2019-2023

TCDSB: Energy Conservation and Demand Management Plan

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Jun 2019

Ontario's broader public sector organizations, including school boards, are required to develop and publish an Energy Conservation and Demand Management (ECDM) plan every five years, beginning in 2014. Technical advice and analysis for this document were provided by Enerlife Consulting Inc.

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EXECUTIVE SUMMARY

In accordance with provincial requirements, the Toronto Catholic District School Board (the Board) has prepared a board-wide Energy Conservation and Demand Management (ECDM) plan that will increase energy efficiency in existing and new Board facilities, thereby reducing energy consumption and greenhouse gas (GHG) emissions. This ECDM plan presents energy savings results achieved and lessons learned since the previous plan, and lays out the goals, strategy and business case for the Board's energy efficiency investments over the next 5 years.

In the previous plan, approved in June 2014 and covering 2013-2018, the Board set a target of 11% overall energy savings to be achieved over the plan's 5-year term. However, there was no dedicated funding available for energy efficiency measures until FY 2017-2018 when Greenhouse Gas Reduction Funding allocations were made from the Ministry to all Ontario boards. Despite the lack of dedicated funding and significant changes to the use of schools described in this report, the board managed to achieve almost 2% board-wide energy savings through energy conscious implementation of infrastructure renewal projects and good operating practices. Lessons learned have informed the development of this ECDM plan.

For the next 5 years (2019-2020 to 2023-2024) the Board has set a target of 11% reduction in total energy intensity measured against the actual 2017-2018 baseline. Targeted investment into the Board's highest savings potential schools will be implemented to achieve this reduction with the best return on investment. The planned improvements prioritize operational efficiencies and management systems for long-term maintenance of savings. All of the Board's capital renewal projects are to include energy efficiency as a priority consideration and all new school construction and expansion projects will establish and achieve high-performance energy efficiency targets. Additionally, while high-savings potential buildings must be prioritized for achieving deep savings, a robust management and operations plan will be put in place for all buildings so that the savings achieved are not offset by general increases elsewhere. Figure 1 summarizes this four-pronged strategy.

Figure 1 Four-part energy efficiency approach

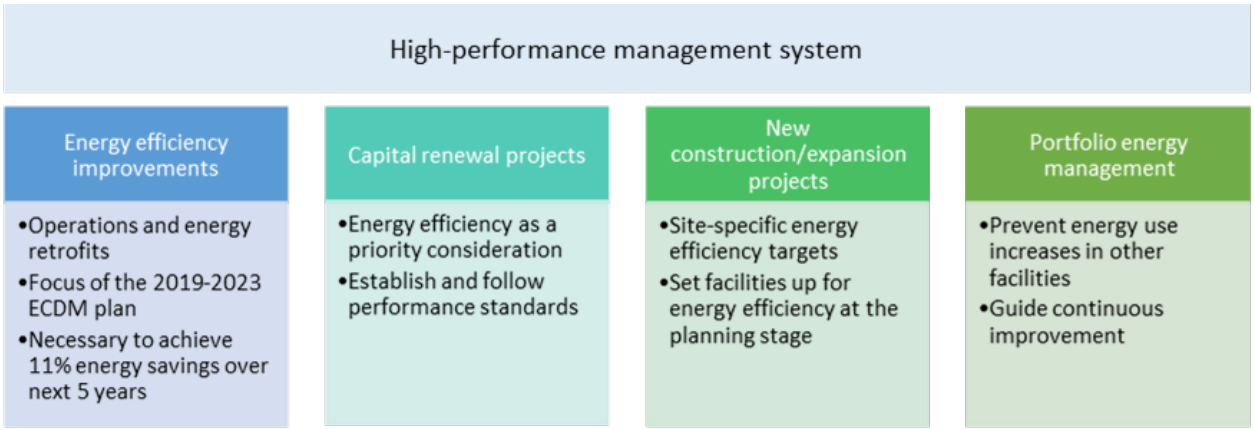


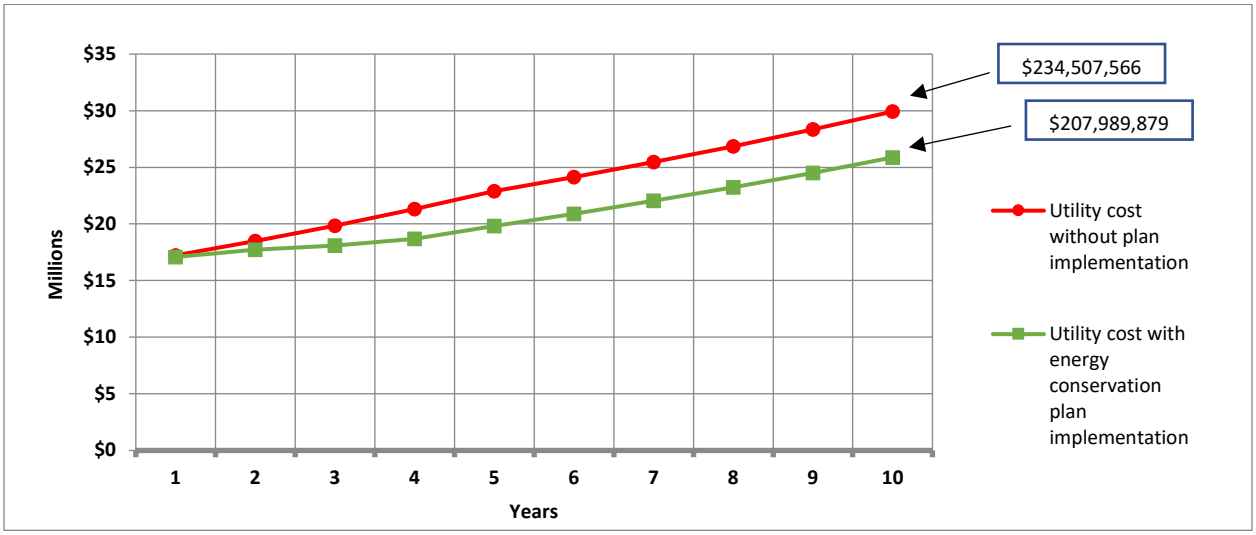
Table 1 summarizes the business case for investment in the high-return energy efficiency improvements included in the scope of this plan. A total investment of $12.4 million is offset by the projected $1.46 million of utility company incentives and yields electricity and natural gas savings worth over $2.3 million per year. Over a ten-year period, total savings and incentives amount to almost $28 million, fully repaying all costs incurred and yielding a net cash balance of over $15.5 million after 10 years. The overall simple payback is 4.5 years and the imputed IRR is 32%. The detailed cash flow model is included in Section 4.6.

Table 1 Energy efficiency improvements business case

Payback period	4.5	Program cost	$2,982,573	Electricity savings (kWh/yr)	11,582,136
Internal Rate of Return	32%	Project cost	$9,455,368	Electricity savings ($)	$1,900,628
		Total with inflation	$12,437,941	Gas savings (m3/yr)	1,499,297
		Incentives	$1,458,073	Gas savings ($)	$422,802
		Total savings over 10 years (electricity + gas)	$26,517,687	Total energy savings ($)	$2,323,430
		Total savings over 10 years + Incentives	$27,975,760	Total energy savings (%)	11.7%
				Total cost savings (%)	11.3%
				GHG emissions reduction (tonnes CO2e)	3,104

Importantly, the foundation of the plan is recognition that the proposed investment is going to be spent anyway. The Board's choice is what to spend it on. If no action is taken, the 2017-2018 utility costs of $17.2 million are projected to grow to $29.9 million in 10 years, for a total spend of $234.5 million over that ten-year period[1]. The planned investment in energy efficiency will lower this expenditure by over $26.5 million over the 10-year period, effectively diverting payments away from inefficient energy use and associated greenhouse gas emissions while helping insulate the Board from future rate increases and environmental regulations. Instead, the plan redirects those funds to productive upgrading of schools, avoidance of pollution associated with energy consumption and long-term utility cost savings.

Figure 2 TCDSB's utility costs with and without energy conservation plan implementation



[1] Utility rate escalation assumptions: electricity 6.5% annually; gas 10% annually for first 5 years and 2.5% annually thereafter.

Key high-performance operational and management considerations for successful implementation of the plan are as follows:

- Energy performance reporting system – keeping all stakeholders, including caretakers, occupants and senior management, aware of and engaged in actual savings being achieved so that successes are built upon and setbacks corrected;
- Staff engagement – training, communications and recognition;
- Enforcement of established board-wide operating standards such as temperature set points and ventilation operating times;
- Establishment and implementation of board-wide design and commissioning standards so that all renewal, expansion and new-build capital projects achieve high levels of energy and environmental performance;
- Energy and building system monitoring – expansion of building automation technology to more schools and implementation of the BAS Control Centre and the Energy Monitoring and Tracking Data Centre; and
- Stakeholder engagement - promotion of energy awareness and environmental stewardship amongst all stakeholders.

The additional resources required to support the full implementation of the plan are included in the Program cost budget and the business case presented above.

1 INTRODUCTION

All Ontario public agencies are required by regulation to prepare and post online an Energy Conservation and Demand Management (ECDM) plan every five years. The first plans were produced in 2014 based on energy consumption for the 2012-2013 school year. This is the Toronto Catholic District School Board's (the Board's) second ECDM plan and is to be posted on or before July 1st, 2019. This report documents energy efficiency measures and energy savings since the Board's 2014 plan and presents the updated plan for the next 5 years. As per provincial requirements, the ECDM plan will be reviewed and updated again at the end of the five years. Energy consumption data for 2017-2018 are used as the baseline for the next five years.

ECDM plans are required to contain two parts:

a. A description of implemented measures and energy savings achieved over the past 5 years (since the 2014 plan).

b. A listing of the energy consumption and greenhouse gas emissions for the most recent year for each of the public agency's facilities along with a description of measures, costs and forecast savings for the next 5 years. The listing for the 2017-2018 school year is provided in Appendix A.

From the government perspective, the benefits of improved energy efficiency are primarily lower greenhouse gas emissions which contribute to provincial and national targets, reduced electrical demand to mitigate projected system capacity shortfalls, and upgrading of buildings' infrastructure. For the Board, implementation of the plan will reduce operating costs, take a big step towards the goal of net-zero emissions and upgrade building systems leading to improved occupant comfort and reduced maintenance costs.

The public is also increasingly aware of energy efficiency and climate change mitigation. In the most recent Sustainable Schools Top Energy Performing School Boards report TCDSB ranked 63rd out of 72 Ontario school boards for energy efficiency. Successful implementation of the plan would raise that ranking by up to 30 places and be a source of real pride for staff, students and trustees.

1.1 About the Toronto Catholic District School Board

The Toronto Catholic District School Board owns and operates 205 elementary and secondary schools (as of 2017), with a total number of 89,675 students. Appendix A includes an alphabetical list of all TCDSB facilities. The Board has an accumulated deferred maintenance backlog of $559 million and a multi-million dollar annual building renewal plan to reduce this deferred liability over time, and the demands on board resources to implement these essential projects are an important consideration in the development of the Plan.

1.2 Broader Conservation Framework

Prior to 2013, and throughout the time period of the previous plan, the Board introduced a range of initiatives to promote environmental stewardship and energy conservation at both the local school level and through Board-wide facility management strategies. The Board has also set an objective to become net-zero energy. This ECDM plan aims to set the stage over the next 5 years for achieving the highest practical level of Board-wide energy efficiency as the first essential step towards net-zero.

2 EDUCATION SECTOR BACKGROUND

2.1 Funding and Energy Management Planning

All school boards receive 100% of their funding from the Ministry of Education. The Ministry announces each Board's funding allocation in March for the next school board Fiscal Year, which runs from September 1st to August 31st. The Ministry does not provide boards with multi-year funding allocations. As a result, while a board may have a five-year energy management strategy, the board's ability to implement their strategy is dependent on the funding that's received for each of the five years covered by their plan.

2.2 Asset Portfolios 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 include major additions and renovations, sites sold/closed/demolished/leased, addition and removal of portables, changes in equipment, and changes in use of space such as addition of child care spaces, before/after school programs, summer school, community use of schools, and occupancy.

3 A REVIEW OF PROGRESS AND ACHIEVEMENTS IN THE PAST 5 YEARS

3.1 TCDSB's Asset Portfolio

The following table lists the energy-related variables/metrics in TCDSB's asset portfolio that changed from the baseline year (FY 2012-2013) to the end of the five-year reporting period (FY 2017-2018).

Table 2 TCDSB's asset portfolio

	FY 2012-2013 (Baseline)	FY 2017-2018	Variance
Total Number of Buildings	227	228	1
Total Number of Portables/Portapaks	439	478	39
Total Floor Area (sf)	10,873,142	10,909,553	36,411
Average Operating Hours	41	41	0
Average Daily Enrolment	83,737	83,831	94
Other Relevant Changes in the Operation of Assets: Total number of kindergarten spaces	7,080 (2013-14)	10,530 (2018-19)	3,450

3.2 Energy Consumption Data for the Board

The table below lists the "metered"[2] consumption values or TCDSB for the baseline year (2012-2013) and for the 2017-2018 time period.

Table 3 TCDSB's energy consumption data

Utility	Fiscal Year 2012-2013 (Baseline)	Fiscal Year 2017-2018 (Current)
Total Electricity (kWh)	80,809,856	79,812,308
Total Natural Gas (m3)	12,355,470	14,639,346
Total Energy (ekWh)	**211,036,510**	**232,061,509**
Greenhouse gas emissions (tonnes CO2e)	34,886	31,071

3.3 Weather-Normalized Energy Consumption Values

In Ontario, 25-35% of energy consumption for a facility is impacted by weather. Weather-normalizing energy consumption values takes into consideration the impact of weather on energy performance and allows for a more accurate comparison from one year to another. To put the impact of weather in context, the following table shows the Weighted Average Heating Degree Days (HDD)[3] and Cooling Degree Days (CDD)[4] for the six most common Environment Canada weather stations in the Ontario education sector.

2 Metered consumption is the quantity of energy used and does not include a loss adjustment value (the quantity of energy lost in transmission).

[3] Heating Degree Day (HDD) is a measure used to quantify the impact of cold weather on energy use. In the data above, HDD are the number of degrees that a day's average temperature is below 18C (the balance point), the temperature at which most buildings need to be heated.

[4] Cooling Degree Day (CDD) is a measure used to quantify the impact of hot weather on energy use. In the data above, CDD are the number of degrees that a day's average temperature is above 18C, the temperature at which most buildings need to be cooled. It should be noted that not all buildings have air conditioning and some building have partial air conditioning.

Table 4 Ontario Degree Days from 2012-2013 to 2017-18

	Fiscal Year					
	2012-2013	**2013-2014**	**2014-2015**	**2015-2016**	**2016-2017**	**2017-2018**
Heating Degree Days (HDD)	3698	4285	4091	3355	3583	3989
Cooling Degree Days (CDD)	289	217	271	462	303	432

TCDSB's energy use values presented in this ECDM plan have been weather-normalized using HDD and CDD information for the Toronto International Airport weather station.

Table 5 below shows TCDSB's weather-normalized energy consumption in the baseline year and FY 2017-2018. These values take into consideration the impact of weather on energy performance and allow for a more accurate comparison of consumption across multiple years. A straight comparison of Total Energy Consumed between one or more years does not take into consideration changes in a board's asset portfolio, such as changes in buildings' attributes and newly implemented programs, which will significant impact energy consumption. As a result, weather-normalized Energy Intensity, the quantity of total energy consumed divided by the total floor area, is the most accurate measurement that allows the evaluation of a board's energy consumption from one year to another as it negates any change in floor areas. The unit of measurement used in this ECDM plan is equivalent kilowatt hours per square foot (ekWh/sf).

Table 5 TCDSB's weather-normalized energy consumption and weather-normalized energy intensity

Weather-Normalized Values*	**Fiscal Year 2012-13 (Baseline Year)**	**Fiscal Year 2017-18 (most recent available data)**
Total Energy Consumed (ekWh)	219,644,385	215,344,763
Energy Intensity (ekWh/sf)	21.94	21.51

Energy intensity (board-wide weighted average)*

	2012-2013	**2017-2018 (unadjusted)**	**2017-2018 (adjusted to 2012-2013 weather conditions)**	**% change**	
Electricity (kWh/sf)	7.77	7.67	7.67	-1.25%	(not weather-sensitive)
Gas (ekWh/sf)	14.18	14.50	13.84	-2.35%	
Total energy (ekWh/sf)	**21.94**	**22.16**	**21.51**	**-1.96%**	
Heating degree-days (Toronto Int-l Airport)	2,849.5	2,997.1		5.2%	
Cooling degree-days (Toronto Int-l Airport)	1,432.6	1,722.0		20.2%	

*Excluding schools that are closed or that have significant data issues

3.4 Review of Previous Energy Conservation Goals and Achievements

In 2014, the Board set annual energy conservation goals for the next five fiscal years. The following table compares energy conservation goals based on the 2014 ECDM plan with actual results for each year.

Table 6 Previous energy conservation goals and actual energy savings

Fiscal Year	Conservation Goal		Energy Savings Achieved*	
	ekWh/sf reduction	%	ekWh/sf reduction	%
2013-2014	0.8	3	0.0	0.0
2014-2015	0.3	2	0.0	0.0
2015-2016	0.3	2	0.04	0.20
2016-2017	0.4	2	0.13	0.59
2017-2018	0.3	2	0.26	1.18

*Excluding schools that are closed or that have significant data issues

The table below compares the 2014 forecasted cumulative energy intensity and energy savings goals with actual energy intensity achieved and actual energy savings.

Table 7 TCDSB's cumulative energy conservation goals

	Cumulative Conservation Goal	Energy Savings Achieved (Weather-normalized)*	Variance
Energy use intensity reduction, %	11%	1.96%	-9.04%
Energy use intensity reduction, ekWh/sf	2.2	0.43	-1.7

*Excluding schools that are closed or that have significant data issues

The Board also set the following additional goals in its 2013-2018 plan:

- To achieve 100% school participation in Ontario EcoSchools Program by 2018;
- To implement a central Energy Monitoring and Data Tracking Centre, linked to a new Building Automation System (BAS) control centre, to improve diagnostics and operation of all HVAC systems;
- To promote and increase energy awareness and environmental stewardship amongst all building occupants, including trustees, senior staff, students, school staff and parents.

TCDSB's conservation goals were forecasted in Spring 2014. Since then a number of factors, which impact 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 are described below. Additionally, due to a lack of dedicated funding, the majority of investment in energy efficiency measures was made in 2017-2018, towards the end of the plan's 5-year period. The savings from these projects have not yet fully materialized. On the operational side, the Board-approved indoor temperature policy of 22°C in the heating season and 25°C in the cooling season was not followed in order to satisfy occupant comfort concerns.

3.4.1 Factors impacting energy use in the education sector

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. **In TCDSB, a total of 3,450 spaces were added between 2013-2014 and 2018-2019, an increase of almost 50%.**

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 parents are demanding that schools have 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.

3.5 Measures Implemented from FY 2012-2013 to FY 2017-2018

3.5.1 Design/construction/retrofit

Since 2012-2013, TCDSB undertook numerous school upgrades as per the board's capital renewal plan, investing into a range of capital projects including boiler replacements and retrofits, envelope upgrades, LED lighting conversions (interior and exterior), and addition of Building Automation Systems (BAS). These were infrastructure renewal projects replacing end-of-life plant and equipment where energy savings were not the primary consideration.

TCDSB received dedicated funding to implement energy efficiency measures when the Greenhouse Gas Reduction Funding was announced in FY 2017-2018. With this funding, the board implemented a number

of energy conservation measures which required significant capital investment. A detailed list of these measures, together with select capital projects which improved the schools' energy efficiency, is included in Appendix B. Savings were recorded in a majority of buildings.

NOTE TO READERS:
It takes a minimum of one full year after an energy management strategy has been implemented before an evaluation can determine the associated actual energy savings achieved.

3.5.2 Operations and maintenance and occupant behaviour

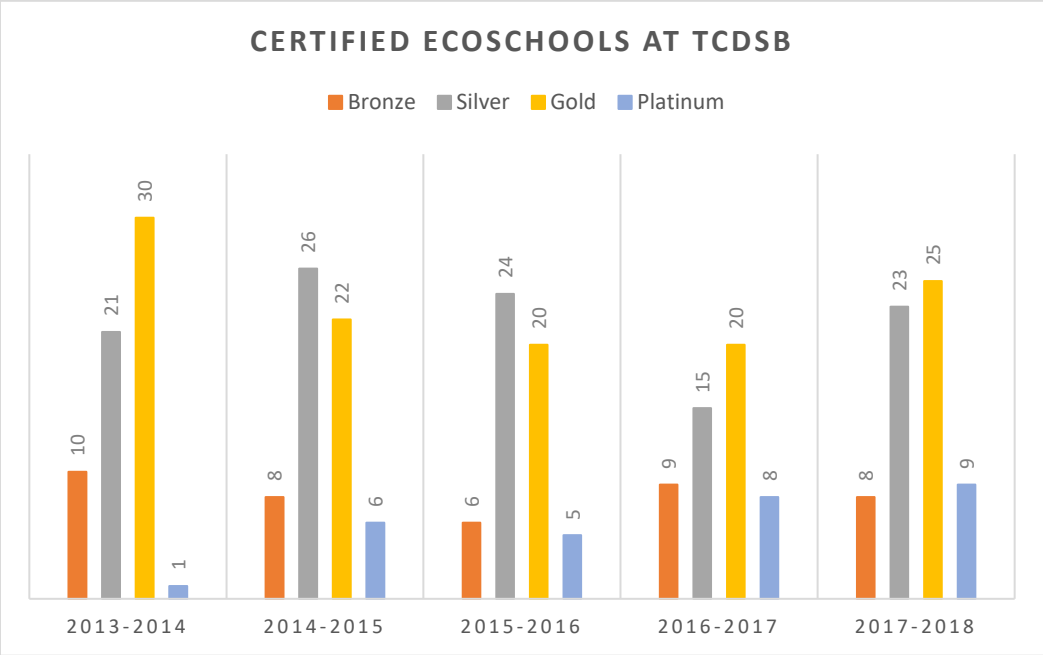
A detailed description of activities to optimize operations and maintenance, and the progress since the last ECDM plan, is included in Appendix C. The board also has numerous activities underway to increase staff and student awareness.

Operational changes initiated since the 2014 plan include:

- Bill verification, monitoring and analysis of electricity, gas and water use for all board facilities
- Full-time staff energy supervisor to monitor energy use and implement efficiency programs
- Implementation of RETscreen Expert Portfolio energy tracking
- Building Automation Systems' (BAS) training for the Board's BAS technicians and custodial staff
- Central BAS monitoring and response centre
- Procurement policies to purchase Energy Star rated appliances and equipment
- Energy efficiency performance standards for new and replacement HVAC equipment including fans, motors, pumps and chillers
- Individual school energy audits undertaken by the Board's energy supervisor
- Interval meter installations

As of the 2017-2018 school year, 65 of the Board's schools are certified EcoSchools.

Figure 3 TCDSB's certified EcoSchools



3.6 Lessons Learned

The 2014 plan was ahead of its time in anticipating the importance of management systems, organizational alignment and engagement of staff and students for achieving and sustaining high levels of energy efficiency. Even with dedicated funding, which TCDSB received only towards the end of the 2014 plan's time period, managing energy use across a large portfolio of more than 200 buildings of different ages and building condition, and with a wide range of building systems and technologies, is a task of significant magnitude and complexity. The experience and results of the past 5 years serve to inform the recommendations in this ECDM plan.

The primary lessons learned are as follows:

- Substantial savings can be achieved through prioritizing high-savings potential buildings. It is not possible to meet energy reduction targets without committing funding and resources to high-potential buildings. Specific funding allocations are needed for energy efficiency improvements in these buildings.
- The investment in utility data management has improved data quality and reporting which provide the platform for scaling up energy conservation effort and results.
- Closer tracking, reporting and verification of energy savings and correction of increases can substantially improve overall results.
- The addition of the energy supervisor has proved to have been a good investment and necessary to achieve the results so far. Scaling up the savings will require additional effort and resources which are budgeted for in this plan.

4 ENERGY CONSERVATION AND DEMAND MANAGEMENT PLAN FOR FY 2019-2020 TO FY 2023-2024

This section outlines TCDSB's plan to reduce energy consumption and manage demand through renewable energy and energy management strategies, including design/construction/retrofit, operations and maintenance, and occupant behaviour.

4.1 Goals and Objectives

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

Table 8 TCDSB's annual energy intensity conservation goals

Annual Energy Intensity Conservation Goal	Fiscal Year				
	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
ekWh/sf reduction	0.08	0.40	0.79	0.81	0.42
% decrease	0.4%	1.9%	3.7%	3.8%	2.0%

The following table indicates the board's Cumulative Energy Intensity Conservation Goal for the next five fiscal years. The board aims to reduce board-wide Energy Intensity from 21.27 to 18.78 ekWh/sf.

Table 9 TCDSB's cumulative conservation goal

Cumulative Energy Intensity Conservation Goal	FY 2019-2020 to 2023-2024
ekWh/sf reduction	2.49
% decrease	11.7%

In addition, the Board has set out the following objectives for the next five fiscal years:

a. Build towards 100% school participation in Ontario EcoSchools program by 2023;

b. Implement a centrally-based Energy Monitoring and Tracking Data Centre;

c. Extend Building Automation Systems (BAS) to more high-savings potential buildings and establish the control centre to improve diagnostics and operation of all HVAC systems; and

d. Further promote and increase energy awareness and environmental stewardship amongst all stakeholders including trustees, senior staff, students, school staff and parents.

NOTE TO READERS:
There are numerous factors that influence a board's ability to meet energy conservation goals. A list of some of these factors include, but are not limited to:

Changes in programming

Example: Introduction of Before and After School programs to schools meant that the number of hours that a facility's HVAC system operates on a daily basis was expanded by four or more hours per weekday to reflect the longer occupancy hours

Changes to Ontario's Building Code
Example: Regular changes/updates to Ontario's Building Code can impact energy consumption. For example, an increase in levels of ventilation in newly constructed buildings or other requirements. As a result, more fresh air is brought into a school to meet the ventilation requirements throughout the day requires heating/cooling of the air (dependent on the season) to meet standard classroom temperatures

Changes to school board funding models
Forecasted Conservation Goals are based on current funding models being in place throughout the next five years. Boards' funding is determined on an annual basis. Any changes to the funding model will impact forecasted values.

Changes in technology
Forecasted Conservation Goals are based on current technologies and associated energy savings. If new technologies become available, anticipated energy savings may increase.

4.2 Energy Management Strategies

Energy management strategies fall into three key categories: design/construction/retrofit, operations and maintenance, and occupant behaviour. The strategies defined below are all incorporated in the proposed plan. See Section 4.5.1 for a description of proposed operations and maintenance and staff and student engagement strategies.

Design/construction/retrofit: Encompasses the original and ongoing intent of how a building and its systems are to perform as a whole through the integration of disciplines such as architecture and engineering.
Operations and maintenance: Includes the strategies the Board uses to ensure that the existing buildings and equipment perform at peak efficiency.
Occupant Behaviour: Strategies that the Board uses to educate occupants, including staff, students and community users, with an emphasis in changing specific behaviours to reduce energy consumption.

4.3 2019 ECDM Plan Development

4.3.1 Site visits

In September 2018, the board's consultant visited ten representative buildings as selected by the Board to collect data which would help validate the Board-wide energy targets and conservation potential and confirm the measures necessary to achieve the savings. The ten facilities are listed in the table below.

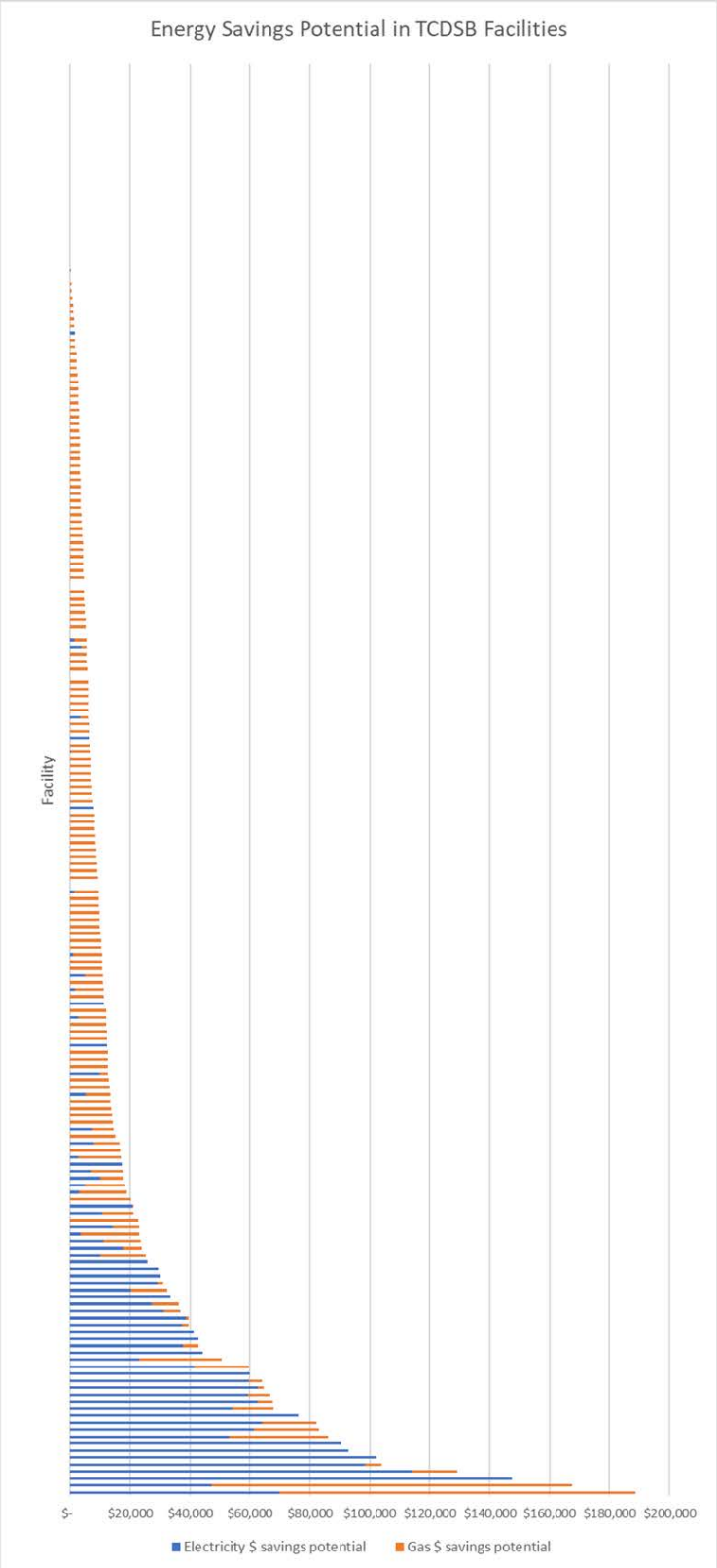
Table 10 TCDSB facilities visited in September 2018

Facility name	Total 2016-2017 energy use (ekWh)	Area (sf)	Year built	Portables	Total energy intensity (2016-2017, eKWh/sf)	Electricity kWh/sf	Gas ekWh/sf
Catholic Education Centre	4,149,979	135,625	1982	0	30.60	21.87	8.73
Michael Power - St Joseph	3,878,128	224,252	1976	6	17.29	10.04	7.26
St Gregory	1,811,805	72,237	1999	0	25.08	7.58	17.50
Senator O'Connor College	3,231,398	135,493	2005	6	23.85	14.46	9.39

Facility name	Total 2016-2017 energy use (ekWh)	Area (sf)	Year built	Portables	Total energy intensity (2016-2017, eKWh/sf)	Electricity kWh/sf	Gas ekWh/sf
St Cyril	542,275	29,051	1958	3	18.67	4.15	14.51
Father Henry Carr	2,615,713	120,319	1965	0	21.74	9.21	12.53
St Basil the Great College	3,974,803	171,835	1998	0	23.13	11.38	11.75
St Matthew	1,209,400	42,882	1926	2	28.20	6.18	22.02
St Andre	505,476	50,321	2015	0	10.05	5.52	4.52
St Charles Garnier	990,292	43,656	1975	0	22.68	5.00	17.68

4.3.2 Board-wide energy targets and conservation potential

Figure 4 Annual cost savings potential – all TCDSB facilities



2017-2018 electricity and natural gas consumption data for a total of 205 schools and administration buildings were compared against good practice energy targets from the province-wide Sustainable Schools reporting. The target for each building is adjusted for material variables including weather, building type, heating system type and number of portables. The difference between actual consumption and the target quantifies the savings potential for each individual building.

Some buildings have far greater savings potential than others due to varying combinations of design, construction, maintenance and operational inefficiencies. Results are presented in Figure 4 in terms of annual cost savings potential. The highest potential buildings are at the bottom of the chart, with several in excess of $100,000/year. The buildings at the top of the chart are those with little or no savings potential.

4.3.3 Facilities selected for the energy efficiency project

From the list of all board facilities, the following 40 were selected for energy efficiency project implementation, based on their overall energy savings potential and other considerations. This list may be adjusted, if necessary, as the scope of work is further developed. Together, these 40 buildings make up the overall board-wide 11% energy reduction goal for this plan, worth over $2.3 million per year in utility cost savings as detailed in Section 4.6.

Table 11 Annual cost savings potential – selected TCDSB facilities

Facility	Electricity savings potential, %	Electricity $ savings potential	Gas savings potential, %	Gas $ savings potential	Total $ savings potential
Senator O'Connor	58.80%	$191,748	1.83%	$654	$192,402
Bishop Marrocco/Thomas Merton	31.93%	$136,171	29.95%	$35,029	$171,199
Michael Power/St Joseph	38.15%	$142,657	0.00%	0	$142,657
O L of Lourdes	67.99%	$122,965	0.00%	$0	$122,965
St Mother Teresa	39.78%	$103,768	21.13%	$10,240	$114,008
Fr Henry Carr	38.76%	$72,980	48.41%	$24,553	$97,533
Francis Libermann	51.16%	$84,323	38.05%	$12,713	$97,037
O L of Sorrows	57.83%	$70,631	54.12%	$16,775	$87,406
St Jane Frances	62.00%	$77,763	40.10%	$8,347	$86,110
O L of Fatima	58.48%	$77,399	35.55%	$8,382	$85,781
Mary Ward	30.60%	$79,726	4.30%	$2,053	$81,779
St Nicholas of Bari	64.68%	$76,333	30.16%	$4,654	$80,987
St Oscar Romero	24.44%	$56,276	35.10%	$21,581	$77,857
Marshall McLuhan	30.67%	$68,858	0.00%	$0	$68,858
St Maria Goretti	46.26%	$61,391	1.67%	$252	$61,643
O L of Victory	50.86%	$58,659	14.51%	$2,662	$61,321
St Timothy	47.96%	$53,879	25.46%	$4,615	$58,495
St Dorothy	54.00%	$48,852	46.96%	$7,441	$56,293
St Anthony	54.46%	$50,691	31.28%	$5,299	$55,990
Loretto College	33.86%	$44,223	22.61%	$6,135	$50,358
St Albert	50.97%	$27,299	70.57%	$13,086	$40,384
St Dominic Savio	36.99%	$24,427	56.04%	$10,713	$35,140
St Gregory	21.45%	$19,419	47.50%	$13,376	$32,795
St Ignatius of Loyola	38.32%	$18,961	68.08%	$13,532	$32,493
St Bonaventure	25.93%	$11,077	75.57%	$20,335	$31,412
Josyf Cardinal Slipyj	27.43%	$17,277	58.97%	$12,591	$29,868
O L of the Assumption	53.61%	$22,535	65.08%	$7,092	$29,627
St Gerald	23.93%	$11,499	69.43%	$17,256	$28,755
St Brendan	25.21%	$16,341	46.57%	$8,782	$25,123
St Eugene	30.66%	$10,256	75.14%	$13,825	$24,080
St Agatha	42.56%	$15,406	66.05%	$8,409	$23,815
St Matthew	0.00%	$0	71.76%	$21,510	$21,510
Immaculate Conception	31.67%	$20,948	0.00%	$0	$20,948
St Augustine	0.00%	$0	70.62%	$18,018	$18,018
St Marcellus	11.00%	$5,454	57.12%	$10,581	$16,035

Facility	Electricity savings potential, %	Electricity $ savings potential	Gas savings potential, %	Gas $ savings potential	Total $ savings potential
St Barnabas	1.14%	$440	63.58%	$13,874	$14,314
St Charles Garnier	0.00%	0	64.74%	$14,091	$14,091
St Vincent de Paul	0.00%	$0	56.05%	$13,006	$13,006
St Rita	0.00%	0	55.49%	$10,675	$10,675
St Stephen	0.00%	0	56.10%	$10,663	$10,663

4.3.4 Energy efficiency project measures and costs

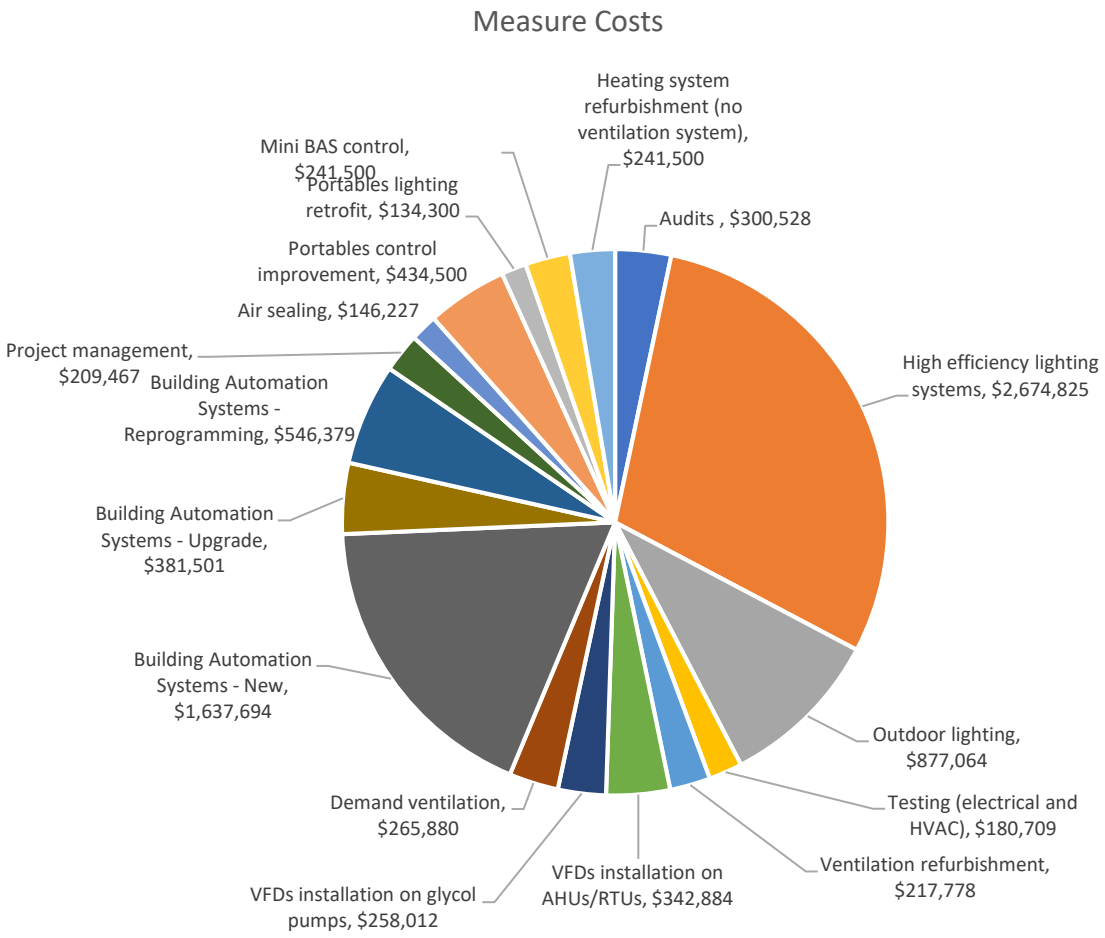
The overall scope of work necessary to achieve the targeted savings in the 40 selected buildings is described in the table below and will be tailored to the individual buildings according to their particular inefficiencies and needs. Buildings may be added to or removed from the plan as necessary.

Table 12 Measures recommended for selected buildings

ID#	Measure	Description
	General	
Audit	Audits and analysis	Data collection and analysis, incentive applications
	Lighting	
Lighting1	High efficiency lighting systems	Convert to LED by re-lamping and re-ballasting. Reduce number of fixtures and lamps in over-lit areas.
Lighting2	Outdoor lighting	Replace with LED fixtures
	HVAC	
HVAC1	Testing (electrical and HVAC)	Test HVAC systems for motor loads, flow rates, pressure losses and faulty equipment
HVAC2	Ventilation refurbishment	Repair and replace equipment, re-balance flows, add zone dampers
HVAC3	VFDs installation on AHUs/RTUs	Install VFDs on supply and return fans
HVAC4	VFDs installation on glycol pumps	Install VFDs on glycol pumps
HVAC16	Demand ventilation	Install CO2 and motion sensors, re-program controls
	Control	
CTRL1	Building Automation Systems - New	Install full BAS to Board specification
CTRL3	Building Automation Systems - Upgrade	Expand and re-program BAS for system control optimization
	Building Envelope	
ENVLP7	Air sealing	Caulking and weather-stripping, targeted thermography
	Schools without Mechanical Ventilation	
NOVNT1	Mini BAS Control	Equip with Wi-Fi controller for heating system and exhaust fans
NOVNT2	Heating system refurbishment	Test and refurbish pumps and control valves
	Portables	
PORT1	Portables HVAC control improvement	Equip with Wi-Fi controller with motion, temperature and CO2 sensors, inspect and refurbish OA damper

The budgeted project costs for this work in the selected buildings totals $9.46 million, broken down as shown in Figure 5. The biggest planned investments are in lighting and building automation.

Figure 5 Recommended measure costs (selected buildings)



4.4 Projected Savings (selected buildings)

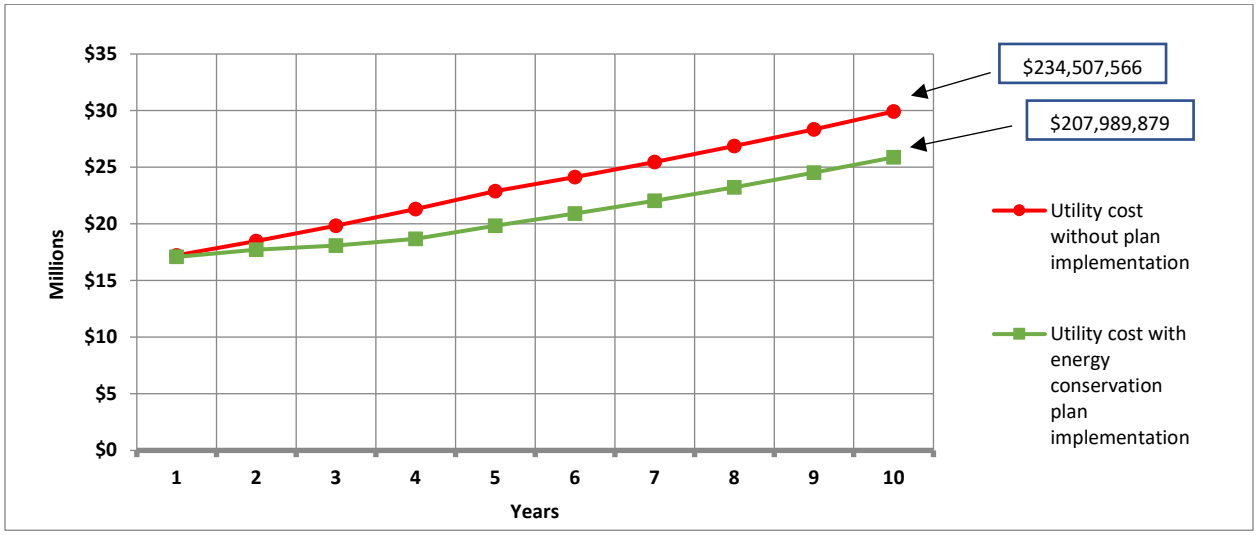
The targeted utility cost savings at 2017-2018 rates total over $2.3 million per year and are presented in detail in Table 13. The numbers may vary somewhat depending on which buildings are finally selected, and the model will be updated accordingly.

Table 13 TCDSB energy savings potential (selected high-potential buildings)

Electricity savings (kWh/yr)	11,582,136
Electricity savings ($)	$1,900,628
Gas savings (m3/yr)	1,499,297
Gas savings ($)	$422,802
Total energy savings ($)	$2,323,430
Total energy savings (%)	11.7%
Total cost savings (%)	11.3%
GHG emissions reduction (tonnes CO2e)	3,104

This magnitude of savings will lower the Board's utilities' expenditure by 11% over the 10-year period. Figure 6 shows the ten-year value of the accumulated savings (over $26.5 million).

Figure 6 TCDSB's utility costs with and without energy conservation plan implementation



4.5 Implementation and Program Costs

Implementing a program of this scale and complexity requires management systems, organizational engagement and resources. The Board has made a positive start to putting those capabilities in place. This plan builds on lessons learned to support successful execution and achievement of savings.

4.5.1 Organizational alignment

Key elements included in this plan are:

- Energy performance reporting system
    - Monthly and weekly (interval meter) reporting of actual savings for the selected buildings throughout the implementation period
    - Quarterly reporting of savings and increases for all buildings and Board-wide net energy, utility cost and GHG emissions reductions
    - Annual reporting to senior management of overall progress compared to baseline and targets
- Staff engagement
    - Progress reporting to caretakers and maintenance staff
    - Team training in energy metrics and building specific opportunities
    - Recognition of success
- Energy and building system monitoring
    - Implementation and resourcing of the Energy Monitoring and Tracking Data Centre
    - Implementation and resourcing of the BAS Control Centre with targeted fault detection and response
- Stakeholder engagement
    - Promote and increase energy awareness and environmental stewardship amongst all stakeholders, including trustees, senior staff, students, school staff and parents

4.5.2 Resources

The plan involves multiple projects requiring a great deal of analytics, coordination and engagement. Projects can be spread over the 5-year period, but the sooner the work is implemented the better the likelihood that utility company incentives will still be available and the greater the net positive cash flow. An early next step will be to decide on the project timelines and create the resourcing plan to support it. A preliminary allowance of $325,000/year has been built into the financial model to pay for required additional resources.

4.5.3 Cash Flow and Return on Investment

Table 14 summarizes the target savings and the budget project and program costs over a ten-year term. The ECDM plan implementation yields a simple payback of 4.5 years, an internal rate of return of 32%, and net positive cash flow in the 4th year. Figure 7 shows the net cash balance, after payment of all project and program costs, totaling over $15.5 million after 10 years. Table 15 provides the details of the 10-year cash flow model.

Table 14 Energy efficiency improvements business case

Payback period	4.5	Program cost	$2,982,573	Electricity savings (kWh/yr)	11,582,136
Internal Rate of Return	32%	Project cost	$9,455,368	Electricity savings ($)	$1,900,628
		Total with inflation	$12,437,941	Gas savings (m3/yr)	1,499,297
		Incentives	$1,458,073	Gas savings ($)	$422,802
		Total savings over 10 years (electricity + gas)	$26,517,687	Total energy savings ($)	$2,323,430
		Total savings over 10 years + Incentives	$27,975,760	Total energy savings (%)	11.7%
				Total cost savings (%)	11.3%
				GHG emissions reduction (tonnes CO2e)	3,104

Figure 7 10-year cash flow model

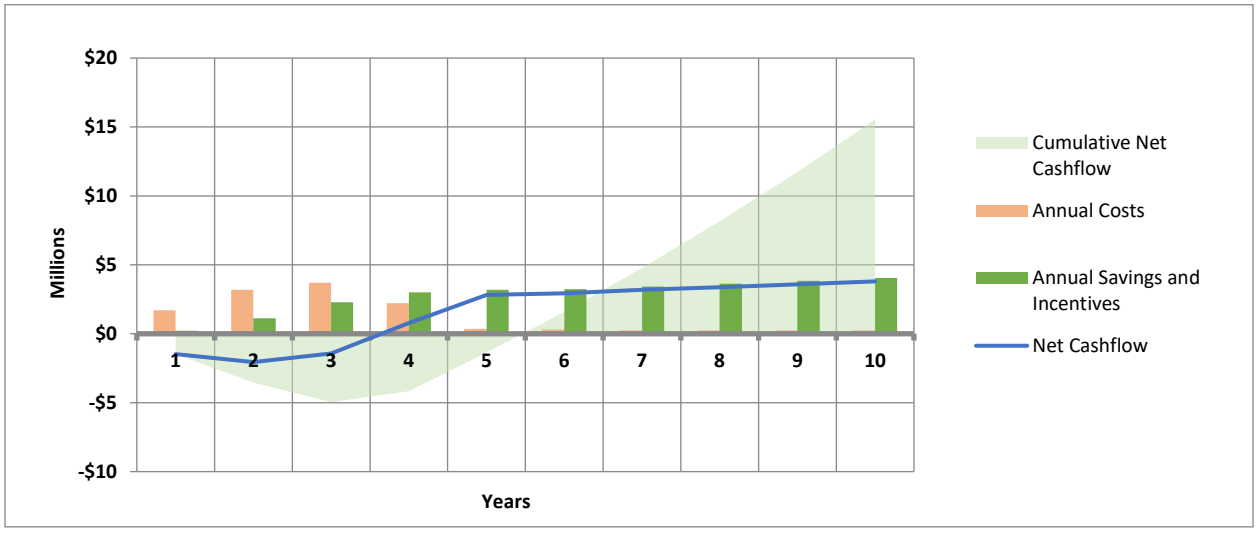


Table 15 10-year cash flow model breakdown

Cashflow Analysis	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**TOTAL**
Program cost (with inflation)	$ 325,000	$ 333,125	$ 341,453	$ 349,989	$ 358,739	$ 311,137	$ 231,939	$ 237,737	$ 243,681	$ 249,773	$ 2,982,573
Project cost (with inflation)	$ 1,379,488	$ 2,850,591	$ 3,359,733	$ 1,865,557	$ -	$ -	$ -	$ -	$ -	$ -	$ 9,455,368
Total cost	**$ 1,704,488**	**$ 3,183,716**	**$ 3,701,186**	**$ 2,215,546**	**$ 358,739**	**$ 311,137**	**$ 231,939**	**$ 237,737**	**$ 243,681**	**$ 249,773**	**$ 12,437,941**
Incentives	$ 85,274	$ 360,020	$ 516,120	$ 378,218	$ 118,441	$ -	$ -	$ -	$ -	$ -	$ 1,458,073
Total savings (electricity + gas)	$ 139,666	$ 768,537	$ 1,762,102	$ 2,621,740	$ 3,064,118	$ 3,238,525	$ 3,423,649	$ 3,620,172	$ 3,828,818	$ 4,050,360	$ 26,517,687
Total incentives + savings	**$ 224,939**	**$ 1,128,557**	**$ 2,278,221**	**$ 2,999,958**	**$ 3,182,559**	**$ 3,238,525**	**$ 3,423,649**	**$ 3,620,172**	**$ 3,828,818**	**$ 4,050,360**	**$ 27,975,760**
Cumulative Net Cashflow	-$1,479,549	-$3,534,707	-$4,957,672	-$4,173,260	-$1,349,440	$1,577,948	$4,769,659	$8,152,094	$11,737,232	$15,537,819	
Net Cashflow	-$1,479,549	-$2,055,159	-$1,422,965	$784,412	$2,823,820	$2,927,388	$3,191,711	$3,382,435	$3,585,138	$3,800,588	32%

Project Cost Analysis	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Total**
Implementation (for selected facilities)	$ 1,379,488	$ 2,781,064	$ 3,197,842	$ 1,732,355	$ -	$ -	$ -	$ -	$ -	$ -	$ 9,090,749
Escalation rate	1.0000	1.0250	1.0506	1.0769	1.1038	1.1314	1.1597	1.1887	1.2184	1.2489	
Total project cost with inflation	$ 1,379,488	$ 2,850,591	$ 3,359,733	$ 1,865,557	$ -	$ -	$ -	$ -	$ -	$ -	$ 9,455,368

Program Cost Analysis	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Total**
Operations & maintenance	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 500,000
Internal project management	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 1,500,000
Program management	$ 125,000	$ 125,000	$ 125,000	$ 125,000	$ 125,000	$ 75,000	$ -	$ -	$ -	$ -	$ 700,000
Total program cost	$ 325,000	$ 325,000	$ 325,000	$ 325,000	$ 325,000	$ 275,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 2,700,000
Escalation rate	1.0000	1.0250	1.0506	1.0769	1.1038	1.1314	1.1597	1.1887	1.2184	1.2489	
Total program cost with inflation	$ 325,000	$ 333,125	$ 341,453	$ 349,989	$ 358,739	$ 311,137	$ 231,939	$ 237,737	$ 243,681	$ 249,773	$ 2,982,573

Utility Cost Analysis	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Total**
Electricity cost without retrofit	$ 13,097,200	$ 13,948,518	$ 14,855,171	$ 15,820,757	$ 16,849,107	$ 17,944,299	$ 19,110,678	$ 20,352,872	$ 21,675,809	$ 23,084,736	$ 176,739,147
Gas cost without retrofit	$ 4,128,296	$ 4,541,125	$ 4,995,238	$ 5,494,762	$ 6,044,238	$ 6,195,344	$ 6,350,227	$ 6,508,983	$ 6,671,707	$ 6,838,500	$ 57,768,419
Total utility cost without retrofit **[A]**	$ 17,225,495	$ 18,489,643	$ 19,850,409	$ 21,315,519	$ 22,893,344	$ 24,139,642	$ 25,460,905	$ 26,861,855	$ 28,347,516	$ 29,923,237	$ 234,507,566
Electricity cost with Plan implementation	$ 12,958,211	$ 13,209,398	$ 13,265,935	$ 13,614,135	$ 14,404,012	$ 15,340,273	$ 16,337,391	$ 17,399,321	$ 18,530,277	$ 19,734,745	$ 154,793,697
Gas cost with Plan implementation	$ 4,127,619	$ 4,511,709	$ 4,822,372	$ 5,079,644	$ 5,425,214	$ 5,560,844	$ 5,699,865	$ 5,842,362	$ 5,988,421	$ 6,138,131	$ 53,196,182
Total utility cost with Plan implementation **[B]**	$ 17,085,830	$ 17,721,106	$ 18,088,307	$ 18,693,779	$ 19,829,226	$ 20,901,117	$ 22,037,256	$ 23,241,683	$ 24,518,698	$ 25,872,876	$ 207,989,879
Yearly savings, **[A] - [B]**	$ 139,666	$ 768,537	$ 1,762,102	$ 2,621,740	$ 3,064,118	$ 3,238,525	$ 3,423,649	$ 3,620,172	$ 3,828,818	$ 4,050,360	$ 26,517,687

Savings Analysis	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Total**
Savings projected after project completion											
Electricity (kWh)	2,823,255	4,686,438	3,429,301	643,142	0	0	0	0	0	0	11,582,136
Gas (m3)	9,599	340,927	624,336	524,435	0	0	0	0	0	0	1,499,297
Utility rates											
Elec. rate without escalation ($/kWh)	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	$0.16	
Elec. escalation	1.000	1.065	1.134	1.208	1.286	1.370	1.459	1.554	1.655	1.763	
Elec. rate with escalation($/kWh)	$0.16	$0.17	$0.19	$0.20	$0.21	$0.22	$0.24	$0.26	$0.27	$0.29	
Gas rate without escalation ($/m3)	$0.28	$0.28	$0.28	$0.28	$0.28	$0.28	$0.28	$0.28	$0.28	$0.28	
Gas escalation	1.000	1.100	1.210	1.331	1.464	1.501	1.538	1.577	1.616	1.656	
Gas rate with escalation ($/m3)	$0.28	$0.31	$0.34	$0.38	$0.41	$0.42	$0.43	$0.44	$0.46	$0.47	
Savings ramping up to 100% after Yr 1 of each project's completion											
Electricity (kWh)											
Year 1	846,976	1,405,931	1,028,790	192,943	0	0	0	0	0	0	
Year 2		2,823,255	4,686,438	3,429,301	643,142	0	0	0	0	0	
Year 3			2,823,255	4,686,438	3,429,301	643,142	0	0	0	0	
Year 4				2,823,255	4,686,438	3,429,301	643,142	0	0	0	
Year 5					2,823,255	4,686,438	3,429,301	643,142	0	0	
Year 6						2,823,255	4,686,438	3,429,301	643,142	0	
Year 7							2,823,255	4,686,438	3,429,301	643,142	
Year 8								2,823,255	4,686,438	3,429,301	
Year 9									2,823,255	4,686,438	
Year 10										2,823,255	
Total	846,976	4,229,186	8,538,483	11,131,936	11,582,136	11,582,136	11,582,136	11,582,136	11,582,136	11,582,136	94,239,394
Electricity ($, with escalation)	$ 138,989	$ 739,120	$ 1,589,236	$ 2,206,623	$ 2,445,095	$ 2,604,026	$ 2,773,287	$ 2,953,551	$ 3,145,532	$ 3,349,991	$ 21,945,450
Gas (m3)											
Year 1	2,400	85,232	156,084	131,109	0	0	0	0	0	0	
Year 2		9,599	340,927	624,336	524,435	0	0	0	0	0	
Year 3			9,599	340,927	624,336	524,435	0	0	0	0	
Year 4				9,599	340,927	624,336	524,435	0	0	0	
Year 5					9,599	340,927	624,336	524,435	0	0	
Year 6						9,599	340,927	624,336	524,435	0	
Year 7							9,599	340,927	624,336	524,435	
Year 8								9,599	340,927	624,336	
Year 9									9,599	340,927	
Year 10										9,599	
Total	2,400	94,831	506,610	1,105,970	1,499,297	1,499,297	1,499,297	1,499,297	1,499,297	1,499,297	10,705,591
Gas ($, with escalation)	$ 677	$ 29,417	$ 172,865	$ 415,117	$ 619,024	$ 634,500	$ 650,362	$ 666,621	$ 683,287	$ 700,369	$ 4,572,238
Total savings ($, electricity + gas)	$ 139,666	$ 768,537	$ 1,762,102	$ 2,621,740	$ 3,064,118	$ 3,238,525	$ 3,423,649	$ 3,620,172	$ 3,828,818	$ 4,050,360	$ 26,517,687

Incentive Analysis

Electricity savings on which incentive is paid (kWh)												Total
Year 1	846,976	1,405,931	1,028,790	192,943	0	0	0	0	0	0		3,474,641
Year 2		1,976,278	3,280,506	2,400,511	450,200	0	0	0	0	0		8,107,495
Total	846,976	3,382,210	4,309,297	2,593,453	450,200	0	0	0	0	0		11,582,136
Electricity incentive ($)	$ 84,698	$ 338,221	$ 430,930	$ 259,345	$ 45,020	$ -	$ -	$ -	$ -	$ -		$ 1,158,214

Gas savings on which incentive is paid (m3)												Total
Year 1	2,880	102,278	187,301	157,331	0	0	0	0	0	0		449,789
Year 2		6,719	238,649	437,035	367,105	0	0	0	0	0		1,049,508
Total	2,880	108,997	425,949	594,366	367,105	0	0	0	0	0		1,499,297
Gas incentive ($)	$ 576	$ 21,799	$ 85,190	$ 118,873	$ 73,421	$ -	$ -	$ -	$ -	$ -		$ 299,859
Total incentive ($, electricity + gas)	$ 85,274	$ 360,020	$ 516,120	$ 378,218	$ 118,441	$ -	$ -	$ -	$ -	$ -		$ 1,458,073

Assumptions

Inflation	2.5%	**Savings ramp-up**	Yr 1	Yr 2
Electricity escalation rate	6.5%	Electricity	30%	100%
Gas escalation rate in Yr 2-5	10%	Gas	25%	100%
Gas escalation rate in Yr 6-10	2.5%			
Elec. rate in Yr 1 ($/kWh)	$ 0.1641			
Gas rate in Yr 1 ($/m3)	$ 0.2820	**Incentive payments ratio**	Yr 1	Yr 2
Electricity incentives ($/kWh)	$ 0.10	Electricity	30%	100%
Gas incentives ($/m3)	$ 0.20	Gas	30%	100%

4.6 Renewable Energy

TCDSB aims to reduce the board's energy consumption through renewable energy generation. Rooftop solar photovoltaic systems have been installed in 9 schools as listed in Table 16.

Table 16 TCDSB roof-top solar PV systems

School	Size, kW	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	Sep 2017-Nov 2018
Bishop Allen Academy	150	133,666	166,735	164,790	142,087	149,537	148,807	133,772	30,010
Bishop Marrocco/ Thomas Merton	30	9,984	39,580	42,912	30,986	33,442	43,441	38,036	5,749
Blessed Cardinal Newman	100	85,478	144,731	144,750	150,516	133,257	147,179	141,929	26,973
Jean Vanier	216							236,432	44,279
Father John Redmond	180							188,160	36,096
St Basil The Great	190								2,254
Msgr Percy Johnson	142								3,540
Senator O'Connor	142								
Francis Libermann	166								
Total	**1,316**	**229,128**	**351,046**	**352,452**	**323,589**	**316,236**	**339,427**	**738,329**	**148,901**
Average electricity rate ($/kWh)		0.12	0.13	0.14	0.15	0.16	0.18	0.16	0.17
Value of electricity saved due to solar PV		$27,495	$45,636	$49,343	$48,538	$50,598	$61,097	$121,381	$25,313
Schools which have approximate annual electricity bill equal to the electricity cost saved by solar PV systems		St Pius	Canadian Martyrs	St Paschal Baylon	St Andrew	St Nicholas	Cardinal Leger	Our Lady of Victory	St Bonaventure

The board does not have any facilities with ground source heat pump technology.

5 ADDITIONAL INFORMATION

5.1 Energy management resources

The Board has an energy management position.

- ✓ In-house
  - ✓ Full time
  - ☐ Part time
  - ☐ Shared job function
- ☐ Contracted third party
- ☐ None

5.2 Environmental programs

In 2018-19, schools within the Board that participated in environmental programs.

✓ EcoSchools
__66_ Number of schools that participate

☐ Earthcare Schools
_____ Number of schools that participate

✓ Enbridge School Energy Challenge
__14_ Number of schools that participate

✓ Other
Name of Program:__
https://www.tcdsb.org/Board/environment/EnvironmentalTeaching/Pages/default.aspx
___200__ Number of schools that participate

5.3 Energy efficiency incentives

1. The Board applies to incentive programs to support the implementation of energy efficient projects on a regular basis.

   ✓ Yes ☐ No

   If yes,

   Between Fiscal Year 2013-2014 and Fiscal Year 2017-2018, the Board has applied for **$1,124,296** in incentive funding from various agencies to support the implementation of energy efficient projects.

2. The Board uses the services of the sector's Incentive Programs Advisor (IPA).

   ✓ Yes ☐ No

5.4 Energy Procurement

1. The Board participates in a consortia arrangement to purchase electricity.

   ✓ Yes ☐ No

If yes,

✓ OECM's Strategic Electricity Management and Advisory Services

☐ Other

Provide Name of Consortia: _____

2. The Board participates in a consortia arrangement to purchase natural gas.

✓ Yes ☐ No

If yes,

☐ Ontario Education Collaborative Marketplace's (OECM) Natural Gas Management and Advisory Services

✓ Catholic School Board Services Association's (CSBSA) Natural Gas Management and Advisory Services

☐ Other

Provide Name of Consortia: _____

5.5 Demand Management

1. The Board uses the following method(s) to monitor electrical Demand:
   - ✓ Invoices
   - ☐ Real-time data
   - ✓ Online data from the Local Distribution Company (LDC)
   - ☐ Other

     _____

2. The Board uses the following methodologies to reduce electrical Demand:
   - ✓ Equipment scheduling
   - ☐ Phased/staged use of equipment
   - ☐ Demand-limit equipment
   - ☐ Deferred start-up of large equipment (e.g.: chiller start-up in spring)
   - ☐ Other

     _____

6 SENIOR MANAGEMENT APPROVAL OF THIS ENERGY CONSERVATION AND DEMAND MANAGEMENT PLAN

I confirm that Toronto Catholic District School Board's senior management has reviewed and approved this Energy Conservation and Demand Management Plan.

_____ _____

Name: Lloyd Noronha Date

Title: Associate Director of Facilities, Business and community Development, and Chief Financial Officer

7 APPENDIX A 2017-2018 ENERGY CONSUMPTION AND GHG EMISSIONS FOR BOARD FACILITIES

A summary of the Board's annual energy consumption and greenhouse gas emissions for its operations (schools, administrative offices and related facilities) for the period 2017-2018

	2017-2018
Total electricity use, kWh	79,812,308
Total natural gas use, m3	14,639,346
Total natural gas use, ekWh	152,249,202
Total energy use, ekWh (electricity + gas)	232,061,509
Average total energy intensity (ekWh/sf, unadjusted)	21.27
Greenhouse gas emissions (tonnes CO2e):	
Electricity	3,432
Gas	27,639
Total	31,071

Facility name	Area, sf	2017-2018 Electricity use, kWh	Electricity GHG emissions, tonnes CO2e	2017-2018 Gas use, m3	Gas GHG emissions, tonnes CO2e
All Saints	59,115	591,795	25	50,159	95
Annunciation	30,559	86,287	4	49,482	93
Bishop Allen Academy	128,758	1,663,885	72	174,834	330
Bishop Marrocco/Thomas Merton	240,778	2,598,427	112	414,802	783
Blessed Cardinal Newman	148,606	1,571,319	68	571,029	1,078
Blessed Margherita	35,187	121,606	5	43,606	82
Blessed Pier Giorgio Frassati	48,599	312,522	13	34,397	65
Blessed Sacrament	44,702	161,024	7	69,519	131
Blessed Trinity	34,197	156,512	7	76,723	145
Brebeuf	146,475	1,454,309	63	145,346	274
Canadian Martyrs	33,293	241,121	10	56,767	107
Cardinal Carter Academy	61,053	673,969	29	80,128	151
Cardinal Leger	39,880	334,869	14	29,142	55
Catholic Education Centre	135,576	2,515,410	108	152,971	289
Chaminade College	86,942	522,158	22	112,856	213
Christ The King	32,141	115,021	5	46,036	87
Dante Alighieri	82,742	735,453	32	123,732	234
D'Arcy McGee	81,978	400,289	17	118,546	224
Don Bosco	132,654	708,136	30	161,626	305
East Facilities	32,098	207,855	9	62,995	119
Epiphany of Our Lord Academy	26,081	97,623	4	51,691	98
Father Serra	31,323	249,040	11	61,681	116
Fr Henry Carr	103,011	1,147,259	49	179,870	340
Fr John Redmond	130,062	905,582	39	100,354	189

Facility name	Area, sf	2017-2018 Electricity use, kWh	Electricity GHG emissions, tonnes CO2e	2017-2018 Gas use, m3	Gas GHG emissions, tonnes CO2e
Francis Libermann	77,339	1,004,430	43	118,493	224
Holy Angels	42,787	366,643	16	69,009	130
Holy Cross	39,084	133,177	6	52,056	98
Holy Family	59,288	272,428	12	63,375	120
Holy Name	76,768	272,027	12	72,732	137
Holy Redeemer	23,853	44,722	2	41,734	79
Holy Rosary	35,715	70,908	3	47,877	90
Holy Spirit	34,100	183,808	8	82,043	155
Immaculate Conception	55,079	403,046	17	40,171	76
Immaculate Heart of Mary	28,718	91,525	4	31,300	59
James Cardinal McGuigan	139,446	1,124,785	48	110,636	209
James Culnan	67,985	297,262	13	74,909	141
Jean Vanier	126,390	719,549	31	105,748	200
Josyf Cardinal Slipyj	42,819	383,818	17	75,718	143
Loretto Abbey	82,042	1,178,547	51	488,875	923
Loretto College	78,447	795,817	34	96,218	182
Madonna	78,426	357,667	15	86,465	163
Marshall McLuhan	146,002	1,368,158	59	114,596	216
Mary Ward	170,522	1,587,634	68	169,139	319
Michael Power/St Joseph	219,745	2,278,771	98	158,035	298
Mother Cabrini	28,815	101,849	4	10,187	19
Msgr Fraser - Annex & Orientation	33,562	124,168	5	74,803	141
Msgr Fraser - Isabella	25,640	90,298	4	45,875	87
Msgr Fraser - Midland	32,097	542,874	23	142,817	270
Msgr Fraser - Midland North	35,747	404,873	17	-	-
Msgr Fraser - Norfinch	106,745	497,128	21	85,008	160
Msgr Fraser - O L of Mt Carmel	29,246	93,983	4	74,169	140
Msgr Fraser - St Martin	30,634	76,886	3	52,156	98
Msgr John Corrigan	32,249	294,577	13	40,606	77
Msgr Percy Johnson	140,426	1,269,433	55	129,844	245
Nativity of Our Lord	30,300	165,433	7	61,048	115
Neil McNeil	130,975	432,758	19	135,397	256
Notre Dame	68,512	212,145	9	90,647	171
O L of Fatima	65,531	806,519	35	83,605	158
O L of Grace	29,396	205,140	9	40,100	76
O L of Guadalupe	23,487	158,288	7	54,731	103
O L of Lourdes	69,104	1,102,054	47	48,923	92
O L of Peace	33,723	245,053	11	69,311	131
O L of Perpetual Help	29,988	87,681	4	60,234	114
O L of Sorrows	61,340	744,321	32	109,923	208
O L of the Assumption	18,600	256,131	11	38,645	73
O L of Victory	67,619	702,760	30	65,039	123

Facility name	Area, sf	2017-2018 Electricity use, kWh	Electricity GHG emissions, tonnes CO2e	2017-2018 Gas use, m3	Gas GHG emissions, tonnes CO2e
O L of Wisdom	25,446	124,567	5	59,776	113
Pope Francis	54,196	276,525	12	48,157	91
Precious Blood	40,892	115,551	5	62,983	119
Prince of Peace	38,890	228,332	10	38,695	73
Regina Mundi	45,639	268,914	12	53,478	101
Sacred Heart	41,204	257,362	11	46,046	87
Santa Maria	27,706	135,105	6	29,414	56
Senator O'Connor	130,975	1,987,077	85	126,640	239
Senhor Santo Cristo	53,916	9,572	0	5,511	10
St Agatha	21,119	220,594	9	45,144	85
St Agnes	22,819	233,015	10	71,940	136
St Aidan	35,553	229,178	10	79,104	149
St Albert	26,673	326,393	14	65,757	124
St Alphonsus	48,674	166,342	7	80,156	151
St Ambrose	41,866	265,426	11	34,823	66
St Andre	50,213	279,024	12	24,724	47
St Andrew	54,508	373,262	16	67,473	127
St Angela	68,867	476,561	20	113,195	214
St Anselm	29,289	155,223	7	48,018	91
St Anthony	50,214	567,182	24	60,077	113
St Antoine Daniel	22,701	183,623	8	48,811	92
St Augustine	36,630	210,057	9	90,471	171
St Barbara	34,627	110,118	5	47,534	90
St Barnabas	38,847	235,766	10	77,386	146
St Bartholomew	25,801	51,881	2	33,979	64
St Basil-The-Great	167,831	1,919,108	83	191,540	362
St Bede	42,098	250,755	11	34,125	64
St Benedict	56,069	225,769	10	70,858	134
St Bernard	36,726	234,202	10	59,648	113
St Bonaventure	32,130	260,279	11	95,425	180
St Boniface	29,601	179,960	8	35,858	68
St Brendan	49,245	395,048	17	66,876	126
St Brigid	64,347	205,525	9	103,100	195
St Bruno	45,058	263,991	11	41,697	79
St Catherine	19,343	56,837	2	41,495	78
St Cecilia	69,965	139,857	6	54,953	104
St Charles	38,147	94,937	4	49,886	94
St Charles Garnier	37,501	212,238	9	77,180	146
St Clare	65,326	164,724	7	104,021	196
St Clement	27,448	227,473	10	31,490	59
St Columba	36,414	136,839	6	77,356	146
St Conrad	36,414	442,184	19	64,844	122

Facility name	Area, sf	2017-2018 Electricity use, kWh	Electricity GHG emissions, tonnes CO2e	2017-2018 Gas use, m3	Gas GHG emissions, tonnes CO2e
St Cyril	26,781	123,112	5	36,829	70
St Demetrius	34,466	-	-	32,472	61
St Denis	23,993	86,176	4	25,863	49
St Dominic Savio	41,064	402,444	17	67,788	128
St Dorothy	41,064	551,289	24	56,182	106
St Dunstan	41,064	78,634	3	43,880	83
St Edmund Campion	23,853	130,923	6	42,118	80
St Edward	40,175	503,451	22	56,836	107
St Elizabeth	17,427	129,247	6	30,621	58
St Elizabeth Seton	37,512	246,075	11	33,289	63
St Eugene	22,357	203,847	9	65,246	123
St Fidelis	38,621	267,002	11	24,388	46
St Florence	29,396	193,875	8	39,780	75
St Francis Assisi	41,769	116,737	5	41,787	79
St Francis de Sales	62,915	360,625	16	53,580	101
St Francis Xavier	47,027	182,309	8	53,509	101
St Gabriel	39,460	257,518	11	65,283	123
St Gabriel Lalemant	24,843	525,952	23	-	-
St Gerald	37,125	292,825	13	88,129	166
St Gerard Majella	29,967	-	-	-	-
St Gregory	72,237	551,756	24	99,849	189
St Helen	86,337	453,529	20	71,173	134
St Henry	28,707	152,091	7	43,816	83
St Ignatius of Loyola	31,000	301,544	13	70,481	133
St Isaac Jogues	27,932	100,156	4	38,642	73
St James	27,060	99,577	4	36,280	68
St Jane Frances	53,766	764,325	33	73,808	139
St Jean De Brebeuf	23,293	429,666	18	-	-
St Jerome	38,470	134,277	6	47,771	90
St Joachim	26,651	176,789	8	41,672	79
St John (Toronto)	64,713	186,685	8	82,352	155
St John Bosco	34,488	85,478	4	49,525	94
St John Paul II	141,373	1,730,577	74	162,026	306
St John The Evangelist	26,375	2,202	0	-	-
St John Vianney	37,405	159,136	7	71,712	135
St John XXIII	41,484	200,175	9	58,963	111
St Joseph	38,050	136,551	6	61,456	116
St Joseph College	84,787	418,819	18	132,630	250
St Jude	58,373	205,582	9	64,427	122
St Kateri Tekakwitha	26,619	219,609	9	47,553	90
St Kevin	20,355	100,300	4	24,718	47
St Lawrence	35,306	136,878	6	47,605	90

Facility name	Area, sf	2017-2018 Electricity use, kWh	Electricity GHG emissions, tonnes CO2e	2017-2018 Gas use, m3	Gas GHG emissions, tonnes CO2e
St Leo	50,192	194,339	8	66,271	125
St Louis	30,236	176,230	8	39,458	74
St Malachy	24,972	138,727	6	58,838	111
St Marcellus	38,815	302,161	13	65,687	124
St Margaret	35,273	158,532	7	53,162	100
St Margaret - Beatrice Campus	121,980	1,250,815	54	293,390	554
St Marguerite Bourgeoys	27,243	72,337	3	44,169	83
St Maria Goretti	72,430	808,688	35	53,450	101
St Mark	23,810	274,821	12	32,120	61
St Martha	30,591	150,551	6	60,293	114
St Martin de Porres	30,430	158,230	7	43,757	83
St Mary	63,259	222,875	10	75,054	142
St Mary Catholic Academy	100,083	968,160	42	213,341	403
St Mary of the Angels	45,951	134,423	6	63,352	120
St Matthew	41,366	256,866	11	106,293	201
St Matthias	23,853	156,159	7	54,423	103
St Maurice	42,399	127,537	5	74,670	141
St Michael Choir (Sr)	69,859	728,488	31	63,712	120
St Monica	32,109	132,768	6	54,229	102
St Mother Teresa	142,794	1,589,674	68	171,853	324
St Nicholas	41,298	279,460	12	30,329	57
St Nicholas of Bari	46,489	719,227	31	54,730	103
St Norbert	24,163	125,978	5	34,065	64
St Oscar Romero	157,045	1,402,989	60	218,008	412
St Paschal Baylon	29,160	607,234	26	99,269	187
St Patrick Secondary	210,444	1,803,609	78	278,609	526
St Paul	41,996	113,816	5	47,159	89
St Paul VI	44,702	180,421	8	47,779	90
St Philip Neri	47,297	176,311	8	62,551	118
St Pius X	29,461	253,996	11	51,903	98
St Raphael	33,110	162,238	7	36,236	68
St Raymond	Closed facility		-		-
St Rene Goupil	31,022	230,368	10	21,153	40
St Richard	41,968	152,098	7	49,124	93
St Rita	41,846	102,703	4	68,218	129
St Robert	53,400	532,235	23	30,751	58
St Roch	43,357	195,109	8	71,553	135
St Rose Of Lima	63,033	232,992	10	43,108	81
St Simon	63,033	483,535	21	107,648	203
St Stephen	40,774	185,089	8	67,398	127
St Sylvester	40,774	197,800	9	14,770	28
St Teresa	41,732	107,245	5	57,414	108

Facility name	Area, sf	2017-2018 Electricity use, kWh	Electricity GHG emissions, tonnes CO2e	2017-2018 Gas use, m3	Gas GHG emissions, tonnes CO2e
St Theresa Shrine	41,732	176,166	8	48,529	92
St Thomas Aquinas	66,252	201,405	9	138,186	261
St Thomas More	23,810	182,908	8	54,119	102
St Timothy	58,276	684,577	29	64,283	121
St Ursula	18,314	132,224	6	27,678	52
St Victor	22,712	184,147	8	65,460	124
St Vincent de Paul	49,848	126,777	5	82,290	155
St Wilfrid	55,434	226,718	10	65,158	123
Sts Cosmas and Damian	24,606	228,686	10	47,347	89
The Divine Infant	37,512	274,839	12	68,167	129
Transfiguration	35,930	103,955	4	48,850	92
Venerable John Merlini	42,862	141,017	6	52,783	100
West facilities	15,844	49	0	2	0

8 APPENDIX B LIST OF ENERGY CONSERVATION MEASURES IMPLEMENTED IN 2014-2018

Degree-days	School year	
Toronto Intl Airport weather station	**2012-2013**	**2017-2018**
Heating degree-days (15 deg C)	2,849.5	2,997.1
Cooling degree-days (10 deg C)	1,432.6	1,722.0

Facility name	Facility status	Completed ECM 1	Completed ECM 2	Completed ECM 3	Completed ECM 4	2012-2013 Electricity intensity, kWh/sf	2017-2018 Electricity intensity, kWh/sf	Change in electricity intensity	2012-2013 Gas intensity, ekWh/sf	2017-2018 Gas intensity, ekWh/sf	Change in gas intensity	# of Portables, 2012-2013	# of Portables, 2017-2018
All Saints						8.27	10.01	21%	8.43	8.63	2%	6	6
Annunciation						4.11	2.82	-31%	14.65	17.69	21%	2	0
Bishop Allen Academy		Cooling system upgrade Nov 2014	Sealed the leak in AHU 11 chilled water coil Jun 2015	Lighting (gym Nov 2016; additional Jul 2017; 4 classrooms LED Mar 2018)	Voltage Harmonizer - 2017	9.58	12.92	35%	12.72	14.83	17%	20	24
Bishop Marrocco/Thomas Merton		Lighting (gym Jul 2016; additional Jan 2017)	Voltage Harmonizer Mar 2017	AHU 10 Cooling coil replacement Mar 2014		8.35	10.79	29%	12.69	17.28	36%	0	0
Blessed Cardinal Newman							10.57			41.93			20
Blessed Margherita						5.12	3.46	-33%	17.86	13.30	-26%	0	0
Blessed Pier Giorgio Frassati	New school - 2013					3.21	6.43		3.04	7.60		0	0
Blessed Sacrament		Roof Replacement Jun 2018				4.47	3.60	-19%	10.15	16.84	66%	0	0
Blessed Trinity	Students from St Teresa moved to Blessed Trinity in Sept 2017	Replace Boiler, Terminal Equipment, pumps update BAS Jun 2018				5.26	4.58	-13%	15.25	24.74	62%	0	0
Brebeuf						12.36	9.93	-20%	10.71	10.73	0%	0	0
Canadian Martyrs		Retrofit Boilers, add BAS, replace heat valves Mar 2014	Lighting and controls upgrades Oct 2017			9.34	7.24	-22%	38.38	18.50	-52%	0	0
Cardinal Carter Academy		Replace Boiler, Cooling tower, add BAS Jul 2015	Voltage Harmonizer Mar 2017			15.78	11.04	-30%	15.66	13.58	-13%	0	0
Cardinal Leger		Retrofit Boilers, add BAS, replace heat valves Oct 2014				12.88	8.40	-35%	13.87	7.87	-43%	0	0

Facility name	Facility status	Completed ECM 1	Completed ECM 2	Completed ECM 3	Completed ECM 4	2012-2013 Electricity intensity, kWh/sf	2017-2018 Electricity intensity, kWh/sf	Change in electricity intensity	2012-2013 Gas intensity, ekWh/sf	2017-2018 Gas intensity, ekWh/sf	Change in gas intensity	# of Portables, 2012-2013	# of Portables, 2017-2018
Catholic Education Centre		Voltage Harmonizer Mar 2017	Replacing 250T chiller with 250T (input 146 kW) magnetic bearing chiller Daikin WMC048DD Nov 2017	Replace T8 lighting with LED Jul 2017	Replaced boilers, cooling Tower, replaced BAS, lighting control, commissioning and air balancing, replace underground parking exhaust fans May 2017	24.30	18.55	-24%	14.97	11.72	-22%	0	0
Chaminade College		Full Roof Replacement Aug 2017				5.97	6.01	1%	16.37	14.07	-14%	5	5
Christ The King						4.38	3.58	-18%	16.76	15.75	-6%	0	0
Dante Alighieri						7.83	8.89	13%	15.56	15.48	-1%	20	20
D'Arcy McGee						4.89	4.88	0%	10.13	15.37	52%	0	0
Don Bosco	CLOSED					11.48	5.34		9.75	13.96		0	0
East Facilities		LED Lighting installation Jan 2017	Boiler replacement & BAS upgrade Jan 2018			6.86	6.48	-6%	19.50	18.76	-4%		
Epiphany of Our Lord Academy		Boilers, terminal equipment and BAS Jul 2017				4.44	3.74	-16%	19.67	21.96	12%	0	0
Father Serra						9.05	7.95	-12%	38.90	21.36	-45%	0	1
Fr Henry Carr		Replaced 4 AC compressors & condenser coil Jul 2017				9.24	11.14	20%	17.94	19.03	6%	0	0
Fr John Redmond		Renewable /Solar PV 180 kW Dec 2016	Voltage Harmonizer Aug 2016	Chiller Replacement Jun 2018		8.67	6.96	-20%	10.85	8.23	-24%	0	0
Francis Libermann		Replaced Lighting Equipment and Exterior Lighting Oct 2016	Replace existing 200T McQuay chiller Aug 2018			14.13	12.99	-8%	15.76	16.36	4%	6	8
Holy Angels						5.71	8.57	50%	18.40	17.41	-5%	0	9
Holy Cross						4.57	3.41	-25%	12.57	14.41	15%	0	0

Facility name	Facility status	Completed ECM 1	Completed ECM 2	Completed ECM 3	Completed ECM 4	2012-2013 Electricity intensity, kWh/sf	2017-2018 Electricity intensity, kWh/sf	Change in electricity intensity	2012-2013 Gas intensity, ekWh/sf	2017-2018 Gas intensity, ekWh/sf	Change in gas intensity	# of Portables, 2012-2013	# of Portables, 2017-2018
Holy Family						5.06	4.59	-9%	10.56	11.49	9%	0	0
Holy Name						3.31	3.54	7%	7.77	10.36	33%	0	0
Holy Redeemer	CLOSED					3.49	1.87		13.26	19.39		0	0
Holy Rosary						2.09	1.99	-5%	12.63	14.22	13%	0	0
Holy Spirit		Replace Boiler, pumps and add BAS Jun 2017				6.22	5.39	-13%	19.42	22.76	17%	6	4
Immaculate Conception						8.61	7.32	-15%	7.03	7.70	10%	0	0
Immaculate Heart of Mary						2.91	3.19	10%	12.99	11.82	-9%	0	0
James Cardinal McGuigan		Cafeteria Lights Jul 2017	Voltage Harmonizer Mar 2017			11.14	8.07	-28%	11.82	8.37	-29%	0	0
James Culnan						4.61	4.37	-5%	13.76	11.60	-16%	0	0
Jean Vanier		Replace Gym Cafe lighting Oct 2016	Roof Top Solar PV System Dec 2017			7.10	5.69	-20%	13.59	8.75	-36%	3	3
Josyf Cardinal Slipyj						11.24	8.96	-20%	21.93	19.02	-13%	5	5
Loretto Abbey		Lighting replacement in staff offices and corridors on 3rd and 4th floors Dec 2015	Lighting and controls upgrades Jul 2017	Phase 1 of heating retrofit from Steam to Hydronic system - 2019		15.79	14.37	-9%	61.54	64.55	5%	0	0
Loretto College						5.70	10.14	78%	1.48	13.04	783%	0	0
Madonna		Retrofit 2 Boiler 794M BTU/hr heating upgrade Jul 2015				4.09	4.56	11%	11.58	11.65	1%	0	0
Marshall McLuhan		Voltage Harmonizer Mar 2017				12.66	9.37	-26%	13.07	8.16	-38%	0	0
Mary Ward		Boiler, controls replacement Mar 2014	Replace Cooling Coil in Library Jun 2015	Roof Replacement Apr 2018	Perimeter and Parking Lot Lighting Apr 2018	9.47	9.31	-2%	11.23	11.02	-2%	0	0
Michael Power/St Joseph		Replaced heating and cooling coils in AHU 8 Oct 2015	Lighting and controls upgrades Jan 2017	Voltage Harmonizer Mar 2017		11.90	10.37	-13%	10.52	7.65	-27%	6	6
Mother Cabrini		Replace windows and doors May 2017				4.72	3.53	-25%	10.40	4.09	-61%	2	1
Msgr Fraser - Annex & Orientation						5.58	3.70	-34%	18.29	23.69	30%	0	0
Msgr Fraser - Isabella						9.00	3.52	-61%	13.89	19.36	39%	7	0
Msgr Fraser - Midland		Full Roof Replacement Jul 2014	Lighting and controls upgrades - 2018			5.69	16.91	197%	18.79	33.67	79%	0	6
Msgr Fraser - Midland North						10.35	11.33	9%	0.00	0.00		0	0
Msgr Fraser - Norfinch						6.78	4.66	-31%	9.75	7.45	-24%	27	11

Facility name	Facility status	Completed ECM 1	Completed ECM 2	Completed ECM 3	Completed ECM 4	2012-2013 Electricity intensity, kWh/sf	2017-2018 Electricity intensity, kWh/sf	Change in electricity intensity	2012-2013 Gas intensity, ekWh/sf	2017-2018 Gas intensity, ekWh/sf	Change in gas intensity	# of Portables, 2012-2013	# of Portables, 2017-2018
Msgr Fraser - O L of Mt Carmel						6.59	3.21	-51%	20.13	23.04	14%	0	6
Msgr Fraser - St Martin						2.35	2.51	7%	24.79	16.37	-34%		0
Msgr John Corrigan		Replacement of 8 Unit Ventilators in Classrooms# 109, 110, 111, 112, 113, 114, 115, and 117 Jun 2017				8.29	9.13	10%	11.30	13.85	23%	0	0
Msgr Percy Johnson		Voltage Harmonizer Mar 2018	Renewable/Solar PV Oct 2018			8.47	9.04	7%	12.95	10.01	-23%	0	0
Nativity of Our Lord						6.82	5.46	-20%	12.97	20.95	62%	4	0
Neil McNeil						2.72	3.30	21%	7.81	10.04	28%	6	6
Notre Dame						3.51	3.10	-12%	12.26	14.49	18%	0	0
O L of Fatima						12.37	12.31	-1%	16.57	13.89	-16%	2	4
O L of Grace						6.34	6.98	10%	12.64	13.91	10%	2	2
O L of Guadalupe						6.85	6.74	-2%	24.06	25.02	4%	2	2
O L of Lourdes						13.69	15.95	16%	13.31	8.32	-37%	0	0
O L of Peace		Replace full roof Jun 2014				4.74	7.27	53%	9.28	22.61	144%	3	2
O L of Perpetual Help						3.23	2.92	-10%	17.01	24.55	44%	0	0
O L of Sorrows						9.96	12.13	22%	10.44	19.14	83%	6	8
O L of the Assumption						10.13	13.77	36%	17.12	21.89	28%	10	10
O L of Victory						9.12	10.39	14%	6.37	9.79	54%	0	0
O L of Wisdom						6.05	4.90	-19%	16.44	25.45	55%	7	2
Pope Francis	Senhor Santo Cristo was moved to St. Luke. New school is named Pope Francis - 2016					5.10	5.10	0%	11.10	9.54	-14%		0
Precious Blood						2.73	2.83	4%	14.43	16.98	18%	0	0
Prince of Peace						6.49	5.87	-9%	10.61	10.70	1%	1	0
Regina Mundi						6.50	5.89	-9%	11.89	12.76	7%	2	3
Sacred Heart		Replaced old boiler plant (2 boiler 1474MBH), terminal and install BAS in whole building July 2015				7.75	6.25	-19%	15.53	12.24	-21%	0	0
Santa Maria		Boilers, DHW tanks, terminal equipment and full BAS replacement Jun 2018				4.84	4.88	1%	10.97	9.07	-17%	0	0
Senator O`Connor		Upgrade York chiller refrigeration monitoring system, replace internal components, return chiller to full charge Feb 2017	Lighting and controls upgrades - 18 Jan 2017	Renewable/Solar PV - 18 Mar 2018	Voltage Harmonizer - 18 Mar 2018	13.06	15.17	16%	11.64	8.85	-24%	0	12

Facility name	Facility status	Completed ECM 1	Completed ECM 2	Completed ECM 3	Completed ECM 4	2012-2013 Electricity intensity, kWh/sf	2017-2018 Electricity intensity, kWh/sf	Change in electricity intensity	2012-2013 Gas intensity, ekWh/sf	2017-2018 Gas intensity, ekWh/sf	Change in gas intensity	# of Portables, 2012-2013	# of Portables, 2017-2018
Senhor Santo Cristo	CLOSED					3.18	0.18		21.50	1.69		0	0
St Agatha						11.34	10.45	-8%	23.37	23.32	0%	2	2
St Agnes		Replace Boiler, Terminal Equipment, pumps update BAS Jun 2018	Replace RTU, CI rads, DHW Tank, upgrade BAS Oct 2018			8.55	10.21	19%	25.14	35.20	40%	4	4
St Aidan		Boiler, heating pipe and rad replacement Mar 2018	Replace Boiler Mix Air units, CI rads, DHW Tank, upgrade BAS Jun 2018			5.33	6.45	21%	13.07	24.21	85%	0	0
St Albert						9.13	12.24	34%	25.53	26.20	3%	0	0
St Alphonsus		Boiler, Heat exchanger, Terminal equipment and BAS replacement Jun 2017				3.51	3.42	-3%	15.59	17.62	13%	0	0
St Ambrose	New school - 2013					4.01	6.34		15.77	8.93		0	0
St Andre	New school - 2014						5.56			5.33			0
St Andrew		Retrofit Boilers, add BAS , replace heat valves Oct 2014				6.36	6.85	8%	19.92	13.49	-32%	7	9
St Angela		Replace Boiler, Terminal Equipment, pumps update BAS Jun 2018	Replace Boiler, Exhaust fans, CI rads, DHW Tank, upgrade BAS - 18 Jun 2018			6.00	6.92	15%	21.55	17.63	-18%	0	0
St Anselm						5.47	5.30	-3%	14.50	17.84	23%	0	0
St Anthony		Upgrading and recharging refrigerant in Daikin Chiller Jul 2015				9.15	11.30	23%	13.60	12.98	-5%	0	0
St Antoine Daniel						6.16	8.09	31%	16.68	22.88	37%	8	8
St Augustine						7.74	5.73	-26%	14.78	26.75	81%	10	3
St Barbara						3.27	3.18	-3%	12.31	15.03	22%	1	1
St Barnabas						6.52	6.07	-7%	23.76	21.30	-10%	0	0
St Bartholomew		Retrofit boilers, add BAS, replace heat valves Apr 2014				1.77	2.01	14%	14.55	14.12	-3%	0	0
St Basil-The-Great		Lighting and controls upgrades Jan 2017	Renewable/Solar PV Mar 2018	Voltage Harmonizer -Mar 2018	Replace Chiller, Cooling Tower, pumps update BAS Sep 2018	9.26	11.43	23%	12.22	12.11	-1%	0	0
St Bede		Replace exterior perimeter lighting Oct 2015				7.37	5.96	-19%	6.48	8.94	38%	0	0
St Benedict		Boilers, terminal equipment, BAS Jul 2017				3.83	4.03	5%	14.32	12.09	-16%	4	4
St Bernard						6.59	6.38	-3%	15.16	17.39	15%	0	0
St Bonaventure						5.85	8.10	38%	22.41	33.81	51%	0	3

Facility name	Facility status	Completed ECM 1	Completed ECM 2	Completed ECM 3	Completed ECM 4	2012-2013 Electricity intensity, kWh/sf	2017-2018 Electricity intensity, kWh/sf	Change in electricity intensity	2012-2013 Gas intensity, ekWh/sf	2017-2018 Gas intensity, ekWh/sf	Change in gas intensity	# of Portables, 2012-2013	# of Portables, 2017-2018
St Boniface						6.39	6.08	-5%	11.94	13.18	10%	7	3
St Brendan						4.92	8.02	63%	11.31	14.87	32%	3	2
St Brigid		Replace boiler, terminal equipment, pumps, update BAS Jun 2018				2.82	3.19	13%	3.76	17.27	359%	0	0
St Bruno	St. Raymond students are relocated to St. Bruno					5.98	0.00		14.86	0.00		0	0
St Catherine		Heating system upgrade Jun 2018				5.09	2.94	-42%	27.33	24.22	-11%	0	0
St Cecilia						2.21	2.00	-10%	8.37	8.37	0%	0	0
St Charles						2.58	2.49	-4%	13.86	14.18	2%	0	0
St Charles Garnier						6.05	5.66	-6%	18.97	22.26	17%	0	0
St Clare		Replace boiler, terminal equipment, pumps, update BAS Jun 2018				2.67	2.52	-5%	18.55	17.46	-6%	0	0
St Clement						7.57	8.29	10%	16.04	12.32	-23%	6	0
St Columba						4.41	3.76	-15%	22.99	23.28	1%	0	0
St Conrad						11.55	12.14	5%	0.00	19.21		0	0
St Cyril		Replaced full roof (part eco roof) Jun 2017	Replace boiler, terminal equipment, pumps update BAS -20 Jun 2018	Sun control window film - 15 Aug 2015		5.05	4.60	-9%	10.17	14.84	46%	5	3
St Demetrius		Full Roof Replacement Jul 2014	Retrofit 2 Boiler 872 MBH (each) Jul 2015	Lighting Control and upgrades Oct 2018		0.00	0.00		29.43	10.09		0	0
St Denis						3.27	3.59	10%	10.19	11.52	13%	0	0
St Dominic Savio						10.21	9.80	-4%	12.92	17.21	33%	0	0
St Dorothy						12.94	13.43	4%	16.29	14.95	-8%	0	0
St Dunstan						2.32	1.91	-18%	10.68	10.13	-5%		0
St Edmund Campion						7.77	5.49	-29%	18.60	18.52	0%	5	2
St Edward	New school - 2013					2.60	12.53		0.00	15.04		4	2
St Elizabeth		Retrofit boiler and domestic hot water tank Jul 2014				15.37	7.42	-52%	19.52	16.35	-16%	4	4
St Elizabeth Seton						7.14	6.56	-8%	9.03	9.68	7%	0	0
St Eugene						6.99	9.12	30%	20.02	31.27	56%	6	0
St Fidelis						7.39	6.91	-6%	16.08	6.84	-57%	6	6
St Florence						6.96	6.60	-5%	16.00	14.97	-6%	0	0
St Francis Assisi						4.69	2.79	-40%	12.60	10.78	-14%	0	0
St Francis de Sales						5.67	5.73	1%	8.61	9.08	5%	0	0

Facility name	Facility status	Completed ECM 1	Completed ECM 2	Completed ECM 3	Completed ECM 4	2012-2013 Electricity intensity, kWh/sf	2017-2018 Electricity intensity, kWh/sf	Change in electricity intensity	2012-2013 Gas intensity, ekWh/sf	2017-2018 Gas intensity, ekWh/sf	Change in gas intensity	# of Portables, 2012-2013	# of Portables, 2017-2018
St Francis Xavier						3.46	3.88	12%	13.46	12.31	-9%	2	4
St Gabriel		Heating system upgrade Mar 2018	Boiler, rads, pump, DHW, exhaust fans Mar 2018			3.74	6.53	74%	13.01	17.98	38%	1	1
St Gabriel Lalemant	*All-electric*					18.26	21.17	16%	0.00	0.00		4	3
St Gerald		Replaced exterior lights Dec 2015				7.37	7.89	7%	15.31	26.15	71%	0	0
St Gerard Majella	CLOSED					2.99	0.00		22.21	0.00		0	0
St Gregory						6.67	7.64	15%	17.91	14.97	-16%	0	3
St Helen						0.13	5.25		8.90	8.82		0	0
St Henry						6.53	5.30	-19%	16.75	16.24	-3%	1	0
St Ignatius of Loyola						9.68	9.73	1%	21.20	23.99	13%	0	0
St Isaac Jogues						4.08	3.59	-12%	13.76	15.23	11%	1	0
St James						3.38	3.68	9%	25.33	12.47	-51%	0	0
St Jane Frances						13.48	14.22	5%	12.94	14.92	15%	5	0
St Jean De Brebeuf	*All-electric*					15.07	18.45	22%				3	1
St Jerome		Replace boiler, terminal equipment, pumps update BAS Mar 2018				3.34	3.49	5%	15.24	13.18	-14%	1	4
St Joachim						7.77	6.63	-15%	15.05	14.79	-2%	0	0
St John (Toronto)						2.90	2.88	-1%	13.18	13.87	5%	0	0
St John Bosco						2.92	2.48	-15%	12.52	15.53	24%	0	0
St John Paul II		Replace exterior lights Jan 2017	Voltage harmonizer Mar 2017	Replace the glycol heat exchanger, domestic hot water system and allied auxiliaries Jun 2018		14.73	12.24	-17%	8.86	12.73	44%	13	13
St John The Evangelist						2.01	0.08		8.79	0.00		9	0
St John Vianney						3.58	4.25	19%	14.44	20.77	44%	0	0
St John XXIII		Replacement of boilers, terminals equipment and BAS Jun 2017				4.34	4.83	11%	15.15	15.52	2%	0	0
St Joseph		Replace boiler, terminal equipment, pumps, update BAS May 2018				4.96	3.59	-28%	18.80	17.74	-6%	0	0
St Joseph College						5.46	4.94		0.00	17.25		0	0
St Jude						4.51	3.52	-22%	14.76	11.87	-20%	0	0
St Kateri Tekakwitha						6.00	8.25	37%	58.94	19.30	-67%	1	2
St Kevin						5.70	4.93	-14%	8.62	12.71	48%	3	1
St Lawrence						3.73	3.88	4%	10.95	14.53	33%	3	3
St Leo						3.44	3.87	13%	16.65	14.37	-14%	0	0

Facility name	Facility status	Completed ECM 1	Completed ECM 2	Completed ECM 3	Completed ECM 4	2012-2013 Electricity intensity, kWh/sf	2017-2018 Electricity intensity, kWh/sf	Change in electricity intensity	2012-2013 Gas intensity, ekWh/sf	2017-2018 Gas intensity, ekWh/sf	Change in gas intensity	# of Portables, 2012-2013	# of Portables, 2017-2018
St Louis		Retrofit Boilers, add BAS, replace heat valves Oct 2014				7.75	5.83	-25%	14.94	14.21	-5%	0	0
St Malachy						5.13	5.56	8%	18.25	25.81	41%	4	0
St Marcellus		Replaced full roof Oct 2015				8.40	7.78	-7%	16.44	18.51	13%	4	2
St Margaret		Partial roof replacement Jun 2018				11.61	4.49	-61%	13.32	16.48	24%	12	2
St Margaret - Beatrice Campus						12.26	13.11	7%	30.45	31.18	2%	0	0
St Marguerite Bourgeoys						3.10	2.66	-14%	14.32	17.66	23%	0	0
St Maria Goretti						11.48	11.17	-3%	8.32	6.90	-17%	9	7
St Mark		Lighting control and upgrades Jul 2018				13.01	11.54	-11%	16.68	14.73	-12%	0	0
St Martha						5.86	4.92	-16%	23.46	20.87	-11%	0	0
St Martin de Porres		Retrofit 2 Boilers 672MBTU/hr Heating upgrade Jul 2015				5.87	5.20	-11%	14.46	15.63	8%	3	4
St Mary		Voltage harmonizer Mar 2017	Replace boiler, cooling tower, pumps, update BAS May 2018			3.33	3.52	6%	9.53	12.71	33%	0	0
St Mary Catholic Academy						10.29	9.67	-6%	14.39	22.60	57%	0	0
St Mary of the Angels						3.15	2.93	-7%	16.59	14.86	-10%	0	0
St Matthew						4.81	6.21	29%	23.41	28.24	21%	2	2
St Matthias	Closing Holy Redeemer and consolidating students into St Matthias - 2017					3.75	6.55		22.67	24.79		0	4
St Maurice		Replacement of boilers, DHW tanks, terminal equipment and full BAS Jun 2017				3.70	3.01	-19%	18.34	19.61	7%	0	0
St Michael Choir (Sr)		GYM RTU replacement Feb 2015	Replace Boiler and pumps Oct 2016			8.51	10.43	23%	17.47	10.02	-43%	0	0
St Monica						3.14	4.13	32%	17.49	18.45	5%	0	0
St Mother Teresa		Lighting and controls upgrades Jan 2017	Voltage Harmonizer Mar 2017			12.68	11.13	-12%	11.10	11.68	5%	0	0
St Nicholas	New school - 2013					5.33	6.77		9.32	7.97		0	0
St Nicholas of Bari		Full roof replacement Jul 2017	Replace all windows and doors Jul 2018			13.57	15.47	14%	13.59	12.46	-8%	0	0
St Norbert		Lighting and controls upgrades Jan 2017				5.25	5.21	-1%	15.56	15.32	-2%	2	2
St Oscar Romero		Window remediation May 2015	Boiler retrofit Oct 2015	Roof Replacement Jul 2018		8.61	8.93	4%	15.24	15.16	-1%	0	0
St Paschal Baylon	Addition in 2018					10.73	20.82	94%	13.03	36.08	177%	16	0

Facility name	Facility status	Completed ECM 1	Completed ECM 2	Completed ECM 3	Completed ECM 4	2012-2013 Electricity intensity, kWh/sf	2017-2018 Electricity intensity, kWh/sf	Change in electricity intensity	2012-2013 Gas intensity, ekWh/sf	2017-2018 Gas intensity, ekWh/sf	Change in gas intensity	# of Portables, 2012-2013	# of Portables, 2017-2018
St Patrick Secondary		Voltage harmonizer Mar 2017	Lighting and controls upgrades Jan 2017			6.64	8.57	29%	10.50	14.24	36%	0	0
St Paul		Retrofit Boilers, add BAS, replace heat valves Oct 2014				3.48	2.71	-22%	13.83	12.29	-11%	0	0
St Paul VI						4.33	4.04	-7%	10.91	11.62	7%	0	0
St Philip Neri	CLOSED					4.30	3.73		13.11	13.76		0	0
St Pius X						8.72	8.62	-1%	18.22	18.88	4%	0	0
St Raphael						6.37	4.90	-23%	12.47	11.63	-7%	8	5
St Raymond	CLOSED					2.94			12.06			0	0
St Rene Goupil						6.02	7.43	23%	7.47	7.43	-1%	0	0
St Richard						4.67	3.62	-22%	13.22	12.69	-4%	0	0
St Rita						2.72	2.45	-10%	10.62	17.86	68%	0	0
St Robert						10.16	9.97	-2%	8.36	6.21	-26%	2	3
St Roch		Controller boiler plant Nov 2016				4.69	4.50	-4%	10.30	17.96	74%	2	1
St Rose Of Lima						3.25	3.70	14%	5.82	7.49	29%	4	4
St Simon						5.29	7.67	45%	2.11	15.11	614%	6	0
St Stephen		Replace all three interior stairwell and all exterior doors May 2017				4.31	4.54	5%	17.42	15.17	-13%	0	0
St Sylvester						4.54	4.85	7%	4.70	3.20	-32%	1	2
St Teresa	CLOSED					2.55	2.57	1%	12.90	12.71	-1%	0	0
St Theresa Shrine						3.33	4.22	27%	10.27	10.92	6%	0	0
St Thomas Aquinas		Heating system upgrade Jun 2018				2.88	3.04	6%	15.56	19.50	25%	0	0
St Thomas More						8.62	7.68	-11%	17.27	22.66	31%	0	0
St Timothy						7.35	11.75	60%	7.06	10.21	45%	2	2
St Ursula						9.06	7.22	-20%	14.24	13.93	-2%	4	2
St Victor		Replacement of boilers, terminal equipment, BAS in original part of school Jul 2018				7.03	8.11	15%	25.97	27.00	4%	6	0
St Vincent de Paul						1.95	2.54	31%	21.81	15.20	-30%	0	0
St Wilfrid						4.81	4.09	-15%	12.32	11.21	-9%	0	1
Sts Cosmas and Damian						9.45	9.29	-2%	22.72	20.67	-9%	2	2
The Divine Infant		Windows and doors replacement Jul 2015	Replace full roof Jul 2016			5.52	7.33	33%	10.38	17.89	72%	0	0
Transfiguration		Replace full roof Jul 2016				5.59	2.89	-48%	18.26	12.82	-30%	1	0

Facility name	Facility status	Completed ECM 1	Completed ECM 2	Completed ECM 3	Completed ECM 4	2012-2013 Electricity intensity, kWh/sf	2017-2018 Electricity intensity, kWh/sf	Change in electricity intensity	2012-2013 Gas intensity, ekWh/sf	2017-2018 Gas intensity, ekWh/sf	Change in gas intensity	# of Portables, 2012-2013	# of Portables, 2017-2018
Venerable John Merlini		Replacement of boilers (2 x794MBH) and controls, Installation of new roof top unit and new duct system Jul 2015				4.84	3.29	-32%	29.07	11.10	-62%	0	0
West facilities		LED lighting installation Jul 2017	Boiler replacement & BAS upgrade Jan 2018			4.14	0.00		12.83	0.00			

9 APPENDIX C ORGANIZATIONAL COMMITMENT AND OCCUPANT AWARENESS MEASURES IMPLEMENTED SINCE 2014

Measure	Description	Status/Progress since last ECDM plan				
		2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Active and Sustainable Transportation	https://www.tcdsb.org/ProgramsServices/BoardServices/studenttransportation/Documents/TCDSB%20Transportation%20Demand%20Management%20Plan.pdf	Board participation in Winter Walk Day, Bike to School Week, School Transportation Management Planning, School Transportation Planning through Planning Department		Board participation in Winter Walk Day, Bike to School Week, School Transportation Management Planning, School Transportation Planning through Planning Department. Installation of bicycle racks at school locations in conjunction with the City of Toronto. TCDSB creation of Active and Sustainable Transportation Charter.	Board participation in Winter Walk Day, Bike to School Week, School Transportation Management Planning, School Transportation Planning through Planning Department. Installation of bicycle racks at school locations in conjunction with the City of Toronto	
Earth Hour	The Board monitors the number of Schools participating in the Earth hour (switching lights off for one hour) through the TCDSB Earth Hour Challenge and Participation. The board created a poster for School Earth Hour challenge published on the board website. Introduced a "Lights Out" sticker to be displayed near classroom light switches.	Earth Hour – 114 TCDSB locations participated this year	Earth Hour – 117 TCDSB locations participated this year	Earth Hour – 77 TCDSB locations participated this year	Earth Hour – 104 TCDSB locations participated this year	Earth Hour – 77 TCDSB locations participated this year
Earth Month Community Clean Up				St John Paul II, St Henry and St John were on City TV in their Clean Toronto Together Segment	Clean Toronto Together – 97 TCDSB locations participated with 32,107 staff and student participants. This information has also been posted to the Board website with all the areas they have cleaned.	Clean Toronto Together - 103 TCDSB locations participated with 33,227 participants. Mayor Tory visited Blessed Sacrament and participated in the events. This information has been posted to the Board website and through social media.

Measure	Description	Status/Progress since last ECDM plan				
		2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
EcoSchools		A total of 65 schools are certified EcoSchools at TCDSB in 2017-18, with the highest-ever number certifying at the top level, Platinum (9 schools). See chart following this table.				
Energy Month	National Sweater day, Flip The Switch, Phantom Friday, Energy Education day. Details are posted o the board website.					First year program ran at the Board
Environmental Committee	The Board 's Environmental Committee helps to maintain and promote the TCDSB as a community leader in environmental stewardship and sustainability. The committee supports and promotes increasing participation in the board's many energy conservation and environmental awareness initiatives.			Sharing Powerpoint presentation by Sharon Smith (Ontario Electronic Stewardship), sharing of utility statistics (2014/2015) by Facility, distribution of SaveONenergy guidelines on Equipment Disposal & decommissioning, water bottle initiative to reduce waste	Sharing of Powerpoint presentation on Energy Management in TCDSB, distribution of utility statistics 2015/16, launching the first Enbridge Energy Challenge program	Launching of Enbridge Energy Challenge for the second year in Nov 2018.
Environmental Teaching		Integrated into school curriculum under the Ministry of Education's Acting Today, Shaping Tomorrow initiative				
School Ground Greening		Integrated into renewal, capital projects. School-based activities are ongoing on a yearly basis				
TCDSB Tree Planting Program	Trees planted not including Capital or Renewal Projects	n/a	255	275	243	212
Waste Management		Waste Management is provided through the City of Toronto for Waste, Recycling and Organics Diversion. Various other items are recycled through vendor take back programs. Published www.tcdsb.org under Environmental Services				
Energy Procurement		Electricity and Gas purchases are done with the assistance of OECM/CSBSA advisory services using annual contracts.				
Annual energy consumption updates for all schools and TCDSB-owned facilities on the Board's website		Published annually on board website				

Measure	Description	Status/Progress since last ECDM plan				
		2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Real-time energy consumption monitors for schools				Toronto Hydro MV monitors 19 schools on their web portal	Toronto Hydro Powerlens monitors 19 schools on their web portal	Over fifty facilities are currently monitored by Eyedro real-time energy monitoring system. To be implemented at other sites.