption data for City facilities for the last year for which complete information is available for a full year. The consumption data for 2017 is found below:

Operation Name	Address	Total Square Footage	Electricity (kWh)	Natural Gas (Cubic Metre)
BUS STORAGE	65 Clarke St	11,790	37,465.78	46,503.195
CITY HALL	500 Dundas St	23,996	293,366.16	28,465.538
CIVIC CENTRE ARENA	895 Nellis St	28,529	408,246.23	25,967.977
COMMUNITY COMPLEX GOFF HALL	381 Finkle St	7,486	113,460.01	7,858.732
COMMUNITY COMPLEX GYM CLUB	381 Finkle St	13,559	205,504.18	14,234.110
COMMUNITY COMPLEX ARENA	381 Finkle St	133,435	2,022,380.02	140,078.798
ENGINEERING GARAGE	944 James St	20,018	164,786.77	33,328.0550
ENGINEERING OFFICES	944 James St	8,600	70,794.59	14,318.177
FIRE DEPARTMENT	251 Vansittart Ave	5,868	45,757.59	15,099.669
FIRE DEPARTMENT	1203 Parkinson Rd	12,480	123,301.20	17,075.981

Operation Name	Address	Total Square Footage	Electricity (kWh)	Natural Gas (Cubic Metre)
LION'S POOL	245 Vansittart Ave	2,567	20,035.83	7,160.987
MARKET CENTRE	22 Reeve St	25,200	116,325.62	12,142.181
PARK'S OFFICES	192 Wellington St S	1,920	8,846.88623	2,382.880
PARK'S WORKSHOP	192 Wellington St S	7,320	33,728.75	9,084.730
RECYLING FACILITIES	63 Clarke St S	11,520	66,767.76	18,667.623
SMALL BUSINESS CENTRE	453 Dundas St	5,225	21,944.66	1,665.826
SOUTHSIDE AQUATIC CENTRE	315 Finkle St	16,154	416,326.78	123,476.120
WOODSTOCK ART GALLERY 4th flr	449 Dundas St	6,763	2,219.82	2,537.274
WOODSTOCK ART GALLERY	449 Dundas St	26,976	326,023.27	10,120.583
WOODSTOCK MUSEUM	466 Dundas St	13,628	293,803.56	21,672.499
WOODSTOCK POLICE DEPARTMENT	615 Dundas St	24,058	502,440.24	39,482.015
WOODSTOCK PUBLIC LIBRARY	445 Hunter St	24,470	241,585.48	32,730.355
WORK STORAGE	944 James St	6,461	47,287.30	16,345.655

In accordance with section 5(7) of Ontario Regulation 397/11, the City of Woodstock will publish updated energy consumption information by July 1 of each year on the website.

Energy Intensity

The chart below shows the normalized data for energy intensity for each facility from 2012 to 2016. The energy intensity is trending downward in each facility except City Hall, Vansittart Ave Fire Hall, Lion's Pool, and the Small Business Centre.

	Energy Intensity (eWh/HDD/sqft)					
Operation Name	2012	2013	2014	2015	2016	% Change
BUS STORAGE	13.00033	12.12013	12.70813	14.09062	12.43991	-4%
CITY HALL	6.68244	6.07623	5.52982	6.89639	6.90224	3%
CIVIC CENTRE ARENA	6.69267	5.40565	5.21826	6.05940	5.98501	-11%
COMMUNITY COMPLEX GOFF HALL	11.06660	9.00216	8.54984	8.77811	8.42154	-24%
COMMUNITY COMPLEX GYM CLUB	11.06660	9.00216	8.54984	8.77811	8.42154	-24%
COMMUNITY COMPLEX ARENA	11.04200	9.00216	8.54984	8.77811	8.42154	-24%
ENGINEERING BUILDING GARAGE	7.77261	7.37249	7.39018	8.03651	6.78481	-13%
ENGINEERING BUILDING OFFICES	7.77261	7.37249	7.39018	8.03651	6.78481	-13%
FIRE DEPARTMENT Parkinson	7.63714	7.52954	7.38843	6.76726	7.47265	-2%
FIRE DEPARTMENT Van Ave	9.87287	10.08850	9.93264	7.17106	10.55728	7%

	Energy Intensity (eWh/HDD/sqft)					
Operation Name	2012	2013	2014	2015	2016	% Change
LION'S POOL	4.48086	6.65035	8.57479	8.71213	13.93542	211%
MARKET CENTRE	2.78608	2.55484	2.34981	2.41084	2.61963	-6%
PARK'S OFFICES			7.58515	6.67546	5.29364	-30%
PARK'S WORKSHOP	6.09327	5.69015	7.58515	6.67546	5.29364	-13%
RECYLING FACILITIES	6.04596	5.92552	6.28055	7.38301	5.30225	-12%
SMALL BUSINESS CENTRE	1.85096	1.91011	2.02290	2.02529	2.17063	17%
SOUTHSIDE AQUATIC CENTRE	28.49953	23.81016	22.57569	25.34006	23.80414	-16%
STORAGE FACILITIES	1.75442	1.38786	0.18861	0.21723	0.29268	-83%
WOODSTOCK ART GALLERY	5.66241	4.17580	3.36832	3.96944	4.54046	-20%
WOODSTOCK ART GALLERY 4th floor	1.77402	1.38786	1.40539	1.55521	1.31777	-26%
WOODSTOCK MUSEUM	13.60118	11.95471	10.91564	10.54654	10.04776	-26%
WOODSTOCK POLICE DEPARTMENT	9.81399	9.16241	8.34139	9.14999	9.62088	-2%
WOODSTOCK PUBLIC LIBRARY	8.50964	6.71951	6.30219	6.97716	6.65943	-22%
WORK STORAGE	7.94560	8.88083	9.13953	10.05235	7.57459	-5%

Green House Gas Consumption

The chart below shows the normalized data for GHG consumption for each facility from 2012 to 2016. The consumption is trending downward in each facility except Bus Storage, Vansittart Ave Fire Hall and Lion's Pool.

	GHG (kg)					
Operation Name	2012	2013	2014	2015	2016	% Change
BUS STORAGE	86386.89	161555.23	111109.48	112515.46	89000.81	3%
CITY HALL	67032.05	102958.12	59988.32	72585.79	62655.87	-7%
CIVIC CENTRE ARENA	81018.58	4796940.39	70653.94	75501.06	60034.30	-26%
COMMUNITY COMPLEX GOFF HALL	36932.50	49763.95	30546.81	28025.57	22233.20	-40%
COMMUNITY COMPLEX GYM CLUB	66893.91	90134.85	55327.83	50761.25	40269.83	-40%
COMMUNITY COMPLEX ARENA	656381.51	887022.87	544484.78	499544.79	396298.06	-40%
ENGINEERING BUILDING GARAGE	78734.59	140168.28	91294.39	91745.50	65450.89	-17%
ENGINEERING BUILDING OFFICES	33825.42	60218.16	39221.29	39415.09	28118.58	-17%

	GHG (kg)					
Operation Name	**2012**	**2013**	**2014**	**2015**	**2016**	**% Change**
FIRE DEPARTMENT Parkinson	45385.44	82935.86	51618.84	39106.81	35144.58	-23%
FIRE DEPARTMENT Van Ave	29719.05	1774.96	37385.91	22166.08	31155.07	5%
LION'S POOL	5463.72	14245.34	13521.94	11905.51	18369.97	236%
MARKET CENTRE	32430.06	51849.36	31123.73	27981.73	25334.25	-22%
PARK'S OFFICES			9881.24	7723.37	5244.79	-47%
PARK'S WORKSHOP	31046.25	55976.11	37672.21	29445.34	19995.75	-36%
RECYLING FACILITIES	37051.06	559493.44	47669.42	47968.46	30355.35	-18%
SMALL BUSINESS CENTRE	4248.53	7300.70	5279.53	5152.41	3743.00	-12%
SOUTHSIDE AQUATIC CENTRE	234007.28	363593.52	229355.12	231839.62	202025.32	-14%
STORAGE FACILITIES	357.94	334.47	161.97	172.17	186.49	-48%
WOODSTOCK ART GALLERY	45924.56	49100.02	37531.21	38976.46	32930.20	-28%
WOODSTOCK ART GALLERY 4th floor	13880.60	20842.83	7082.77	7130.67	5421.63	-61%
WOODSTOCK MUSEUM	82405.45	830173.71	71834.98	59207.82	47026.07	-43%
WOODSTOCK POLICE DEPARTMENT	104986.11	171029.63	99923.68	98631.43	87355.33	-17%
WOODSTOCK PUBLIC LIBRARY	99747.26	16090.47	83901.75	88728.92	71538.47	-28%
WORK STORAGE	26222.97	55551.65	37863.27	38384.75	25146.14	-4%

4.0 Goals and Objectives

The City of Woodstock has developed the following goal for conserving and reducing energy consumption and managing demand for energy as part of the 2020-2024 CDM plan.

- Continue to pursue energy conservation in all City facilities through the capital budget and planning process.

The City will focus on RTU replacements and installation of automated systems. RTU replacements help to conserve energy by using high efficiency electric motors and variable frequency drive, adding ventilation control which cuts down the intake of fresh air when it is not needed, including programmable thermostats for set-back times, and improving efficiency for the natural gas burners. Automated systems of all HVAC equipment in a building ensures maximum system efficiency and performance levels are obtained.

5.0 The Plan

This section outlines the measures and actions the City of Woodstock will put in place at various facilities over the next five (5) years to conserve and reduce energy consumption and work towards meeting the goals and objectives outlined in this plan.

Action Item and Cost Estimate	Forecast of the expected results	Savings estimate	Estimated time	Year
Art Gallery Replace RTU with a more efficient unit, $75,000	Electrical savings 16,000 kWh/year, 12 kW Gas savings 4,600 m^3/year	Electrical savings $1,600/year Gas savings $730/year	20 years	2019
Police Station Replace RTU with a more efficient unit, $30,000	Electrical savings 4,800 kWh/year, 3.5 kW Gas savings 1250 m^3/year	Electrical savings $480/year Gas savings $200/year	20 years	2019
Police Station HVAC automation system, $35,000	Facility runs 24 hours so only minor savings are expected		20 years	2019
Library Replace boiler with high efficiency unit, $80,000	Gas savings 4000 m^3/year	Gas savings $640/year	25 years	2020
City Hall HVAC automation system, $100,000	Electrical savings 20,000 kWh/year Gas savings 4800 m^3/year	Electrical savings $2,000/year Gas savings $750/year	20 years	2019
Cowan Park Indoor sports field LED lighting retrofit and controls, $75,000	Unknown	Electrical savings $17,000/year for lights and $9,000/year for controls	15 years	2019

Action Item and Cost Estimate	Forecast of the expected results	Savings estimate	Estimated time	Year
Market Theatre Replace RTU with a more efficient unit, $115,000	Electrical savings 17,000 kWh/year, 12 kW Gas savings 4,500 m^3/year	Electrical savings $1,700 Gas savings $720	20 years	2019
Van Ave Fire Hall HVAC replacement, $40,000	Electrical savings 2,300 kWh/year, 1.5 kW Gas savings 800 m^3/year	Electrical savings $250/year Gas savings $150/year	25 years	2020
Community Complex Replace RTUs with more efficient units $30,000 each year	Electrical savings 4,800 kWh/year, 3.5 kW Gas savings 1,200 m^3/year	Electrical savings $480/year Gas savings $200/year	20 years	2019, 2020, 2021
Southside Pool HVAC automated controls, $28,000	Electrical savings 40,000 kWh/year Gas savings 13,000 m^3/year	Electrical savings $4,000/year Gas savings $2,000/year	20 years	2019
Southside Pool, LED lighting retrofit, $15,000	Electrical savings 40,000 kWh/year	Electrical savings $4,000/year	15 years	2019

6.0 Renewable Energy

The City of Woodstock supports the expansion of renewable energy and is leading by example. The City currently has a total of 13 solar photovoltaic installations across the City. The chart below outlines the data for each installation as of June 12, 2019.

				Environmental Benefits	
Location	**Installation Date**	**Lifetime Energy (MWh)**	**Lifetime Revenue**	**CO2 Emissions Saved (kg)**	**Equivalent Trees Planted**
Commerce Way	7/6/2014	99.08	$ 39,341.09	38,840.91	129.8
Universal Road	7/16/2014	97.1	$ 38,696.29	38,062.01	127.2
Parkinson Road	7/17/2014	95.62	$ 37,179.30	37,482.47	125.26

				Environmental Benefits	
Location	**Installation Date**	**Lifetime Energy (MWh)**	**Lifetime Revenue**	**CO2 Emissions Saved (kg)**	**Equivalent Trees Planted**
Keyes Drive	11/1/2013	45.84	$ 39,413.38	17,969.30	60.05
Finkle Street (Complex)	7/17/2014	100.39	$ 40,364.84	39,352.51	131.51
Finkle Street (Aquatics)	7/23/2014	23.6	$ 11,858.53	9,252.47	30.92
Vansittart Avenue	7/24/2014	5.71	$ 32,451.59	2,237.49	7.48
Wellington Street	11/1/2013	59.07	$ 32,430.88	23,156.49	77.39
Springbank Avenue	6/12/2012	113.65	$ 58,186.42	45,549.06	148.88
Main Street	6/28/2012	69.3	$ 45,456.60	27,166.22	90.79
Ingersoll Avenue	4/25/2012	125.52	$ 66,693.70	49,204.72	164.43
Sutherland Drive	4/24/2012	77.66	$ 39,298.54	30,443.51	101.74
Springbank Avenue (2)	4/23/2012	63.62	$ 40,841.66	24,937.60	83.34
	Total	**976.16**	**$ 522,212.82**	**383,654.76**	**1,278.79**

7.0 Senior Management Approval

This CDM plan has been approved by David Creery, Chief Administrative Officer for the City of Woodstock, and presented to Woodstock City Council.

8.0 Conclusion

The City of Woodstock's Conservation and Demand Management plan has been developed so that the City can better understand, manage, conserve and reduce energy consumption. This plan provides a guide for the City to move forward on implementing improvements to facilities that reduce energy consumption and greenhouse gas emissions and their associated costs. The City is committed to the CDM plan and the annual energy consumption data submitted to the Ministry of Energy will continue to be used to track our progress.