2019 5-YEAR ENERGY CONSERVATION AND DEMAND MANAGEMENT PLAN

THE TOWNSHIP OF NORTH DUMFRIES

June 26, 2019

The TOWNSHIP of NORTH DUMFRIES

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DEFINITIONS

ECDM - Energy Conservation and Demand Management
GHG - Greenhouse Gases
EUI - Energy Use Intensity
ECM - Energy Conservation Measures
mtCO2e - Metric Tonnes of CO2 equivalent
ekWh/sqft - Equivalent kWh per square foot

1 INTRODUCTION

This Energy Conservation & Demand Management (ECDM) plan was created in accordance with the requirements described in Ontario Regulation 507/18 under the Electricity Act. It provides a roadmap for energy management in The Township of North Dumfries for the next five years (2019 - 2023). The main objectives of this plan are:

- To examine historical energy consumption and GHG emissions, as well as energy conservation measures (ECMs) that have been implemented since the 2014 draft ECDM plan (Note: the 2014 draft ECDM plan was not passed by council. Only a draft report was found).
- Examine whether the goals of the 2014 draft ECDM plan have been met, and set goals for the 2019 ECDM plan to be met by 2024.
- Examine what ECMs and strategies can be implemented in the next five years to meet the goals set out in the 2019 ECDM plan.

All three objectives will come together to form a complete roadmap that will determine the priorities, technologies, projects, and opportunities required to achieve The Township of North Dumfries' corporate energy and GHG goals.

2 FACILITIES

2.1 Baseline

A list of the facilities included in this section are summarized in Table 1.

Table 1: Township of North Dumfries facilities list

Building	Category	Address	Year	Area [sqft]
Ayr Fire Station	Fire station	501 Scott Street	1,990	15,752
Roseville Community Centre	Indoor facility	3195 Roseville Road	1,977	3,054
Ayr Community Centre	Indoor recreation facility	7 Church Street	1,945	30,012
North Dumfries Community Complex	Indoor recreation facility	2958 Greenfield Road	2,011	73,722
North Dumfries Public Works Depot	Storage facility	1168 Greenfield Road	2,008	17,212
Schmidt Park	Storage facility	53 Hilltop Drive	2,003	1,200
Victoria Park	Storage facility	75 Rose Street	1,960	800

2.1.1 Energy Consumption

Figure 1 summarizes The Township of North Dumfries' annual electricity and natural gas consumption from 2014 - 2018.

An increase in annual electricity consumption was seen in the fire station and storage facilities in 2014 but has remained relatively constant otherwise.

An increase in annual natural gas consumption was seen in the indoor recreation facilities in 2015 but has remained relatively constant otherwise.

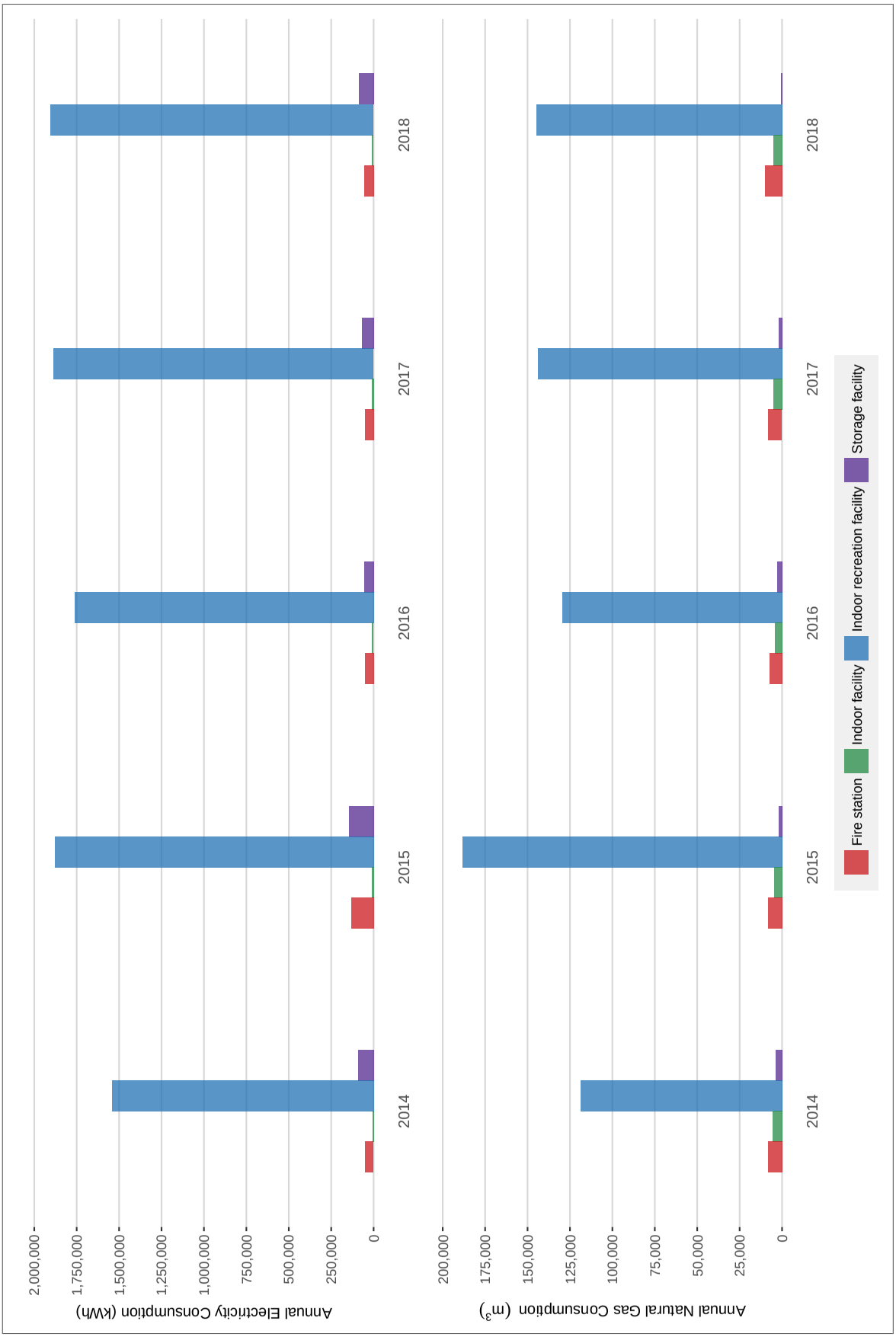

Figure 1: Annual electricity and natural gas consumption

2.1.2 Greenhouse Gas Emissions

GHG emissions are typically measured in metric tonnes of carbon dioxide (mtCO2e). To illustrate, a typical passenger vehicle emits approximately 4.6 mtCO2e per year. GHG emissions can be broken down into three categories - Scope 1, Scope 2, and Scope 3.

Scope 1 emissions are defined as direct emissions from sources owned or controlled by the organization. An example of this would be the emissions from the burning of natural gas or propane in on-site equipment. This is typically the second largest contributor to a facility's GHG emissions.

Scope 2 emissions are defined as indirect emissions from sources owned or controlled by the organization. An example of this would be the downstream emissions from electricity purchased from the grid for use in on-site equipment. This is typically the smallest contributor to a facility's GHG emissions.

Scope 3 emissions are defined as emissions from sources not owned or directly controlled by the organization. An example of this would be emissions from vehicles used in employee travel and commuting. Scope 3 emissions were not included in this inventory as it is outside the scope of this ECDM plan. However, this would typically be the largest contributor to a facility's GHG emissions.

Table 2: GHG conversion factors

Utility	Unit	Factor
Electricity	[mtCO2e/kWh]	0.000043
Natural Gas	[mtCO2e/m^3]	0.0019
Fuel Oil	[mtCO2e/L]	0.0027

Figure 2 summarizes The Township of North Dumfries' GHG emissions from 2014 - 2018 calculated using the conversion factors shown in Table 2. It is separated into Scope 1 and 2 emissions. It can be seen that Scope 1 and 2 emissions can be directly tied to a facility's electricity and natural gas consumption.

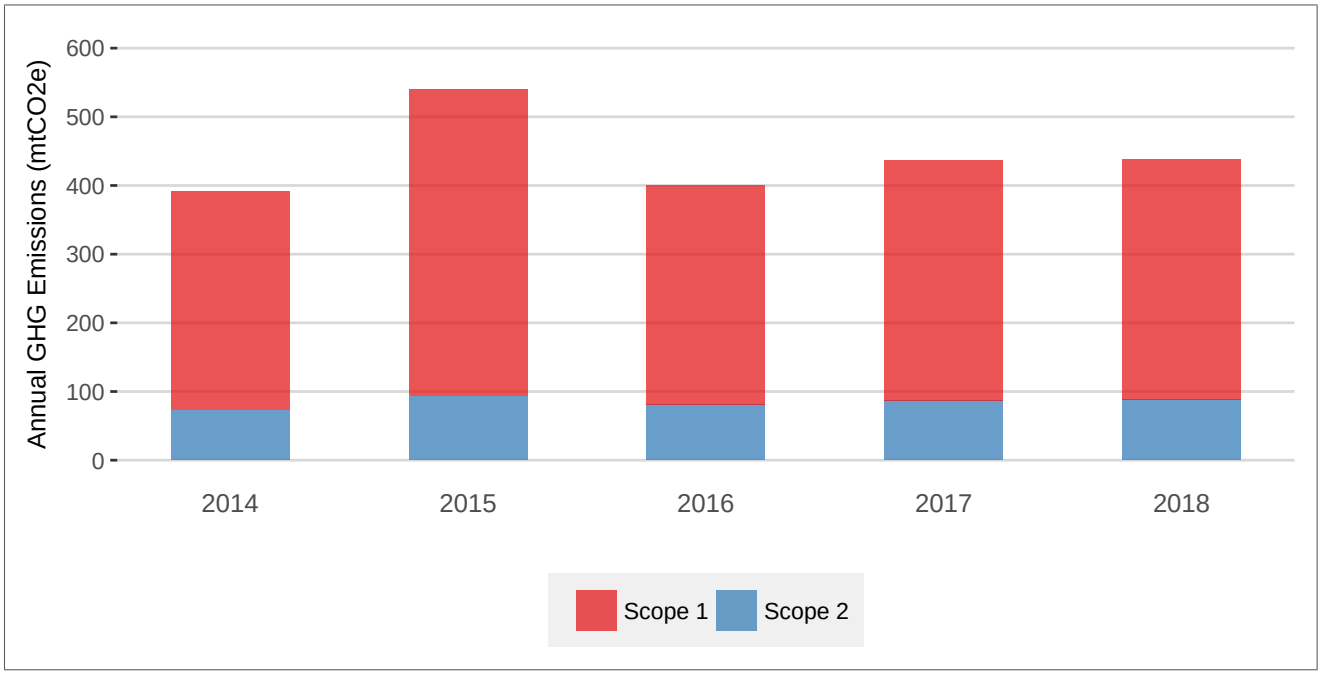

Figure 2: Annual GHG emissions

2.2 Energy Conservation Measures

2.2.1 Completed ECMs

A number of energy conservation measures (ECMs) have been implemented since the draft 2014 CDM plan was completed in an effort to achieve the goals set out in the plan. A list of the ECMs implemented to date is summarized in Table 3.

Table 3: Completed ECMs summary table

Building	ECM	Year Completed	Electricity Savings [kWh]	Natural Gas Savings [m^3]	Capital Cost [$]
North Dumfries Community Complex	Administrative office relocation	2014			
North Dumfries Community Complex	Occupancy sensors	2015			
Street Lights	LED street light conversion	2017	150,915	0	

Note: Not all costs and energy savings were documented, and therefore could not all be quantified.

The Township of North Dumfries made a decision in 2014 to move administrative staff from their old offices at 1171 Greenfield Road to the newly constructed North Dumfries Community Complex. Part of this decision was based on the fact that placing the staff at the new and more energy efficient building would result in lower overall energy consumption for The Township of North Dumfries.

The North Dumfries Community Complex had occupancy sensors installed in 2015 at almost all areas of the facility, resulting in significant annual electricity consumption savings at the facility.

The Township of North Dumfries also completed a large LED street light retrofit in 2017 which converted 90% of the street lights to LEDs resulting in significant annual electricity consumption savings. The remaining 10% are planned to be retrofitted to LED by the end of 2020.

2.2.2 Planned projects

The Township of North Dumfries is experiencing considerable growth and has a number of projects planned for the next five years. These projects include new buildings, existing building renovations, and existing equipment retrofits. Energy conservation initiatives will be considered when planning these projects. A list of the planned projects is summarized in Table 4.

Table 4: Planned projects summary table

Building	Project	Year Planned
Ayr Community Centre	Ice plant rehabilitation	2021
Ayr Community Centre	LED lighting retrofit - ice rink	2021
Ayr Community Centre	Replace windows	2022
Ayr Community Centre	Retrofit community hall bathrooms	2022
Ayr Fire Station	Office renovations	2020
New Township Office	New township office construction	2021
North Dumfries Community Complex	Ice plant rehabilitation	2023
North Dumfries Public Works Depot	Quonset hut demolition and replacement	2020
North Dumfries Public Works Depot	Main shop renovation	2021
Roseville Community Centre	Roof replacement	2022
Victoria Park Storage Building	New washrooms	2020

2.2.3 Potential ECMs

Energy audits were completed for all Township of North Dumfries' facilities in 2019. There were a number of energy conservation opportunities identified for facilities across The Township of North Dumfries.

However, not all ECMs evaluated are financially feasible (simple payback < 10 years). Additionally, The Township of North Dumfries' focus in the next five years will be improving its existing facilities and building new facilities to better suit its growing needs. As a result, ECMs that will be prioritized are ones that can be implemented as renovations are completed, or are both easy to implement and have a large energy reduction impact.

Table 5 summarizes ECMs evaluated in the energy audits that had a simple payback of less than 10 years. This ensures that the planned ECMs are financially feasible. ECMs listed in the first half of the table are those which would be prioritized as they can be implemented as renovations are completed, or are both easy to implement and have a large energy reduction impact. ECMs listed in the second half of the table can be considered for implementation if operating budgets allow.

Table 5: Facilities potential ECMs summary table

Building	ECM	Electricity Savings [kWh]	Natural Gas Savings [m^3]	Fuel Oil Savings [L]	Capital Cost [$]	Simple Payback [Years]
Prioritized Energy Conservation Measures						
Ayr Community Centre	LED lighting retrofit	34,366	0	0	26,600	5.0
Ayr Community Centre	Brine pump controls	8,898	0	0	7,500	7.0
Ayr Fire Station	Replace shower heads	0	217	0	600	2.4
Ayr Fire Station	LED lighting retrofit	19,903	0	0	10,800	4.9
North Dumfries Community Complex	Optimize floating head pressure controls	60,500	0	0	2,000	0.3
North Dumfries Community Complex	Zamboni floodwater treatment	118,795	2,221	0	35,000	2.4
North Dumfries Community Complex	Interior LED lighting retrofit	164,218	0	0	68,600	2.8
North Dumfries Community Complex	Exterior LED lighting retrofit	15,702	0	0	12,800	6.9
North Dumfries Public Works Depot	Radiant tube heaters	0	0	11,845	10,200	2.1
North Dumfries Public Works Depot	Drive Thru Air Curtain	-1,488	0	6,778	45,000	5.7
Other Potential Energy Conservation Measures						
Ayr Community Centre	Electric baseboard programmable thermostat	972	0	0	500	4.3
Schmidt Park Storage Building	Interior LED lighting retrofit	6,905	0	0	4,800	5.8
North Dumfries Public Works Depot	Electric baseboard programmable thermostat	648	0	0	500	6.9
Ayr Fire Station	Radiant tube advanced controls	0	579	0	1,000	7.1
Ayr Community Centre	Zamboni floodwater treatment	29,628	5,154	0	35,000	7.5
Roseville Community Centre	Install NG DHW heater	1,642	-194	0	1,500	9.0
Schmidt Park Storage Building	Exterior LED lighting retrofit	2,453	0	0	2,800	9.6
Ayr Community Centre	Floating head pressure controls	30,250	0	0	35,000	9.6

3 RENEWABLE GENERATION

There is currently no renewable generation (such as solar and wind projects) installed at any Township of North Dumfries facilities, and no plans to implement it in the near future.

4 GOALS SUMMARY

This section will summarize The Township of North Dumfries' previous goals from the draft 2014 ECDM plan, current goals for the 2019 ECDM plan, an action plan on how to achieve the current goals, and some additional energy management strategies to consider.

4.1 Previous

The Township of North Dumfries 2014 draft ECDM plan had a goal of reducing overall energy consumption by 5% from 2011 levels by 2019. Figure 3 shows the energy use intensity (EUI) for The Township of North Dumfries facilities from 2014 - 2018. In general, there has been a trend of decreasing EUI in the last five years despite the growth in the Township and increased use of its facilities. This shows that The Township of North Dumfries has made progress towards the goal set in the 2014 ECDM plan.

4.2 Current

Table 6 compares the 2018 EUI of each facility with the 2016 median EUI of similar type facilities in the largest municipalities within Southern Ontario. The goal for the 2019 ECDM plan is for The Township of North Dumfries facilities to be below the 2016 median EUI by 2024.

Table 6: The Township of North Dumfries 2018 EUI summary

Building	**2018 EUI** [ekWh/sqft]	**2016 Median EUI*** [ekWh/sqft]
Ayr Community Centre	29	34
Ayr Fire Station	10	31
North Dumfries Community Complex	35	34
North Dumfries Public Works Depot	13	31
Roseville Community Centre	20	26
Schmidt Park**	37	31
Victoria Park	7.1	31

* For largest municipalities in Southern Ontario.
** Usage is high due to the meter at Schmidt Park being shared with the school board.

4.3 Strategy

The main energy management strategies The Township of North Dumfries plans to implement throughout the next five years in order to achieve the goals outlined in this plan are as follows:

1. Consider implementing ECMs listed in Table 5 over the next five years, especially when existing building renovations are planned. Priority would be given to ECMs listed in the first half of Table 5.
2. New buildings should aim to exceed current energy efficiency standards and practices in order to minimize the life cycle cost of operating and maintaining the building. The North Dumfries Community Complex was constructed to high energy efficiency standards and should be used as an example for all new buildings.
3. Updated energy audits to be completed for The Township of North Dumfries facilities by 2023, prior to the 2024 ECDM plan update.

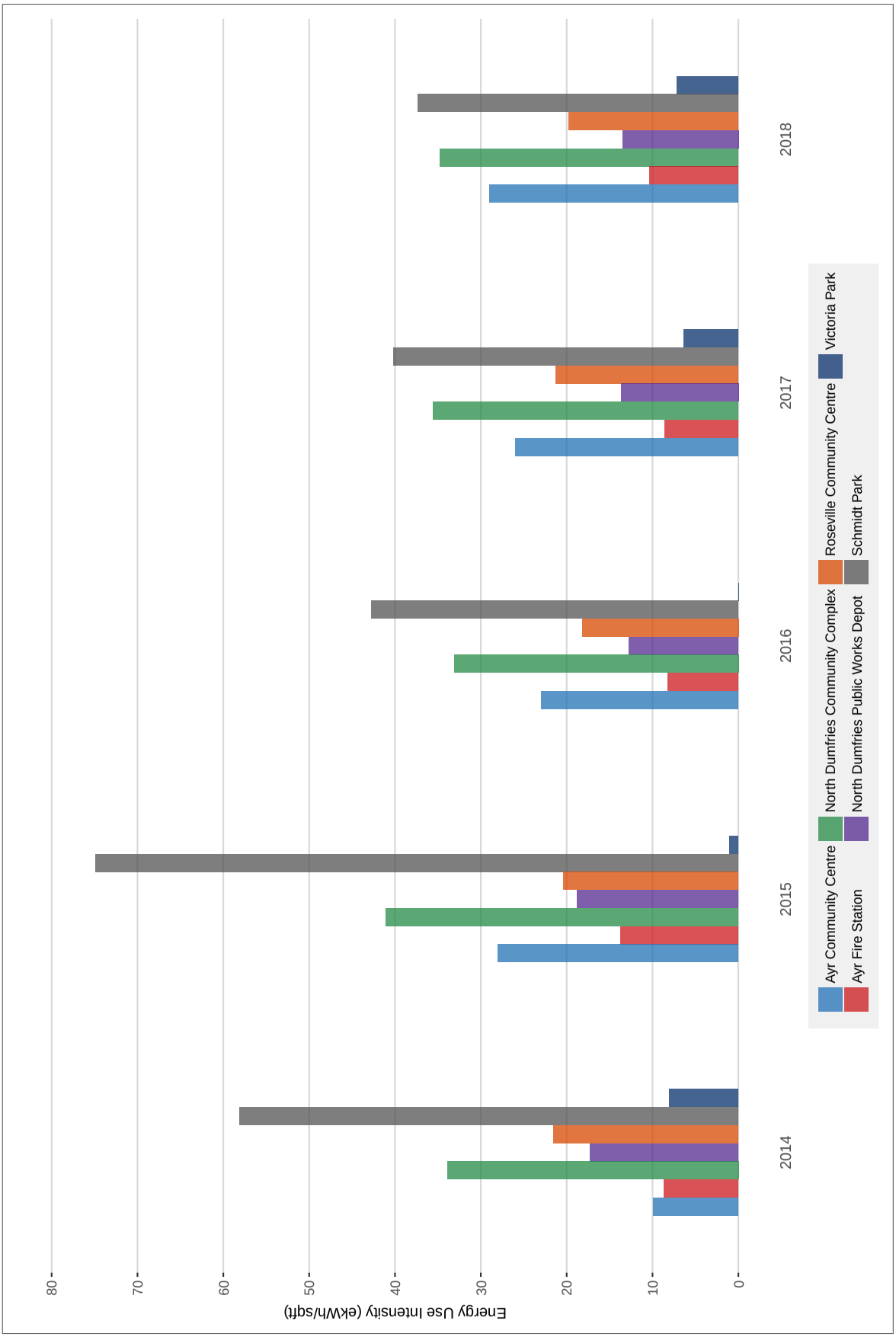

Figure 3: Annual energy use intensity from 2014 - 2018

4.4 Additional Strategies

The following strategies will also be considered from a strategic energy management perspective:

- New buildings/equipment
  - Consider energy efficiency upgrades during renovations or equipment replacements rather than purchasing "like for like".
  - Develop formal guidelines for considering energy at all stages of new building design.
  - Develop procurement policies that favour life cycle costs over lowest first costs.
  - Ensure all new buildings and equipment are properly commissioned.
- Energy management
  - Consider designating a staff member to be responsible for some aspects of energy management such as tracking energy consumption, pushing implementation of ECMs, and creating a culture of energy efficiency at The Township of North Dumfries.
  - Investigate potential to adopt an energy management system to monitor and analyze energy consumption across The Township of North Dumfries facilities.
  - Formalize methodology to monitor and track progress of implemented ECMs.
  - Create annual report documenting progress of energy efficiency initiatives.
- Training
  - Provide general training on energy efficiency for operation and maintenance (O&M) staff.
  - Provide targeted training for O&M staff as needed.
  - O&M staff to keep up to date on industry trends and best practices.
- Communication/staff engagement
  - Improve communication of energy initiatives to staff and public.
  - Develop staff engagement strategy to encourage a corporate culture of sustainability.
  - Host online suggestion box/survey for staff to provide commentary on potential energy efficiency opportunities.

EXECUTIVE SUMMARY

The Ontario Provincial Government has committed to help public agencies better understand and manage their energy consumption. As part of this commitment, Ontario Regulation 507/18 under the Electricity Act requires public agencies, including municipalities, municipal service boards, school boards, universities, colleges and hospitals to report on their energy consumption and Greenhouse Gas (GHG) emissions annually, to develop and implement an Energy Conservation and Demand Management (ECDM) Plan, and to update their ECDM Plan every five years.

The The Township of North Dumfries is committed to developing and executing on strategies to reduce environmental impact, utility costs, and ensure regulatory compliance in accordance with Ontario Regulation 507/18.

Table 7 summarizes the facilities included in this ECDM plan.

Table 7: Township of North Dumfries facilities list

Building	Category	Address	Year	Area [sqft]
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Table 8 summarizes the energy consumption and GHG emissions for The Township of North Dumfries facilities for 2018. This is the baseline that the current goal will be based on.

Table 8: The Township of North Dumfries 2018 energy consumption and GHG emissions summary

		Fire Stations	Indoor Recreation Facilities	Indoor Facilities	Storage Facilities	Total
Electricity Consumption	[kWh]	56,578	1,903,133	8,155	88,344	2,056,209
Natural Gas Consumption	[m^3]	10,079	144,976	4,939	808	160,803
Fuel Oil Consumption	[L]	-	-	-	17,407	17,407
GHG Emissions	[mtCO2e]	21	356	9.7	52	439

GOAL

Table 9 compares the 2018 EUI of each facility with the 2016 median EUI of similar type facilities in the largest municipalities within Southern Ontario. The goal for the 2019 ECDM plan is for The Township of North Dumfries facilities to be below the 2016 median EUI by 2024.

Table 9: The Township of North Dumfries 2018 EUI summary

Building	**2018 EUI** [ekWh/sqft]	**2016 Median EUI*** [ekWh/sqft]
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Ayr Fire Station	10	31
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*For largest municipalities in Southern Ontario.

STRATEGIES

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1. Consider implementing ECMs listed in Table 5 over the next five years, especially when existing building renovations are planned. Prioritization should be given to ECMs listed in the first half of Table 5.
2. New buildings should follow current energy efficiency standards and practices in order to minimize the life cycle cost of operating and maintaining the building. The North Dumfries Community Complex was constructed to high energy efficiency standards and should be used as an example for all new buildings.
3. Updated facility energy audits been completed for The Township of North Dumfries in 2019 and will be updated in 2023, prior to the 2024 ECDM plan update.