ST. CLAIR CATHOLIC
DISTRICT SCHOOL BOARD
Lighting the Way ~ Rejoicing in Our Journey

Energy Conservation and Demand Management Plan
2019 to 2023

July 1, 2019

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Introduction

The Energy Conservation and Demand Management Plan fulfills the requirements under the Electricity Act, 1998, Ontario Regulation 507/18 to support the reduction of energy consumption and the five-year Demand Management Plan covering the St. Clair Catholic District School Board (SCCDSB) fiscal years 2019 to 2023.

The Plan highlights past and future opportunities to further this commitment to energy conservation,
energy reduction and green initiatives.

Education Sector Background

Funding and Energy Management Planning

All school boards receive 100% of their funding from the Ministry of Education.

The Ministry announces each Board's annual 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 received for each of the five years covered by their plan.

Asset Portfolios and Energy Management Planning

The education sector is unique in that a board's asset portfolio can experience substantial 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:

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 / Lifecycle
    - Type of technology
    - % Air conditioned space

- Site Use
    - Elementary / Secondary school
    - Administrative building
    - Maintenance / warehouse facility
    - Community hubs

Other Variables:

- Programs
    - Child care
    - Before / After School Programs
    - Summer School
    - Community Use

- Occupancy
    - Increase or decrease in number of students
    - Increase in the hours of operation
    - New programs being added to a site

- Air Conditioning
    - Increase in air-conditioned space in buildings
    - Increase in air-conditioned space in portables

PART I – A REVIEW OF PROGRESS AND ACHIEVEMENTS IN THE PAST FIVE YEARS

A. The Board's Asset Portfolio

The following table outlines the energy-related variables and metrics in the Board's asset portfolio that changed from the baseline Fiscal Year 2012 to 2013 to the end of the five-year reporting period Fiscal Year 2017 to 2018.

Key Metrics	(Baseline Year) Fiscal Year 2012 to 2013	Fiscal Year 2017 to 2018	Variance
Total Number of Buildings	**31**	**29**	**-2**
Total Number of Portables/Portapaks	**2**	**8**	**+6**
Total Floor Area	**1,255,087**	**1,187,034**	**-68,053**
Average Operating Hours	**4,420**	**4,760**	**+340**
Average Daily Enrolment	**8,485.00**	**8,639.16**	**+154.16**
Other Relevant Changes in the Operation of Assets:			
Community Use of School (hours)	**4,671.25**	**5,997.25**	**+1,326**
Dedicated Child Care Spaces (sq.ft.)	**28,798**	**44,901**	**+16,103**
% of Space with A/C	**74%**	**85%**	**+11%**

B. Energy Usage Data for the Board

The chart below lists the "metered"[1] consumption values in the common unit of ekWh and Kilowatt Hours (kWh).

Utility	Fiscal Year 2012 to 2013 (Baseline year)	Fiscal Year 2017 to 2018
Total Electricity (kWh)	*9,699,746*	*7,031,988*
Total Natural Gas (ekWh)	*9,898,775*	*9,698,820*

C. Weather Normalized Energy Consumption Values

In Ontario, 25% to 35% of energy consumption for a facility is affected by weather. To demonstrate the effect of weather, the following table shows the Weighted Average Heating Degree Days (HDD)[2] and Cooling Degree Days (CDD)[3] for the six most common Environment Canada weather stations in the Ontario education sector.

Ontario Degree Days	Fiscal Year					
	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
HDD	3698	4285	4091	3355	3583	3989
CDD	289	217	271	462	303	432

The best way to compare energy usage values from one year to another is to use weather normalized values as they take into consideration the impact of weather on energy performance and allows an "apple-to-apple" comparison of consumption across multiple years.

However, 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' features (refer to the Facility Variables listed on pages 5 and 6), and newly implemented programs (refer to the Note to Readers on pages 10-12) which will greatly impact energy consumption.

As a result, weather normalized Energy Intensity[4] is the most accurate measurement that allows the evaluation of a board's energy use from one year to another as it cancels out any change in floor area. The unit of measurement used is either equivalent kilowatt hours per square foot (ekWh/ft2) or equivalent kilowatt hours per square metre (ekWh/ft2).

1 Metered consumption is the quantity of energy used and does not include a loss adjustment value (the quantity of energy lost in transmission).
[2] 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.
[3] 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. The UCD only applies CDD to meters that demonstrate an increase in consumption due to air conditioning.
4 Energy Intensity (known as EI) is the quantity of total energy consumed divided by the total floor area. EI is typically expressed as equivalent kilowatt hours per square foot (ekWh/ft2), gigajoule per square metre (GJ /m2), etc., depending on the user's preference.

Weather Normalized Values (Selfridge ANGB)	Fiscal Year 2012 to 2013 (Baseline Year)	Fiscal Year 2017 to 2018 (Most Recent Data Available)	Variance
Total Energy Consumed (ekWh)	19,080,100	15,972,720	-3,107,380
Energy Intensity (eKWh/ft2)	15.20	13.46	-1.75
Energy Intensity (eKWh/m2)	163.64	144.84	-18.80

D. 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 charts compare the Energy Intensity Conservation Goal with the Actual Energy Intensity Reduced for each year.

Fiscal Year	Conservation Goal Metered Data		Actual Energy Savings Weather Normalized (Selfridge ANGB)	
	ekWh	%	ekWh	%
2013-14	-192,651	-1%	- 614,600	-3.22%
2014-15	-192,651	-1%	60,660	0.33%
2015-16	-192,651	-1%	- 1,089,388	-5.88%
2016-17	-192,651	-1%	- 737,960	-4.23%
2017-18	-192,651	-1%	- 726,096	-4.35%

NOTE TO READERS:
Conservation Goals were forecasted in Spring 2014 using Metered Data; Actual Savings presented above calculated using Weather Normalized Data on year over year basis.

Fiscal Year	Conservation Goal Metered Data			Actual Energy Savings Weather Normalized (Selfridge ANGB)		
	ekW/ft2	ekW/m2	%	ekW/ft2	ekW/m2	%
2013-14	15.05	162.00	-1%	14.40	154.98	-4.3%
2014-15	14.90	160.38	-1%	13.86	149.17	-6.9%
2015-16	14.75	158.78	-1%	13.92	149.82	-5.6%
2016-17	14.60	157.19	-1%	14.00	150.68	-4.1%
2017-18	14.46	155.62	-1%	13.46	144.84	-6.8%

NOTE TO READERS:
Conservation Goals were forecasted in Spring 2014. Since then, several 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 include:

Full Day Kindergarten (also known as 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.

Before and After School Programs

These programs were implemented to support the introduction of FDK spaces. Before and After School Programs require a facility's heating, ventilation, and air conditioning (HVAC) system to operate for an extended period daily, increasing overall energy intensity.

Community Use of Schools

The Ministry of Education provides funding to all school boards, so they can make school space more affordable for use after hours. Under this program 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 extended periods, increasing 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 increased use of these spaces, including during non-school hours requires a facility's HVAC system to operate for extended periods, increasing overall energy intensity.

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 (also known as 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.

Ministry of Education SB-10, 2017 – Energy Efficiency Requirements in the Building Code came into effect on January 1, 2017. This supplemental instruction increased building envelope insulation thickness for walls and roofs, impacted glass, mechanical and electrical. Energy conservation measures incorporated in designs:

- LED Lights
- Roof Insulation Upgraded to R50
- Wall Insulation Upgraded to R35
- High Efficiency Water Source Heat Pump in Each Classroom
- Condensing Domestic Hot Water Heater and Boiler with 96% Thermal Efficiency
- Improved Glazing

E. Cumulative Energy Conservation Goals

The chart below compares the 2014 Forecasted Cumulative Energy Intensity Conservation Goal with the Actual Cumulative Energy Intensity Reduced Savings.

Cumulative Energy Intensity	(ekWh/ft2)	(ekWh/m2)	Variance
Forecasted. Cumulative Energy Intensity Conservation Goal of Fiscal Year 2013 to 2014 through Fiscal Year 2017 to 2018	**-0.75**	**-8.02**	
Forecasted Cumulative Energy Intensity Conservation Goal as a Percentage			**-5.0%**
Actual Cumulative Energy Intensity Reduced or Increased from Fiscal Year 2013 to 2014 through Fiscal Year 2017 to 2018 – Weather Normalized	**-1.75**	**-18.80**	
Variance between 2014 Forecast Cumulative Conservation Goal and Actual Cumulative Energy Intensity– Weather Normalized	**-1.00**	**-10.78**	
% of Cumulative Energy Intensity Conservation Goal Achieved - Weather Normalized			**234%**

F. Measures Implemented from Fiscal Year 2012-13 to Fiscal Year 2017-18

A list of the measures implemented, the associated costs, and the fiscal year that the measure was implemented within the Board are outlined in *Appendix E: Investments in Energy Efficiency 2014-2018*:

- Total Investment in Design, Construction and Retrofit Strategies
- Total Investment in Operations and Maintenance Strategies
- Total Investment in Occupant Behaviour Strategies
- Total Investments

NOTE TO READERS:

IMPORTANT CONSIDERATION - 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.

PART II – ENERGY CONSERVATION and DEMAND MANAGEMENT PLAN for FISCAL YEAR 2018 to 2019 to FISCAL YEAR 2023 to 2024

Part II outlines the board's plan to reduce energy consumption through renewable energy and energy management strategies including: Design/Construction/Retrofit; Operations and Maintenance; and Occupant Behaviour.

A. Background

The St. Clair Catholic District School Board was created on January 1, 1998 as a result of the amalgamation of the former Lambton and Kent County Roman Catholic Separate School Boards. In the past, we were separated by geography, yet united by our common bonds as Catholic educators. In 1998 we came together, united by our traditions, philosophies, and a renewed dedication to a strong and vibrant Catholic education.

The St. Clair Catholic District School Board provides educational services to approximately 8834 students (2018-2019). In 2018-2019 the Board operated 26 elementary schools, 2 secondary schools, 1 Catholic Education Centre and 2 Maintenance Facilities with an accumulated area of 1,182,191 square feet (including portables).

Energy & Environmental Services for the Board is operated as a shared service under the umbrella of Chatham-Kent Lambton Administrative School Services (CLASS). CLASS is equally owned by the Lambton Kent District and the St Clair Catholic District School Boards who mutually benefit in the provision of shared services.

The Boards believe that all learners, leaders and community members have a shared responsibility for minimizing their impact on the environment and for taking an active role in protecting it. The Boards respect and acknowledge the interdependence of the environment, the economy, society, and the challenge of balancing all three in building a healthy, sustainable future.

It is the policy of the Boards to model and promote responsible energy conservation and sound environmental practices within all operational, teaching, learning and community connections within the Boards. To achieve this directive, the Boards shall implement programs, procedures, strategies and practices to reflect the directions of this policy and to protect and conserve the environment while ensuring that schools and workplace environments are safe and healthy.

B. Energy Management Strategies

Energy management strategies fall into three key categories:

i. Design/Construction/Retrofit
ii. Operations and Maintenance
iii. Occupant Behaviour

i. Design/Construction/Retrofit

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

ii. Operations and Maintenance

Operations and maintenance include the strategies the Board uses to ensure that the existing buildings and equipment perform at peak efficiency. 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.

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

C. Future Energy Conservation Goals

The Board has set out the following annual and cumulative energy intensity reduction conservation goals for the next five fiscal years:

Annual Energy Intensity Conservation Goal	Fiscal Year 2018 to 2019	Fiscal Year 2019 to 2020	Fiscal Year 2020 to 2021	Fiscal Year 2021 to 2022	Fiscal Year 2022 to 2023
ekW/ft2	13.43	13.39	13.36	13.33	13.29
ekW/m2	144.48	144.12	143.76	143.40	143.04
Percentage Decrease	-0.25%	-0.25%	-0.25%	-0.25%	-0.25%

The following table shows the Board's Cumulative Energy Intensity Conservation Goal for the next five fiscal years:

Cumulative Conservation Goal	Fiscal Year 2018 to 2019 through Fiscal Year 2022 to 2023
ekWh/ft2	-0.17
ekWh/m2	-1.80
Percentage Decrease	-1.25%

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

Introduction or expansion of programs to schools will increases the number of hours that a facility's HVAC and electrical system operates to reflect the longer occupancy hours.

Changes to Ontario's Building Code

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 will result in more fresh air is brought into a school to meet the ventilation requirements; and subsequently will increase need for 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 currently 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.

D. Environmental Programs

In 2018-19, one (1) school within the Board participated in the EcoSchools environmental program; achieving "Gold" certification in its first year.

E. Energy Efficiency Incentives

The Board applies to incentive programs to support the implementation of energy efficient projects on a regular basis and uses the services of the sector's Incentive Programs Advisor (IPA).

Between Fiscal Year 2013-14 and Fiscal Year 2017-18, the Board has applied for more than $239,000 in incentive funding from various agencies to support the implementation of energy efficient projects.

F. Energy Procurement

The Board participates in a consortia arrangement through the OECM's Strategic Electricity Management and Advisory Services to purchase electricity.

The Board participates in a consortia arrangement through the Local Authority Services (LAS) to purchase natural gas.

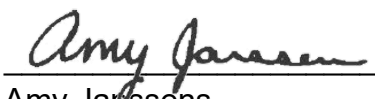
G. Demand Management

The Board uses local power distribution company invoices and real-time consumption data to support monitoring of electrical Demand. The Board also 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)

Senior Management Approval of Energy Conservation and Demand Management Plan

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



April 23, 2019

Amy Janssens
Associate Director-Corporate Services

Date

APPENDIX A - Design Construction and Retrofit Strategies

Design, Construction and Retrofit Strategies		2018-2019				2020-2021		2021-2022		2022-2023		2018/2019-2022/2023
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 Saving (ekWh)**	**Estimated Total Accumulated Energy Savings (ekWh)**
High Efficiency Lighting Systems	15	$ 120,000	97,959	$ 300,000	244,898	$ 300,000	244,898	$ 300,000	244,898	$ 50,000	40,816	2,734,694
Outdoor Lighting	15	$ 10,000	8,163	$ 25,000	20,408	$ 25,000	20,408	$ 25,000	20,408	$ 10,000	8,163	232,653
Occupancy Sensors	10	$ 5,000	5,714	$ 10,000	11,429	$ 10,000	11,429	$ 10,000	11,429	$ 5,000	5,714	137,143
		2018-2019		**2019-2020**		**2020-2021**		**2021-2022**		**2022-2023**		**2018/2019-2022/2023**
H.V.A.C.	**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)**
High-efficiency Boilers (condensing)	15	$ -	-	$ 300,000	834,086	$ 300,000	834,086	$ 300,000	834,086	$ -	-	7,506,777
Heat Recovery/Enthalpy Wheels	30	$ 200,000	431,630	$ 300,000	647,445	$ 350,000	755,352	$ 400,000	863,260	$ 200,000	431,630	9,172,134
Energy Efficient HVAC systems	30	$ 1,000,000	130,944	$ 1,300,000	170,227	$ 1,400,000	183,321	$ 1,500,000	196,415	$ 1,000,000	130,944	2,409,362
		2018-2019		**2019-2020**		**2020-2021**		**2021-2022**		**2022-2023**		**2018/2019-2022/2023**
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	$ 100,000	65,472	$ 150,000	98,208	$ 150,000	98,208	$ 150,000	98,208	$ 150,000	98,208	1,309,436
Building Automation Systems - Upgrade	10	$ -	-	$ 20,000	13,094	$ -	-	$ 20,000	13,094	$ -	-	78,566
Real-time energy data for operators to identify and diagnose building issues	10	$ 30,000	98,208	$ 30,000	98,208	$ 40,000	130,944	$ 50,000	163,680	$ 50,000	163,680	1,767,739
		2018-2019		**2019-2020**		**2020-2021**		**2021-2022**		**2022-2023**		**2018/2019-2022/2023**
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)**
New Roof	25	$ 750,000	64,744	$ 2,000,000	172,652	$ 2,000,000	172,652	$ 2,200,000	189,917	$ 750,000	64,744	1,976,865
New Windows	30	$ -	-	$ 350,000	75,535	$ 375,000	80,931	$ 400,000	86,326	$ -	-	717,585
		2018-2019		**2019-2020**		**2020-2021**		**2021-2022**		**2022-2023**		**2018/2019-2022/2023**
Design, Construction & Retrofit Strategies Total	**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)**
Total		**$ 2,215,000**	**902,834**	**$ 4,785,000**	**2,386,189**	**$ 4,950,000**	**2,532,228**	**$ 5,355,000**	**2,721,721**	**$ 2,215,000**	**943,899**	**28,042,953**

APPENDIX B - Operations and Maintenance Strategies

Operations and Maintenance Strategies		2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023
Policy and Planning	**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)**
New School Design/Construction Guidelines and Specifications	5	$ -	-	$ -	-	$ 5,000	9,821	$ -	-	$ -	-	29,462
Nighttime Blackout of Sites - Interior	10	$ 10,000	8,163	$ 10,000	8,163	$ 10,000	8,163	$ 10,000	8,163	$ 10,000	8,163	122,449
Nighttime Blackout of Sites - Exterior	10	$ 10,000	8,163	$ 10,000	8,163	$ 10,000	8,163	$ 10,000	8,163	$ 10,000	8,163	122,449
Procures Only Energy Star Certified Appliances	5	$ -	-	$ 10,000	11,429	$ -	-	$ 10,000	11,429	$ 10,000	11,429	80,000
HVAC Optimization (coil cleaning, re-calibration of equipment)	3	$ -	-	$ -	-	$ 150,000	736,558	$ -	-	$ -	-	2,209,673
		2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023
Energy Audits	**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)**
Engineering Audit	5	$ 25,000	246	$ 25,000	246	$ 10,000	98	$ -	-	$ -	-	2,504
		2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023
Operations and Maintenance Strategies Total	**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)**
Total		**$ 45,000**	**16,572**	**$ 55,000**	**28,001**	**$ 185,000**	**762,803**	**$ 30,000**	**27,755**	**$ 30,000**	**27,755**	**2,566,538**

APPENDIX C - Occupant Behaviour Strategies

Occupant Behaviour Strategies

		2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023
Training and Education	**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)**
Building Automation Training (site specific)	3	$ -	-	$ 1,000	8,587	$ 1,000	8,587	$ 1,000	8,587		-	77,280
Ongoing Training and Awareness Programs for Energy Conservation	5	$ -	-	$ 1,000	624	$ 1,000	624	$ 1,000	624	$ 1,000	624	6,236
Participate in Environmental Programs, such as EcoSchools, Earthcare	1	$ 10,000	12,472	$ 10,000	12,472	$ 10,000	12,472	$ 10,000	12,472	$ 10,000	12,472	187,073
Occupant Behaviour Strategies Total		**$ 10,000**	**12,472**	**$ 12,000**	**21,682**	**$ 12,000**	**21,682**	**$ 12,000**	**21,682**	**$ 11,000**	**13,095**	**270,589**

APPENDIX D - Conservation Goals

	2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2018/2019-2022/2023
	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 A: Design, Construction and Retrofit Strategies Total	$ 2,215,000	902,834	$ 4,785,000	2,386,189	$ 4,950,000	2,532,228	$ 5,355,000	2,721,721	$ 2,215,000	943,899	28,042,953
Appendix B: Operations and Maintenance Strategies Total	$ 45,000	16,572	$ 55,000	28,001	$ 185,000	762,803	$ 30,000	27,755	$ 30,000	27,755	2,566,538
Appendix C: Occupant Behaviour Strategies Total	$ 10,000	12,472	$ 12,000	21,682	$ 12,000	21,682	$ 12,000	21,682	$ 11,000	13,095	270,589
TOTAL	**$ 2,270,000**	**931,878**	**$ 4,852,000**	**2,435,872**	**$ 5,147,000**	**3,316,713**	**$ 5,397,000**	**2,771,158**	**$ 2,256,000**	**984,749**	**30,880,080**
Percentage reduction		**6**		**15**		**21**		**17**		**6**	**65.36**
Conservation Goal (ekWh/m²)		**8.45**		**22.09**		**30.08**		**25.13**		**8.93**	**94.67**
Conservation Goal (ekWh/ft²)		**0.79**		**2.05**		**2.79**		**2.33**		**0.83**	**8.80**

APPENDIX E - Investments in Energy Efficiency

Lighting	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies
High Efficiency Lighting Systems (T-8, T-5, CFL, LED ...)	$ 103,097	$ 119,911	$ 400,000	$ 410,000	$ -
Outdoor Lighting	$ -	$ -	$ 100,000	$ 90,000	$ -
Occupancy Sensors	$ 14,790	$ -	$ 22,570	$ 34,265	$ -
	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018

HVAC	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies
High Efficiency Boilers (condensing)	$ 168,400	$ 193,000	$ 25,000	$ -	$ -
Energy efficient HVAC systems	$ 2,944,908	$ 392,197	$ -	$ 67,028	$ 71,420
Energy efficient Rooftop units	$ 66,980	$ -	$ 135,037	$ 10,000	$ 12,143
High Efficiency Domestic Hot Water	$ -	$ 6,640	$ -	$ -	$ -
Efficient Chillers and Controls	$ 58,400	$ -	$ -	$ -	$ -
High-efficiency motors	$ 24,000	$ -	$ -	$ -	$ -
VFD	$ 65,400	$ -	$ -	$ -	$ -
	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018

Controls	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies
Building Automation Systems - New	$ 235,730	$ 62,329	$ 34,430	$ 2,775	$ -
	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018

Building Envelope	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies	Investment in Energy Management Strategies
Glazing	$ 413,125	$ 29,000	$ -	$ -	$ 47,975
Increased Wall Insulation	$ 130,700	$ -	$ -	$ -	$ 93,000
New Roof	$ 255,000	$ 196,169	$ 695,530	$ 3,622,740	$ 478,565
Shading Devices	$ 26,279	$ 12,000	$ -	$ -	$ -
Other (Describe)	$ -	$ -	$ -	$ -	$ 46,498
Total Investment in Design, Construction and Retrofit Strategies	**$ 4,506,809**	**$ 1,011,246**	**$ 1,412,567**	**$ 4,236,808**	**749,601**