

Upper Grand District School Board  
Report on Conservation & Cost Savings  
2013 - 2018

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## Introduction

The UGDSB is committed to reducing its consumption of resources and supporting the environmental leadership initiatives of its 3000 staff and 32,000 students. A significant contribution to reducing consumption results from increasing the efficiency of the buildings it operates.

The Board has a long history of initiating upgrades to its buildings to reduce energy consumption. Several initiatives such as the program implemented by Ameresco from 2001 – 2004 specifically targeted system upgrades to save energy. The Board has formalized its commitment to energy reduction in the last 2 years by establishing a team, led by our Energy Manager; dedicated to managing and reducing the energy and water consumed by the Board. The goal of the team, as outlined in the report to Board in April 2019 is as follows:

### **Promote efficient use of energy at the UGDSB**

#### **in order to:**

- a) Ensure maximum dollars available to classroom by reducing energy cost;
- b) Increase public confidence in the Board's ability to efficiently operate its schools;
- c) Demonstrate leadership in the area of environmental stewardship and reduce the Board's carbon footprint.

The Board annually files a summary of the energy consumed at all facilities and maintains an active Energy Consumption and Demand Management Plan as required by Ontario Electricity Act, 1998. The latest 5 year plan was submitted to the Ministry in June 2019<sup>1</sup>.

The purpose of this report is to summarize the technical efforts made in the previous 5 year period to increase the efficiency at the Board's facilities. It highlights the results of the initiatives and summarizes the financial impact to the Board.

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<sup>1</sup> <https://www.ugdsb.ca/wp-content/uploads/2019/06/Energy-Management-Plan-2019-2024.pdf>

## Executive Summary

This report highlights the energy/resource reductions and cost savings from the formal conservation efforts of the Board over the past 5 years.

The Energy Audits conducted at the Board's building sites are summarized.

Formal resource tracking measures have been developed over the past 2 years. The measures and some resulting benefits are as documented.

Energy savings efforts form an integral part of the Board's Renewal program. The measured results of 14 major energy projects demonstrate that the Board has reduced the annual cost of energy at those sites by approximately \$300,000 per year and realized a cumulative savings of approximately \$900,000 over a 5 year period.<sup>2</sup>

By generating electricity the Board earns income or offsets electricity costs by approximately \$450,000 per year. Pursuing energy reduction incentives have netted the Board approximately \$275,000 over 5 years.

In spite of increased energy costs, the Board has generally reduced its spending on energy year over year. Board wide it is estimated that at least \$4,000,000 has been saved in electricity and gas over the past 5 years.

In 2019 the UGDSB was listed in the top 20 Energy Performing School Boards in Ontario based on 2016/17 energy data<sup>3</sup>.

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<sup>2</sup> Figure 3.5 ( <http://bit.ly/UGDSB-MajorEnergyProjectSavings> )

<sup>3</sup> <https://sustainableschools.ca/wp-content/uploads/2019/02/Enerlife-2019-SUS-Top-Energy-Performing-Boards-Report.pdf>

## Background

Currently, the UGDSB operates 84 buildings with just under 400,000 square feet of floor space across Wellington and Dufferin Counties, and within the City of Guelph. The average age of the floor space is approximately 40 years old.

The Board has focused on energy reduction by continuously improving the efficiency of its buildings and equipment for well over 20 years. It continues to upgrade its equipment and refine building operations as part of its operations and building renewal program. More recently, increased attention has also been paid to examining the Board's water consumption in order to eliminate waste and reduce costs to the Board.

In addition to the extensive technical efforts of the operations group, the Board supports a number of initiatives aimed at environmental awareness and action. Many of these help promote reduced energy consumption by encouraging changes to the behaviour of the building occupants.

Board Policy #210 Environmental Education sets the strategic direction. The Environmental Education Management Committee (EEMC) was established in 2012 to develop and monitor the Board plan to support Policy #210.

Both a Board wide Energy Conservation Campaign and specific Annual Event days support energy reduction. The Board and School Improvement Plans contain smart goals and strategies that promote energy conservation and many programs at the school level promote environmental awareness and energy reduction.

The UGDSB is the first Public Board in Ontario to obtain 100% Eco-school certification of all its schools in the Board.<sup>4</sup> At the elementary level, programs such as Earthkeepers and Eco-artists; and at the secondary level CELP, DaVinci and Headwaters, support sustainability and conservation.

At the core of the technical energy reduction efforts are the improvements led by the Board's Energy Management Team and the Board's Renewal Group; implemented by strategically working to achieve the goal of "Promoting Efficient Energy Use".

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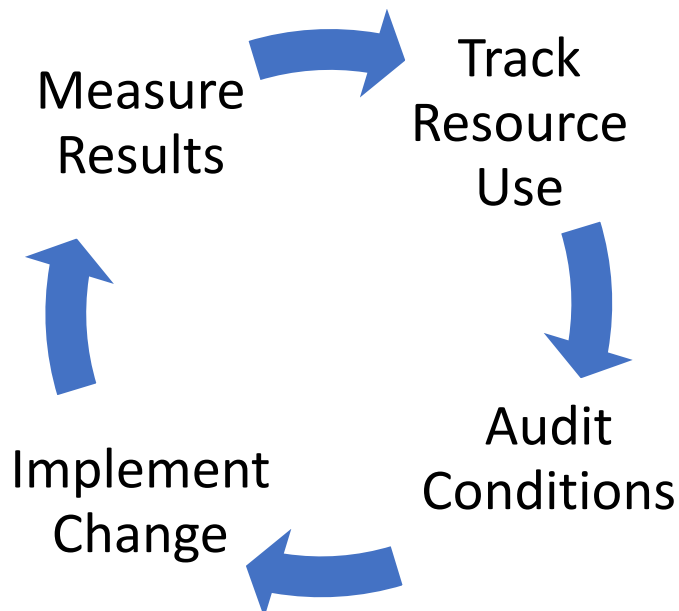
<sup>4</sup> <https://www.cbc.ca/news/canada/kitchener-waterloo/upper-grand-school-board-ecoschools-certification-guelph-1.4706312>

## Strategy of the Energy Management Team

To achieve its goal, the Board's Energy Management Team develops and implements an annual plan to support the following objectives:

1. **Conduct Walk Through Energy Audits**
2. **Track and Report Board Energy / Resource Use**
3. **Support the Building Renewal Program**
4. **Generate Savings to the Board**
5. **Improve Building Automation Systems (BAS)**
6. **Encourage Behavioural Change**
7. **Foster Professional Development**

The team takes a continuous improvement approach to reaching its goal. The above objectives reinforce each other to move toward greater efficiency.



## Energy Audits

“Inspecting what you expect” is often a valuable way of ensuring that planned goals are being achieved as anticipated. Over the past 5 years the Board has audited over 30 buildings to review their operation and identify potential energy saving opportunities. The audits and reports were originally performed by outside firms. In recent years the external audits have been supplemented by internal audits conducted by the energy team. These audits have been carefully designed to support the efforts of the schools to reduce their energy consumption.

A summary of the audits completed in the past 5 years is included as Figure 1.1. The audits conducted by Board’s team are shown in green.

An example internal audit performed at Drayton Heights PS<sup>5</sup> is posted for reference on google drive. The front section of the report and the ‘did you know’ pages are specifically intended to support behavioural change at the school.

Savings specific to these audits are generally difficult to quantify, but addressing the issues discovered, contributes to the overall cost savings realized by the Board.

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<sup>5</sup> <http://bit.ly/UGDSB-Sample-Energy-Audit>

Summary of Energy Audits - Fig 1.1

<b>2013/2014</b>	<b>Victoria Terrace P.S.</b>
	<b>Westwood P.S.</b>
<b>2014/2015</b>	<b>Centre Wellington D.H.S.</b>
	<b>College Heights S.S.</b>
	<b>East Garafraxa P.S.</b>
	<b>Erin P.S.</b>
	<b>John F. Ross C.V.I.</b>
	<b>Mitchell Woods P.S.</b>
	<b>Norwell D.S.S.</b>
	<b>Orangeville D.S.S.</b>
	<b>Parkinson Centennial P.S.</b>
	<b>Primrose E.S.</b>
<b>Wellington Heights S.S.</b>	
<b>2015/2016</b>	<b>Centre Dufferin D.H.S.</b>
	<b>College Heights S.S.</b>
	<b>Edward Johnson P.S.</b>
	<b>Mono Amaranth P.S.</b>
	<b>Salem P.S.</b>
	<b>Westside S.S.</b>
<b>2016/2017</b>	<b>Alma P.S.</b>
	<b>Centre Wellington D.H.S.</b>
	<b>Grand Valley and District P.S.</b>
	<b>Orangeville D.S.S.</b>
	<b>Princess Elizabeth P.S.</b>
	<b>Rickson Ridge P.S.</b>
	<b>Westside S.S.</b>
<b>2017/2018</b>	<b>College Heights S.S.</b>
	<b>Drayton Heights P.S.</b>
	<b>Erin P.S.</b>
	<b>Guelph Board Office</b>
	<b>John McCrae P.S.</b>
	<b>Maryborough P.S.</b>
	<b>Montgomery Village P.S.</b>
	<b>Ottawa Crescent P.S.</b>
	<b>Princess Margaret P.S.</b>
<b>*Energy team audits</b>	

## Tracking Board Energy / Resources Use

Monitoring energy use is the backbone of a successful energy management strategy.<sup>6</sup> As a result, maintaining an efficient method of tracking the resources used by the Board is a key objective of the Board's energy team overall.

The team focuses on utility tracking in part to:

- Prioritize sites for energy audits and projects,
- Identify consumption and/or billing anomalies,
- Verify that modifications and projects are delivering the expected results.

A significant challenge in the past 5 years has been to develop a reliable and sustainable methodology for tracking and reviewing energy and resource (water) consumption by the Board. The implementation of this initiative is still underway and will need to be adapted over time to reflect changes in the data available and the real time monitoring implemented in the Board's buildings. Even though this is not yet fully implemented, work on this action item is already well underway and some significant benefits and cost savings are resulting from this initiative.

### *Hydro & Natural Gas*

Hydro and gas consumption are tracked and analyzed by month in order to review building performance, and identify anomalies which can be addressed.

Figure 2.1 shows a sample of the monthly utility billing data tracked for each building site. Percentage increases and decreases are easily identified from the data. This helps quickly identify anomalies in either the consumption or billing by the utilities.

Figure 2.2 shows month by month energy consumption trends plotted for review. This allows for a month by month visual analysis. Consumption or billing anomalies are particularly easy to spot in this format.

Figure 2.3 shows annual energy consumption data, plotted against a weather corrected baseline. This data is used to identify opportunities for future savings, identifies site issues to be addressed, and indicates the effectiveness of projects previously implemented.

Figure 2.4 for electricity and Figure 2.5 for heating fuel (natural gas, propane & oil), illustrate the trending of data which has been developed to review the performance of all Board sites. These diagrams plot the annual energy intensity<sup>7</sup> for each site over a 5 year period.

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<sup>6</sup> [https://www.mmh.com/wp\\_content/digitallumens\\_wp\\_conent\\_120215.pdf](https://www.mmh.com/wp_content/digitallumens_wp_conent_120215.pdf)

<sup>7</sup> Energy Intensity is the amount of energy a site uses divided by its floor area



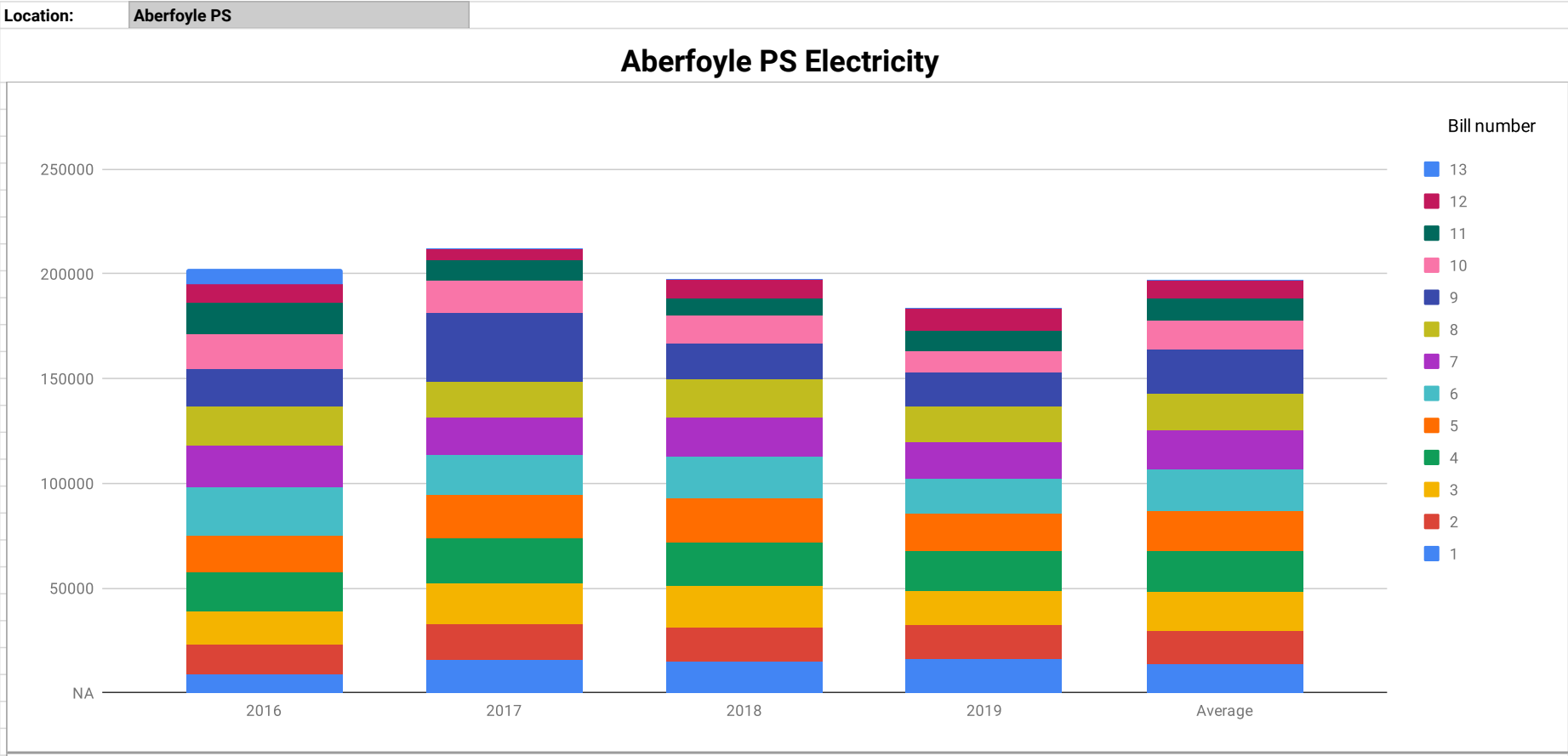
## Utility Bill Data - Fig 2.1

Site	Utility	FY Bill #	Consumption	Previous Bill Consumption	Last FY Consumption	% increase from last FY	FY Running Total	Last FY Running Total	Running Total % Diff
Aberfoyle PS	Electricity	12	10,080.00	9680	9,120.00	10.53%	183,280.00	197,280.00	-7.10%
Aberfoyle PS	Electricity	11	9,680.00	10720	8,000.00	21.00%	173,200.00	188,160.00	-7.95%
Aberfoyle PS	Electricity	10	10,720.00	16080	13,280.00	-19.28%	163,520.00	180,160.00	-9.24%
Aberfoyle PS	Electricity	9	16,080.00	16640	16,960.00	-5.19%	152,800.00	166,880.00	-8.44%
Aberfoyle PS	Electricity	8	16,640.00	17840	18,640.00	-10.73%	136,720.00	149,920.00	-8.80%
Aberfoyle PS	Electricity	7	17,840.00	16880	18,400.00	-3.04%	120,080.00	131,280.00	-8.53%
Aberfoyle PS	Electricity	6	16,880.00	17360	20,240.00	-16.60%	102,240.00	112,880.00	-9.43%
Aberfoyle PS	Electricity	5	17,360.00	19360	20,800.00	-16.54%	85,360.00	92,640.00	-7.86%
Aberfoyle PS	Electricity	4	19,360.00	16400	20,480.00	-5.47%	68,000.00	71,840.00	-5.35%
Aberfoyle PS	Electricity	3	20,240.00	20,240.00	20,240.00	-18.97%	48,640.00	51,360.00	-5.30%
Aberfoyle PS	Electricity	2	15,840.00	16400	16,160.00	-1.98%	32,240.00	31,120.00	3.60%
Aberfoyle PS	Electricity	1	16,400.00	9120	14,960.00	9.63%	16,400.00	14,960.00	9.63%
Aberfoyle PS	Electricity	12	9,120.00	8000	5,440.00	67.65%	197,280.00	212,080.00	-6.98%
Aberfoyle PS	Electricity	11	8,000.00	13280	10,000.00	-20.00%	188,160.00	206,640.00	-8.94%
Aberfoyle PS	Electricity	10	13,280.00	16960	14,960.00	-11.23%	180,160.00	196,640.00	-8.38%
Aberfoyle PS	Electricity	9	16,960.00	18640	33,120.00	-48.79%	131,280.00	131,600.00	-0.24%
Aberfoyle PS	Electricity	8	18,640.00	18400	16,960.00	9.91%	112,880.00	113,600.00	-0.63%
Aberfoyle PS	Electricity	7	18,400.00	20240	18,000.00	2.22%	92,640.00	94,480.00	-1.95%
Aberfoyle PS	Electricity	6	20,240.00	20800	19,120.00	5.86%			
Aberfoyle PS	Electricity	5	20,800.00	20480	20,560.00	1.17%			

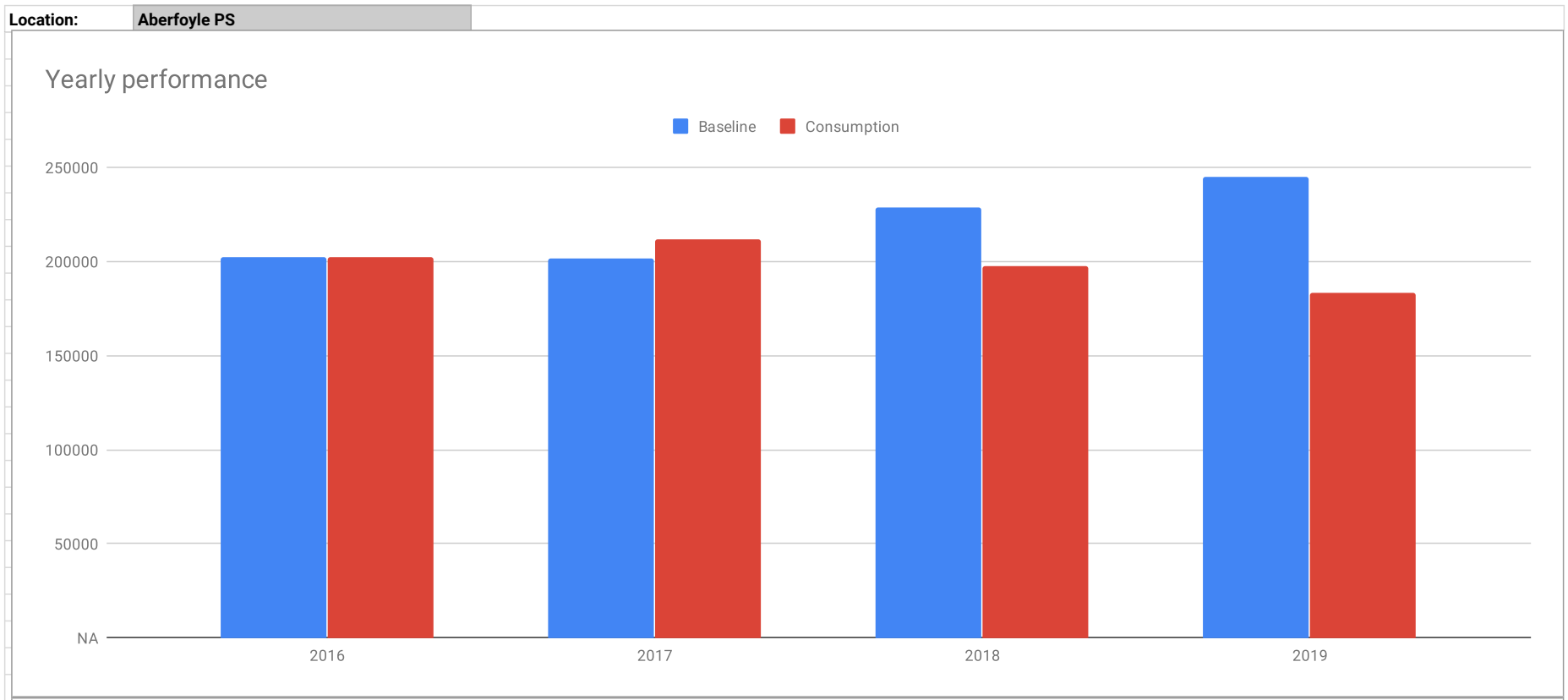
Comparison to last FY bill

Comparison to last FY Running Total

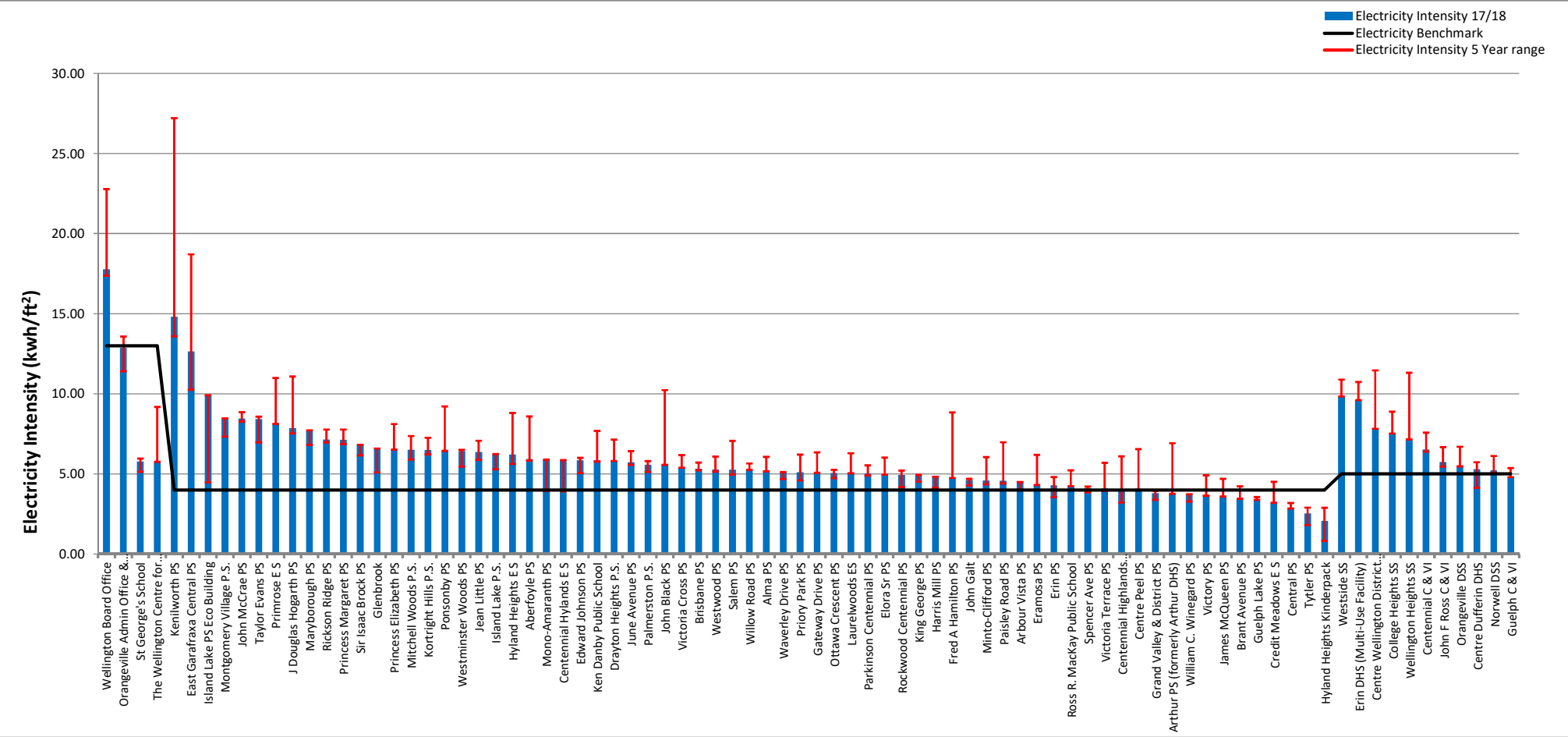
Site Comparison by Month - Fig 2.2



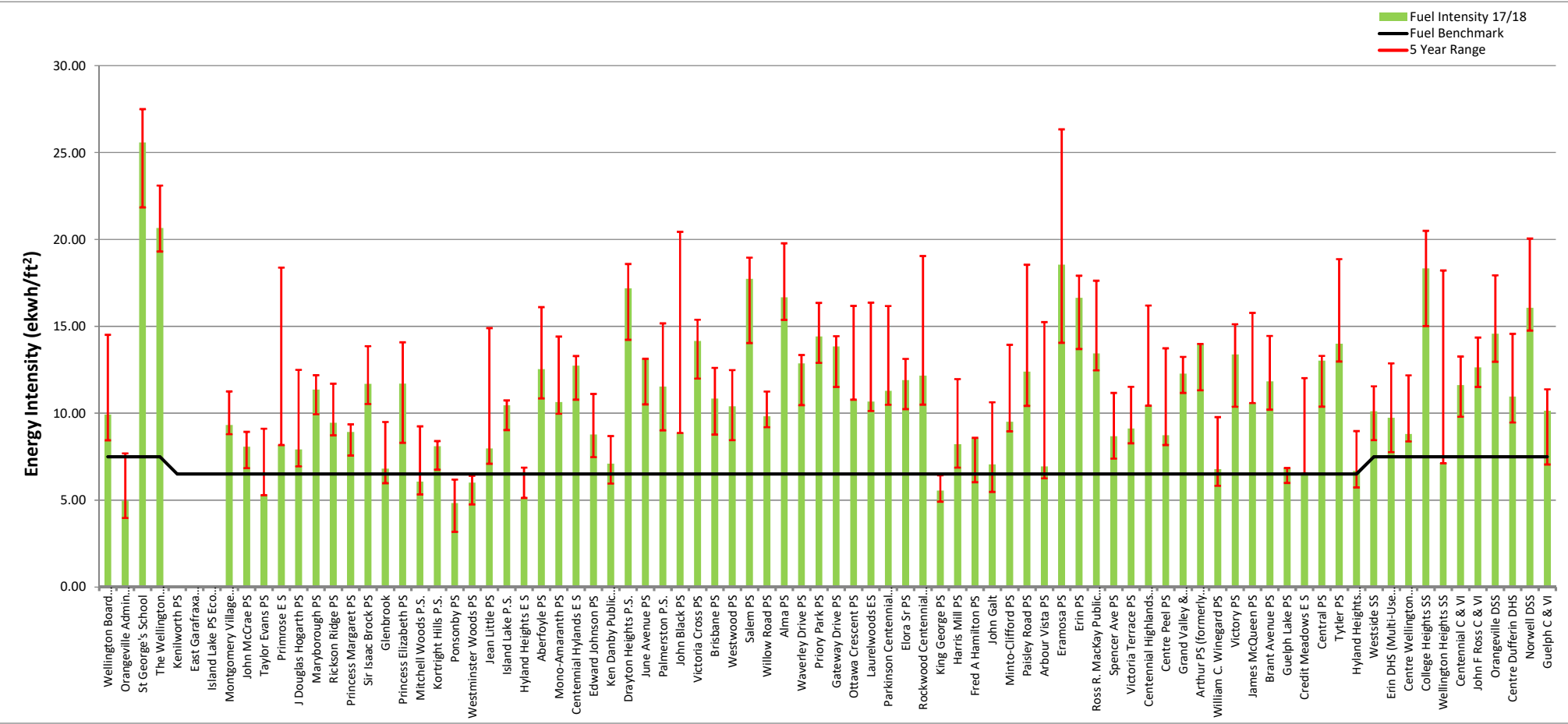
# Site Performance - Fig 2.3



UGDSB Electricity Intensity 17/18 - Fig 2.4



UGDSB Fuel Intensity 17/18 - Fig 2.5



## *Water*

Water costs to the Board have been generally increasing on an annual basis. The cost of water Board wide was approximately \$600,000 in the 2017/18 fiscal year. Tracking and review of water consumption by the Board was an obvious extension of the work of tracking energy use. Figure 2.6 shows an example of the data collected from utility bills for water consumption.

Review of the water consumption data revealed several obvious anomalies in water use. Sites were investigated and measures were put in place to correct issues found. Four of the most significant examples are summarized on Figure 2.7(a).

In order to dig further into the high usage sites it was decided to pilot the installation of Board owned flow measuring equipment at sites with high water usage. This resulted in the identification of several other issues which could be detected by the discrete data sampling measurements available from this equipment. Savings from five of the most significant examples realized from this pilot are summarized in Figure 2.7(b).

Since instantaneous alarms can be initiated by the Board owned equipment to alert high water use, corrections to issues detected have begun to be more immediately implemented. As a result, some issues have been detected and repairs made within the billing cycle (ie. prior to any bill received which would be available for analyzing the billing data). Two examples are listed in Figure 2.7(c). The usage chart for the water leak detailed at Taylor Evans PS is included for illustration as Figure 2.8. It illustrates that water use increased to a sustained 9000 litres per hour over the course of a weekend until the leak was repaired. This loss results from a single defective flush valve on a toilet fixture. This event wasted approximately 524,000 litres (524 m<sup>3</sup>) of water between the time the flush valve malfunctioned and the plumber repaired the leak. Had it not been detected until after the bill was received and the information entered into the database, approximately ten times the water would have been wasted at a cost of approximately \$18,000.

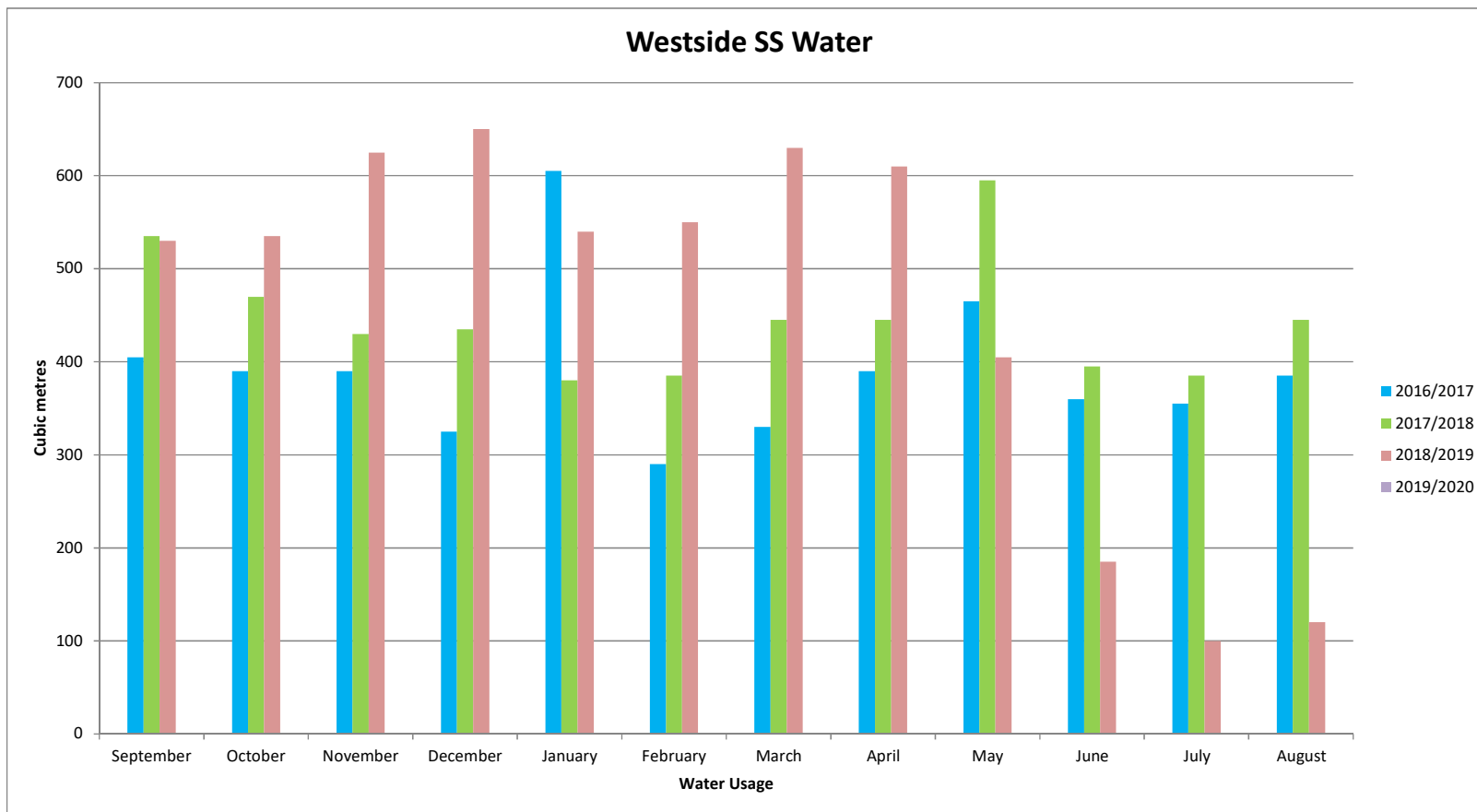
This program is still in its infancy. Based on the few cases presented here, significant savings can be achieved simply by eliminating waste. The examples documented in this report to date, have resulted in an estimated \$80,000 annual savings to the Board. The nature of water consumption (leaks can and will happen at any time) requires that this program, after being fully developed, needs to be maintained to ensure savings into the future.

The team is excited to have purchased sufficient flow measuring devices to deploy at approximately  $\frac{2}{3}$  of our municipally metered buildings across the Board.

We are expecting future success stories resulting in significant cost savings and water conservation over the next 5 years.

### Water Bill Tracking - Fig 2.6

	2016/2017	2017/2018	2018/2019	2019/2020
September	405.00	535.00	530.00	
October	390.00	470.00	535.00	
November	390.00	430.00	625.00	
December	325.00	435.00	650.00	
January	605.00	380.00	540.00	
February	290.00	385.00	550.00	
March	330.00	445.00	630.00	
April	390.00	445.00	610.00	
May	465.00	595.00	405.00	
June	360.00	395.00	185.00	
July	355.00	385.00	100.00	
August	385.00	445.00	120.00	
<b>Totals</b>	<b>4690.00</b>	<b>5345.00</b>	<b>5480.00</b>	



## Projected Water Savings - Fig 2.7

### Water Billing Anomalies - Fig 2.7 (a)

Location	Means of detection	Issue found	Estimated water savings per year
Ecole Arbour Vista P.S.	Utility bill analysis	Several flush valves leaking	\$4,000.00
Brant Ave. P.S.	Utility bill analysis	Constant urinal flushing	\$4,000.00
Paisley Road P.S.	Utility bill analysis	Toilet valve and urinal solenoid replaced	\$15,000.00
Westside S.S.	Utility bill analysis	Water cooled fridge found to be dumping water continuously	\$4,000.00
<b>Total</b>			<b>\$27,000.00</b>

### Water Monitoring Issues - Fig 2.7 (b)

Location	Means of detection	Issue found	Estimated water savings per year
CCVI	Water monitor (Flowie)	Incorrectly programmed Irrigation	\$10,000.00
Mono Amaranth P.S.	Water monitor (Flowie)	Urinal flushes too frequent and too long	\$4,000.00
Princess Elizabeth P.S.	Water monitor (Flowie)	Urinal flushes too frequent and too long	\$4,000.00
Spencer Ave. P.S.	Water monitor (Flowie)	Toilets leaking	\$5,000.00
Westwood P.S.	Water monitor (Flowie)	Urinal tanks constantly leaking and flushings too frequent	\$13,000.00
<b>Total</b>			<b>\$36,000.00</b>

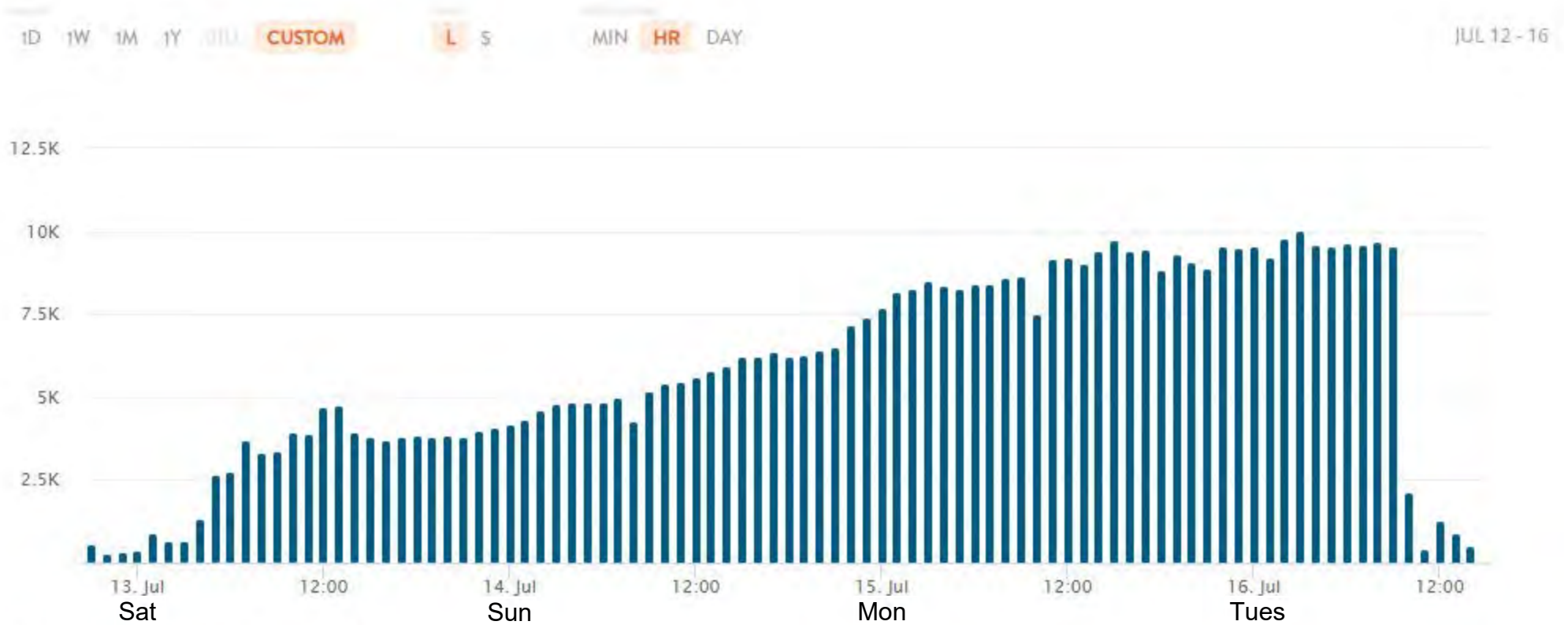
### Water Alarm Repairs - Fig 2.7 (c)

Location	Means of detection	Issue found	Interpolated savings over one billing cycle
College Heights	Water monitor (Flowie)	Water softener malfunctioning	\$2,000.00
Taylor Evans P.S.	Water monitor (Flowie)	Toilet valve stuck opening and flushing constantly	\$19,000.00
<b>Total</b>			<b>\$21,000.00</b>



High Water Use at Taylor Evans - Fig 2.8

### Water usage timeline



During this period

**524K** L TOTAL      **5820** L / HOUR AVERAGE

## Building Renewal and Energy Projects

Integrating energy saving improvements into the Board's renewal plan is an effective way to increase energy efficiency and decrease energy usage.

The Capital and Renewal department has focused on integrating energy reduction and operational cost savings into renewal projects for over 20 years. In recent years, the formal efforts of the energy team have helped develop renewal projects with an increased focus on energy reduction. The increased resources have resulted in more in-depth project commissioning, promoting projects focused on savings, and formally tracking the performance of major projects. This has, in turn, increased the environmental and economic benefits to the Board.

In addition to renewal projects, specific energy reduction opportunities in school buildings are formally identified, implemented and/or supported by the team.

Increased resources focused on energy reduction and utility tracking in part, support the renewal plan by:

1. Supplementing project prioritization based on energy usage and audit results.
2. Supporting the development and design of the project details, particularly those affecting energy consumption.
3. Providing expertise to review and commission new equipment and adjustments to building operations.
4. Providing documented results of the changes implemented.

The energy saving projects included in the Renewal Plan in general consist of:

- major energy projects
- heating HVAC equipment upgrades
- changes and improvements to the walls, floor and roof systems (envelope upgrades)
- conversions of indoor and outdoor lighting to more efficient fixtures.

While the Board attempts to build energy reduction and operational cost savings into every renewal project, the following figures (3.1, 3.2, 3.3 and 3.4) summarize the UGDSB's more significant initiatives to reduce energy use grouped in the categories outlined above.

## Major Energy Projects - Fig 3.1

Year initiatives commenced	Location	Initiatives completed
2012/2013	<b>Centre Wellington D.H.S.</b>	VFD retrofits, LED Lighting upgrades, chiller reprogrammed, control system improvements.
	<b>Primrose E.S.</b>	Controls system upgrade and modification, roof renovation, condensing boiler added, cooling tower upgrades, ext and int lighting upgrade to LED.
2013/2014	<b>Eramosa P.S.</b>	Reduce building air leaks, exhaust modifications, LED lighting upgrades.
	<b>Jean Little P.S.</b>	Air conditioning added, controls upgrade, condensing boiler added, machine and wood shop modifications, roof renovation, heating pumps replaced and power exhaust upgrade.
2014/2015	<b>Centre Dufferin D.H.S.</b>	Controls system upgrade, RTU and AHU replacements, 50 kW net metre solar array installed, energy audit, LED lighting upgrade.
	<b>East Garafraxa P.S.</b>	Controls system upgrade, energy walk through.
	<b>Kenilworth P.S.</b>	Controls system upgrade, radiant heating upgrade.
	<b>Wellington Heights S.S.</b>	Walkthrough audit, control system scheduling modifications, control system and HVAC upgrade, condensing boiler added, LED lighting upgrades.
2015/2016	<b>Mitchell Woods P.S.</b>	Walkthrough audit, chiller modifications, coil adjustments, cooling tower replacement, rebalanced HVAC, LED Lighting upgrades, VFD calibrations.
	<b>Paisley Road P.S.</b>	LED lighting upgrades, repair to exhaust systems, VFDs on fans, boiler upgrade to condensing.
2016/2017	<b>Credit Meadows E.S.</b>	Controls system replacement and HVAC upgrade.
	<b>John Black P.S.</b>	Boiler upgrade to condensing, HVAC upgrades, LED lighting upgrade.
	<b>Laurelwoods E.S.</b>	Controls system replacement, condensing boiler installed, RTU replacements, LED lighting upgrade, roof renovation.
	<b>Minto Clifford P.S.</b>	Controls system replacement, RTU replacements, roof renovation.
2017/2018	<b>Edward Johnson P.S.</b>	Audit, controls system replacement, roof renovation, condensing boiler, heat pump and exhaust fan replacement, lighting upgrades.
	<b>St. Georges Centre ESL</b>	LED lighting retrofit from T12 for entire building.
	<b>Willow Road P.S.</b>	LED lighting upgrades, unit ventilator controls upgrade, condensing boiler.

**2012/2013**

Brant Ave P.S.	Centennial Hylands E.S.	Centre Wellington D.H.S.
Primrose E.S.		

**2013/2014**

Eramosa P.S.	James McQueen P.S.	Jean Little P.S.
Victory P.S.		

**2014/2015**

Centennial C.V.I.	Centre Dufferin D.H.S	East Garafraxa P.S.
Jean Little P.S.	John F. Ross C.V.I	Kenilworth P.S.
Rockwood Centennial P.S.	Salem P.S.	Taylor Evans P.S.
Victoria Terrace P.S.	Wellington Heights S.S.	Westside S.S.
Westwood P.S.		

**2015/2016**

Arthur P.S.	Eramosa P.S.	Grand Valley & District P.S.
Guelph C.V.I.	Hyland Heights E.S.	J.D Hogarth P.S.
John F. Ross C.V.I.	Kenilworth P.S.	Norwell D.S.S.
Paisley Road P.S.	Palmerston P.S.	Spencer Ave E.S.
Victoria Terrace P.S.	Wellington Heights S.S.	

**2016/2017**

Board Office	Centre Dufferin D.H.S	Credit Meadows E.S.
Erin P.S.	Guelph C.V.I.	James McQueen P.S.
J.D. Hogarth P.S.	John Black P.S.	John F. Ross C.V.I
Laurelwoods E.S.	Minto Clifford P.S.	Mitchell Woods P.S.
Orangeville D.S.S.	Ottawa Crescent P.S.	Priory Park P.S.
Rockwood Centennial P.S.		

**2017/2018**

Aberfoyle P.S.	Board Office	Centennial C.V.I.
Centre Wellington D.H.S.	Edward Johnson P.S.	Gateway Drive P.S.
Guelph C.V.I	J.D. Hogarth P.S.	Paisley Road P.S.
Parkinson Centennial P.S.	Primrose E.S.	Taylor Evans P.S.
Willow Road P.S.		

**2012/2013**

Primrose E.S.		
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**2013/2014**

Centre Peel P.S.	Eramosa P.S.	F.A. Hamilton P.S.
James McQueen P.S.	Palmerston P.S.	Rockwood Centennial P.S.
Victory P.S.		

**2014/2015**

Board Office	Brisbane P.S.	Centennial C.V.I.
College Heights S.S.	John F. Ross C.V.I	

**2015/2016**

Central P.S.	Centre Dufferin D.H.S.	Guelph C.V.I
Hyland Heights E.S.	John F. Ross C.V.I.	Norwell D.S.S.
Orangeville D.S.S.	Parkinson Centennial P.S.	Victoria Terrace P.S.
Victory P.S.		

**2016/2017**

Alma P.S.	Brant Ave P.S.	Centennial C.V.I.
Erin P.S.	Grand Valley & District P.S.	Jean Little P.S.
Ottawa Crescent P.S.	Princess Elizabeth P.S.	Priory Park P.S.
Waverley Drive P.S.		

**2017/2018**

Aberfoyle P.S.	Board Office	Brant Ave P.S.
Centennial C.V.I.	Centre Wellington D.H.S.	Edward Johnson P.S.
Elora P.S.	Gateway Drive P.S.	Guelph C.V.I
John Black P.S.	Minto Clifford P.S.	Norwell D.S.S.
Ottawa Crescent P.S.	Parkinson Centennial P.S.	Salem P.S.
Willow Road P.S.		

**2012/2013**

Centre Peel P.S.	Centre Wellington D.H.S.	Credit Meadows E.S.
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**2013/2014**

Brant Ave P.S.	Eramosa P.S.	James McQueen P.S.
Maryborough P.S.	Paisley Road P.S.	Rockwood Centennial P.S.
Ross R. MacKay P.S.		

**2014/2015**

Centennial C.V.I.	Centre Dufferin D.H.S	College Heights S.S.
Guelph C.V.I.	Maryborough P.S.	

**2015/2016**

Arthur P.S.	Board Office	Brisbane P.S.
Central P.S.	Centre Dufferin D.H.S	Centre Wellington D.H.S.
Elora P.S.	Erin D.H.S	Grand Valley & District P.S.
Guelph C.V.I.	John F. Ross C.V.I.	Norwell D.S.S.
Palmerston P.S.	Princess Elizabeth P.S.	Wellington Heights S.S.
Willow Road P.S.		

**2016/2017**

Board Office	Brant Ave P.S.	Centennial C.V.I.
Centre Dufferin D.H.S	Drayton Heights P.S.	Eramosa P.S.
Gateway Drive P.S.	James McQueen P.S.	John Black P.S.
John F. Ross C.V.I	June Avenue P.S.	Kortright Hills P.S.
Laurelwoods E.S.	Mitchell Woods P.S.	Orangeville D.S.S.
Ottawa Crescent P.S.	Priory Park P.S.	Ross R. MacKay P.S.
Salem P.S.	Victoria Cross P.S.	Waverley Drive P.S.

**2017/2018**

Aberfoyle P.S.	Alma P.S.	Board Office
Centre Peel P.S.	Centre Wellington D.H.S.	Dufferin Office
Edward Johnson P.S.	Elora P.S.	Gateway Drive P.S.
John F. Ross C.V.I.	John Galt P.S.	Norwell D.S.S.
Parkinson Centennial P.S.	Primrose E.S.	Princess Elizabeth P.S.
Rockwood Centennial P.S.	St.Georges Centre E.S.L	Tytler P.S.
Westwood P.S.	Willow Road P.S.	

## *Monitoring Results*

Project monitoring is an important component of the Board's continuous improvement approach to building renewal and energy conservation. In addition, we believe that to be most effective, our Renewal and Energy Reduction initiatives need to be planned, implemented and then monitored. Ongoing monitoring not only ensures accountability, but also provides the opportunity to:

- Optimize project components,
- Identify operational and behavioural issues which limit conservation efforts,
- Identify new conservation opportunities for implementation and,
- Identify and implement highly successful project components at other Board sites.

Many of our energy reduction initiatives are implemented as specific projects in our buildings, based on either performance issues or identified significant cost saving potential. Monitoring changes to the facilities' energy use after a project has been completed documents any savings generated. This allows comparison of the actual measured results to the expected results and the financial impact of the improvements to be summarized.

Simply stated, energy consumption at renovated sites is formally tracked to verify expected outcomes. The documented results from many of the most significant projects in the past 5 years, follow. These examples illustrate that achieving energy reduction requires a significant, continued effort to refine the intended improvements and implement subsequent changes.

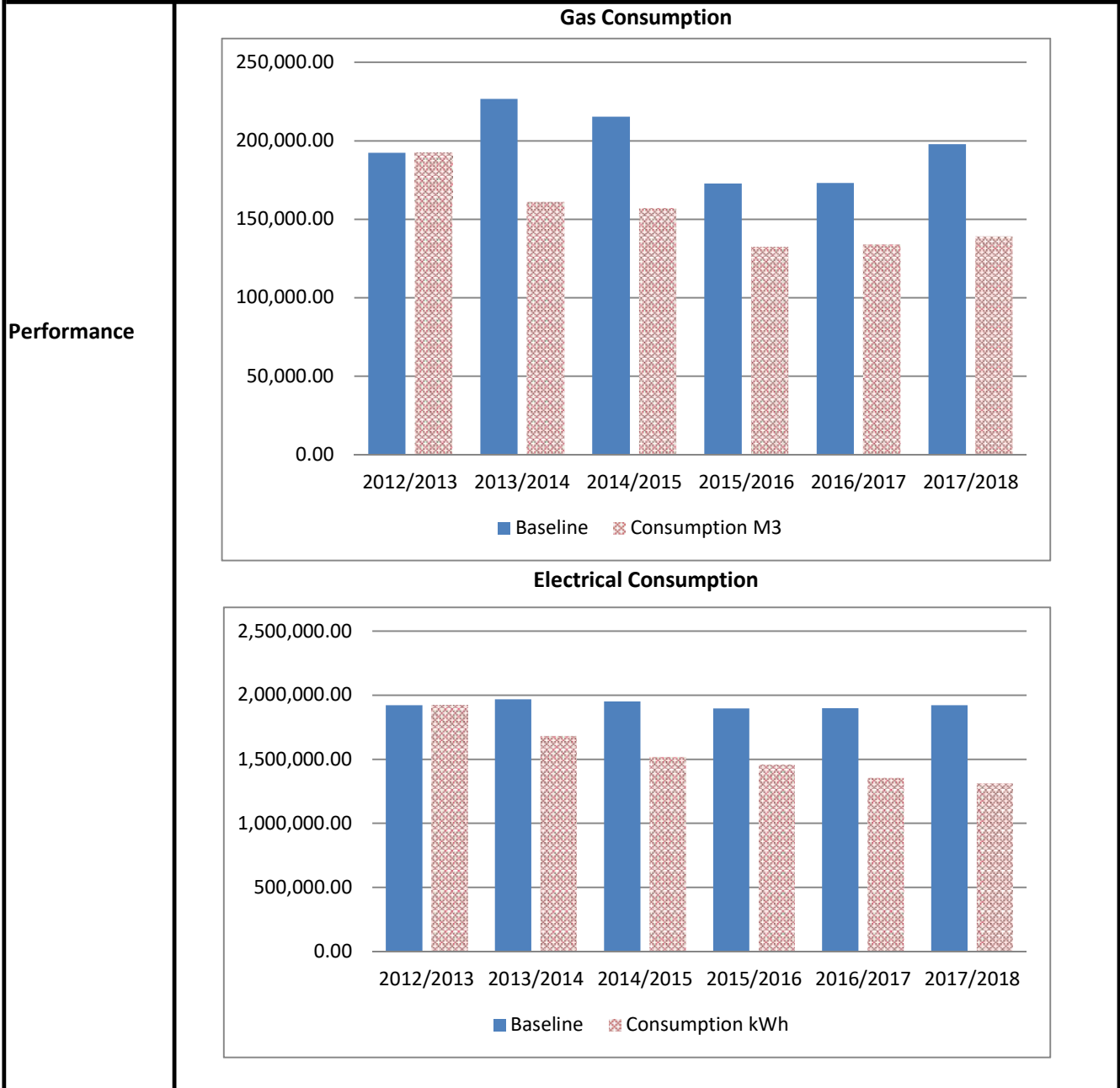
The specific project reports are followed by a summary page (Figure 3.5) which highlights the calculated savings from the project initiatives. While not all the project initiatives are included here, annual savings from these projects are estimated at almost \$300,000 and the cumulative savings estimated are over \$900,000.

<b>School</b>	Wellington Heights S.S.		<b>Location</b>	Mount Forest																														
<b>Project Details</b>	2015 - AHU schedules trimmed back to not run 24-7 2016 - Audit walkthrough - Controls, HVAC and condensing boiler upgrade 2017 - Machine and wood shop modifications 2018 - Power exhaust upgrade																																	
<b>Incentives</b>	None																																	
<b>Performance</b>	<div style="text-align: center;"> <b>Gas Consumption</b> <table border="1"> <caption>Gas Consumption Data</caption> <thead> <tr> <th>Year Range</th> <th>Baseline (M3)</th> <th>Consumption M3 (M3)</th> </tr> </thead> <tbody> <tr> <td>2014/2015</td> <td>105,000</td> <td>105,000</td> </tr> <tr> <td>2015/2016</td> <td>85,000</td> <td>82,000</td> </tr> <tr> <td>2016/2017</td> <td>85,000</td> <td>52,000</td> </tr> <tr> <td>2017/2018</td> <td>98,000</td> <td>50,000</td> </tr> </tbody> </table> </div> <div style="text-align: center; margin-top: 20px;"> <b>Electrical Consumption</b> <table border="1"> <caption>Electrical Consumption Data</caption> <thead> <tr> <th>Year Range</th> <th>Baseline (kWh)</th> <th>Consumption kWh (kWh)</th> </tr> </thead> <tbody> <tr> <td>2014/2015</td> <td>840,000</td> <td>840,000</td> </tr> <tr> <td>2015/2016</td> <td>830,000</td> <td>830,000</td> </tr> <tr> <td>2016/2017</td> <td>810,000</td> <td>560,000</td> </tr> <tr> <td>2017/2018</td> <td>820,000</td> <td>500,000</td> </tr> </tbody> </table> </div>				Year Range	Baseline (M3)	Consumption M3 (M3)	2014/2015	105,000	105,000	2015/2016	85,000	82,000	2016/2017	85,000	52,000	2017/2018	98,000	50,000	Year Range	Baseline (kWh)	Consumption kWh (kWh)	2014/2015	840,000	840,000	2015/2016	830,000	830,000	2016/2017	810,000	560,000	2017/2018	820,000	500,000
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<b>Savings</b>	<b>Range</b>	<b>\$ saved on Natural Gas</b>	<b>\$ saved on Electricity</b>																															
	2017/2018	\$11,302	\$53,786																															
	Cumulative	\$21,094	\$99,781																															



<b>School</b>	Centre Wellington D.H.S.	<b>Location</b>	Fergus
<b>Project Details</b>	2013- VFDs added to gym unit, library units and cooling tower 2015 - Lighting replacement of exterior lighting and gym to LED 2016 - Chiller reprogrammed to start on classroom demand - Ashrae II Energy Audit- Full audit of gas, water, and electrical systems - Total of 30 T-8, and 16 HID gym fixtures changed to LED 2017 - Reprogrammed VFDs to run on classroom demand 2018- Energy team audit - Student commons LED lighting upgrade, domestic hot water controls		

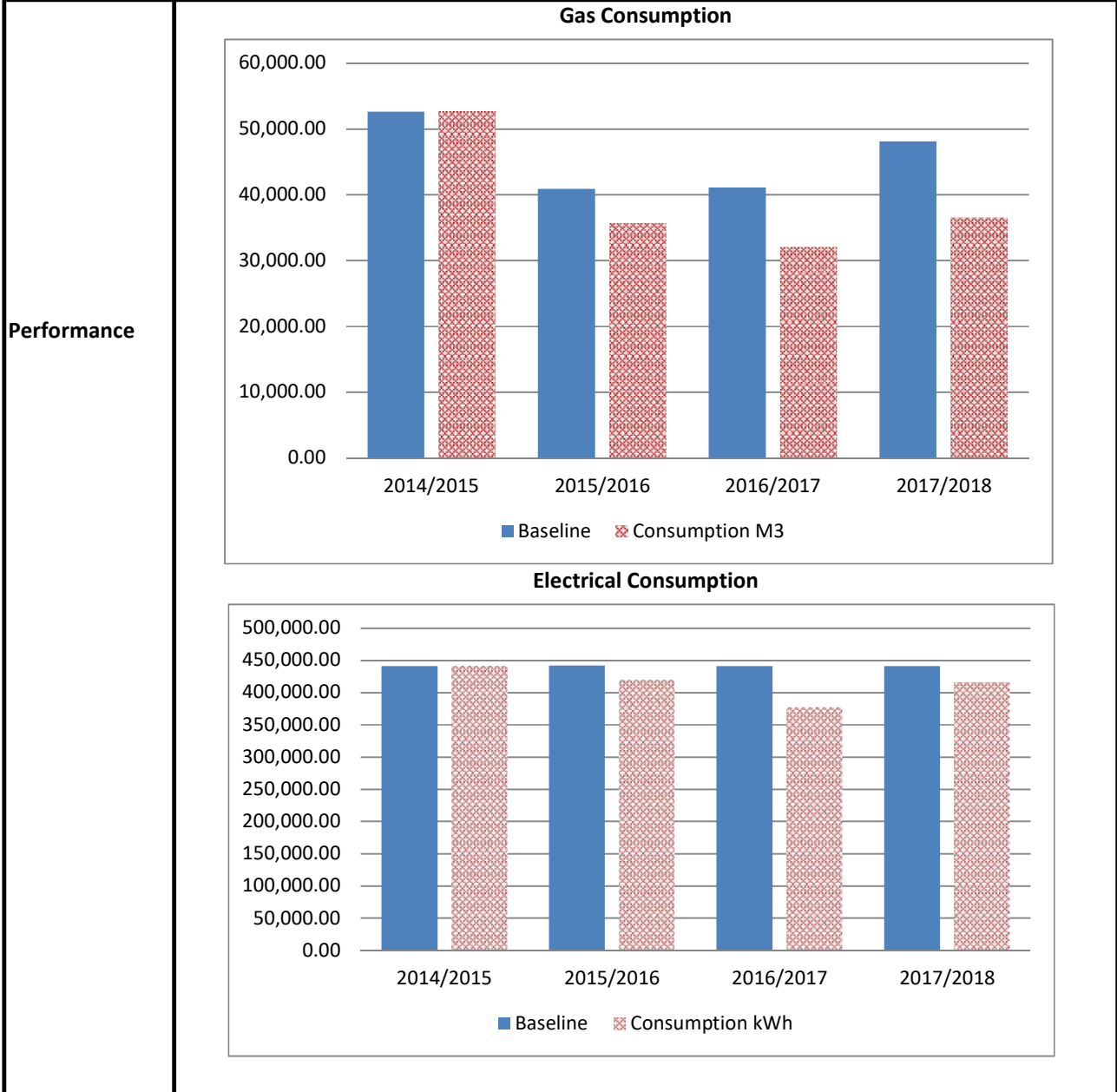
<b>Incentives</b>	None
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<b>Savings</b>	<b>Range</b>	<b>\$ saved on Natural Gas</b>	<b>\$ saved on Electricity</b>
	2017/2018	\$13,324	\$109,772
	Cumulative	\$61,945	\$383,534

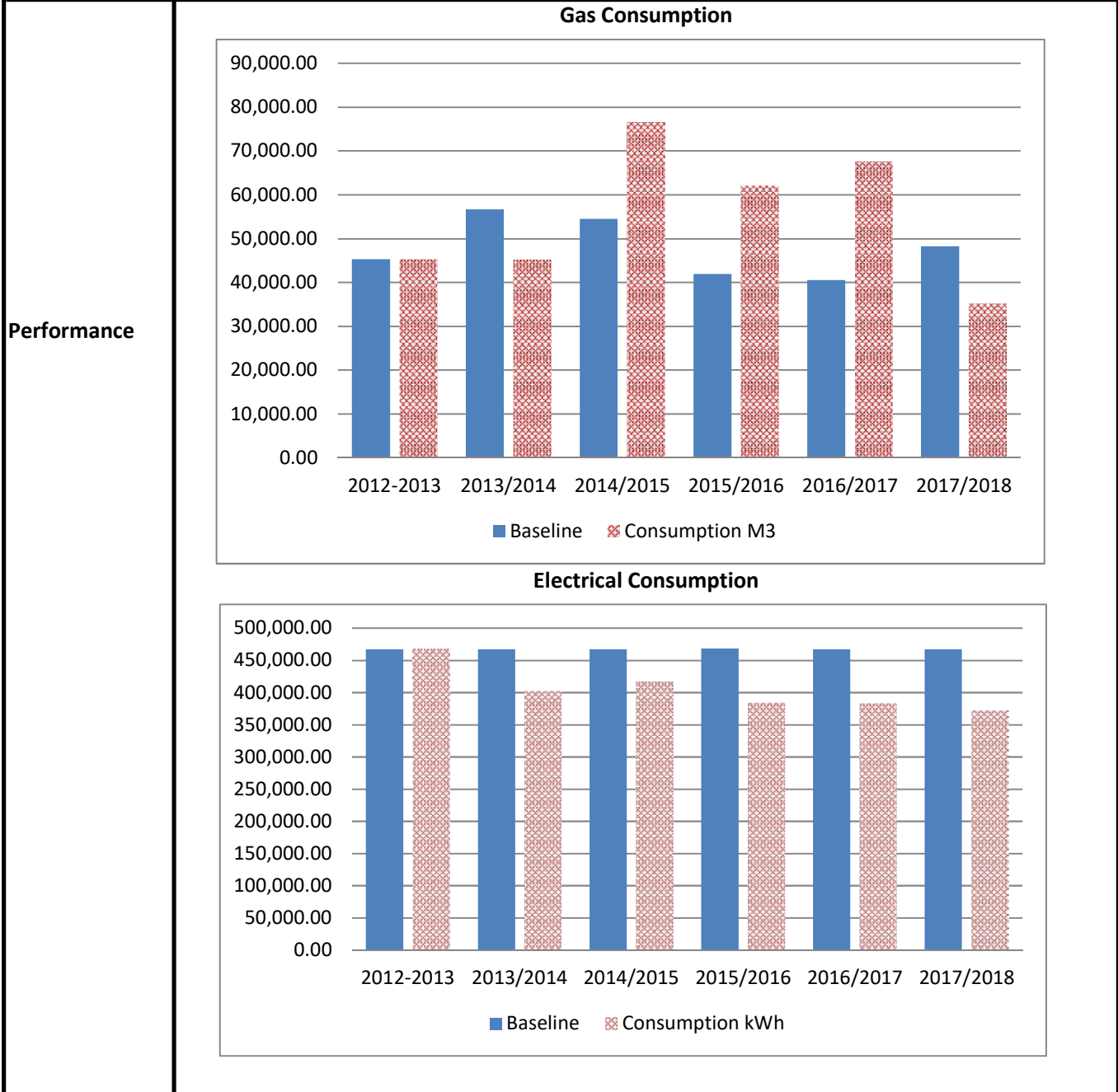
<b>School</b>	Mitchell Woods P.S.	<b>Location</b>	Guelph
<b>Project Details</b>	2016 - Modified chiller to run based on room demand - Energy walkthrough 2017 - Drained coil for makeup air unit and now using strictly reheat - Cooling tower replacement - Rebalanced airflows in school and slowed down VFD - Lighting upgrade to LED, rewired lighting circuits to reduce usage 2018 - Air handler VFD failed, wasting energy - Replaced failed VFD and restored energy savings		

<b>Incentives</b>	None
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<b>Savings</b>	<b>Range</b>	<b>\$ saved on Natural Gas</b>	<b>\$ saved on Electricity</b>
	2017/2018	\$2,606	\$3,799
	Cumulative	\$6,431	\$18,750

<b>School</b>	Primrose E.S.	<b>Location</b>	Shelburne
<b>Project Details</b>	2013- Controls upgrade - Roof insulation 2017- Controls system modification for efficiency 2018- Condensing boiler, heat recovery mods, cooling tower upgrades - Ext. and int. lighting upgrade to LED (foyer stairwells, gym) including controls		
<b>Incentives</b>	None		



<b>Savings</b>	<b>Range</b>	<b>\$ saved on Natural Gas</b>	<b>\$ saved on Electricity</b>
	2017/2018	\$3,520	\$19,903
	Cumulative	-\$12,494	\$76,050

<b>School</b>	Eramosa P.S.		<b>Location</b>	Rockwood																																				
<b>Project Details</b>	2014- Sealant and exterior wallpack lighting. 2016- Exhaust system found to be oversized. Modifications to reduce volume. 2017- LED lighting in Gym.																																							
<b>Incentives</b>	None																																							
<b>Performance</b>	<div style="text-align: center;"> <p><b>Oil Consumption</b></p> <table border="1"> <caption>Oil Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline</th> <th>Consumption L</th> </tr> </thead> <tbody> <tr> <td>2013/2014</td> <td>43,500</td> <td>43,500</td> </tr> <tr> <td>2014/2015</td> <td>42,000</td> <td>45,000</td> </tr> <tr> <td>2015/2016</td> <td>33,000</td> <td>26,000</td> </tr> <tr> <td>2016/2017</td> <td>33,000</td> <td>25,000</td> </tr> <tr> <td>2017/2018</td> <td>37,500</td> <td>34,500</td> </tr> </tbody> </table> </div> <div style="text-align: center; margin-top: 20px;"> <p><b>Electrical Consumption</b></p> <table border="1"> <caption>Electrical Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline</th> <th>Consumption kWh</th> </tr> </thead> <tbody> <tr> <td>2013/2014</td> <td>110,000</td> <td>110,000</td> </tr> <tr> <td>2014/2015</td> <td>110,000</td> <td>98,000</td> </tr> <tr> <td>2015/2016</td> <td>110,000</td> <td>83,000</td> </tr> <tr> <td>2016/2017</td> <td>110,000</td> <td>79,000</td> </tr> <tr> <td>2017/2018</td> <td>110,000</td> <td>73,000</td> </tr> </tbody> </table> </div>				Year	Baseline	Consumption L	2013/2014	43,500	43,500	2014/2015	42,000	45,000	2015/2016	33,000	26,000	2016/2017	33,000	25,000	2017/2018	37,500	34,500	Year	Baseline	Consumption kWh	2013/2014	110,000	110,000	2014/2015	110,000	98,000	2015/2016	110,000	83,000	2016/2017	110,000	79,000	2017/2018	110,000	73,000
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<b>Savings</b>	<b>Range</b>	<b>\$ saved on Oil</b>		<b>\$ saved on Electricity</b>																																				
	2017/2018	\$2,750		\$6,014																																				
	Cumulative	\$12,925		\$20,244																																				

<b>School</b>	Jean Little P.S.		<b>Location</b>	Guelph																																										
<b>Project Details</b>	2013 - Air conditioning added 2014 - Addition of condensing boiler to support 2 originals 2015 - Controls upgrade- AHU schedules trimmed back to not run 24-7 2017 - Machine and wood shop modifications, roof replacement 2018 - Power exhaust upgrade and heating pumps replaced																																													
<b>Incentives</b>	None																																													
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<b>Savings</b>	<b>Range</b>	<b>\$ saved on Natural Gas</b>	<b>\$ saved on Electricity</b>																																											
	2017/2018	\$3,693	\$3,959																																											
	Cumulative	\$15,608	\$15,382																																											

<b>School</b>	Centre Dufferin D.H.S.		<b>Location</b>	Shelburne																														
<b>Project Details</b>	2015- Controls upgrade, 8 RTU replacements, LED in stairways, foyer and hallways 2016- 50kw solar array commissioned and operational in November of 2015 2017- Walkthrough audit -LED lighting upgrade- Gym, exterior wall packs, soffits -Controls upgrades (cafeteria, teaching kitchen, tech shops)																																	
<b>Incentives</b>	None																																	
<b>Performance</b>	<div style="text-align: center;"> <b>Gas Consumption</b> <table border="1"> <caption>Gas Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline (M3)</th> <th>Consumption M3</th> </tr> </thead> <tbody> <tr> <td>2014/2015</td> <td>~145,000</td> <td>~145,000</td> </tr> <tr> <td>2015/2016</td> <td>~120,000</td> <td>~110,000</td> </tr> <tr> <td>2016/2017</td> <td>~120,000</td> <td>~100,000</td> </tr> <tr> <td>2017/2018</td> <td>~120,000</td> <td>~115,000</td> </tr> </tbody> </table> </div> <div style="text-align: center; margin-top: 20px;"> <b>Electrical Consumption</b> <table border="1"> <caption>Electrical Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline (kWh)</th> <th>Consumption kWh</th> </tr> </thead> <tbody> <tr> <td>2014/2015</td> <td>~650,000</td> <td>~650,000</td> </tr> <tr> <td>2015/2016</td> <td>~620,000</td> <td>~550,000</td> </tr> <tr> <td>2016/2017</td> <td>~610,000</td> <td>~530,000</td> </tr> <tr> <td>2017/2018</td> <td>~610,000</td> <td>~600,000</td> </tr> </tbody> </table> </div>				Year	Baseline (M3)	Consumption M3	2014/2015	~145,000	~145,000	2015/2016	~120,000	~110,000	2016/2017	~120,000	~100,000	2017/2018	~120,000	~115,000	Year	Baseline (kWh)	Consumption kWh	2014/2015	~650,000	~650,000	2015/2016	~620,000	~550,000	2016/2017	~610,000	~530,000	2017/2018	~610,000	~600,000
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<b>Savings</b>	<b>Range</b>	<b>\$ saved on Natural Gas</b>	<b>\$ saved on Electricity</b>																															
	2017/2018	\$840	\$3,018																															
	Cumulative	\$9,289	\$37,699																															

<b>School</b>	East Garafraxa P.S.		<b>Location</b>	Orangeville															
<b>Project Details</b>	2015- BAS controls project 2016- Energy walkthrough																		
<b>Incentives</b>	None																		
<b>Performance</b>	<p style="text-align: center;"><b>Electrical Consumption</b></p> <table border="1"> <caption>Electrical Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline (kWh)</th> <th>Consumption kWh (kWh)</th> </tr> </thead> <tbody> <tr> <td>2014/2015</td> <td>380,000</td> <td>380,000</td> </tr> <tr> <td>2015/2016</td> <td>290,000</td> <td>275,000</td> </tr> <tr> <td>2016/2017</td> <td>295,000</td> <td>235,000</td> </tr> <tr> <td>2017/2018</td> <td>345,000</td> <td>290,000</td> </tr> </tbody> </table>				Year	Baseline (kWh)	Consumption kWh (kWh)	2014/2015	380,000	380,000	2015/2016	290,000	275,000	2016/2017	295,000	235,000	2017/2018	345,000	290,000
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<b>Savings</b>	<b>Range</b>	<b>\$ saved on Electricity</b>																	
	2017/2018	\$9,574																	
	Cumulative	\$28,329																	

<b>School</b>	Kenilworth P.S.		<b>Location</b>	Kenilworth															
<b>Project Details</b>	2015- Controls upgrade- DDC added to each room 2017- Controls upgrade- provide duty cycle programming for gym electric heaters																		
<b>Incentives</b>	None																		
<b>Performance</b>	<div style="text-align: center;"> <b>Electrical Consumption</b> <table border="1"> <caption>Electrical Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline (kWh)</th> <th>Consumption kWh (kWh)</th> </tr> </thead> <tbody> <tr> <td>2014/2015</td> <td>~305,000</td> <td>~305,000</td> </tr> <tr> <td>2015/2016</td> <td>~240,000</td> <td>~150,000</td> </tr> <tr> <td>2016/2017</td> <td>~195,000</td> <td>~165,000</td> </tr> <tr> <td>2017/2018</td> <td>~230,000</td> <td>~165,000</td> </tr> </tbody> </table> </div>				Year	Baseline (kWh)	Consumption kWh (kWh)	2014/2015	~305,000	~305,000	2015/2016	~240,000	~150,000	2016/2017	~195,000	~165,000	2017/2018	~230,000	~165,000
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2017/2018	~230,000	~165,000																	
<b>Savings</b>	<b>Range</b>	<b>\$ saved on Electricity</b>																	
	2017/2018	\$10,777																	
	Cumulative	\$39,714																	



<b>School</b>	Paisley Road P.S.		<b>Location</b>	Guelph																																				
<b>Project Details</b>	2014- Parking lot and gym lights upgraded - Repair to exhaust systems 2016- VFDs on fans 2018- Boiler upgrade to condensing																																							
<b>Incentives</b>	None																																							
<b>Performance</b>	<div style="text-align: center;"> <p><b>Gas Consumption</b></p> <table border="1"> <caption>Gas Consumption Data (M3)</caption> <thead> <tr> <th>Year</th> <th>Baseline</th> <th>Consumption M3</th> </tr> </thead> <tbody> <tr> <td>2013/2014</td> <td>78,000.00</td> <td>78,000.00</td> </tr> <tr> <td>2014/2015</td> <td>74,000.00</td> <td>67,000.00</td> </tr> <tr> <td>2015/2016</td> <td>60,000.00</td> <td>44,000.00</td> </tr> <tr> <td>2016/2017</td> <td>60,000.00</td> <td>45,000.00</td> </tr> <tr> <td>2017/2018</td> <td>68,000.00</td> <td>51,000.00</td> </tr> </tbody> </table> </div> <div style="text-align: center; margin-top: 20px;"> <p><b>Electrical Consumption</b></p> <table border="1"> <caption>Electrical Consumption Data (kWh)</caption> <thead> <tr> <th>Year</th> <th>Baseline</th> <th>Consumption kWh</th> </tr> </thead> <tbody> <tr> <td>2013/2014</td> <td>310,000.00</td> <td>310,000.00</td> </tr> <tr> <td>2014/2015</td> <td>305,000.00</td> <td>255,000.00</td> </tr> <tr> <td>2015/2016</td> <td>285,000.00</td> <td>220,000.00</td> </tr> <tr> <td>2016/2017</td> <td>285,000.00</td> <td>195,000.00</td> </tr> <tr> <td>2017/2018</td> <td>295,000.00</td> <td>200,000.00</td> </tr> </tbody> </table> </div>				Year	Baseline	Consumption M3	2013/2014	78,000.00	78,000.00	2014/2015	74,000.00	67,000.00	2015/2016	60,000.00	44,000.00	2016/2017	60,000.00	45,000.00	2017/2018	68,000.00	51,000.00	Year	Baseline	Consumption kWh	2013/2014	310,000.00	310,000.00	2014/2015	305,000.00	255,000.00	2015/2016	285,000.00	220,000.00	2016/2017	285,000.00	195,000.00	2017/2018	295,000.00	200,000.00
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2015/2016	60,000.00	44,000.00																																						
2016/2017	60,000.00	45,000.00																																						
2017/2018	68,000.00	51,000.00																																						
Year	Baseline	Consumption kWh																																						
2013/2014	310,000.00	310,000.00																																						
2014/2015	305,000.00	255,000.00																																						
2015/2016	285,000.00	220,000.00																																						
2016/2017	285,000.00	195,000.00																																						
2017/2018	295,000.00	200,000.00																																						
<b>Savings</b>	<b>Range</b>	<b>\$ saved on Natural Gas</b>	<b>\$ saved on Electricity</b>																																					
	2017/2018	\$4,059	\$11,434																																					
	Cumulative	\$14,168	\$47,111																																					

<b>School</b>	Credit Meadows E.S.		<b>Location</b>	Orangeville								
<b>Project Details</b>	2017- Controls - Condensing Unit Replacement - Office and Library A/C System Replacement - Hydronic System Pump Replacement											
<b>Incentives</b>	None											
<b>Performance</b>	<b>Gas Consumption</b>											
	<table border="1"> <caption>Gas Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline (M3)</th> <th>Consumption M3</th> </tr> </thead> <tbody> <tr> <td>2016/2017</td> <td>38,500</td> <td>38,500</td> </tr> <tr> <td>2017/2018</td> <td>44,500</td> <td>29,000</td> </tr> </tbody> </table>				Year	Baseline (M3)	Consumption M3	2016/2017	38,500	38,500	2017/2018	44,500
Year	Baseline (M3)	Consumption M3										
2016/2017	38,500	38,500										
2017/2018	44,500	29,000										
<b>Performance</b>	<b>Electrical Consumption</b>											
	<table border="1"> <caption>Electrical Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline (kWh)</th> <th>Consumption kWh</th> </tr> </thead> <tbody> <tr> <td>2016/2017</td> <td>155,000</td> <td>155,000</td> </tr> <tr> <td>2017/2018</td> <td>155,000</td> <td>150,000</td> </tr> </tbody> </table>				Year	Baseline (kWh)	Consumption kWh	2016/2017	155,000	155,000	2017/2018	155,000
Year	Baseline (kWh)	Consumption kWh										
2016/2017	155,000	155,000										
2017/2018	155,000	150,000										
<b>Savings</b>	<b>Range</b>	<b>\$ saved on Natural Gas</b>	<b>\$ saved on Electricity</b>									
	2017/2018	\$4,595	\$537									
	Cumulative	\$4,595	\$537									

<b>School</b>	John Black P.S.		<b>Location</b>	Fergus								
<b>Project Details</b>	2017- Boiler upgrade to condensing - HVAC upgrades - LED upgrade- Changerooms, wallpacks, hallways, parking lot, washrooms											
<b>Incentives</b>	None											
<b>Performance</b>	<b>Gas Consumption</b>											
	<table border="1"> <caption>Gas Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline (M3)</th> <th>Consumption M3</th> </tr> </thead> <tbody> <tr> <td>2016/2017</td> <td>43,000</td> <td>43,000</td> </tr> <tr> <td>2017/2018</td> <td>49,000</td> <td>30,000</td> </tr> </tbody> </table>				Year	Baseline (M3)	Consumption M3	2016/2017	43,000	43,000	2017/2018	49,000
Year	Baseline (M3)	Consumption M3										
2016/2017	43,000	43,000										
2017/2018	49,000	30,000										
<b>Performance</b>	<b>Electrical Consumption</b>											
	<table border="1"> <caption>Electrical Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline (kWh)</th> <th>Consumption kWh</th> </tr> </thead> <tbody> <tr> <td>2016/2017</td> <td>210,000</td> <td>210,000</td> </tr> <tr> <td>2017/2018</td> <td>210,000</td> <td>200,000</td> </tr> </tbody> </table>				Year	Baseline (kWh)	Consumption kWh	2016/2017	210,000	210,000	2017/2018	210,000
Year	Baseline (kWh)	Consumption kWh										
2016/2017	210,000	210,000										
2017/2018	210,000	200,000										
<b>Savings</b>	<b>Range</b>	<b>\$ saved on Natural Gas</b>	<b>\$ saved on Electricity</b>									
	2017/2018	\$4,385	\$1,907									
	Cumulative	\$4,385	\$1,907									

<b>School</b>	Laurelwoods E.S.		<b>Location</b>	Amaranth																		
<b>Project Details</b>	2017- Controls system replaement - Boiler upgrade to condensing - RTU replacement for 2,5,6,7 - LED lighting upgrade 2018- Roof renovation																					
<b>Incentives</b>	None																					
<b>Performance</b>	<div style="text-align: center;"> <p><b>Gas Consumption</b></p> <table border="1"> <caption>Gas Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline (M3)</th> <th>Consumption M3</th> </tr> </thead> <tbody> <tr> <td>2016/2017</td> <td>38,000</td> <td>38,000</td> </tr> <tr> <td>2017/2018</td> <td>43,000</td> <td>40,000</td> </tr> </tbody> </table> </div> <div style="text-align: center; margin-top: 20px;"> <p><b>Electrical Consumption</b></p> <table border="1"> <caption>Electrical Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline (kWh)</th> <th>Consumption kWh</th> </tr> </thead> <tbody> <tr> <td>2016/2017</td> <td>225,000</td> <td>225,000</td> </tr> <tr> <td>2017/2018</td> <td>235,000</td> <td>200,000</td> </tr> </tbody> </table> </div>				Year	Baseline (M3)	Consumption M3	2016/2017	38,000	38,000	2017/2018	43,000	40,000	Year	Baseline (kWh)	Consumption kWh	2016/2017	225,000	225,000	2017/2018	235,000	200,000
Year	Baseline (M3)	Consumption M3																				
2016/2017	38,000	38,000																				
2017/2018	43,000	40,000																				
Year	Baseline (kWh)	Consumption kWh																				
2016/2017	225,000	225,000																				
2017/2018	235,000	200,000																				
<b>Savings</b>	<b>Range</b>	<b>\$ saved on Natural Gas</b>		<b>\$ saved on Electricity</b>																		
	2017/2018	\$770		\$5,967																		
	Cumulative	\$770		\$5,967																		

<b>School</b>	Minto Clifford P.S.		<b>Location</b>	Minto																		
<b>Project Details</b>	2017- Controls replacement - RTU replacement (7 units) 2018- Roof replacement																					
<b>Incentives</b>	None																					
<b>Performance</b>	<div style="text-align: center;"> <p><b>Gas Consumption</b></p> <table border="1"> <caption>Gas Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline (M3)</th> <th>Consumption M3</th> </tr> </thead> <tbody> <tr> <td>2016/2017</td> <td>38,000.00</td> <td>38,000.00</td> </tr> <tr> <td>2017/2018</td> <td>45,000.00</td> <td>37,000.00</td> </tr> </tbody> </table> </div> <div style="text-align: center; margin-top: 20px;"> <p><b>Electrical Consumption</b></p> <table border="1"> <caption>Electrical Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline (kWh)</th> <th>Consumption kWh</th> </tr> </thead> <tbody> <tr> <td>2016/2017</td> <td>195,000.00</td> <td>190,000.00</td> </tr> <tr> <td>2017/2018</td> <td>200,000.00</td> <td>185,000.00</td> </tr> </tbody> </table> </div>				Year	Baseline (M3)	Consumption M3	2016/2017	38,000.00	38,000.00	2017/2018	45,000.00	37,000.00	Year	Baseline (kWh)	Consumption kWh	2016/2017	195,000.00	190,000.00	2017/2018	200,000.00	185,000.00
Year	Baseline (M3)	Consumption M3																				
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Year	Baseline (kWh)	Consumption kWh																				
2016/2017	195,000.00	190,000.00																				
2017/2018	200,000.00	185,000.00																				
<b>Savings</b>	<b>Range</b>	<b>\$ saved on Natural Gas</b>		<b>\$ saved on Electricity</b>																		
	2017/2018	\$1,790		\$1,814																		
	Cumulative	\$1,790		\$1,814																		

<b>School</b>	F.A. Hamilton P.S.		<b>Location</b>	Guelph																																																																		
<b>Project Details</b>	2009 – Boiler retrofit and controls upgrade 2011 – Addition and renovation 2015 – Removal of 8 portable classrooms																																																																					
<b>Incentives</b>	None																																																																					
<b>Performance</b>	<div style="text-align: center;"> <b>Gas Consumption</b> <table border="1"> <caption>Gas Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline</th> <th>Consumption M3</th> </tr> </thead> <tbody> <tr><td>2008/2009</td><td>82,000</td><td>82,000</td></tr> <tr><td>2009/2010</td><td>72,000</td><td>28,000</td></tr> <tr><td>2010/2011</td><td>82,000</td><td>26,000</td></tr> <tr><td>2011/2012</td><td>64,000</td><td>18,000</td></tr> <tr><td>2012/2013</td><td>78,000</td><td>26,000</td></tr> <tr><td>2013/2014</td><td>92,000</td><td>30,000</td></tr> <tr><td>2014/2015</td><td>88,000</td><td>29,000</td></tr> <tr><td>2015/2016</td><td>70,000</td><td>21,000</td></tr> <tr><td>2016/2017</td><td>70,000</td><td>23,000</td></tr> <tr><td>2017/2018</td><td>80,000</td><td>28,000</td></tr> </tbody> </table> </div> <div style="text-align: center; margin-top: 20px;"> <b>Electrical Consumption</b> <table border="1"> <caption>Electrical Consumption Data</caption> <thead> <tr> <th>Year</th> <th>Baseline</th> <th>Consumption kWh</th> </tr> </thead> <tbody> <tr><td>2008/2009</td><td>310,000</td><td>310,000</td></tr> <tr><td>2009/2010</td><td>300,000</td><td>320,000</td></tr> <tr><td>2010/2011</td><td>310,000</td><td>240,000</td></tr> <tr><td>2011/2012</td><td>280,000</td><td>260,000</td></tr> <tr><td>2012/2013</td><td>300,000</td><td>320,000</td></tr> <tr><td>2013/2014</td><td>310,000</td><td>350,000</td></tr> <tr><td>2014/2015</td><td>310,000</td><td>250,000</td></tr> <tr><td>2015/2016</td><td>290,000</td><td>180,000</td></tr> <tr><td>2016/2017</td><td>290,000</td><td>180,000</td></tr> <tr><td>2017/2018</td><td>300,000</td><td>160,000</td></tr> </tbody> </table> </div>				Year	Baseline	Consumption M3	2008/2009	82,000	82,000	2009/2010	72,000	28,000	2010/2011	82,000	26,000	2011/2012	64,000	18,000	2012/2013	78,000	26,000	2013/2014	92,000	30,000	2014/2015	88,000	29,000	2015/2016	70,000	21,000	2016/2017	70,000	23,000	2017/2018	80,000	28,000	Year	Baseline	Consumption kWh	2008/2009	310,000	310,000	2009/2010	300,000	320,000	2010/2011	310,000	240,000	2011/2012	280,000	260,000	2012/2013	300,000	320,000	2013/2014	310,000	350,000	2014/2015	310,000	250,000	2015/2016	290,000	180,000	2016/2017	290,000	180,000	2017/2018	300,000	160,000
Year	Baseline	Consumption M3																																																																				
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<b>Savings</b>	<b>Range</b>	<b>\$ saved on Natural Gas</b>	<b>\$ saved on Electricity</b>																																																																			
	2017/2018	\$11,842	\$17,726																																																																			
	Cumulative	\$108,803	\$64,659																																																																			

Major Energy Project Savings - Fig 3.5

<b>Year initiatives commenced</b>	<b>Location</b>	<b>\$ saved on gas/oil and electric 2017/2018</b>	<b>Cumulative savings since project started</b>
2012/2013	<b>Centre Wellington D.H.S.</b>	\$123,096.00	\$445,479.00
	<b>Primrose E.S.</b>	\$23,423.00	\$63,557.00
2013/2014	<b>Eramosa P.S.</b>	\$8,764.00	\$33,169.00
	<b>Jean Little P.S.</b>	\$7,652.00	\$30,990.00
2014/2015	<b>Centre Dufferin D.H.S.</b>	\$3,858.00	\$46,988.00
	<b>East Garafraxa P.S.</b>	\$9,574.00	\$28,329.00
	<b>Kenilworth P.S.</b>	\$10,777.00	\$39,714.00
	<b>Wellington Heights S.S.</b>	\$65,088.00	\$120,875.00
2015/2016	<b>Mitchell Woods P.S.</b>	\$6,405.00	\$25,181.00
	<b>Paisley Road P.S.</b>	\$15,492.00	\$61,279.00
2016/2017	<b>Credit Meadows E.S.</b>	\$5,132.00	\$5,132.00
	<b>John Black P.S.</b>	\$6,292.00	\$6,292.00
	<b>Laurelwoods E.S.</b>	\$6,737.00	\$6,737.00
	<b>Minto Clifford P.S.</b>	\$3,604.00	\$3,604.00
	<b>TOTAL SAVED</b>	\$295,894.00	\$917,326.00

## Incentives & Income Generated

### *Solar*

The UGDSB installed solar photovoltaic (PV) technology to generate electricity at various sites beginning in 2012. The majority of power that is generated is enrolled in the Province's Feed-In-Tariff program (microFIT). All new installations are 'Net-metered' installations. Figure 4.1(a) shows the amount of energy generated in fiscal year 2018/19. Figure 4.1(b) shows the revenue generated from the microFIT program along with the dollars saved from the energy generated at the net-metering sites.

In 2012, the Board initiated applications to install solar panels to generate electricity at all of the elementary school sites. Forty-two (42) microFIT systems were approved and solar array systems were installed to produce electricity. The electricity produced is sold to the Province for \$0.80/kWh at these sites.

After the IESO<sup>8</sup> cancelled the MicroFIT program, the only reasonable option to connect the Board to the grid was by net-metering. Connected in this fashion, the Board offsets the power it consumes with the power it generates. The Board has installed net-metered solar arrays at 3 sites, (50kW array at Centre Dufferin DHS in 2015/16, and 10kW arrays at Guelph Lake PS and John F Ross CVI in 2016/17). As the cost of electricity rises, the payback on these net-metered systems becomes more valuable to the Board.

The introduction of a formal energy team in 2019 has allowed the Board to better focus on the production/maintenance of our solar arrays. This effectively increased the efficiency of the systems, and thus the dollars paid back to the Board. Figure 4.2 summarizes the total earnings from electricity generated by the Board's solar installations; totaling almost \$2.2 million in the past 5 years.

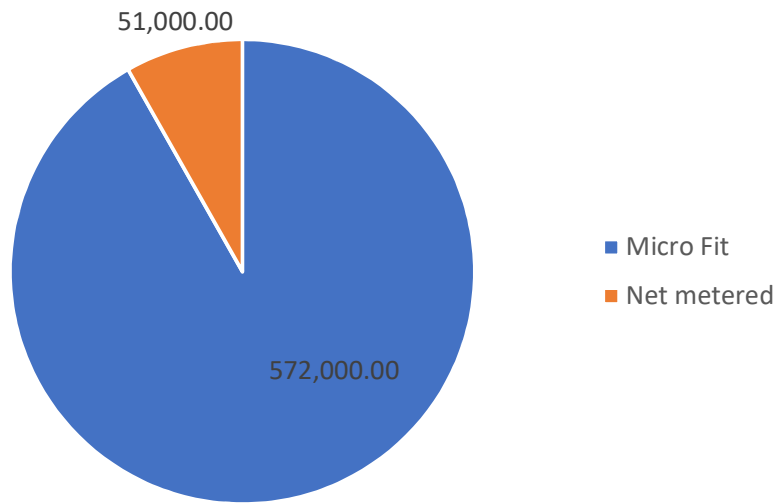
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<sup>8</sup> IESO – Independent Electricity System Operator



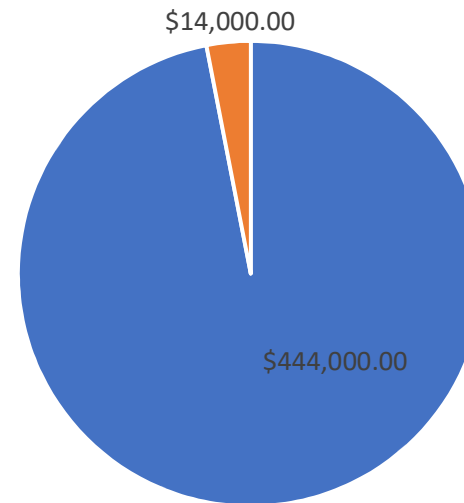
2017-18 Solar Generated And Earned - Fig 4.1

2017-18 kWh Generated - Fig 4.1 (a)



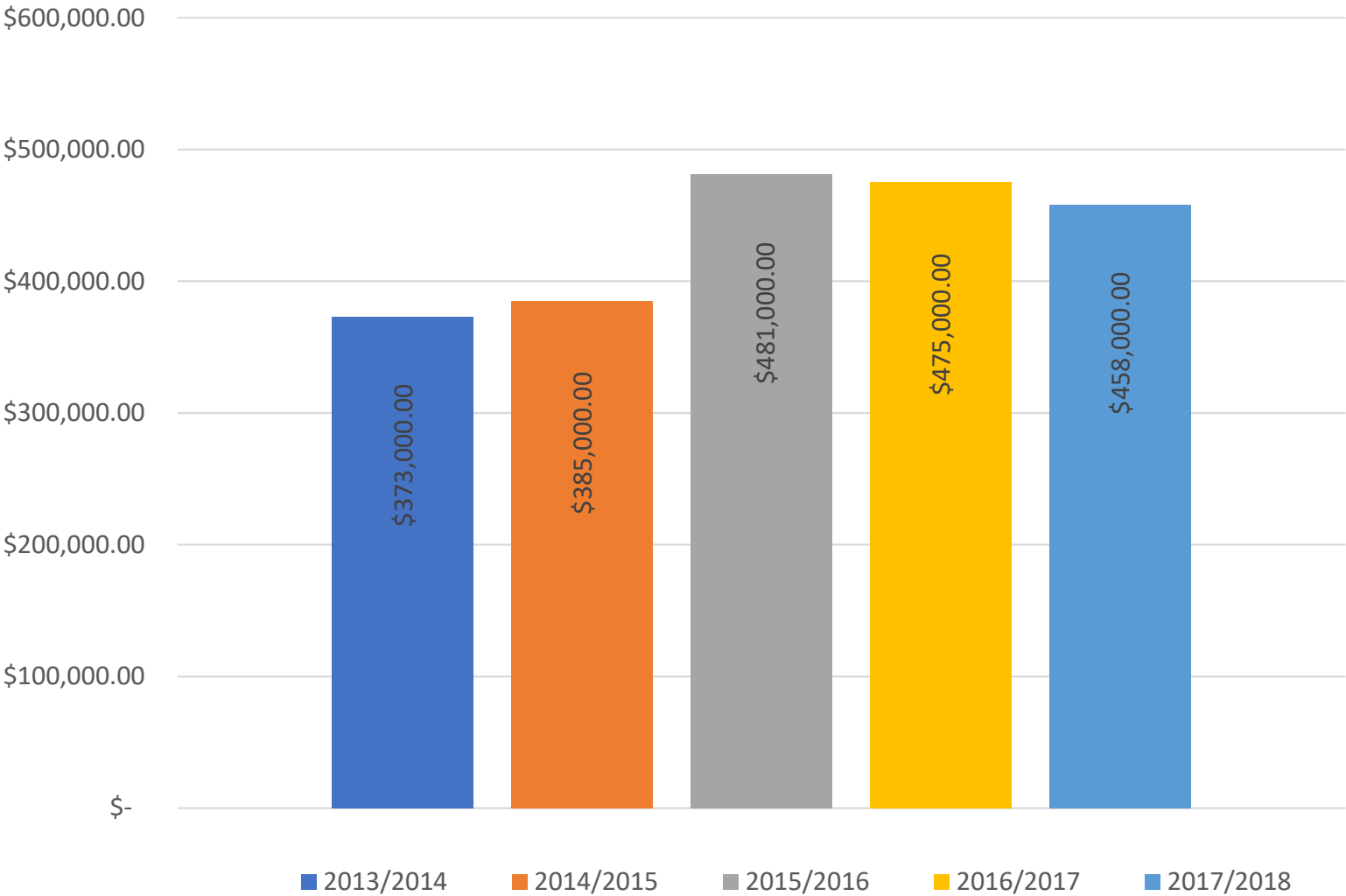
Total Generated: 623,000 kWh

2017-18 Solar \$ Earned - Fig 4.1 (b)



Total Earned: \$458,000

\$ Earned From All Solar Projects - Fig 4.2



Total Earned: \$2,172,000 (incl. HST)

### *Incentives*

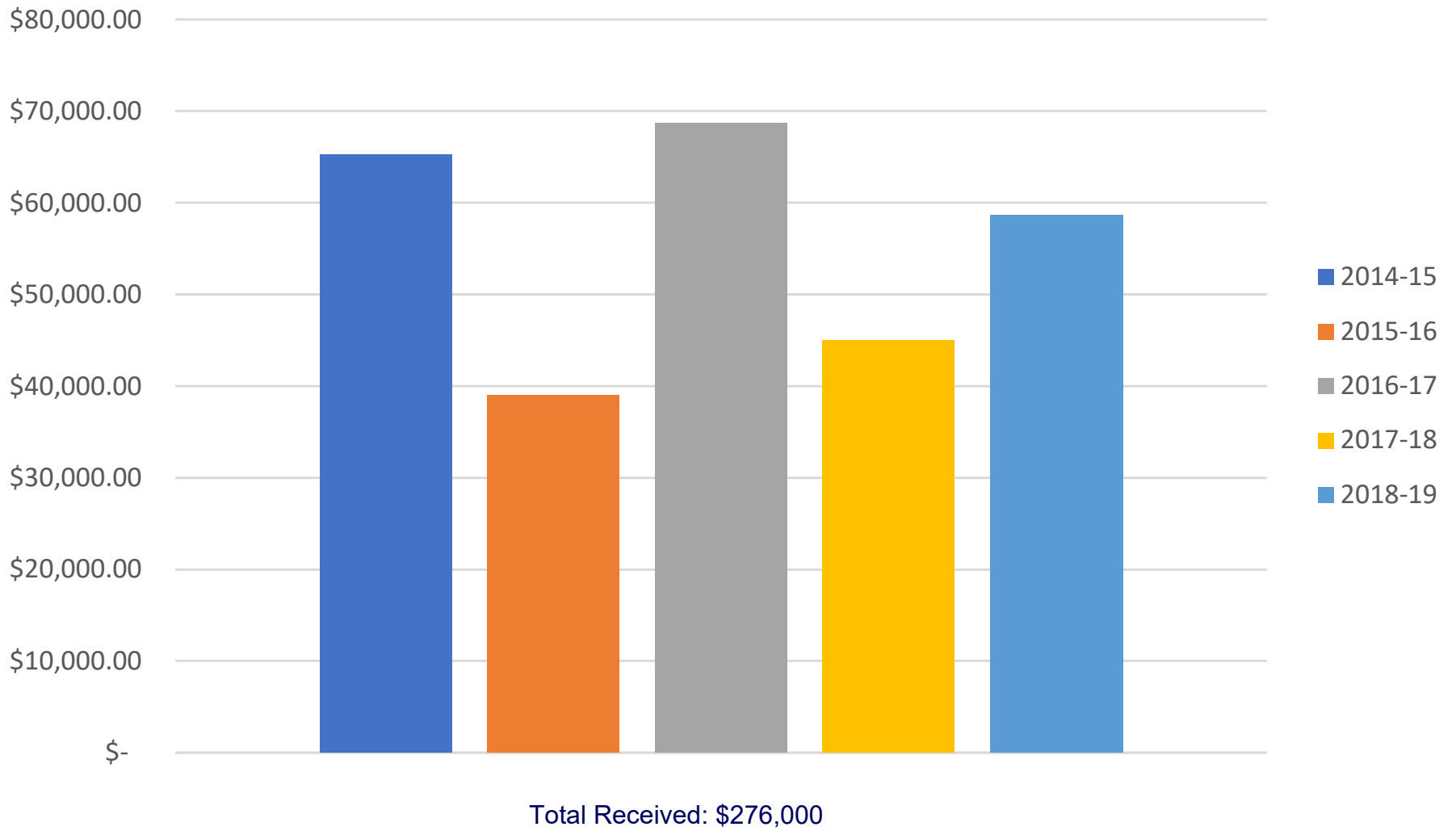
In the past number of years there have been financial incentives from governments or utility providers for implementing energy saving measures or purchasing more efficient equipment. When planning energy renewal projects, paying particular attention to the incentives available and the rules regarding the application can provide revenue to help fund the projects. Researching and applying for incentives to fund cost reduction measures helps the Board get a faster return on investment.

Over the past 5 fiscal years, the Board has received over \$270,000 in incentive funding from various agencies to support the implementation of energy efficient projects. Figure 4.3 summarizes the incentive funds received. The UGDSB is dedicated to applying to incentive programs and will continue to investigate incentive programs in the future to help support our goals.

### *Billing Errors*

Ensuring accuracy of the utility bills to the Board may become more of a focus in future years. To date almost \$25,000 has been returned to the Board as a result of identified billing anomalies.

Incentive Funds Received - Fig 4.3



## Energy Savings Board Wide

A significant component of the 5 year Energy and Demand Management Plan filed with the Ministry of Energy is the setting of targets for energy reduction. The Board's success in its efforts to meet its target along with targets for the next 5 years are documented in the plan filed in June of 2019 which is available on the Board's website.

Energy conservation results in cost savings to the Board by reducing the amount used and by partially offsetting the cost increase of utilities. In addition to the raw energy usage data supplied annually to the Ministry of Energy, it is useful to also review the financial impact of the energy conservation initiatives Board wide.

It is interesting to note that the GSN<sup>9</sup> from the province provides increases to the non-staff component of the Operations Grant in part to offset the increase cost of utilities, recognizing that the cost of utilities to Boards is on the rise. Figure 5.1 summarizes the average cost of utilities to the UGDSB over the past 5 years.

Even in light of these increases, the Board's cost for energy has generally trended down. Figure 5.2 shows the cost of utilities to the Board over the past 5 years.

Since utility consumption is affected by the weather in any particular year and the cost of utilities varies, savings to the Board cannot be estimated by simply comparing the cost to the Board year over year. In addition, not all initiatives result in energy savings; in some cases increased energy use is expected; for example adding air conditioning or increased ventilation.

For the purpose of estimating the overall savings to the Board, the overall energy use over the past five years is compared to the weather normalized base year. This is a conservative approach since some of the actual savings are offset by increased use resulting from planned improvements.

The electrical consumption plotted against the weather adjusted baseline over the past 5 years is summarized in Figure 5.3. The natural gas consumption is summarized in Figure 5.4. These two figures highlight, in grey, the net results Board wide, of the energy conservation efforts both technical and behavioural.

Figures 5.5 and 5.6 provide the estimated dollar value of the resulting savings to the Board. Board wide the estimated net savings from electricity and gas are approximately \$4,000,000 over the past 5 years; approximately \$3.55 million from electricity and the remainder from natural gas. This data suggests that, as a result of energy conservation initiatives Board wide, the Board is spending about \$900,000 less per year on utilities than it would have, if no conservation measures were introduced.

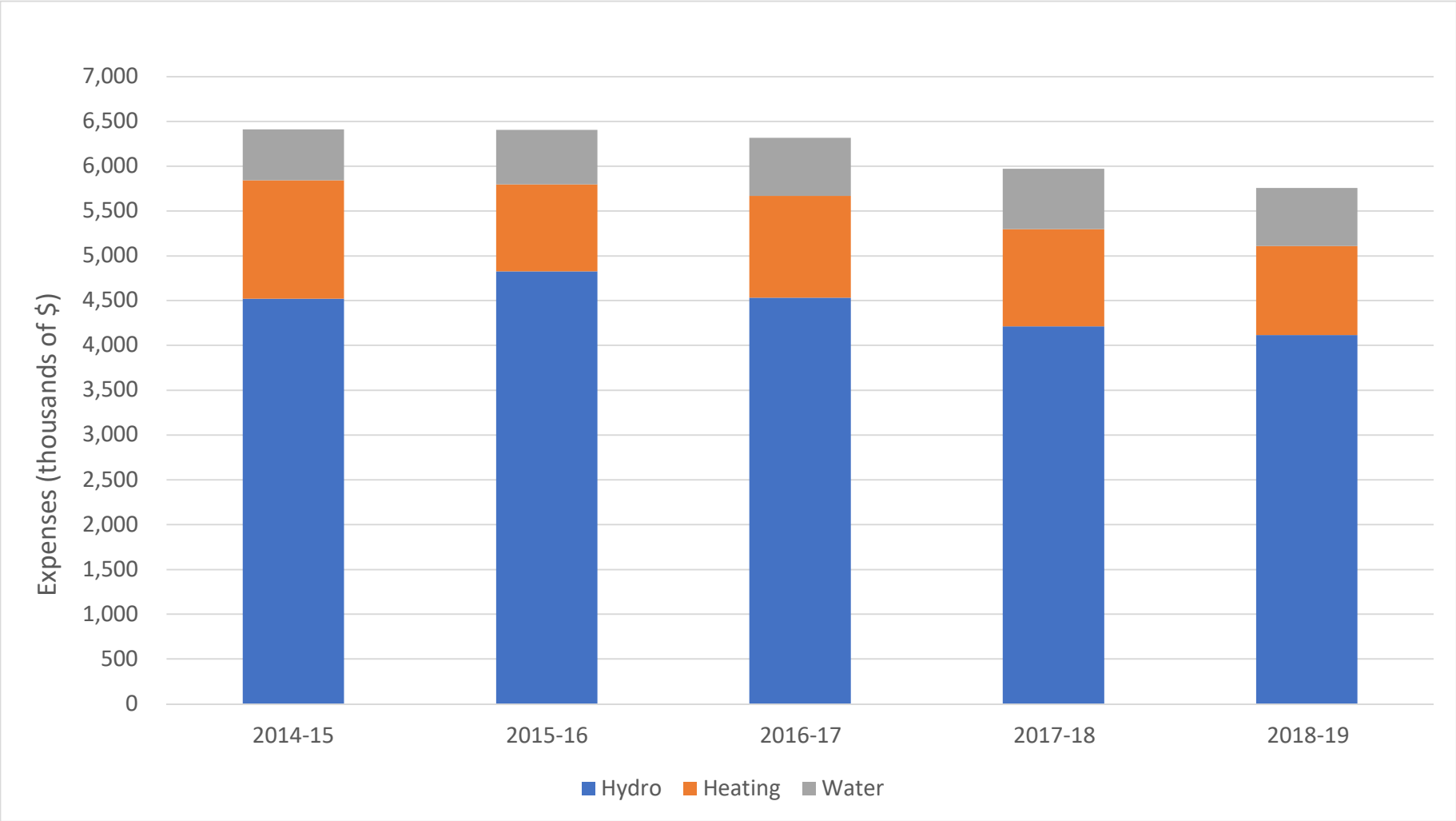
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<sup>9</sup> GSN – Grant for Student Needs

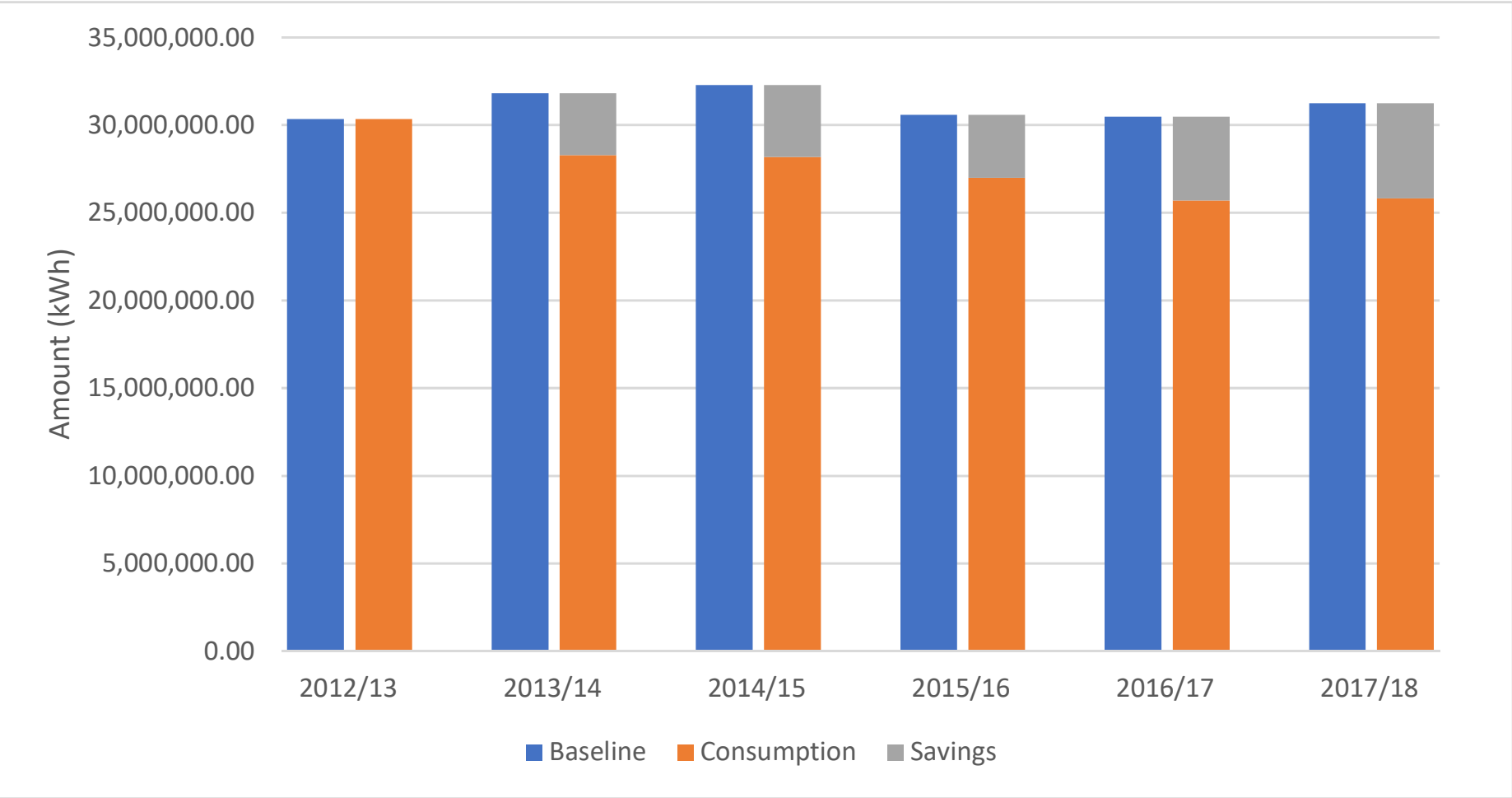
Utility Rates - Fig 5.1

<b>FY</b>	<b>Electricity \$/kWh</b>	<b>Natural Gas \$/m<sup>3</sup></b>	<b>Water \$/m<sup>3</sup></b>
<b>2013-14</b>	\$ 0.12	\$ 0.23	\$ 2.57
<b>2014-15</b>	\$ 0.15	\$ 0.24	\$ 3.70
<b>2015-16</b>	\$ 0.16	\$ 0.26	\$ 3.67
<b>2016-17</b>	\$ 0.18	\$ 0.25	\$ 4.33
<b>2017-18</b>	\$ 0.17	\$ 0.28	\$ 4.03
<b>2018-19</b>	\$ 0.16	\$ 0.24	\$ 4.27

UGDSB Utility Expenses - Fig 5.2

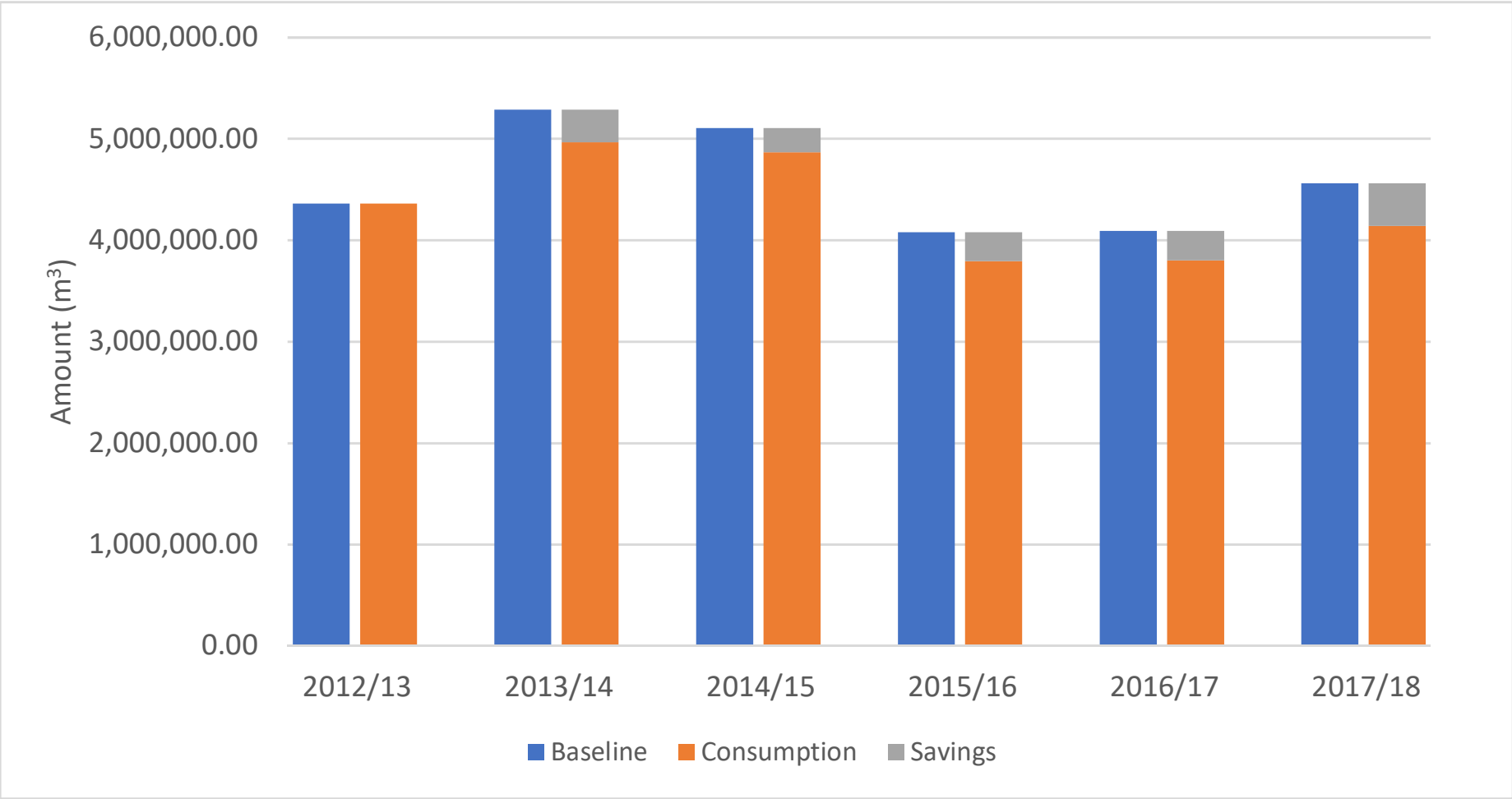


UGDSB Electricity Consumption - Fig 5.3

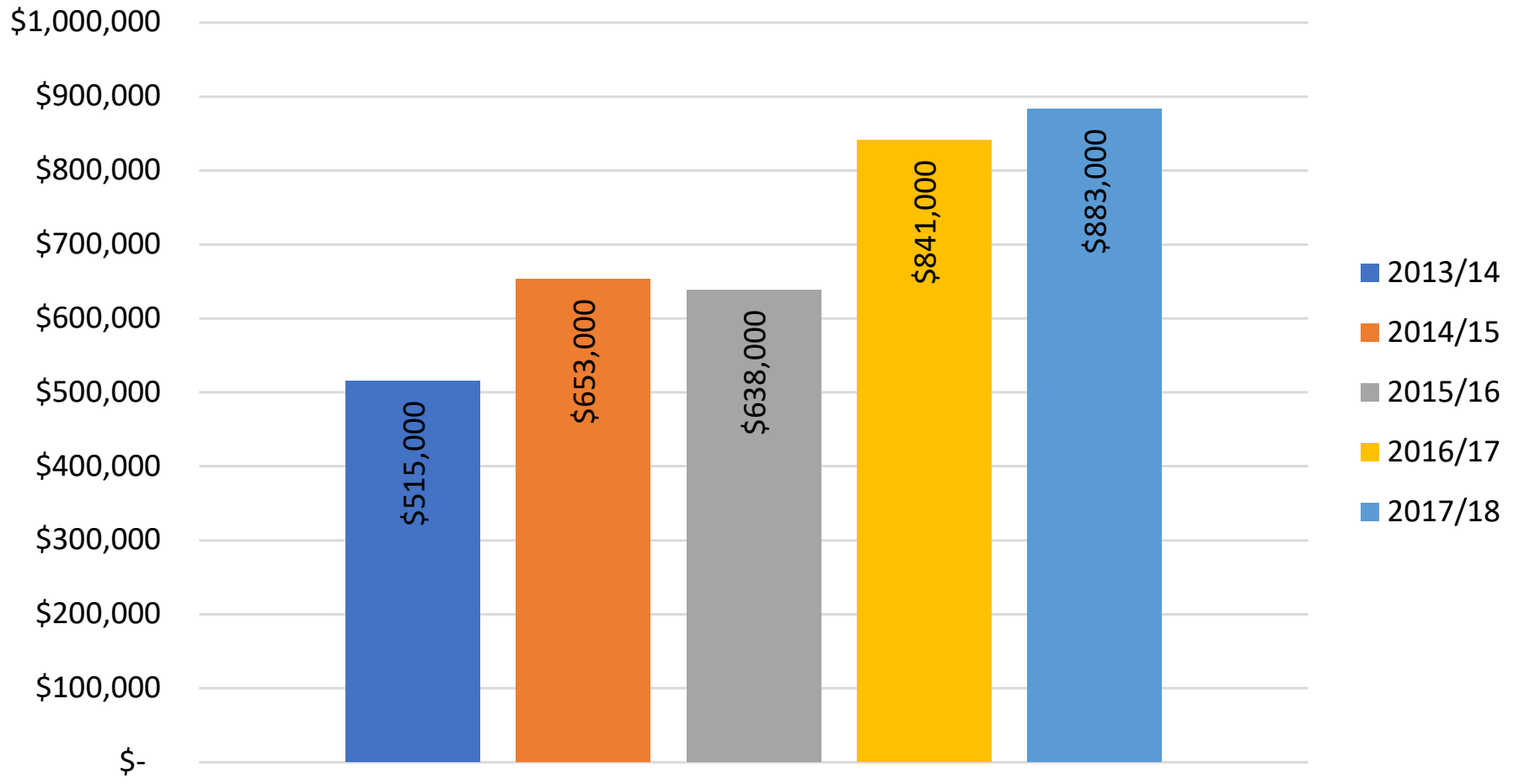




UGDSB Natural Gas Consumption - Fig 5.4

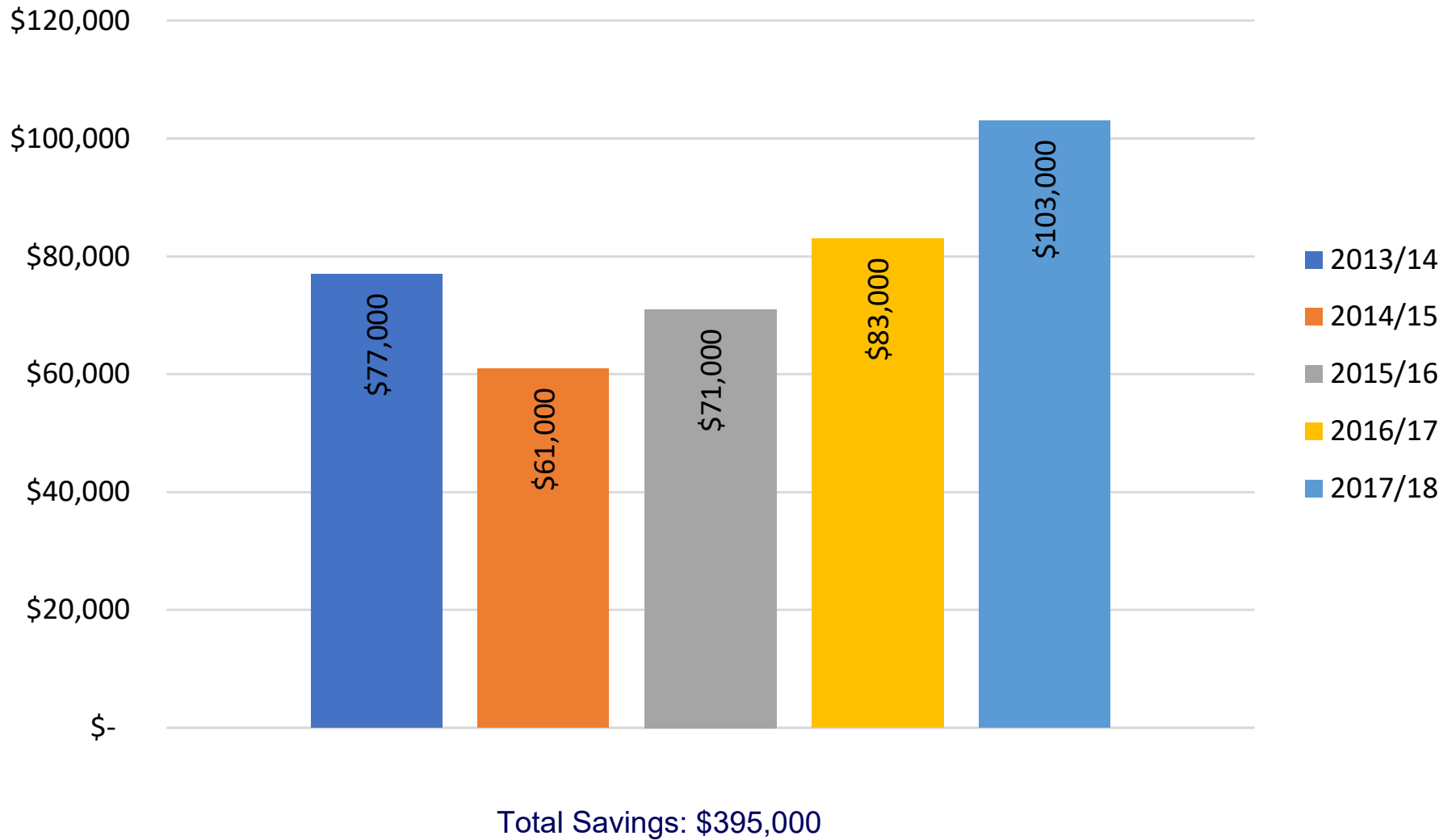


Electrical Dollars Saved - Fig 5.5



Total Savings: \$3,530,000

Natural Gas Dollars Saved - Fig 5.6



## *Energy Benchmarks and Sustainable Schools*

From time to time, the Sustainable Schools, on behalf of the Ontario Government, reviews the utility data submitted by all the school boards in Ontario. It uses this data to compare how Boards are performing against theoretical benchmarks and ranks the Boards in Ontario based on energy efficiency and energy saving potential. The summary page of the latest report is included as Figure 5.7.

Thanks to the technical operational changes already implemented and the consolidated efforts of staff and students across the Board who have been making a consistent effort to conserve energy, the UGDSB placed in the top 20 for Energy Performing School Boards<sup>10</sup>. Based on the energy usage data reported in 2017, the Board was ranked 19<sup>th</sup> in the Province compared to the previous ranking of 26<sup>th</sup>.

The authors of this report believe we should all be proud of the efforts that we have made thus far, but remember that we need to continuously renew our commitment to being leaders in conservation in order to build on our successes.

S:\CAPProj\Board Reports (General) & Presentations\Energy\Conservation & Cost Savings - sept '19\UGDSB Report on Conservation & Cost Savings 2013-2018.docx

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<sup>10</sup> <https://sustainableschools.ca/wp-content/uploads/2019/02/Enerlife-2019-SUS-Top-Energy-Performing-Boards-Report.pdf>



# SUSTAINABLE SCHOOLS

saving our energy for education

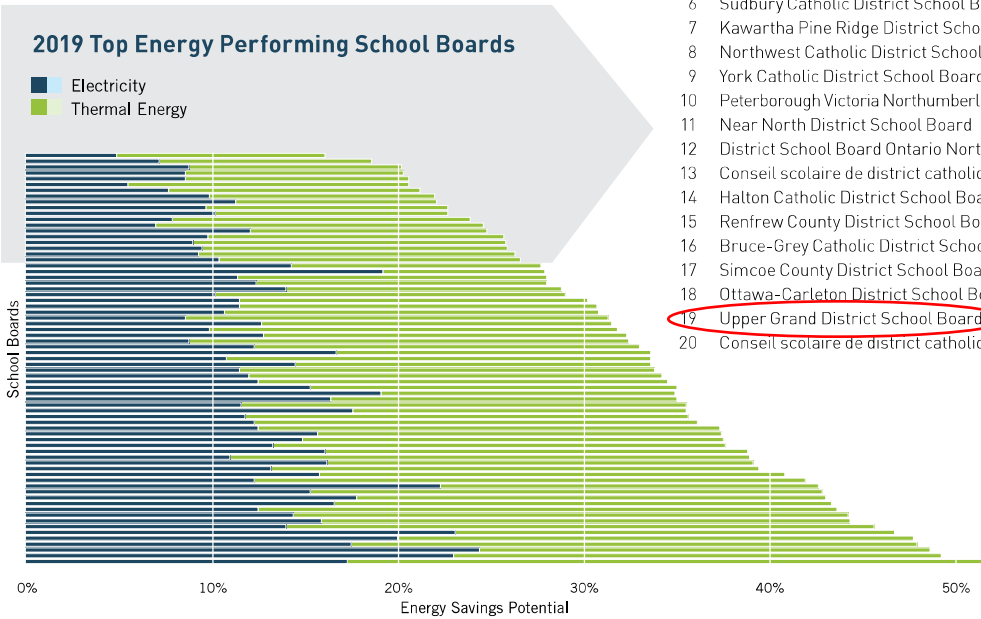
FEBRUARY 2019

## 2019 Top Energy Performing School Boards Report

**SUSTAINABLE SCHOOLS** is pleased to recognize the most energy efficient school boards in Ontario, based on reported data for the September 2016 – August 2017 school year. The overall energy savings potential for individual boards ranges from 16% for the most efficient to more than 50%. The top twenty boards (those with the least savings potential) are reported below, along with

their rankings in the 2017 report. The total energy savings potential across all boards is 34.3%, worth close to \$112 million annually, accounting for 235,000 tonnes of avoidable greenhouse gas emissions. Natural gas has a bigger percentage savings potential than electricity and offers the lion's share of emissions reductions.

The Ontario school sector as a whole reduced its weather-normalized electricity use by 4.7%, and its thermal energy use by 1.7% over this 2-year period. There were a number of notable successes: 12 boards achieved more than 10% electricity savings board-wide, and 4 boards achieved over 10% natural gas savings.



2019 Ranking	School Board	Number of facilities	2017 Ranking
1	Conseil scolaire de district catholique du Nouvel-Ontario	34	4
2	York Region District School Board	222	2
3	Upper Canada District School Board	83	14
4	Ottawa Catholic District School Board	86	5
5	Durham District School Board	135	1
6	Sudbury Catholic District School Board	17	11
7	Kawartha Pine Ridge District School Board	90	10
8	Northwest Catholic District School Board	8	13
9	York Catholic District School Board	105	7
10	Peterborough Victoria Northumberland and Clarington Catholic District School Board	37	3
11	Near North District School Board	38	19
12	District School Board Ontario North East	33	33
13	Conseil scolaire de district catholique Franco-Nord	13	12
14	Halton Catholic District School Board	58	8
15	Renfrew County District School Board	30	37
16	Bruce-Grey Catholic District School Board	14	16
17	Simcoe County District School Board	117	23
18	Ottawa-Carleton District School Board	151	18
19	Upper Grand District School Board	82	26
20	Conseil scolaire de district catholique du Centre-Est de l'Ontario	54	30
<b>1407 Total</b>			

### The Size of the Prize

The province-wide conservation potential is summarized below. This level of savings is achievable through meeting good practice energy use targets for elementary schools, secondary schools, and administration buildings.

	Electricity savings potential	Natural gas savings potential	Utility cost savings potential	GHG emissions reduction potential
<b>Percent</b>	27.8%	38.3%	34.3%	37%
<b>Quantity</b>	518,540 MWh/year	113,627,000 m3/year	\$112 million/year	235,000 tonnes CO2e/year

### ABOUT THIS REPORT

This 2019 report uses energy data and building information for Ontario's 4,968 schools and education centres as publicly reported by the 72 school boards. After screening for apparent data gaps and errors, 4,726 facilities were ultimately included. Site-specific energy targets are set for every building based on top quartile (good practice) benchmarks for elementary and secondary schools and administration buildings, adjusted for weather differences, heating system type and other material variables including numbers of portables. The energy savings potential is determined for each building as the difference between its actual and target energy use, and the energy efficiency of the school board is determined by rolling up results for all of their buildings. For the White Paper outlining the methodology visit [sustainable-schools.ca](http://sustainable-schools.ca). Despite modest overall electricity and gas savings achieved since the 2017 report (which was based on the 2014-15 school year), the overall savings potential is higher in this report due to downward energy target adjustments.