Hastings and Prince Edward
District School Board

Shannon Binder, Chair of the Board
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Possibilities TODAY & TOMORROW

Administrative Council
Report 01-A
June 4, 2019

ENERGY CONSERVATION AND DEMAND MANAGEMENT PLAN 2018/19 – 2023/24

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Facility Services Department

TABLE OF CONTENTS

1.0 Executive Summary

Ontario Regulation 507/18, Broader Public Sector: Energy Reporting and Conservation Demand Management Plans, under *The Electricity Act 1998*, details the requirements for public agencies such as municipalities, universities and colleges, hospitals and schools to report energy use and the requirement for the organization to develop an Energy Conservation and Demand Management Plan (ECDM).

Energy conservation saves money for businesses and families as well as reducing demand on the electricity grid and reduces greenhouse gas emissions. The Hastings and Prince Edward District School Board(HPEDSB) committed to energy conservation in its initial 2014 ECDM plan and remains committed to further applying energy conservation to its priorities.

The purpose of the original 2014 ECDM Plan for the school board was to develop a framework to understand the impact of its operations on greenhouse gas (GHG) emissions and to develop GHG reduction targets. The 2019 ECDM Plan requires each school board to report on its energy consumption over the five years, detail current and proposed energy conservation actions with forecasted results with proposed reduction targets, and to provide a summary of progress and achievements since the previous plan; the ECDM Plan aligns itself with the boards *Strategic Plan,* placing significance on ensuring effective management of all resources (human, financial, environmental).

The ECDM Plan also highlights current and ongoing efforts being carried out through the Facility Services department for capital projects and operating process improvements. HPEDSB plans to reduce energy consumption by 4% equivalent kilowatt hour (ekWh) with a 3.1 equivalent kilowatt hour per square foot (ekWh/ft2) over the next five years. As all boards receive 100% of their funding through the Ministry of Education, and though the board may have a five-year energy management strategy, the board's ability to implement their strategy is dependent on the funding that is received for each of the five years covered by their plan.

In addition to facility projects, a variety of little to no cost initiatives aimed at occupant behavior strategies are available to HPEDSB which can also enhance energy savings and thereby assist in cost avoidance. It is inevitable that utility prices will continue to rise year over year and to mitigate the boards exposure to these rising costs is to practice wise energy use. Actions such as turning off lights, limiting the number of appliances in each building, reducing occupancy heating and cooling set points are examples of no cost initiatives. HPEDSB follows its own *Procedure 130 Environmentally Responsible Operations and Education* which highlights the boards' ongoing commitment to preparing students with knowledge, skills and practices they need to be environmentally responsible citizens.

Through the review of the boards' asset portfolio and energy management, key focus areas for energy efficiency projects have been identified as:

- Lighting
- HVAC
- Controls
- Building Envelope
- Policy and Planning
- Energy monitoring
- Occupant Strategies

The ECDM Plan is a culmination of a series of processes involving collection of data, reviewing building performance, continuous improvement strategies and the evaluation, measurement and communication of goals achieved.

2.0 Asset Portfolio and Energy Management Planning

The education sector is unique in that a board's asset portfolio can experience significant changes that significantly impact a board's energy consumption over a five-year period.

Some of the most common variables and metrics that change in the education sector are listed below.

Table 1: Facility Variables

Facility Variables	
Construction	• Year built • Number of floors • Orientation of the building
Building Area	• Major additions • Sites sold/closed/demolished/leased • Portables • Installed • Removed • Areas under construction
Equipment/Systems	• Age • Type of technology • Lifecycle • % air conditioned space
Site Use	• Elementary school • Secondary school • Administrative building • Maintenance/warehouse facility • Community Hubs
Shared Use Sites	• Libraries • Gymnasiums
Other Variables	
Programs	• Child care • Before/After School Programs • Summer School • Community Use
Occupancy	• Significant increase or decrease in number of students • Significant increase in the hours of operation • New programs being added to a site
Air Conditioning	• Significant increase in air conditioned space • Portables

The following chart outlines the energy-related variables/metrics in the Board's asset portfolio that changed from the baseline year (FY 2012-13) to the end of the five-year reporting period (FY 2017-18).[1]

Table 2: Energy related variables

	FY 2012-13 (Baseline)	FY 2017-18	Variance
Total Number of Buildings[2]	57	53	-5
Total Number of [3]Portables/Portapaks	15	3	-12
Total Floor Area sqft[4]	2585442.5	2597025.524	+8583.024
Average Operating Hours	45	68	+22.5
Average Daily Enrolment[5]	14707	13079.50	-1627.57

[1] Data Collection

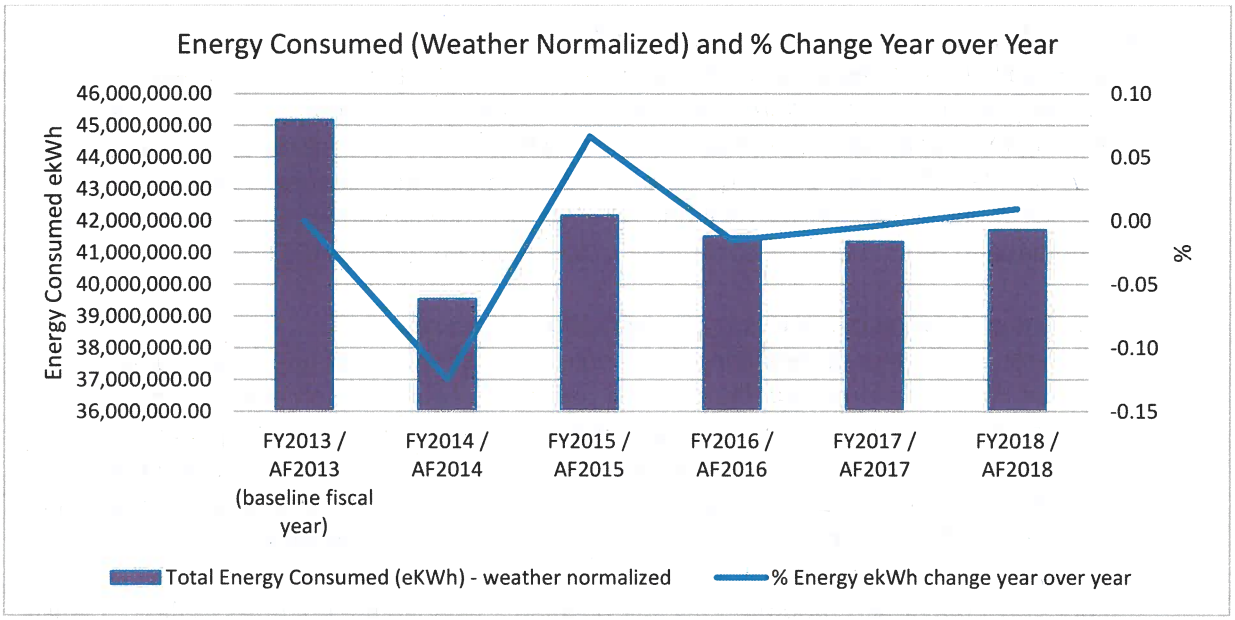
The board utilizes a variety of techniques to collect energy data month over month. The Ministry of Education requires all Boards to subscribe to a Utility Consumption Database (UCD) where data is fed directly from local distribution companies (for electricity and gas) to a centralized hub that feeds into energy management software; this software also receives yearly updates through SFIS to update total floor area and average daily enrollment. Internally, facility services collects invoice data to record actual costs, whereas the UCD only collects usage values. Most recently, the board has employed real-time energy data monitoring at all sites to further assist in future energy management planning.

[2] Total Number of buildings includes those that still consume energy and are owned by HPEDSB (includes closed/surplus properties)
[3] Total Number of portables includes those that use electricity and heat on a regular basis (Coe Hill, Frink Centre)
[4] Total Floor Area is calculated based on buildings that are owned by HPEDSB and consume energy; space does not need to have occupants
[5] SFIS data as of 2018

3.0 Progress and Achievements 2012-2013 to 2017-2018

HPEDSB set an aggressive goal of 5% energy reduction in the 2014 ECDM Plan and was successful at achieving an overall reduction of 7.65%, the difference between 45,171,680 ekWh in FY2013 to 41,716,390 ekWh in FY2018.

Figure 1: Energy Consumed and % Change Year over Year



Energy Intensity (the measure of electricity and gas by square area) change is reflected in the graph above. The values are calculated year over year and where the percentage is a negative, HPEDSB was successful at achieving an energy intensity reduction from year to year. The spike in FY2015 is a result of low energy intensity the year prior; the reason for this change is speculated to be the cause of changes in building use (i.e. summer permits with air conditioning). Factors affecting energy intensity are addressed in section 5.0, page 9.

HPEDSB achieved key focus areas of the plan have been addressed as follows:

- *Development of energy awareness and communication programs*

  Schools connect with the Energy and Environmental Technologist to deliver in class presentations about school specific energy use. These presentations coincide with curriculum courses and more specifically EcoSchools reporting.

  HPEDSB has implemented real-time monitoring at all sites, this data is displayed in graphic displays at each school foyer.

- *Partnerships with local utilities*

  Facility Services works closely with all utilities (Local Distribution Companies - LDC's) to ensure that the board is engaged in energy management strategies; LDC's are involved in aspects of project planning and working with the Independent Electricity System Operation (IESO) to realize incentive monies for projects.

- *Water Management Plan*

  Facility Services has been successful at reducing its water use through the installation of water efficient fixtures. Partnering with local utility providers to call when consumption is reading too high has allowed the department to address unnecessary use, such as leaks, in a prompt manner.

- *Energy Performance of existing and new buildings*

  New buildings are being designed keeping in mind reduction of energy consumption and demand targets using building concept considerations, including placement, orientation, building materials, utility systems and building finishes. School closures resulting in amalgamation into new buildings or to fill existing buildings, closure of portables, and closure of unused space will continue as a result of demographic changes, in order to maintain and reduce energy consumption and demand across HPEDSB.

- *Building renewal planning and energy conservation measures*

  When renovations or an addition is built onto an existing school, in-place equipment such as HVAC systems, lighting etc., are part of the consideration process. Some equipment processes may be instituted to meet current Ontario Building Code (OBC) standards which may result in increased energy consumption. For example, under the OBC buildings constructed today have increased ventilation requirements meaning more outside air is brought into a facility. As a result, HVAC systems need to work longer to either heat or cool the outdoor air to bring it to the same temperature as the standardized indoor temperature for the building. Despite the changes to OBC, Facility Services strives to reduce energy use through replacement of aged equipment to more efficient standards.

4.0 Energy Consumption Data for the Board

The chart below lists the metered consumption values in the common unit of ekWh.

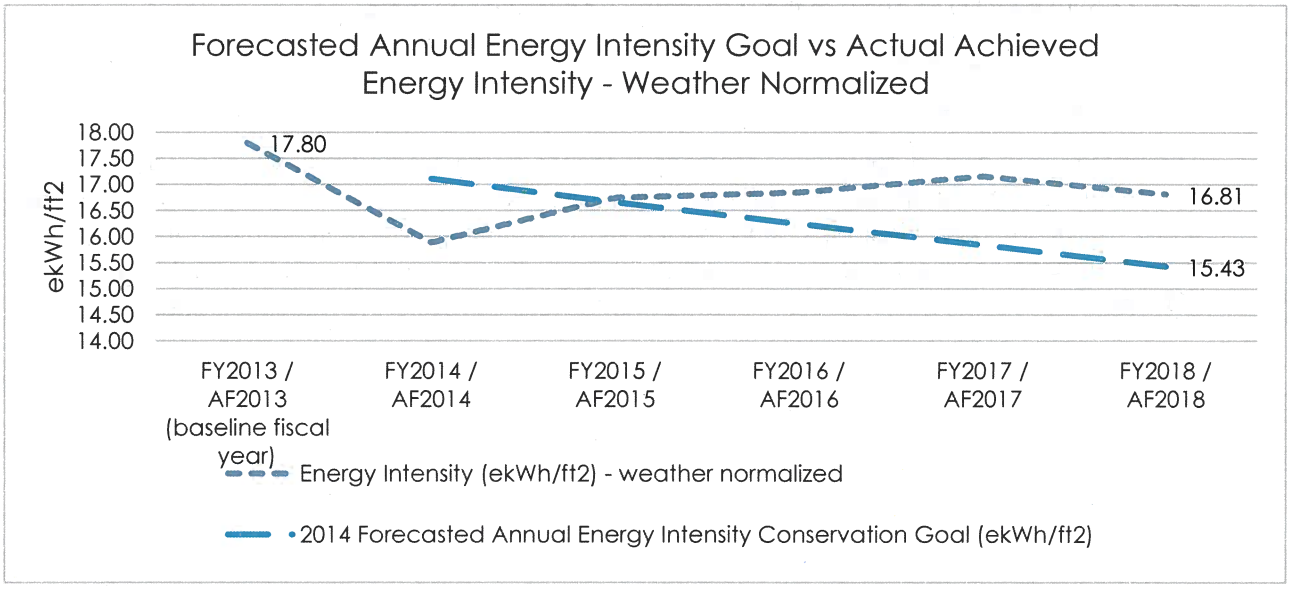
Table 3: Metered Data

Utility	Fiscal Year 2012-13 (Baseline)	Fiscal Year 2017-18 (Current)
Total Electricity (kWh)	13,218,640.00	13,230,190.00
Total Natural Gas (ekWh)	26,879,360.00	24,631,340.00
Total Heating Fuel (ekWh)	599,591.90	529,498.10
Total Propane (ekWh)	4,590,250.00	4,911,618.00

Metered (also known as "raw") consumption data does not take into consideration the impact of weather on energy usage and as a result it does not allow an accurate analysis of energy performance from one year to the next. As 25-35% of energy consumption for Ontario is impacted by weather, the best way to compare energy consumption values year over year is to use weather normalized[6] values.

The 2014 Plan highlights HPEDSB's plan to have reduced its ekWh/ft^2 from 17.80 to 15.43 by FY2018. This was an aggressive goal given the many changes to the asset portfolio and its use that impact energy conservation, and the final outcome is a 16.81 ekWh/ft^2.

Figure 2: Forecasted Annual Energy Intensity Goals vs Achieved Energy Intensity

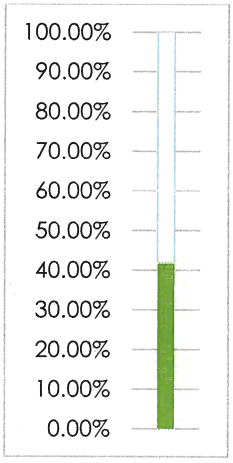


[6] To achieve weather normalization values, heating degree days (HDD) and cooling degree days (CDD) are tallied from Environment Canada weather stations and divided against the energy use for each building. As a result, weather normalized Energy Intensity is the most accurate measurement that allows the evaluation of the boards' energy consumption from one year to another. It is important to note however that it does not take into account changes in the boards' asset portfolio.

5.0 Review of Previous Energy Conservation Goals and Achievements

While HPEDSB continues to work towards further energy reduction, its aggressive goal set in 2014 continues to be a measurement to strive for. Currently, HPEDSB has met 41.79% of its goal.

Figure 3: Measurement of Success Against the Goal



Since the conservation goals were forecasted in the Spring 2014, a number of factors impacting energy consumption have been introduced to the education sector that may either increase or limit a board's ability to achieve the forecasted Conservation Goals.

Some of these factors include:

Full Day Kindergarten (FDK)

The introduction of FDK resulted in many new spaces being created through new additions or extensive renovations of existing facilities which resulted in more floor area and in some cases more energy-intensive designs due to factors such as higher ventilation requirements, the implementation of air conditioning etc. which increase the energy intensity of a building. Under FDK, spaces for more than 470,000 new students were added to the education sector.

Before and After School Programs

These programs were implemented to support the introduction of FDK spaces. However Before and After School Programs require a facility's HVAC system to operate for an extended period of time on a daily basis, which increases overall energy intensity.

Community Use of Schools

The Ministry of Education introduced funding to all school boards so they can make school space more affordable for use after hours. Both indoor and outdoor school space is available to not-for-profit community groups at reduced rates, outside of regular school hours. As a result of this funding, the use of spaces in schools, typically gymnasiums and libraries, increased to maximum utilization. The use of these spaces during non-school hours requires a facility's HVAC system to operate for an extended period of time on a daily basis, which increases overall energy intensity.

Community Hubs

In 2016, the Ministry of Education introduced funding for boards to implement Community Hubs within their asset portfolios. As a result, many schools now offer a wider range of events (cultural), programs (arts, recreation, childcare) and services (health, family resource centres).

The dramatic increase in community use means that many schools now operate from 6:00 a.m. until 11:00 p.m. during weekdays and are open for large quantities of time on weekends. As a result, a facility's HVAC system must operate for significantly longer to support community hubs and overall energy consumption/intensity is increased.

Air Conditioning

Historically schools have not had air conditioning or it has been a minimal space within the facility. However with changing weather patterns, "shoulder seasons" such as May, June and September are experiencing higher than normal temperatures and there is further interest in schools having air conditioning. Air conditioning significantly increases a facility's energy consumption.

Compliance with current Ontario Building Code (OBC)

When renovations or an addition is built onto an existing school, in-place equipment such as HVAC systems, lighting etc., may be required to meet current OBC standards which may result in increased energy consumption.

For example, under the OBC buildings constructed today have increased ventilation requirements meaning more outside air is brought into a facility. As a result, HVAC systems need to work longer to either heat or cool the outdoor air to bring it to the same temperature as the standardized indoor temperature for the building.

6.0 Energy Conservation and Demand Management Plan FY 2019 – FY 2023/24

The HPEDSB Energy Conservation and Demand Management Plan is a living document that defines resources and methodologies designed to improve energy efficiency, effectiveness, and optimizing performance, taking into account all of the boards school and administrative sites. Energy conservation also provides an opportunity to redirect much needed funds from energy costs towards facility improvements or education in the classroom.

Benefits to energy efficiency in schools include:

- "Reducing greenhouse gas emissions by decreasing energy consumption. Emissions from energy use represent one of the largest impacts schools have on the environment.
- Stimulating the local economy through job creation and encourage the development of markets for energy efficiency products and services.
- Creating a more conducive learning environment. Research has shown certain energy efficiency measures, such as daylighting and ventilation improvements, have a positive effect on student learning.
- Providing an opportunity to adapt academic curricula to promote awareness of energy issues and support the building of a culture of conservation."[7]

The ECDM plan highlights current and ongoing efforts being carried out by staff and students to aid in reduction of HPEDSB's energy footprint. The Facility Services department continues to dedicate resources to conserving and reducing energy consumption and managing our demand for energy by:

- Employing an Energy and Environmental technologist to monitor and report on energy use
- Participating in consortia for energy procurement strategies
- Developing projects for building renewal with attention to energy efficiency and cost avoidance
- Adjusting building operations and maintenance strategies to manage energy demand
- Incorporating occupant behavior strategies in staff and student education

[7] https://media.assets.eco.on.ca/archive/2015/03/2011-Energy.2.pdf#page=54

The target set by HPEDSB is 4% ekWh energy reduction, with a conservation goal of 3.17 ekWh/ft^2 over the next five years. Though this goal seems aggressive, it is attainable. The Toronto Region Conservation Authority (TRCA) publishes an annual Sustainable Schools Report, where all school boards across the province are measured against their benchmarked values, and many HPEDSB schools remain above this stated benchmark.[8]The ECDM Plan outlines key actions and systems that must be pursued in order for HPEDSB to meet its energy conservation and greenhouse gas reduction targets, striving to meet TRCA benchmarks.

Key actions and systems include:

Design, Construction and Retrofit Strategies	High Efficiency Lighting Systems High Efficiency Condensing Boilers Energy Efficient Rooftop Units High Efficiency Domestic Hot Water High Efficiency motors Variable Frequency Drives Entrance Heater Controls Real Time Energy monitoring New Roofs and Windows
Operations and Maintenance Strategies	Day and Night temperature guidelines Procurement of Energy Star appliances HVAC optimization Energy audits
Occupant Behaviour Strategies	Building Operator Training Ongoing training and awareness programs for energy conservation

For the Board's relevant projects over the next five years, please refer to **Calculating Energy Conservation Goals FY 2019 to FY 2023, Appendix B.**

[8] TRCA benchmark data and HPEDSB schools is included in Appendix C.

HPEDSB has set out the following energy intensity reduction conservation goals for the next five fiscal years.

Table 4: Annual Energy Intensity Conservation Goals

Annual Energy Intensity Conservation Goal	Fiscal Year				
	2018-19	2019-20	2020-21	2021-22	2022-23
ekW/ft^2	0.16	0.13	0.35	0.25	0.23
% decrease	1	1	2	2	1

HPEDSB has calculated its Cumulative Energy Intensity Conservation Goal for the next five fiscal years.

Table 5: Cumulative Conservation Goals

Cumulative Conservation Goal	FY 2018-19 to 2022-23
ekWh/ft^2	3.17
Percentage (%) Decrease	4%

7.0 Senior Management Approval

Senior Management Approval of this Energy Conservation and Demand Management Plan

We confirm that Hastings & Prince Edward District School Board's senior management has reviewed and approved this Energy Conservation and Demand Management Plan.

Name: Mandy Savery-Whiteway

Signature: Mandy Savery-Whiteway

Job Title: Director of Education

Date: June 7/2019

Name: Nick Pfeiffer

Signature: N. Pfeiffer

Job Title: Superintendent of Business Services

Date: JUN 7/19.

Conservation Goal

	2018
Total Building Area (includes portables) (m^2)	230,613.11
Total Building Area (includes portables) (ft^2)	2,597,025.52
Energy Consumption for the board (ekWh)	41,716,390.00

value taken from HPEDSB calculation - UCD, sqft and operating hours

	2018-19		2019-20		2020-21		2021-22		2022-23		2018/19-2022/23
	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)
Appendix B; Design, Construction and Retrofit Strategies Total	$ 490,000	400,000	$ 585,000	330,235	$ 3,682,000	889,590	$ 3,692,000	629,616	$ 3,482,000	569,208	7,818,151
Appendix C; Operations and Maintenance Strategies Total	$ 1,000	3,453	$ 1,500	3,458	$ -	0	$ -	0	$ -	0	31,097
Appendix D; Occupant Behaviour Strategies Total	$ 7,000	20,035	$ 10,000	28,622	$ 10,000	28,622	$ 10,000	28,622	$ 10,000	28,622	386,399
TOTAL	$ 498,000	423,489	$ 596,500	362,315	$ 3,692,000	918,212	$ 3,702,000	658,238	$ 3,492,000	597,830	8,235,647
Percentage reduction		1		1		2		2		1	3.948398762
Conservation Goal ($ekWh/m^2$)		1.84		1.57		3.98		2.85		2.59	35.71
Conservation Goal ($ekWh/ft^2$)		0.163066757		0.139511631		0.353563057		0.253458519		0.230197999	3.171184517

Energy Intensity per school from FY2014-FY2018 - Weather Normalized at Trenton		FY2014	FY2015	FY2016	FY2017	FY2018
SFIS #	School Name	Energy Intensity (EI) / (ekWh/ft²)	Energy Intensity (EI) / (ekWh/ft²)	Energy Intensity (EI) / (ekWh/ft²)	Energy Intensity (EI) / (ekWh/ft²)	Energy Intensity (EI) / (ekWh/ft²)
108	Athol-South Marysburgh Public School	13.03988	3.359200954	3.234488	3.661611	17.02036
	Bayside Annex Junior School	52.8901	54.10577393	55.07025	48.03471	59.0133
5225	Bayside PS (Gr 7&8) & Bayside Secondary School	18.15975	18.5847435	16.73794	17.1246	16.20484
2135	Bayside Public School	15.90606	15.71069527	14.51694	14.94832	15.20927
196	Birds Creek Public School	13.40887	15.06390953	14.47491	20.90061	14.89665
2	Breadner Elementary School	14.68567	15.78048325	15.70758	30.14436	—
502	C M L Snider School	10.75413	11.09545422	11.12068	8.526443	11.51387
5268	Centennial Secondary School	15.36005	15.10980225	15.69047	14.01432	14.60438
5276	Centre Hastings Secondary School	17.53301	18.52846527	19.32348	16.93409	16.99644
472	Coe Hill School	—	4.976952076	8.391016	8.513614	6.883124
484	College Street Public School - SOLD	20.98113	19.5979023	21.15482	40.67963	—
580	Deseronto Public School	12.17667	13.89447308	17.8615	17.28912	16.71616
671	Earl Prentice Public School - CLOSED March 2018	25.37473	25.79331779	25.56735	23.92741	21.39929
6353	Eastside Secondary School	16.68031	17.68323135	13.44499	19.62687	19.44601
15768	Education Centre	18.11476	17.6986599	17.12844	17.5534	16.74192
847	Foxboro Public School	13.36705	13.94921589	10.72695	11.93761	12.1999
850	Frankford Public School	16.62897	17.32905388	16.98248	16.42362	17.66876
15774	Georg Umb Maintenance Building	4.667053	4.725196362	4.638341	3.949502	4.063981
	H.R. Frink Outdoor Ed & Natural Science School	20.34702	20.63147163	18.47052	16.54852	24.32622
24319	Harmony Public School	—	12.80882931	13.57917	3.869795	14.61701
1028	Harry J Clarke Public School	19.57223	15.24717903	19.03932	18.40351	22.34896
1494	Hermon Public School	19.83875	4.523868084	4.053171	28.09881	17.94948
1083	Hillcrest School	17.54228	16.74448586	18.67867	17.88424	0.939776
1254	Kente Public School	16.32039	18.10890007	19.05965	21.6856	18.43412
1419	Madoc Public School	21.37283	22.70968246	22.29233	22.25967	20.62197
374	Madoc Township Public School	21.91277	22.34559441	19.02531	14.76987	17.74593
1471	Marmora Senior Public School	23.8469	25.91325188	25.79589	26.47317	23.37837
72	Massassaga-Rednersville Public School	17.05136	30.06219673	19.9511	23.16842	28.61012
1493	Maynooth Public School	15.36018	13.27344704	26.7139	24.60291	27.4885
5547	North Hastings High School	13.94898	13.35381413	13.97605	21.87351	21.3785
1660	North Trenton Public School	28.69178	26.68482399	24.20177	25.03041	19.57842
1757	Park Dale School	16.41258	18.00440788	18.20622	17.90496	18.22943
1002	Pinecrest Memorial Elementary School - SOLD	17.66288	20.47785568	20.74314	19.48861	14.01761
1861	Prince Charles Public School (Trenton)	24.5671	22.24298096	8.413291	18.33553	16.03448
1863	Prince Charles School (Belleville)	12.74349	15.43067741	19.01784	16.31178	14.37866
5599	Prince Edward Collegiate Institute	8.898922	13.06941319	13.13277	12.92401	11.54603
1872	Prince of Wales Public School	14.27853	13.57335567	21.11607	13.7095	14.42844
9322	Queen Elizabeth PS (Trenton)-Demolished	16.80447	17.76104546	—	—	—
1914	Queen Elizabeth School (Belleville)	19.07379	20.65155029	20.52976	19.21812	19.39134
1907	Queen Elizabeth School (Picton)	8.557482	18.83739853	19.56521	19.90689	19.41089
1926	Queen Victoria School	13.5861	13.65529633	14.70853	13.08663	13.88932
5604	Quinte Secondary School	18.97167	19.67627144	19.74717	19.68304	19.41764
2154	Sir John A Macdonald School	17.11913	16.04136848	19.90999	19.01945	16.68126
6015	Sir Winston Churchill School	26.29503	23.84461212	0.877622	0.902297	0.972213
395	Sophiasburgh Central School	16.75512	14.98309135	21.01369	17.91027	20.43149
24245	Stirling Public School	—	—	—	—	6.137403
2469	Susanna Moodie Elementary School	16.16466	10.86697388	11.48333	11.19721	12.1078
24565	Trent River	—	—	—	—	—
5711	Trenton High School	17.43906	17.46587372	16.92345	14.92099	16.00274
24247	Tweed Elementary	—	—	—	—	—
2341	Tyendinaga Public School	13.20261	9.528838158	22.93576	21.86899	26.10863
2351	V. P. Carswell Elementary School	20.12588	16.06708527	18.9225	20.6483	19.2902
2984	William R. Kirk School	21.33977	20.9272213	23.45757	22.80465	18.98542
1654	York River Public School	9.60067	12.08354855	10.03658	9.848463	9.53441

Toronto Region Conservation Authority - Sustainable Schools Benchmarks 2017-18	
School Type:	
Elementary	12
Secondary	15
Admin Buildings	20

Data taken from UCD - Overall Board Profile
- = data not available

Appendix A

School	SQ Ft	2012/13 Energy Use Hours	2012/13 Months in use	2017/18 Energy Use Hours	2017/18 Months in Use	School Status
SWC	*21000*	*40*	*10*	*0*	*0*	*closed June 2015*
BREAD	*45768*	*40*	*10*	*0*	*0*	*closed June 2016, demo June 2019*
HILL	*21119*	*40*	*10*	*0*	*0*	*closed June 2017*
BAYS DISPOSAL	*0*	*60*	*12*	*0*	*0*	*closed June 2017*
EARL P	*22023*	*40*	*10*	*0*	*0*	*closed March 2018*
HARM - DEMO SITE	30031	40	10	**0**	**0**	demolished 2015
QET	38642	40	10	**0**	**0**	demolished 2015
OLD MASS	**0**	**0**	**0**	**0**	**0**	end 1990
OLD ASM	**0**	**0**	**0**	**0**	**0**	end 1990
RIVER VALLEY	**0**	**0**	**0**	**0**	**0**	end 1990
LW HOUSE	**0**	**0**	**0**	**0**	**0**	end 1990
SMB	**16792**	**40**	**10**	**0**	**0**	**end Sept 2011**
ST PRIM	18514	40	10	**0**	**0**	end Sept 2013
ST JUN	26296	40	10	**0**	**0**	end Sept 2013
TWD HUNDER	25995	40	10	**0**	**0**	end Sept 2013
ST SR	25381	40	10	**0**	**0**	end Sept 2015
SH CONNOR	17298	40	10	**0**	**0**	end Sept 2016
PINEC	46199	40	10	40	10	SOLD Dec 2018
COLL	34498	40	10	**0**	**0**	SOLD March 2018
BANCROFT	**26995.89**	**40**	**10**	**0**	**0**	**SOLD Sept 2011**
HJC	59137	50	10	80	12	
ASM	15851	40	10	45	11	
EDCENT	41000	60	12	80	12	
FRINK	3200	40	10	40	10	
BAYANNEX	4798.5	40	10	50	11	
KENTE	35700	40	10	65	11	
MAD	35693	50	10	80	12	
MARM	30128	40	10	65	12	
MAYN	12917	40	10	45	12	
HERM	13993	40	10	45	11	
GUMB	10495	50	12	50	12	
YORK	41387	40	10	80	12	
NT	13896	40	10	45	11	
PRKD	31926	40	10	80	12	
PCT	38815	40	10	80	11	
PCB	38836	50	12	80	11	
POW	41785	40	10	80	11	
QEP	53497	40	10	65	11	
QEB	25155	40	10	50	11	
QVIC	41796	40	10	65	11	
BC	21549	40	10	50	11	
BAY PS	26996	40	10	80	11	
SJAM	30462	50	10	75	11	
TYEND	34447	50	10	80	11	
VP CARS	16232	40	10	45	11	
STPS	**107434.48**	**50**	**12**	80	12	
TES	**41107.3341**	**40**	**10**	80	11	
HARM	**56069.21**	**50**	**10**	80	12	
TRPS	**55897**	**0**	**0**	80	12	
SMOO	40031	40	10	65	11	
KIRK	17685	60	12	60	12	
MADTWP	16899	40	10	45	11	
SOPH	27394	40	10	80	12	
COE	12400	40	10	45	11	
CML	51990	50	10	80	12	
BSS	153000	60	10	90	12	
CSS	176540	60	10	100	12	
CHSS	160960	60	10	85	12	
NHSS	120600	60	10	85	12	
PECI	182300	60	10	90	12	
QSS	120980	60	10	90	12	
THS	138680	60	10	90	12	
DES	25080	40	10	45	11	
ESS	149420	60	10	85	12	
MASSRED	23207	50	10	50	12	
FOX	37286	40	10	80	11	
FRANK	38535	50	10	80	12	
Sq Ft 2012-13	**2585442.5**					
SQ Ft 2017-18	**2597025.52**					
Average Hours		**45.4386**		**68.854**		
Total Number of buildings	**57**			**53**		

Legend:
Bold font = did not count data in given year
Italics = building owned by HPEDSB, consuming energy
Rationale - 2012-13 hours were recorded as 40 hours, 10 months for elementary, 60 hours, 10 months for secondary
Due to change in use, hours were changed in 2017/18 to reflect energy hours use of building
Avg hours were increased to better reflect the energy use of the building; this is not based on majority occupancy

Design, Construction and Retrofit Strategies												
		2018-19		2019-20		2020-21		2021-22		2022-23		2018/19-2022/23
Lighting	**Quantity of Time that Measure will be in place (years)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Total Accumulated Energy Savings (ekWh)**
High Efficiency Lighting Systems	15	$ 490,000	400,000	$ 250,000	204,082	$ 180,000	146,939	$ 100,000	81,633	$ -	-	3,420,408
Outdoor Lighting	15	$ -	-	$ -	-	$ 40,000	32,653	$ 40,000	32,653	$ 100,000	81,633	244,898
Occupancy Sensors	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
		2018-19		2019-20		2020-21		2021-22		2022-23		2018/19-2022/23
HVAC	**Quantity of Time that Measure will be in place**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Total Accumulated Energy Savings (ekWh)**
Efficient Boilers (near condensing)	30	$ -	-	$ -	-			$ -	-	$ -	-	-
High Efficiency Boilers (condensing)	15	$ -	-	$ -	-	$ 80,000	222,423	$ -	-	$ -	-	667,269
High-efficiency boiler burners	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Geothermal	20	$ -	-	$ -	-	$ -	-	$ 170,000	27,755	$ -	-	55,510
Heat recovery/enthalpy wheels	30	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Economizers	15	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Energy efficient HVAC systems	30	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Energy efficient Rooftop units	15	$ -	-	$ 325,000	106,392	$ 140,000	45,830	$ 140,000	45,830	$ 140,000	45,830	700,548
High Efficiency Domestic Hot Water	15	$ -	-	$ 10,000	19,762	$ 10,000	19,762	$ 10,000	19,762	$ 10,000	19,762	197,619
Efficient Chillers and Controls	25	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
High-efficiency motors	20	$ -	-	$ -	-	$ 20,000	11,429	$ 20,000	11,429	$ 20,000	11,429	68,571
VFD	15	$ -	-	$ -	-	$ 10,000	14,450	$ 10,000	14,450	$ 10,000	14,450	86,697
Demand Ventilation	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Entrance Heater Controls	20	$ -	-	$ -	-	$ 50,000	98,208	$ 50,000	98,208	$ 50,000	98,208	589,246
Destratification Fans	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Other		$ -						$ -		$ -		-
		2018-19		2019-20		2020-21		2021-22		2022-23		2018/19-2022/23
Controls	**Quantity of Time that Measure will be in place**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Total Accumulated Energy Savings (ekWh)**
Building Automation Systems - New	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Building Automation Systems - Upgrade	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Real-time energy data for operators to identify and diagnose building issues	10	$ -	-	$ -	-	$ 2,000	6,547	$ 2,000	6,547	$ 2,000	6,547	39,283
Voltage Harmonizers	15	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
		2018-19		2019-20		2020-21		2021-22		2022-23		2018/19-2022/23
Building Envelope	**Quantity of Time that Measure will be in place**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Total Accumulated Energy Savings (ekWh)**
Glazing	30	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Increased Wall Insulation	50	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
New Roof	25	$ -	-	$ -	-	$ 3,000,000	258,978	$ 3,000,000	258,978	$ 3,000,000	258,978	1,553,867
New Windows	30	$ -	-	$ -	-	$ 150,000	32,372	$ 150,000	32,372	$ 150,000	32,372	194,233
Treatments	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Shading Devices	30	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Design, Construction and Retrofit Strategies Total		**$ 490,000**	**400,000**	**$ 585,000**	**330,235**	**$ 3,682,000**	**889,590**	**$ 3,692,000**	**629,616**	**$ 3,482,000**	**569,208**	**7,818,151**

Operations and Maintenance Strategies

Policy and Planning	Quantity of Time that Measure will be in place (years)	2018-19		2019-20		2020-21		2021-22		2022-23		2018/19-2022/23	Energy Payback Period	% related to Electricity	% related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)			
New school design/construction guidelines and specifications	5	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	5	50	50
Day and Night Temperature Guidelines for all Schools	10	$ 1,000	3,453	$ 1,000	3,453	$ -	-	$ -	-	$ -	-	31,077	5	20	80
Night time blackout of sites – Interior	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	7	100	0
Night time blackout of sites – Exterior	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	7	100	0
Procures only Energy Star certified appliances	5	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	5	100	0
Demand Ventilation (servicing)	3	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	5	50	50
HVAC optimization (coil cleaning, re-calibration of equipment)	3	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	2	50	50
Commissioning (retro and re)	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	10	50	50
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	0		100

Energy Audits	Quantity of Time that Measure will be in place	2018-19		2019-20		2020-21		2021-22		2022-23		2018/19-2022/23	Energy Payback Period	% related to Electricity	% related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)			
Walk Through Audit	5	$ -	-	$ 500	5	$ -	-	$ -	-	$ -	-	20	1000	50	50
Engineering Audit	5	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	1000	50	50
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	0		100

Operations and Maintenance Strategies Total	$ 1,000	3,453	$ 1,500	3,458	$ -	-	$ -	-	$ -	-	31,097

$0.175	= cost of 1 ekWh electricity
$ 0.0287	= cost of 1 ekWh natural gas
0.0955	m^3 = 1 ekWh
$0.30	= cost of 1 m^3 of natural gas

Occupant Behaviour Strategies

Training and Education	Quantity of Time that Measure will be in place (years)	2018-19		2019-20		2020-21		2021-22		2022-23		018/19-2022/23	Energy Payback Period	% related to Electricity	% related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)			
Building Operator Training	3	$ 7,000	20,035	$ 10,000	28,622	$ 10,000	28,622	$ 10,000	28,622	$ 10,000	28,622	386,399	3	60	40
Energy Benchmarking Program	5	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	1000	50	50
Building Automation Training (site specific)	3	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	1	60	40
Ongoing training and awareness programs for energy conservation	5	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	10	90	10
Provide detailed information on Building Operational costs	1	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	1000	50	50
Provide detailed information on energy consumption (e.g. via the Utility Consumption Database or other database)	1	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	1000	50	50
Participate in environmental programs, such as EcoSchools, Earthcare	1	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	5	90	10
Other tools (Energy Manager position)		$ -	-	$ -	-		-		-	$ -	-	-	15	50	50
Occupant Behaviour Strategies Total		**$ 7,000**	**20,035**	**$ 10,000**	**28,622**	**$ 10,000**	**28,622**	**$ 10,000**	**28,622**	**$ 10,000**	**28,622**	**386,399**			

$0.175	= cost of 1 ekWh electricity
$ 0.0287	= cost of 1 ekWh natural gas
0.0955	m^3 = 1 ekWh
$0.30	= cost of 1 m^3 of natural gas