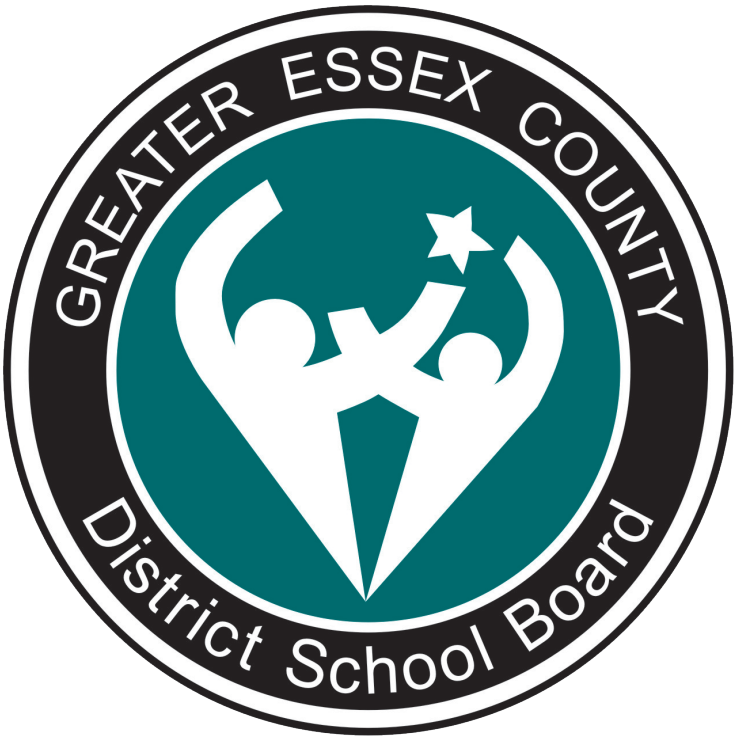

Energy Conservation and Demand Management Plan

2024-2028

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Education Sector Background

Funding and Energy Management Planning

Each year school boards receive approximately $1.4 billion in School Renewal funding from the province. In addition, school boards may receive time-limited funds over this period.

The Ministry typically announces each Board's funding allocations, for the upcoming school board Fiscal Year (September 1st to August 31st), in March-April.

While a board may have a five-year energy management strategy, the ability to implement their strategy depends on the funding that is 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 Facility Variables:

- Construction
  - Year built
  - Number of floors
  - Orientation of the building
- Building Area
  - Major additions
  - Sites sold/closed/demolished/leased
  - Portables
    - Installed
    - Removed
    - Areas under construction
- Equipment/Systems
- Age
- Type of technology
- Lifecycle
- Percentage of air-conditioned space
- Site Use
  - Elementary school
  - Secondary school
  - Administrative building
  - Maintenance/warehouse facility
  - Community Hubs
- Shared Site Use (For example: two or more boards share common areas and/or partnered with a municipality)
  - Swimming pools
  - Libraries
  - Lighted sports fields
  - Sports domes

Other Variables:

- Programs
    - Child care
    - Before/After School Programs
    - Summer School
    - Community Use
        - Outdoor ice rinks
- Occupancy
    - Significant increase or decrease in number of students
    - Significant increase in the hours of operation
    - New programs being added to a site
- Air Conditioning
    - Significant increase in air-conditioned space
    - Portables

PART I: A REVIEW OF PROGRESS & 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 2017 to 2018 to the end of the five-year reporting period Fiscal Year 2022 to 2023.

Table 1: Board's Asset Portfolio

Key Metrics	(Baseline Year) Fiscal Year 2017 to 2018	Fiscal Year 2022 to 2023	Variance
Total Number of Buildings	77	73	-4
Total Number of Portables/Portapaks	70	99	+29
Total Floor Area (ft^2)	5,112,712	5,162,773	+50,061
Average Operating Hours	42	65	+23
Average Daily Enrolment	34,312	32,160	-2,152
% of Total Floor Area Air Conditioned	43%	52%	+9%
Number of Facilities with Mechanical Ventilation	53	70	+30
Community Use of Schools: Community Rental Hours # of School Based Child Care Programs	 34,972 hrs 48	 20,002.5hrs 50	 -14,969.5 +2

B. Energy Usage Data for the Board

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

Table 2: Metered Usage Values

Utility	Fiscal Year 2017 to 2018 (Baseline year)	Fiscal Year 2022 to 2023
Total Electricity (kWh)	25,410,582	22,700,672
Total Natural Gas (ekWh)	53,823,956	50,596,260
Total Heating Fuel (Type 1- only Pelee Island) (ekWh)	52,647	22,625

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.

Table 3: Ontario Degree-days

Ontario Degree Days	Fiscal Year 2017 to 2018	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
HDD	3,989	4,196	3,837	3,696	3,799	3,611
CDD	432	334	415	392	340	267

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

[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.

programs (refer to the Note to Readers beginning on page 9) 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).

Table 4: Weather Normalized Values

Weather Normalized Values	Fiscal Year 2017 to 2018 (Baseline Year)	Fiscal Year 2022 to 2023 (Most Recent Data Available)
Total Energy Consumed (ekWh)	78,525,776	74,072,828
Energy Intensity (eKWh/ft^2)	14.53	13.28
Total GHG Emissions ($kgCO_2$)	10,489,518	9,991,933
Emissions Intensity ($kgCO_2/m^2$)	20.89	19.29

D. Review of Previous Energy Conservation Goals and Achievements

In 2019, the Board set annual energy conservation goals for the following five fiscal years. The following table compares the Energy Intensity Conservation Goal with the Actual Energy Intensity Reduced for each year.

Table 5: Comparison of Energy Intensity Conservation Goal and Actual Energy Intensity Reduced

Fiscal Year	Conservation Goal ekWh/ft2	Conservation Goal Percentage	Actual Energy Savings ekWh/ft2
2018 to 2019	13.19	2%	.41
2019 to 2020	12.93	2%	.12
2020 to 2021	12.68	2%	-1.34
2021 to 2022	12.43	2%	1.25
2022 to 2023	12.19	2%	.81

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.

NOTE TO READERS:

When reviewing annual Actual Energy Savings and Actual Energy Percentage across the five (5) years in the chart above, the following should be considered:

1. Conservation goals in the above chart were forecast in Spring 2019 based on the assumption that operational parameters would remain consistent from FY2019 through FY2023. However, the pandemic that arrived in early 2020, significantly changed how schools operated and impacted their energy consumption.

2. As a result of significant operational changes from one year to the next from FY2019 to FY2023, an apple-to-apple comparison of Energy Intensity (ekWh/ft^2 – the quantity of energy consumed per area) is not possible.
   - Factors that reduced energy consumption include:
     - temporary school closures in FY2020 and FY2021, due to the pandemic
       - boards with centralized Building Automation Systems (BAS) that could be remotely programed to “unoccupied set points”, should show a reduction in consumption
     - temporary suspension of community use of schools, before/after school programs, childcare programs, continuing education, and summer school programs
       - for schools with these programs, the number of “occupied set point” operating hours would be significantly reduced
   - Factors that increased consumption include:
     - Implementation of new health and safety factors in FY2021 through FY2023 to address pandemic issues, such as:
       - increased ventilation (intake of fresh air),
       - increased filtration requirements
       - expanded operating hours of HVAC equipment

A board’s ability to achieve their 2019 forecasted Conservation Goals may be limited by some or all the above factors.

Before and After School Programs

Before-School and After-School Programs need a facility’s Heating, Ventilation, and Air Conditioning (also known as HVAC) system to operate for an extended period of time on a daily basis, which increases the overall energy intensity.

Community Use of Schools

Both indoor and outdoor school space is available to not-for-profit community groups at reduced rates, outside of regular school hours. The use of spaces in schools, typically gymnasiums and libraries, has increased over time. The use of these spaces during non-school hours requires a facility’s HVAC system to operate for an extended period on a daily basis, which will increase the overall energy intensity.

Community Hubs

Many schools now offer a greater 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 run from 6:00 a.m. until 11:00 p.m. during weekdays and are open many times on weekends. The use of these spaces during non-school hours requires a facility's HVAC system to operate for an extended period on a daily basis, which will increase the overall energy intensity.

Air Conditioning

Historically, schools have not had air conditioning, or it has been a minimal space in the facility. However, with changing weather patterns, "shoulder seasons" such as May, June and September are experiencing higher than normal temperatures and there is an increased desire for schools to have air conditioning. Air conditioning significantly increases a facility's energy use, specifically electricity 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 Ontario Building Code ("OBC") standards which may result in increased energy use.

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

Pandemic

When reviewing year-over-year value, it should be noted that FY2020 values will be lower as schools were closed due to the pandemic (March 2020 until June 2020). During that time, the sector saw a decrease of 16% in electricity consumption and 3% in natural gas consumption. The difference in the percentage for the two utilities, reflects that natural gas is primarily used for heating and April, May and June do not have the same heating demands due to weather.

In FY2021 consumption values were typically higher than FY2020, but due to limited occupancy as a result of the ongoing pandemic, lower than previous consumption levels.

Ventilation and Filtration

In consultation with the Office of the Chief Medical Officer of Health, the Ministry of Labour, Immigration, Training and Skills Development and others, school boards have been expected to continue to build on established practices to optimize air quality to support healthy and safe learning environments for students and staff.

Many of these new recommendations/requirements can impact utility consumption. For instance, the implementation of standalone HEPA filtration units has impacted energy consumption, primarily electricity.

E. Cumulative Energy Conservation Goal

The following table compares the 2019 Forecasted Cumulative Energy Intensity Conservation Goal with the Actual Cumulative Energy Intensity Reduced Savings.

Table 6: Cumulative Energy Intensity Goal from Fiscal Year 2018 to 2019 through Fiscal Year 2022 to 2023

Cumulative Energy Intensity	(ekWh/ft2)	Variance
Forecasted Cumulative Energy Intensity Conservation Goal of Fiscal Year 2018 to 2019 through Fiscal Year 2022 to 2023	63.42	_____
Forecasted Cumulative Energy Intensity Conservation Goal as a Percentage	_____	10%
Actual Cumulative Energy Intensity Reduced or Increased from Fiscal Year 2018 to 2019 through Fiscal Year 2022 to 2023 – Weather Normalized	1.24	_____
Variance between 2019 Forecast Cumulative Conservation Goal and Actual Cumulative Energy Intensity– Weather Normalized	-62.18	_____
% of Cumulative Energy Intensity Conservation Goal Achieved - Weather Normalized	_____	1.96

F. Measures Implemented from Fiscal Year 2018 to 2019 to Fiscal Year 2022 to 2023

A list of the measures implemented, the related costs, and the fiscal year that the measure was implemented within the Board are outlined in the included **Appendix: Investments in Energy Efficiency between Fiscal Year 2019 and Fiscal Year 2023.** Here is the list of the information included:

1. Design, Construction and Retrofit Investments
2. Operations and Maintenance Investments
3. Occupant Behaviour Investments
4. Summary of All Investment Types

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 measure the related actual energy savings achieved.

PART II – ENERGY CONSERVATION and DEMAND MANAGEMENT PLAN for FISCAL YEAR 2022 to 2023 to FISCAL YEAR 2027 to 2028

Part II outlines the board's plan to reduce energy consumption through renewable energy and energy management strategies including:

1. Design, Construction and Retrofit;
2. Operations and Maintenance; and lastly
3. Occupant Behavior.

Background

1. The Board has an energy management position which includes the following options.
    - ☒ In-house including:
        a. Full time- Energy and Environmental Officer
        b. Full time- Building Systems Officer
    - ☒ Contracted third party: Jupiter Energy Advisors and Shell Energy Advisors
    - ☐ None

2. Energy Management Strategies

Energy management strategies fall into three key categories:

1. Design/Construction/Retrofit
2. Operations and Maintenance
3. Occupant Behaviour

Design/Construction/Retrofit

Definition

Design, construction, and retrofit includes the original and ongoing intent of how a building and its systems are to work through the combination 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 Fiscal Year 2023 to 2024 to Fiscal Year 2027 to 2028, Appendix B: Design, Construction, and Retrofit.**

Operations and Maintenance

Definition

Operations and maintenance include the strategies the Board uses to make sure that the existing buildings and equipment performs at maximum efficiency. For the Board's relevant projects over the next five years, please refer to **Calculating Energy Conservation Goals Fiscal Year 2023 to 2024 to Fiscal Year 2027 to 2028, Appendix C: Operations and Maintenance.**

Occupant Behaviour

Definition

Strategies that the Board uses to teach occupants, including staff, students and community users, with an emphasis on changing specific actions to reduce energy consumption. For the Board's relevant projects over the next five years, please refer to **Calculating Energy Conservation Goals Fiscal Year 2023 to 2024 to Fiscal Year 2027 to 2028, Appendix D: Occupant Behaviour.**

A. Future Energy Conservation Goals

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

Table 7: Annual Energy Intensity Conservation Goals

Annual Energy Intensity Conservation Goal	Fiscal Year 2023 to 2024	Fiscal Year 2024 to 2025	Fiscal Year 2025 to 2026	Fiscal Year 2026 to 2027	Fiscal Year 2027 to 2028
Percentage Decrease (ekWh/ft^2)	2.98	2.04	1.56	1.50	2.26

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

Table 8: Cumulative Conservation Goal

Cumulative Conservation Goal	Fiscal Year 2023 to 2024 through Fiscal Year 2027 to 2028
Percentage Decrease (ekWh/ft^2)	10.34

B. Environmental Programs

In Fiscal Year 2022 to 2023, schools within the Board participated in environmental programs.

1. Eco Schools:
   - 20 schools participated.
2. Other:
   - Environmental Stewardship Program:

All schools participate in environmental/ energy lessons, assemblies, and field trips to Fighting Island. This program is based on the availability of funding each year. Through the allotted funding, there are two full-time stewardship teachers that work system wide.

C. 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 2018 to 2019 and Fiscal Year 2022 to 2023, the Board has received $ 599,191.11 in incentive funding from different agencies to support the implementation of energy efficient projects. Though we have seen a substantial increase in incentive funding for the previous 5-years, this is expected to decrease going forward as some incentives have transitioned to a direct-to-consumer model where the incentive is automatically reduced from the upfront cost, rather than applying for a rebate at project completion.

2. The Board uses external resources, such as IESO Service Representatives and / or Enbridge Service Representatives, to apply for incentives.

   ☒ Yes ☐ No

   ☒ IESO Service Representative

   ☒ Enbridge Service Representative

   ☒ Other Save on Energy

D. 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

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

   ☒ Yes ☐ No

   If yes,

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

   ☒ Other:

   Provide Name of Consortia: Shell Energy Services

3. The Board participates in a consortia arrangement to purchase alternative utilities (fuel oil, propane, wood, district heat, district cool).

   ☐ Yes ☒ No

E. 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 cut down 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: Adjusting out temperature set points in our building automation systems.

F. Senior Management Approval of this Energy Conservation and Demand Management Plan

I confirm that The Greater Essex County District School Board's senior management has reviewed and approved this Energy Conservation and Demand Management Plan.

Vicki Houston

Full Name: Vicki Houston
Job Title: Director of Education
Date: July 1, 2024

Appendix A: Investments in Energy Efficiency between Fiscal Year 2019 and Fiscal Year 2023

Design, Construction and Retrofit Strategies	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
Lighting / Electrical	**Investments 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 (D5020, D502001, D502003, D502004)	$ 1,200,808	$ 1,028,567	$ 129,187	$ 305,084	$ 491,778
Outdoor Lighting (D502004)	$ 50,000	$ 15,177	$ 3,710	$ -	$ 3,750
Occupancy Sensors (D5021, D5022)	$ 547,270	$ 5,819	$ -	$ -	$ -
Daylight Harvesting	$ -	$ -	$ -	$ -	$ -
Dimming Switches					
Other (Describe)					
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**
Efficient Boilers (near condensing) (D3020, D302001, D302002)	$ -	$ -	$ -	$ -	$ -
High-efficiency Boilers (condensing) (D3020, D302001, D302002)	$ 1,330,270	$ 1,940,519	$ 807,557	$ 244,186	$ 3,100,424
High-efficiency Boiler Burners (D3020)	$ -	$ -	$ -	$ -	$ -
Geothermal (D302099)	$ -	$ -	$ -	$ -	$ -
Heat Recovery/Enthalpy Wheels (D3090)	$ -	$ -	$ 3,684,351	$ -	$ 3,420
Economizers (D306002)	$ -	$ -	$ -	$ -	$ -
Energy Efficient HVAC systems (D3050,D3040)	$ 2,772,091	$ 667,443	$ 1,786,110	$ 3,635,999	$ 2,992,695
Energy Efficient Rooftop Units (D302098)	$ 300,295	$ -	$ 1,841,082	$ 5,402,565	$ 964,877
High Efficiency Domestic Hot Water (D2020)	$ -	$ -	$ -	$ -	$ -
Efficient Chillers and Controls (D3030, D303011, D303012)	$ 646,463	$ 40,597	$ 633,181	$ 671,704	$ -
High-efficiency Motors (D304007, D303011)	$ 278,960	$ 125,889	$ 291,224	$ 151,602	$ 285,801
VFD (D302056)	$ -	$ -	$ -	$ 147,477	$ 76,807
Demand Ventilation (D3040)	$ -	$ -	$ -	$ -	$ -
Entrance Heater Controls (D302099)	$ -	$ -	$ -	$ -	$ -
Destratification Fans (D3090)	$ -				
Other (Describe)	$ -	$ -	$ -	$ -	$ -
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 (D3060)	$ -	$ -	$ -	$ -	$ -
Building Automation Systems - Upgrade (D3060)	$ 177,678	$ 761,782	$ 446,601	$ 191,339	$ 964,023
Real-time energy data for operators to identify and diagnose building issues					
Voltage Harmonizers (D501001)					
Other (Describe)	$ -	$ -	$ -	$ -	$ -
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 (B302006, B2020, B3021)	$ -	$ -	$ -	$ -	$ -
Increased Wall Insulation (B2010)	$ -	$ -	$ -	$ -	$ -
New Roof (B3010, B3020)	$ 6,413,824	$ 2,844,794	$ 227,787	$ 3,712,614	$ 2,526,670
New Windows (B2020)	$ 3,505,777	$ 4,111,974	$ 2,452,439	$ 2,386,600	$ 3,291,721
Treatments	$ -	$ -	$ -	$ -	$ -
Shading Devices	$ -	$ -	$ -	$ -	$ -
Other (Exterior Doors and Masonry Repointing)	$ 2,354,385	$ 4,267,810	$ 4,776,215	$ 1,726,903	$ 5,054,842
Total Investment in Design, Construction and Retrofit Strategies	**$ 19,577,821**	**$ 15,810,371**	**$ 17,079,444**	**$ 18,576,073**	**$ 19,756,808**

Appendix A (continued): Investments in Energy Efficiency between Fiscal Year 2019 and Fiscal Year 2023

Operations and Maintenance Strategies	2018--2019	2019-20	2020-2021	2021-2022	2022-2023
Policy and Planning	**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**
New School Design/Construction Guidelines and Specifications	$ -	$ -	$ -	$ -	$ -
Day and Night Temperature Guidelines for all Schools	$ -	$ -	$ -	$ -	$ -
Nighttime Blackout of Sites - Interior	$ -	$ -	$ -	$ -	$ -
Nighttime Blackout of Sites - Exterior	$ -	$ -	$ -	$ -	$ -
Procures Only Energy Star Certified Appliances	$ -	$ -	$ -	$ -	$ -
Preventative Maintenance (re-commissioning, coil cleaning, filter changes)	$ 12,984	$ 33,608	$ 246,940	$ 469,322	$ 268,855
Daylight Harvesting (servicing)	$ -	$ -	$ -	$ -	$ -
Demand Ventilation (servicing)	$ -	$ -	$ -	$ -	$ -
Water Leak Detection System					
Other (Describe)	$ -	$ -	$ -	$ -	$ -
Energy Audits	**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**
Walk Through Audit	$ -	$ -	$ -	$ -	$ -
Engineering Audit	$ -	$ -	$ -	$ -	$ -
Other (Describe)					
Total Investment in Operations and Maintenance Strategies	**$ 12,984**	**$ 33,608**	**$ 246,940**	**$ 469,322**	**$ 268,855**

Appendix A (continued): Investments in Energy Efficiency between Fiscal Year 2019 and Fiscal Year 2023

Occupant Behaviour Strategies	2018--2019	2019-20	2020-2021	2021-2022	2022-2023
Training and Education	**Estimated Cost of Implementation**	**Estimated Cost of Implementation**	**Estimated Cost of Implementation**	**Estimated Cost of Implementation**	**Estimated Cost of Implementation**
Building Operator Training	$ -	$ -	$ -	$ -	$ -
Building Automation Training (site specific)	$ -	$ -	$ -	$ -	$ -
Ongoing Training and Awareness Programs for Energy Conservation	$ -	$ -	$ -	$ -	$ -
Provide Detailed Information on Building Operational Costs	$ -	$ -	$ -	$ -	$ -
Board policy to limit appliances brought (space heater, mini fridge, coffee machine) into the workspace	Yes	Yes	Yes	Yes	
Provide Detailed Information on Energy Consumption (e.g. via the Utility Consumption Database or other database)	$ -	$ -	$ -	$ -	$ -
Participate in Environmental Programs, such as EcoSchools, Earthcare	$ -	$ 225,000	$ 225,000	$ 225,000	$ 225,000
Other tools (Define)	$ -	$ -	$ -	$ -	$ -
Total Investment in Occupant Behaviour Strategies	**$ -**	**$ 225,000**	**$ 225,000**	**$ 225,000**	**$ 225,000**

Appendix A (continued): Investments in Energy Efficiency between Fiscal Year 2019 and Fiscal Year 2023

Summary of Investment by Type	2018-2019	2019-2020	~~2020-2021~~	2021-2022	2022-2023	2018/19-2022/2023
Total Investments in Energy Management Strategies FY 2012-13 to FY 2017-18	**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**	**Total Investment in Energy Management Strategies**
Design, Construction and Retrofit Investments Total	$ 19,577,821	$ 15,810,371	$ 17,079,444	$ 18,576,073	$ 19,756,808	90,800,517
Operations and Maintenance Investments Total	$ 12,984	$ 33,608	$ 246,940	$ 469,322	$ 268,855	1,031,709
Occupant Behaviour Investments Total	$ 225,000	$ 225,000	$ 225,000	$ 225,000	$ 225,000	1,125,000
Renewable Energy Investments Total	$ -	$ -	$ 205,808	$ 65,375	$ 55,515	326,698
Total Investment Per Fiscal Year	$ 19,815,805	$ 16,068,979	$ 17,757,192	$ 19,335,770	$ 20,306,178	93,283,924

Appendix B: Calculating Energy Conservation Goals Fiscal Year 2024 to Fiscal Year 2028- Design, Construction, and Retrofit.

		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28
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 (D5020, D502001, D502003, D502004)	30	$ 600,000	546,996	$ 600,000	546,996	$ 300,000	273,498	$ 300,000	273,498	$ 300,000	273,498	6,563,953
Outdoor Lighting (D502004)	30	$ 100,000	91,166	$ 50,000	45,583	$ -	-	$ -	-		-	638,162
Occupancy Sensors (D5021, D5022)	10	$ 150,000	191,449	$ 100,000	127,632	$ -	-	$ -	-	$ -	-	1,467,773
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
H.V.A.C.	**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)**
4+	30		-	$ -	-	$ -	-	$ -	-	$ -	-	-
High-efficiency Boilers (condensing) (D3020, D302001, D302002)	15	$ 3,000,000	6,640,487	$ 1,600,000	3,541,593	$ 1,600,000	3,541,593	$ 1,600,000	3,541,593	$ 1,600,000	3,541,593	68,618,365
High-efficiency Boiler Burners (D3020)	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Geothermal (D302099)	25	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Heat Recovery/Enthalpy Wheels (D3090)	20		-	$ -	-	$ -	-	$ -	-	$ -	-	-
Economizers (D306002)	15	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Energy Efficient HVAC systems (D3050,D3040)	35	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Energy Efficient Rooftop Units (D302098)	25	$ 6,000,000	2,040,735	$ 4,500,000	1,530,551	$ 1,500,000	510,184	$ 1,500,000	510,184	$ 1,500,000	510,184	19,386,984
High Efficiency Domestic Hot Water (D2020)	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Efficient Chillers and Controls (D3030, D303011, D303012)	25	$ 2,000,000	127,632	$ 1,200,000	76,579	$ 600,000	38,290	$ 600,000	38,290	$ 600,000	38,290	1,174,218
High-efficiency Motors (D304007, D303011)	20	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
VFD (D302056)	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Demand Ventilation (D3040)	15	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Entrance Heater Controls (D302099)	20	$ 300,000	612,221	$ 300,000	612,221	$ 300,000	612,221	$ 300,000	612,221	$ 300,000	612,221	9,183,308
Destratification Fans (D3090)	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
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 (D3060)	15	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Building Automation Systems - Upgrade (D3060)	15	$ 3,000,000	2,040,735	$ 2,000,000	1,360,490	$ 1,000,000	680,245	$ 600,000	408,147	$ 300,000	204,074	18,706,739
Real-time energy data for operators to identify and diagnose building issues	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Voltage Harmonizers (D501001)	15	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-		-	-
Building Envelope	**Quantity of Time that Measure will be in place**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Total Accumulated Energy Savings (ekWh)**
Glazing (B302006, B2020, B3021)	30	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Increased Wall Insulation (B2010)	50	$ -	-	$ 75,000	29,863	$ -	-	$ -	-	$ -	-	119,453
New Roof (B3010, B3020)	22	$ 5,000,000	398,176	$ 3,000,000	238,906	$ 2,500,000	199,088	$ 2,500,000	199,088	$ -	3,000,000	6,941,947
New Windows (B2020)	32	$ 3,500,000	696,809	$ 2,500,000	497,721	$ 1,500,000	298,632	$ 1,500,000	298,632	$ -	1,500,000	8,468,087
Treatments	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	75,000	75,000
Shading Devices	30	$ 225,000	71,793	$ 125,000	39,885	$ 75,000	23,931	$ 75,000	23,931	$ -	-	638,162
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-

Appendix C: Calculating Energy Conservation Goals Fiscal Year 2024 to Fiscal Year 2028- Operations and Maintenance.

Operations and Maintenance Strategies		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28
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	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Day and Night Temperature Guidelines for all Schools	10	$ 50,000	159,271	$ 50,000	159,271	$ 50,000	159,271	$ 50,000	159,271	$ 50,000	159,271	2,389,058
Nighttime Blackout of Sites - Interior	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Nighttime Blackout of Sites - Exterior	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Procures Only Energy Star Certified Appliances	5	$ 25,000	31,908	$ 25,000	31,908	$ 25,000	31,908	$ 25,000	31,908	$ 25,000	31,908	478,622
Demand Ventilation (servicing) (D3020,D3030, D3040	3	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
HVAC Optimization (coil cleaning, re-calibration of equipment) (D3020)	3	$ 250,000	1,275,459	$ 250,000	1,275,459	$ 250,000	1,275,459	$ 250,000	1,275,459	$ 250,000	1,275,459	19,131,892
Commissioning (retro and re)	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
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)**
Walk Through Audit	5	$ 10,000	102	$ 10,000	102	$ 10,000	102	$ 10,000	102	$ 10,000	102	1,531
Engineering Audit	5	$ 100,000	1,020	$ 100,000	1,020	$ -	-	$ -	-	$ -	-	9,183
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-
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		**$ 435,000**	**1,467,761**	**$ 435,000**	**1,467,761**	**$ 335,000**	**1,466,740**	**$ 335,000**	**1,466,740**	**$ 335,000**	**1,466,740**	**22,010,286**