



*The Regional Municipality of Halton*  
 Conservation and Demand  
 Management Energy Plan



Strategic Transformation Group - Energy, Fleet & Facilities  
 July 1, 2019

# Summary

Halton Region is committed to addressing climate change and identifying opportunities to take action. Environmental Sustainability and Climate Change was identified as one of the five themes in Halton Region's 2019–2022 Strategic Business Plan. Additionally, in September 2019, Halton Regional Council will be joining municipalities across Canada in declaring a climate emergency and placing an even greater emphasis on the actions identified in this plan.

The Region's Energy Management Strategy is one of the ways that we are working to protect the environment and reduce our carbon footprint from Regional operations. This includes finding solutions within our organization to:



- **reduce** energy consumption and greenhouse gas emissions,
- **recover** energy from operations,
- **shift away** from fossil fuel-based energy and
- **studies** help identify further opportunities through targeted empirical studies

In 2014, Halton Region introduced its first Conservation & Demand Management (CDM) Plan. Between 2013 and 2018, the Region implemented various reduction, recovery and shifting solutions across our facilities, water and wastewater process operations and street lighting on Regional roads. Results from tracking project energy reductions demonstrated that between 2014 and 2018 Halton achieved:

- A two percent reduction in energy consumption
- A reduction of over 168 tonnes of greenhouse gases
- Almost \$900,000 in annual energy cost savings

Our 2019 to 2023 Conservation and Demand Management (CDM) Plan will build on our successes and introduce new targets and actions to further reduce our carbon footprint. Our corporate-wide approach to energy management aligns with the targets set out in the Strategic Business Plan including:

- Five per cent reduction in greenhouse gas emissions related to Regional services
- Five per cent reduction in the hydro consumption/ megalitre of wastewater treated
- Five per cent reduction in the hydro consumption/ megalitre of water treated
- Ten per cent reduction in the hydro consumption required for Regional street lights
- Five per cent reduction in the hydro and heating consumption per square foot in corporate facilities

The potential for future energy and cost savings is significant. The following report outlines the specific actions we will be taking over the next four years to achieve the Strategic Business Plan targets set out above. Additionally, the potential energy reduction from all identified projects could yield a maximum energy cost savings of between 20 to 30% of the annual energy budget, once all projects are completed over a multi-cycle planning horizon.

This plan also recognizes that the actions of individuals and our partner organizations can add up and can make a significant difference in our community reduction efforts. We look forward to working with our local climate partners to see results and inspire others to contribute to a sustainable future for all.

The 2019 to 2023 Conservation and demand Management (CDM) Plan is approved by Senior Management.



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# Glossary of Terms

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## **Biogas**

Gases produced during the breakdown of organic materials (e.g.: methane).

## **CO<sub>2</sub>**

Carbon dioxide. Increase in CO<sub>2</sub> is a result of many natural and human activities. A notable greenhouse gas found in the Earth's atmosphere.

## **CEP**

Community Energy Plan. A roadmap to help a community conserve energy, reduce its carbon footprint, commit to a sustainable and secure supply of energy, and improve energy resilience.

## **CHP**

Combined Heat and Power. A process where electricity is generated using a fuel source and any useful heat energy resulting from this step is captured and used (i.e.: for heating). This allows for more efficient use of the fuel source.

## **CDM**

Conservation and Demand Management.

## **ECM's**

Energy Conservation Measures.

## **GHG**

Greenhouse Gas. These gases absorb and radiate heat energy easily and help maintain the Earth's temperature. If emitted in excess quantities, they can have negative impacts to the Earth's climate.

## **GigaJoule (GJ)**

A joule is a metric measurement unit of energy. Giga is a prefix referring to 1 billion. A Gigajoule is one billion joules. A GJ is used to measure energy from various types of power, such as electricity, natural gas and oil. Similar to equivalent kilowatt hours, the GJ provides a standard measurement that lets you calculate a single energy-intensity figure – a number you can then use to compare with those of other facilities.

## **HVAC**

Heating, Ventilation, and Air Conditioning.

## **kW**

Kilowatt. A unit of electrical power.

## **kWh**

Kilowatt hour. A unit of electrical energy.

## **LED**

a semi-conductor light source that emits light when current is passed through it, consuming considerably less energy than most conventional light sources, while achieving similar or better lighting performance.

## **M&V**

Measurement and Verification.

## **Methane**

A flammable gas which results from many natural and human activities and is an important source of fuel. Methane is a potent greenhouse gas.

## **MW**

Megawatt (equal to 1,000 kilowatts). A unit of electrical power.

## **MWh**

Megawatt hour (equal to 1,000 kilowatt hours). A unit of electrical energy.

## **NG**

Natural gas. A fossil fuel which consists primarily of methane.

## **PCP**

Partners for Climate Protection. A program sponsored by the Canadian Federation of Municipalities that includes a network of 350+ municipalities aimed at reducing greenhouse gas emissions and taking action on climate change.

# Introduction

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Halton Region is dedicated to planning for communities where urban sprawl is minimized, infrastructure is maximized, natural heritage is protected, and natural spaces and farmland are preserved.

With a population of more than 580,000 residents, it is essential that the Region continues to take an active role in creating a healthy, green and sustainable place to live. We do this by incorporating energy and demand management in our vision to preserve a landscape that is rich, diverse, balanced, productive and sustainable, and a society that is economically strong, equitable and caring for the current and future generations.

The overall goal is to enhance the quality of life for all people of Halton both today and in the future.

This Conservation and Demand Management (CDM) Plan will guide Halton Region through the managed control of its utility costs, energy use, greenhouse gas (GHG) emissions, the capture and re- use of available resources, and adopted green building and green procurement policies to deliver optimal results.

The CDM Plan is aligned with the existing Energy, Environmental, Resource and Operational Plans, augmented through polices for Green Procurement, New Construction and Renovation, Existing Building Operation and Maintenance, and Renewable Energy utilization. The Plan also outlines the areas of opportunity that will assist the Region in meeting its short and long term Environmental Sustainability and Climate Change objectives that are defined in the 2019-2022 Strategic Business Plan.



# Energy Management Strategy - Guiding Principles

Halton Region has developed and set out an overall strategy that aligns with existing Federal and Provincial strategies and legislation, as well as Halton's strategic environmental and energy reduction guidelines. Halton's Corporate Energy Management goals include adopting policies and implementing a strategic approach to managing energy and resources that will guide Halton to a future where:

- Energy is a managed resource.
- There is a reduced dependency on fossil fuels in program delivery.
- Energy consumed comes mainly from renewable sources, complemented by conservation programs.
- Energy generation and resource recovery from municipal operations are used to improve system resiliency and sustainability.
- Construction of new infrastructure and the replacement of existing equipment and processes with those designed to adopted green standards.

- Project viability is based on full life cycle costing that considers the four pillars of sustainability (economic, environmental, social and cultural).
  - A green procurement policy guides all future purchases.
- Additionally, an Energy and Resource Management Strategy will enhance service resilience and maximize benefits for



The Halton Waste Management Site converts landfill gas to electricity that is fed back into the local electricity grid as green power.

Halton Region while reducing consumption, recovering energy and resources from Region-owned assets, and shifting away from fossil fuel-based energy to renewable energy sources.



Reduce



Recover



Shift

 Studies

In order to accomplish these goals, the program focuses on three key themes to direct the conservation effort:

- **Reduce** costs and resource consumption without reducing the level of service.
- **Recover** energy and resources from available streams to realize a reduction in energy consumption and a reduction in the mass of material landfilled.
- **Shift** away from fossil fuels towards a more renewable energy mix through the integrative design of green buildings and systems, and site-specific opportunities to incorporate solar, wind, geothermal or hydraulic.
- Additionally, **Studies** will help to identify reduce, recover and shift projects to be included in future Conservation and Demand Management plans.

# 2014-2018 Conservation and Demand Management (CDM) Plan reporting

Under the Region's first Energy Conservation and Demand Management (CDM) Plan 2014 to 2018, the Region committed to reducing its impact on the environment and to the principles of conservation and sustainability through the development and implementation of a Corporate Energy Management Plan and a Corporate Sustainability Action Plan.

Common key themes from each plan were adopted into a single approach in order to provide a guide for effective energy management.

The adoption of the Green Building Policy for New Construction and Renovation, Greening of Existing Facilities Policy, along with the Green Procurement Policy provided

a comprehensive roadmap for integrating energy efficiency and sustainable practices into the Region's ongoing operations and projects.



Traffic Signals on all Regional roads are 100 % converted to LED lighting technology.

In reporting the accomplishments at the end of the first CDM Plan reporting period, the Region has made substantial progress towards incorporating energy conservation initiatives and introducing "green thinking" into corporate policy and practice.

## Annual Energy Consumption Reporting

As required under the legislation of the current *Broader Public Sector Regulation (O.Reg.507/18)*, Halton Region has submitted annual energy consumption reporting to the Ministry in order to comply with the requirements.

A summary of the annual energy consumption profile of the Region's operations in 2013 and the current Broader Public Sector reporting year of 2017 are noted on page 8 with an analysis of the consumption and growth experienced in each sector.

A high level analysis shows that the Region experienced growth between the two reporting years, which is reflected by the sector growth numbers in the Total Energy Consumption by Sector table on page 8. During this same time period, the Region realized a reduction in the energy utilized both in the water and facilities sectors, which can be directly attributed to the conservation measures implemented. In the Wastewater and Street and Traffic lighting sectors, an increase in the energy utilized over the two reporting periods does not directly correspond to the pattern of growth experienced in these sectors, indicating that conservation played a role in minimizing the full energy increase impact in these sectors.





### Treated Water (Mg/L)

2013  
64,081.21  
2017  
70,233.97

**% growth**  
9.60%



### Treated Wastewater (Mg/L)

2013  
86,084.75  
2017  
89,064.30

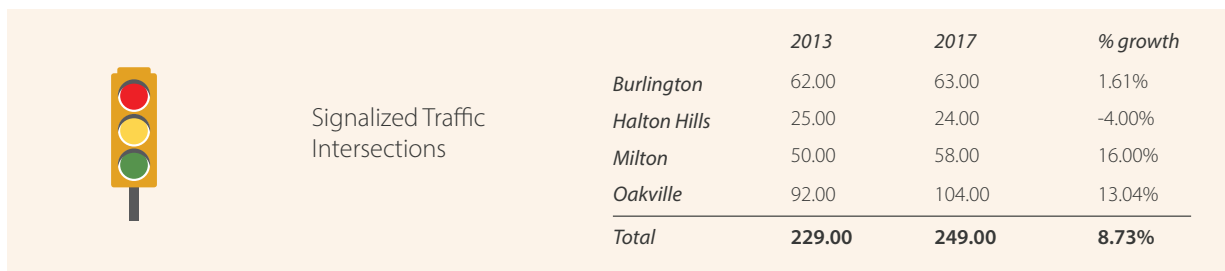
**% growth**  
3.46%



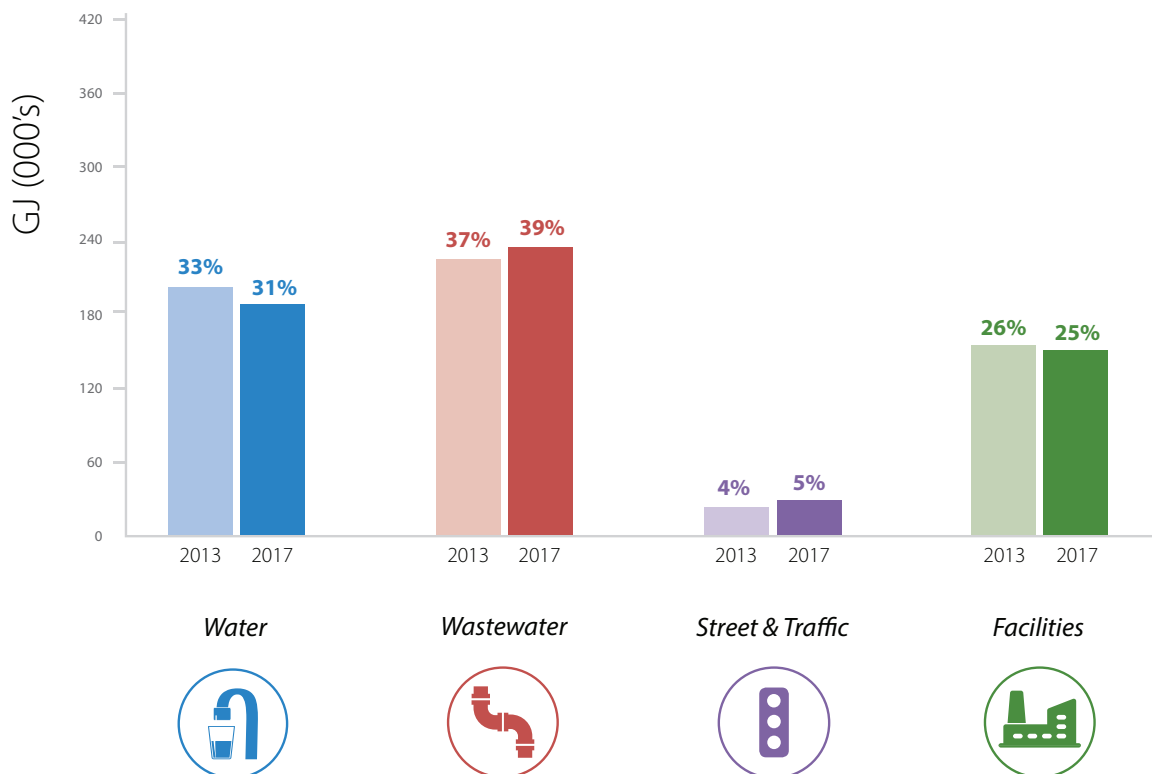
### Facility Floor Area (ft<sup>2</sup>)

2013  
1,046,049.00  
2017  
1,054,143.00

**% growth**  
0.77%



## Total Energy Consumption by Sector – 2013 vs 2017





# Completed Conservation Measures and Actual Results (2014 to 2018)

Halton Region completed the Energy Conservation Measures (ECM's) identified in the 2014 to 2018 CDM plan resulting in a 2.1% overall reduction in the energy consumption.



The implementation of a Green Procurement Policy to encourage the purchase of environmentally preferred goods and services, lowering the impact on the environment, human health and the cost of services are key considerations, within the policy aimed at conserving resources, protecting the environment, and reducing product packaging wherever possible.



The development and adoption of a Greening of Existing Buildings Policy to address energy consumption and greenhouse gas emissions in the operation of existing facilities through the implementation of accepted best practices. Policy goals include reducing energy consumption and greenhouse gas emissions in operational areas such as the implementation of building automation systems, lighting controls, and resource conservation and the selection of more energy efficient equipment during the end-of-life replacement by adopting a total cost of ownership approach including the ongoing completion of energy audits, and the implementation of waste reduction and water conservation strategies.



The development and adoption of a Green Building Policy for New Construction and Renovation that uses a tiered approach to Green Building Construction practices and considers facility use, occupancy and fiscal responsibility in assigning a level for green construction strategies with results geared towards reducing energy consumption through the facility and system design while maintaining a fiscally responsible approach and minimizing the environmental impact of new facilities.



The 2014 to 2018 CDM Plan also committed to undertaking several initiatives to improve energy efficiency in Public Works operations including improvements in water and wastewater plant and pumping and energy conservation in operations through improvements to street and traffic lighting.



*Actual results for all areas of Regional operations were tracked and tallied and are summarized on the following tables.*

# Summary of Completed Energy Conservation Measures (ECM's) - 2013 - 2018

## Facility Measures

Year	ECM's Implemented	Reduction (Demand KW)	Reduction (Electricity kwh)	Reduction (Natural Gas m3)	Savings (Dollars)	Reduction (tonnes of GHG)	Reduction (Gj's)
2013	Lighting, Control and Mechanical Retrofits - various locations	24.42	183,652.93	10,245.55	\$25,711.41	22.55	1,053.15
2014	Lighting, Control and Mechanical Retrofits - various locations	9	68,767	10,986	\$10,468.86	21.96	667.89
2015	Lighting, Control and Mechanical Retrofits - various locations	177.21	330,788.78	0.00	\$46,310.43	5.72	1,190.84
2016	Lighting, Control and Mechanical Retrofits - various locations	28.12	74,372.40	0.00	\$10,412.14	1.29	267.74
2017	Lighting, Control and Mechanical Retrofits - various locations	106.88	334,365.00	0.00	\$45,762.00	5.78	1,203.71
2018	Lighting, Control and Mechanical Retrofits - various locations	10.20	93,785.00	0.00	\$13,129.90	1.62	337.63
<b>Total</b>		<b>355.56</b>	<b>1,085,730.93</b>	<b>21,231.80</b>	<b>\$151,794.73</b>	<b>58.92</b>	<b>4,720.96</b>



Regional Facilities incorporate LED lighting, Occupancy and Daylight sensors to reduce electricity consumption during peak times.

## Street and Traffic Lighting Measures

Year	ECM's Implemented	Quantity (Fixtures)	Reduction (Demand KW)	Reduction (Electricity kwh)	Savings (Dollars)	Reduction (tonnes of GHG)	Reduction (Gj's)
2016	Traffic Signal Conversion to LED - All locations	1260	-	604,829.40	\$87,700.26	10.46	2,177.39
2017	Halton Hills Street Lighting Conversion to LED	742	135.12	548,050.00	\$79,467.25	9.48	1,972.98
2018	Oakville Street Lighting Conversion to LED	1932	312.25	1,266,477.00	\$183,639.17	21.91	4,559.32
<b>Total</b>		<b>3934</b>	<b>447.37</b>	<b>2,419,356.40</b>	<b>\$350,806.68</b>	<b>41.85</b>	<b>8,709.68</b>

## Water and Wastewater Measures

Year	ECM's Implemented	Reduction (Demand KW)	Reduction (Consumption KW)	Reduction (Natural Gas m3)	Savings (Dollars)	Reduction (tonnes of GHG)	Reduction (Gj's)
2013	Wastewater Plant Lighting & Controls Improvements	19.60	235,600.00	\$-	\$34,162.00	4.08	848.16
2014	Water Treatment Plant - Pump & Impeller Optimization	40.00	748,200.00	\$-	\$108,489.00	12.94	2,693.52
2015	Water Treatment Plant Improvements with Energy Efficient Motors, Variable Frequency Drives and Pump Sequencing Controls	110.00	978,000.00	\$-	\$141,810.00	16.92	3,520.80
2016	Aeration Tank Dissolved Oxygen (DO) Sensor Improvements	n/a	490,000.00	\$-	\$ 71,050.00	8.48	1,764.00
<b>Total</b>		<b>150.00</b>	<b>2,451,800.00</b>	<b>\$-</b>	<b>\$355,511.00</b>	<b>42.41</b>	<b>8,826.48</b>

## Total Energy Cost, Consumption and GHG Emissions by Sector - 2017

Sector	GJ's	Budget	GHG tonnes	Reduction *1 (GJ's)	Reduction (% GJ's)	Reduction (GHG tonnes)	Reduction (% GHG's)
Water	192,453.56	\$7,120,790.24	1,801.56	6,214.32	3.2%	12.55	0.7%
Waste Water	238,106.75	\$8,636,317.77	2,562.64	2,612.16	1.1%	29.86	1.2%
Street & Traffic	32,650.15	\$1,463,573.96	156.88	8,709.68	26.7%	41.85	26.7%
Facilities	150,053.79	\$3,710,840.22	3,661.98	6,691.23	4.5%	83.51	2.3%
<b>Total</b>	<b>613,264.24</b>	<b>\$20,931,522.18</b>	<b>8,183.06</b>	<b>24,227.39</b>	<b>4.0%</b>	<b>167.77</b>	<b>2.1%</b>

\*1 Reductions also include reductions from retrofit projects, and efficiencies gained through life cycle and operational efficiency improvements.



An annual savings of 24,200 GJ is the equivalent amount of energy used by 225 typical Ontario households in one year.



# 2019 to 2023 Conservation and Demand Management (CDM) Plan

## Adopting a corporate-wide approach to energy management

The 2014 to 2018 Conservation and Demand Management (CDM) Plan focused on energy conservation in Regional facilities, water and wastewater process operations and street lighting. The Plan did not address energy used from fleet vehicles, equipment or Halton Community Housing Corporation. Energy used in these sectors were addressed by specific plans within each program area.

## Current and Proposed Measures

Energy audits on all Corporate Facilities were conducted in 2016 and completed in 2017. The findings from these audits are summarized and presented in the following table. Additionally, a number of key initiatives were identified from a comprehensive Energy and Resource review completed by Public Works in 2017.

The goals of the Energy Audits and the Energy and Resource Plan were combined to create the overall guidelines of the Energy Conservation and Demand Management Plan, and are aimed at reducing energy consumption and greenhouse gas emissions and the capture and use of available resources from facilities,

waste, water, wastewater and road operations, with the intent of minimizing cost risk and maximizing service delivery to the Region and residents.

The recommendations identified under each of the completed studies were analyzed, tallied and compiled into a comprehensive listing of various Energy Conservation Measures (ECMs) and make up the work plan for the 2019 to 2023 Conservation and Demand Management (CDM) Plan period.

A summary of all the ECMs identified and those to be implemented during the CDM plan period are as indicated in the following tables.

## Corporate Energy Retrofit Program – 2019 to 2023

<b>CONSERVATION MEASURE - Various Locations</b>	<b>Total cost savings</b> (\$)	<b>Total energy savings</b> (GJ)	<b>Total measure cost</b> (\$)	<b>Simple payback</b> (years)
Lighting Retrofit and Re-design	\$298,980	7,490.6	\$1,982,291	6.6
Mechanical Modifications	\$439,484	1,664.2	\$2,939,644	6.7
Building Control Upgrades	\$280,088	2,120.0	\$379,562	1.4
Water Conservation	\$77,102	0.0	\$68,513	0.9
Building Envelope Upgrades	\$12,104	311.1	\$44,850	3.7
<b>Grand Total</b>	<b>\$1,107,758</b>	<b>11,585.9</b>	<b>\$5,414,859</b>	<b>4.9</b>

*Process improvement and resource recovery measures identified through the Energy and Resource strategy.*

# Energy & Resource Plan - 2019 to 2023

## Recommended Projects



### **REDUCE** Projects

Project Type	Capital Cost	20-Year Savings	Annual Savings	Rate of Return
Oakville SW / Skyway / Mid-Halton WWTPs Energy Reduction by Minimizing Operational Trains		\$2,900,000.00	\$145,000.00	Immediate
Optimize Aeration System and DO Control at Oakville SW and SE WWTPs	\$500,000.00	\$1,600,000	\$80,000.00	<10 years
Artificial Intelligence Software for Distribution System	\$2,000,000.00	\$10,000,000.00	\$500,000.00	~4 years
Denitrification at Skyway WWTP	\$700,000.00	\$1,700,000.00	\$85,000.00	<10 years
Continuous CEPT at Region's WWTPs	\$1,000,000.00	\$3,200,000.00	\$160,000.00	<10 years
Alternative Mixing for Digesters	\$1,500,000.00	\$2,800,000.00	\$110,000.00	~ 20 years



## RECOVER Projects

Project Type	Capital Cost	20-Year Savings	Annual Savings	Rate of Return
CHP for biogas energy recovery at Skyway WWTP	\$8,200,000.00	\$19,000,000.00	\$950,000.00	10-15 years
THP + CHP for biogas energy recovery at Skyway WWTP	\$32,600,000.00	\$12,000,000.00	\$600,000.00	>20 years
CHP for biogas energy recovery at Mid-Halton WWTP	\$8,400,000.00	\$22,000,000.00	\$1,100,000.00	10-15 years
THP + CHP for biogas energy recovery at Mid- Halton WWTP	\$36,400,000.00	\$17,000,000.00	\$850,000.00	>20 years
CHP for biogas energy recovery at Oakville SW WWTP	\$2,600,000.00	\$2,500,000.00	\$125,000.00	~20 years
CHP for biogas energy recovery at Oakville SE WWTP	\$2,600,000.00	\$1,700,000.00	\$85,000.00	~20 years
CHP for biogas energy recovery at Georgetown WWTP	\$2,500,000.00	\$3,300,000.00	\$165,000.00	~20 years
SSO Digestion Facility at HWMS	\$48,000,000.00	\$23,000,000.00	\$1,150,000.00	~ 10 Years
SSO Pulp Co-digest at Region's WWTPs	\$33,000,000.00	\$24,000,000.00	\$1,200,000.00	~ 10 Years



## SHIFT Projects

Project Type	Capital Cost	20-Year Savings	Annual Savings	Rate of Return
Solar Panel at the HWMS	\$50,000,000.00	Depends on Government Incentive Programs		
Solar Thermal Energy	\$100,000.00	\$200,000.00	\$ 10,000.00	~10 years



## STUDIES

In addition, a number of studies were identified that would be required to further assess additional Reduce, Recover and Shift projects to be included in future Conservation and Demand Management plans. These include:

Project Type	Capital Cost
Optimize WPPs Production	Engineering investigation required.
Side-stream Treatment at Skyway WWTP	Project under development by others.
Side-stream Treatment at Mid-Halton WWTP	Project under development by others.
Common SSO Digestion with A Third Party	Requires an investigation study (\$200K)
Composting Facility for SSO, Yard Waste Bio- solids	Requires an investigation study (\$200K)
Micro-grid at Region's PW site	Requires an investigation study (\$200K)
Geothermal Facility at Region's PW Site	Requires an investigation study (\$150K)

**Total annual savings for all projects: \$7,315,000.00**





## Alignment with External Partners and Agencies

The premise that ‘together we can accomplish more’ is an additional theme that is included in this CDM Plan. Once Regional Council officially declares a Climate Change Emergency, there will be increased opportunity for the Region to work jointly with the local municipalities and community partners to further the conservation efforts, demand management and greenhouse reductions.

Various external agencies, local community energy, environmental and sustainability groups, and the four Local Municipalities, all have a stake in how Halton Region manages its energy and environmental programs. Discussing opportunities to partner with these groups on energy and greenhouse gas reduction projects and initiatives can benefit everyone in the greater community.

In order to align with energy and greenhouse gas reduction initiatives moving forward, the Region will engage external partners to explore and leverage opportunities with the common goal of energy and greenhouse reductions, and align with existing programs that help to formulate a common approach including:

### 1. Partners for Climate Protection (PCP) Program

This program utilizes a milestone approach defined by the Federation of Canadian Municipalities and incorporates a series of five milestones as follows:

- i. Milestone one: Creating a Greenhouse Gas Emissions Inventory
- ii. Milestone two: Setting the Emissions Reduction Target
- iii. Milestone three: Developing the Local Action Plan

iv. Milestone four: Implementing the Plan

v. Milestone five: Measuring Progress – Monitor, verify & report on greenhouse gas reductions.

Since 2006, the Region has been tracking the energy consumption and carbon footprint of its energy consuming assets and operations. In 2014, Halton Region submitted, applied for and received credit for completion of Milestone 1 – Corporate Inventory, which set 2007 as the reporting base year.

The Region will continue to participate in the PCP Program in order to report reductions to its carbon footprint for initiatives implemented since 2007.

The Region has also committed sharing this information with external partners and agencies looking to incorporate energy and greenhouse gas emissions data into a broader inventory as may be required to secure funding through new government funded programs specific to energy and greenhouse gas reduction.

### 2. External Partner Agencies – Town of Oakville Community Energy Plan Task Force

The Region strives to expand its working relationship with external agencies delivering community based energy and environmental solutions within Halton. The Region is currently a member of the Town of Oakville’s Community Energy Task Force, participating alongside residents, community leaders from local businesses, government agencies, utilities, schools and community groups who have been invited to share their expertise in helping Oakville develop their Community Energy Plan (CEP).

# Project Implementation

Implementation of specific conservation and recovery projects and studies will be completed over the multi-year term of the Plan. When completed, the projects could realize a maximum potential energy reduction and cost savings of 20 to 30% and over \$7,000,000 per year.



## Energy and greenhouse gas reduction targets

Lastly, the CDM Plan aligns with the Halton Region 2019-2022 Strategic Business Plan, as it targets a reduction in energy consumption and CO2 emissions across Halton's entire portfolio as follows:



5% reduction in greenhouse gas emissions related to Regional Services;



5% reduction in the hydro consumption/megalitre of wastewater treated;



5% reduction in the hydro consumption/megalitre of water treated;



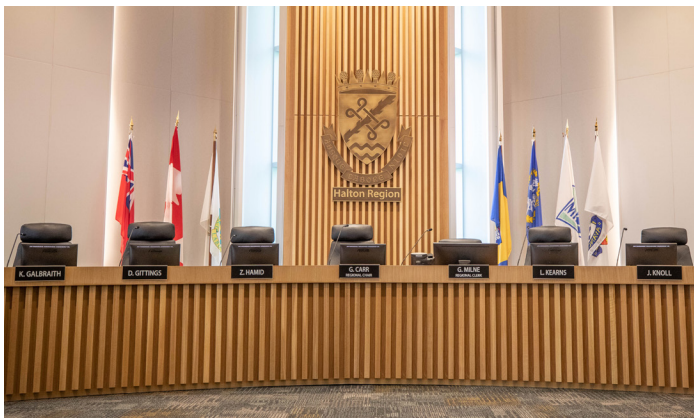
10% reduction in the hydro consumption required for Regional street lights; and



5% reduction in the hydro and natural gas consumption/square foot of Corporate facilities.







## Summary

By pursuing opportunities for energy conservation in all areas, and incorporating green building design, alternate energy production, energy management and sustainable operations, the Region will be able to make the best possible decisions regarding its energy conservation measures.

Halton Region will continue to make great strides towards establishing a Corporate Energy Management approach that achieves the goals of:

- Conserving and reducing energy use;
- Treating energy as a managed resource;
- Reducing dependency on fossil fuels;
- Redirecting energy consumed to come mainly from renewable sources;
- Investigating energy generation and recovery projects in municipal operations;
- Constructing new infrastructure and replacing existing equipment and processes to meet green standards;
- Reassessing project viability to be based on full life cycle costing and a triple bottom line approach; and
- Engaging external partners and agencies within the community.

The potential for future energy and costs savings is significant. By continuing to perform energy audits and feasibility studies, as well as implementing appropriate measures from these studies, procuring future goods and services in a green manner, building future assets to new greener standards, and promoting energy conservation through internal awareness campaigns, the Region will see significant reductions in energy consumption and greenhouse gas emissions.

By implementing all of the initiatives outlined in this Plan, Halton will be in a strong position to reduce energy and greenhouse gas emissions from Regional operations as well as contribute to a sustainable community.





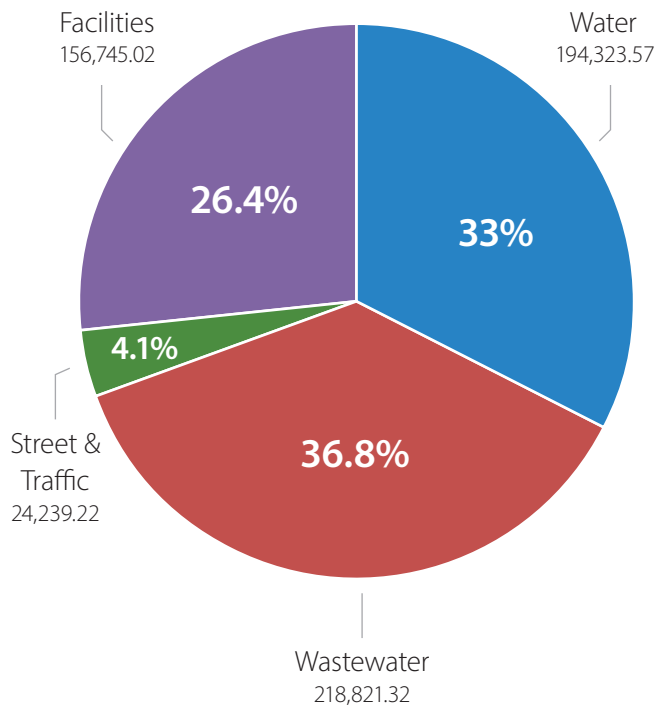
# Appendix

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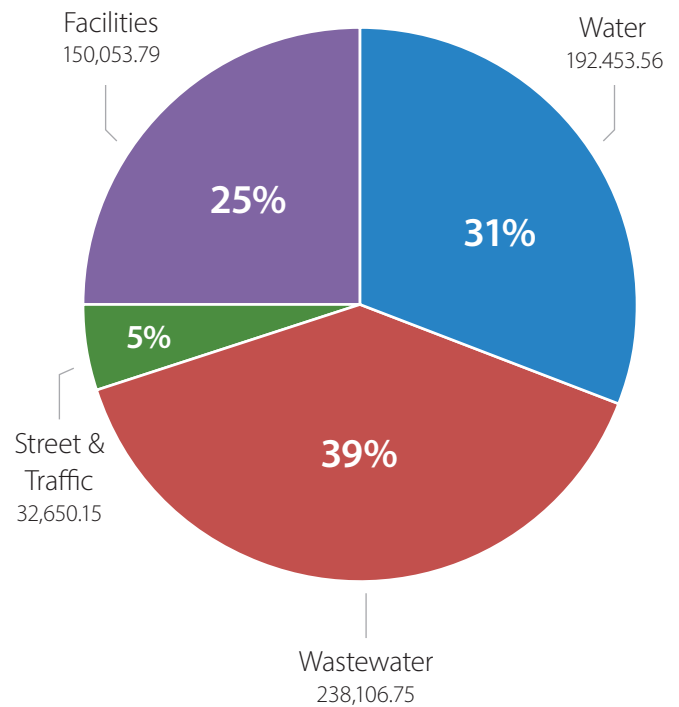


# Total Energy Consumption by Sector

In 2013,  
the Region's Energy Profile was as follows:



In 2017,  
the Region's Energy Profile was as follows:



## 2013 Breakdown

	GJ	\$	%
Water	194,323.57	\$6,111,639.49	32.7%
Wastewater	218,821.32	\$6,854,396.70	36.8%
Street & Traffic	24,239.22	\$999,681.10	4.1%
Facilities	156,745.02	\$3,480,506.45	26.4%
<b>Grand Total</b>	<b>594,129.13</b>	<b>\$17,446,223.74</b>	<b>100%</b>

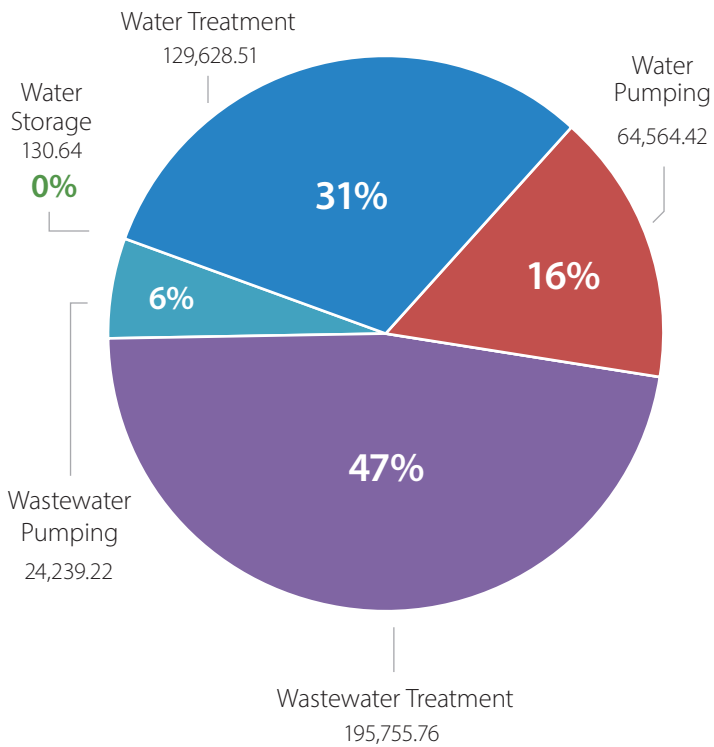
## 2017 Breakdown

	GJ	\$	%
Water	192,453.56	\$7,120,790.24	31.4%
Wastewater	238,106.75	\$8,636,317.77	38.8%
Street & Traffic	32,650.15	\$1,463,573.96	5.3%
Facilities	150,053.79	\$3,710,840.22	24.5%
<b>Grand Total</b>	<b>613,264.24</b>	<b>20,931,522.18</b>	<b>100%</b>

# Total Energy Consumption by Water/Wastewater Type

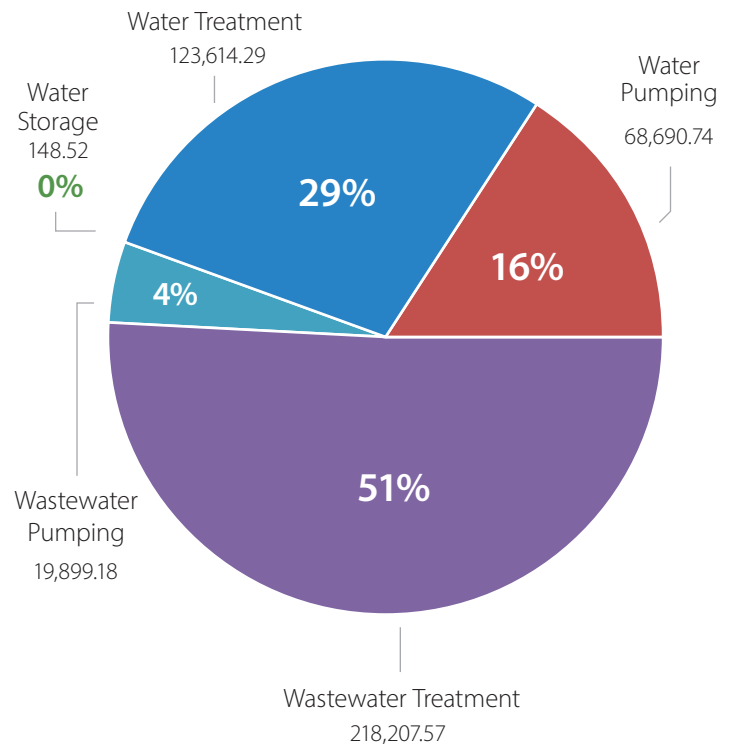
In 2013,

the total energy used by each water/wastewater type was:



In 2017,

the total energy used by each water/wastewater type was:



## 2013 Breakdown

	GJ	\$	%
Water Treatment	129,628.51	\$3,717,441.09	31.38%
Water Pumping	64,564.42	\$2,389,162.12	15.63%
Water Storage	130.64	\$5,036.29	0.03%
Wastewater Treatment	195,755.76	\$5,969,545.90	47.38%
Wastewater Pumping	23,065.57	\$884,850.80	5.58%
			<b>100%</b>

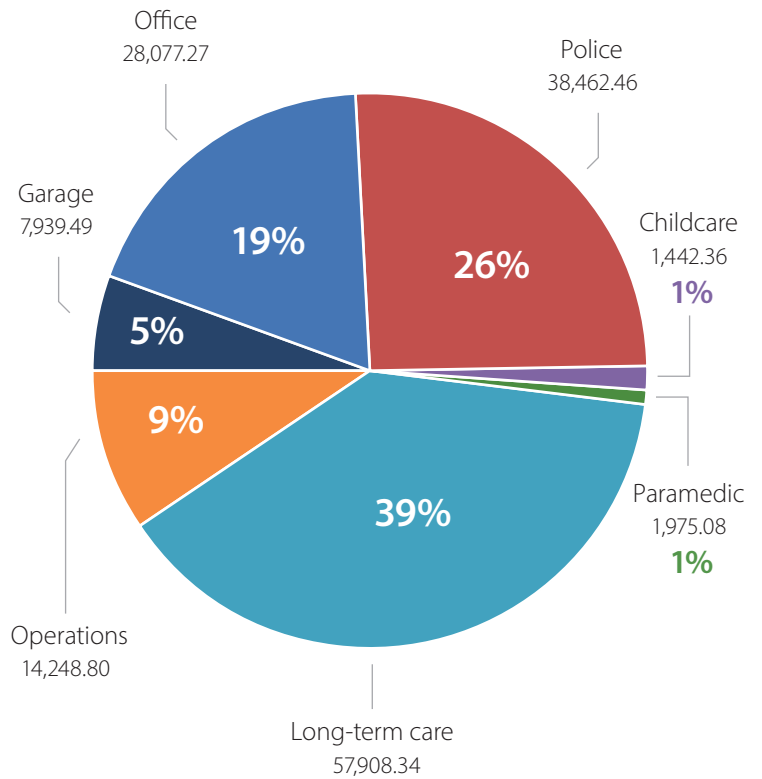
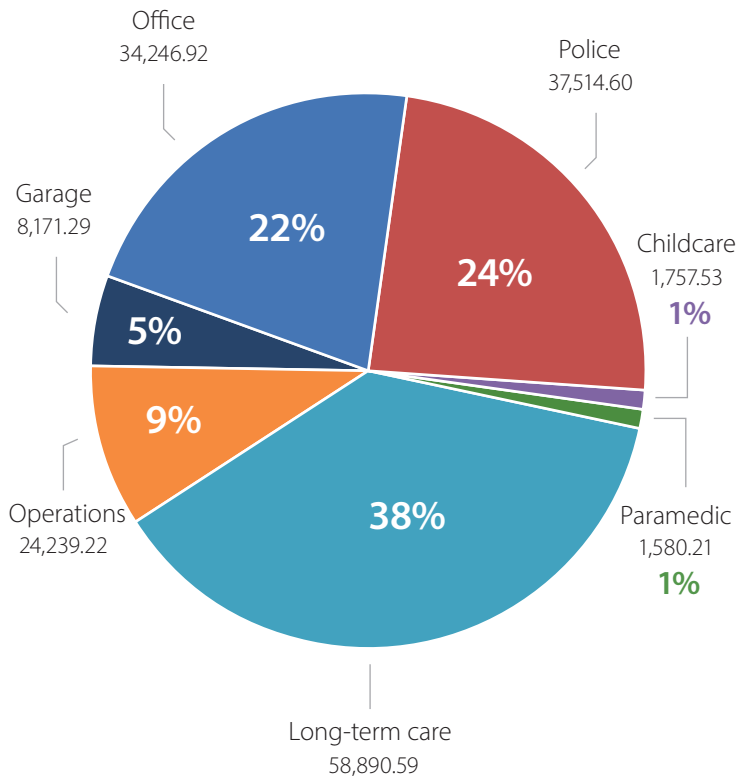
## 2017 Breakdown

	GJ	\$	%
Water Treatment	123,614.29	\$4,030,234.49	28.71%
Water Pumping	68,690.74	\$3,084,522.93	15.95%
Water Storage	148.52	\$6,032.82	0.03%
Wastewater Treatment	218,207.57	\$7,732,898.36	50.68%
Wastewater Pumping	19,899.18	\$903,419.41	4.62%
			<b>100%</b>

# Total Energy Consumption by Facility Type

In 2013,  
the total energy consumption by facility type was:

In 2017,  
the total energy consumption by facility type was:



## 2013 Breakdown

	GJ	\$	%
Office	34,246.92	\$716,849.17	21.85%
Police	37,514.60	\$762,875.90	23.93%
Paramedic	1,580.21	\$36,345.55	1.01%
Childcare	1,757.53	\$39,839.09	1.12%
Long-term care	58,890.59	\$1,199,460.17	37.57%
Operations	14,583.89	\$552,507.23	9.30%
Garage	8,171.29	\$172,629.34	5.21%
			<b>100%</b>

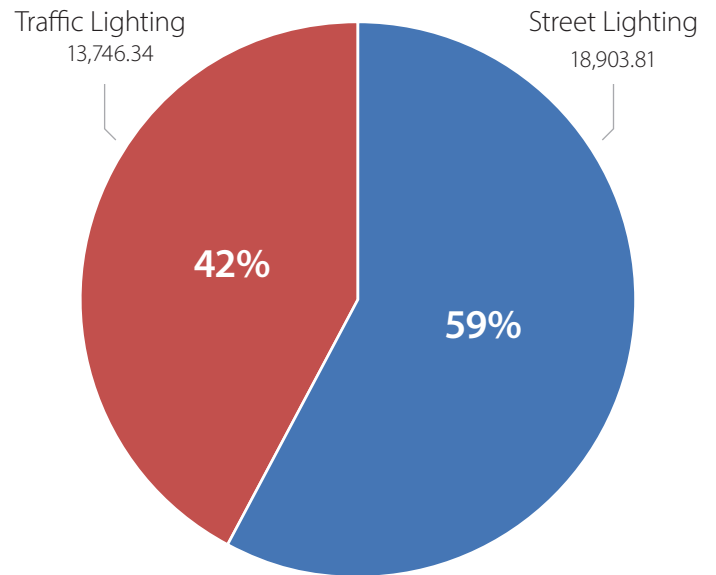
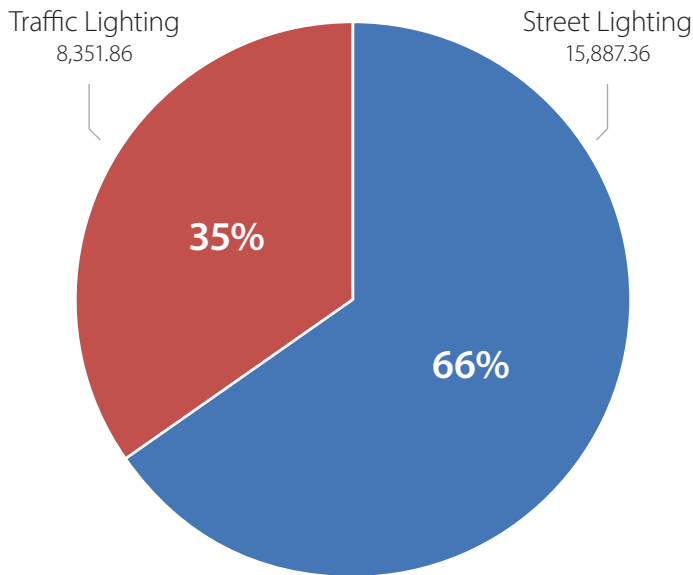
## 2017 Breakdown

	GJ	\$	%
Office	28,077.27	\$755,109.08	18.71%
Police	38,462.46	\$1,034,508.93	25.63%
Paramedic	1,975.08	\$49,887.76	1.32%
Childcare	1,442.36	\$38,037.72	0.96%
Long-term care	57,908.34	\$1,418,660.61	38.59%
Operations	14,248.80	\$52,080.78	9.50%
Garage	7,939.49	\$362,555.34	5.29%
			<b>100%</b>

# Total Energy Consumption by Street Lighting Type

In 2013,  
the total energy consumption by street lighting type was:

In 2017,  
the total energy consumption by street lighting type was:



## 2013 Breakdown

	GJ	\$	%
Street Lighting	15,887.36	\$684,088.72	65.54%
Traffic Lighting	8,351.86	\$315,592.38	34.46%
			<b>100%</b>

## 2017 Breakdown

	GJ	\$	%
Street Lighting	18,903.81	\$1,042,293.12	57.90%
Traffic Lighting	13,746.34	\$421,280.84	42.10%
			<b>100%</b>