Energy Conservation and Demand Management Plan

July 1, 2024.

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Education Sector Background

Funding and Energy Management Planning

Each year school boards receive approximately $1.4 billion 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's 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 important changes that crucially impact a board's energy consumption over a five-year period.

The following is a list of some of the most common variables and metrics that change in the education sector.

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
- Other
    - Click or tap here to enter text.
    - Click or tap here to enter text.

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	21	21	0
Total Number of Portables/Portapaks	16	16	0
Total Floor Area	89314	89314	0
Average Operating Hours	46	46	0
Average Daily Enrolment	7473	6804	669
% of Total Floor Area Air Conditioned	2829	2829	0
Number of Facilities with Mechanical Ventilation	21	21	0
Other Relevant Changes in the Operation of Assets: Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

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)	6,983,424.5	6,323,545.5
Total Natural Gas (ekWh)	16,366,922	16,650,154

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

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	3989	4196	3837	3696	3799	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 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).

[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.t
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.

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)	23,350,346	18,973,700
Energy Intensity (eKWh/ft2)	24.73	20.09
Energy Intensity (eKWh/m2)	266.15	216.26
Total GHG Emissions ($kgCO_2$)	3,131,548.75	2,420,950.75
Emissions Intensity ($kgCO_2ft^2$)	Click or tap here to enter text.	Click or tap here to enter text.
Emissions Intensity ($kgCO_2/m^2$)	36	27.59

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 ekWh/m2	Conservation Goal Percentage	Actual Energy Savings ekWh/ft2	Actual Energy Savings ekWh/m2	Actual Energy Percentage
2018 to 2019		2.47	0.95%	0.71	7.66	2.88%
2019 to 2020		2.61	1.00%	2.70	29.03	11.23%
2020 to 2021		2.61	1.00%	0.33	3.57	1.55%
2021-2022		2.61	1.00%	0.21	2.26	1.00%
2022 to 2023		2.61	1.00%	0.68	7.36	3.29%

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.

1. 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.

In addition to the pandemic-related factors outlined above, there are a number of other factors that regularly impact a board’s ability to achieve their conservation goals, including:

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 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 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)	(ekWh/m2)	Variance
Forecasted Cumulative Energy Intensity Conservation Goal of Fiscal Year 2018 to 2019 through Fiscal Year 2022 to 2023 Source: Board's 2019 Plan (to be input by Board)	1.20	12.91	Do not write in this cell
Forecasted Cumulative Energy Intensity Conservation Goal as a Percentage Source: Board's 2019 Plan (to be input by Board)	Do not write in this cell	Do not write in this cell	4.95
Actual Cumulative Energy Intensity Reduced or Increased from Fiscal Year 2018 to 2019 through Fiscal Year 2022 to 2023 – Weather Normalized	4.63	49.88	Do not write in this cell
Variance between 2019 Forecast Cumulative Conservation Goal and Actual Cumulative Energy Intensity– Weather Normalized	3.43	36.97	Do not write in this cell
% of Cumulative Energy Intensity Conservation Goal Achieved - Weather Normalized	Do not write in this cell	Do not write in this cell	386%

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 **Appendix: Investments in Energy Efficiency between Fiscal Year 2019 and Fiscal Year 2023.** Here is the list of sheets:

1. Design, Construction and Retrofit Investments
2. Operations and Maintenance Investments
3. Occupant Behaviour Investments
4. Renewable Energy Investments
5. 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
   b. Part time
   c. Shared job function

   ☒ Contracted third party, or

   ☐ None

2. Energy Management Strategies

Energy management strategies fall into four key categories:

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

Renewable Energy

Definition

Renewable energy is a strategy to cut down a board's energy use from the province's electricity grid and includes:

- solar panels
- wind turbines, etc.

For a list of the Board's renewable energy projects, please refer to the **Calculating Energy Conservation Goals Fiscal Year 2024 to Fiscal Year 2028** explained in **Appendix A: Renewable Energy**.

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
ekW/ft^2	0.51	1.42	0.19	0.19	0.19
ekW/m^2	5.47	15.25	2.04	2.04	2.04
Percentage Decrease	2.57	7.18	0.96	0.96	0.96

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
ekWh/ft^2	2.49
ekWh/m^2	25.83
Percentage Decrease	12.63

B. Environmental Programs

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

1. Eco Schools:
   Click or tap here to enter text. number of schools participate
2. Earth Care Schools:

Click or tap here to enter text. number of schools participate

3. Other:

The name of the program is Click or tap here to enter text.
Click or tap here to enter text. Number of schools participate

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 applied for incentive funding from different agencies to support the implementation of energy efficient projects.

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 Third Party Consultants

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

☒ Other:

Provide Name of Consortia: Lakehead Purchasing Consortium

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: Lakehead Purchasing Consortium

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:

Click or tap here to enter text.

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:

Click or tap here to enter text.

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

I confirm that (insert Board's name) senior management has reviewed and approved this Energy Conservation and Demand Management Plan.

Full Name: Brent Mandryk

Job Title: Superintendent of Business & Corporate Services

Date: June 24, 2024

Investments in Energy Management Strategies

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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)	$ 80,000	$ 67,472	$ 119,437	$ 168,346	$ 194,582
Outdoor Lighting (D502004)	$ -	$ -	$ -	$ 35,000	$ -
Occupancy Sensors (D5021, D5022)	$ -	$ -	$ -	$ -	$ -
Daylight Harvesting	$ -	$ -	$ -	$ -	$ -
Dimming Switches					
Other (Describe)					

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
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)	$ -	$ 145,000	$ -	$ 587,251	$ 412,748
High-efficiency Boiler Burners (D3020)	$ -	$ -	$ -	$ -	$ -
Geothermal (D302099)	$ -	$ -	$ -	$ -	$ -
Heat Recovery/Enthalpy Wheels (D3090)	$ -	$ -	$ -	$ -	$ -
Economizers (D306002)	$ -	$ -	$ -	$ -	$ -
Energy Efficient HVAC systems (D3050,D3040)	$ 255,782	$ 200,919	$ 11,578	$ 760,342	$ 19,289
Energy Efficient Rooftop Units (D302098)	$ -	$ -	$ -	$ -	$ -
High Efficiency Domestic Hot Water (D2020)	$ -	$ 19,946	$ 251,688	$ -	$ -
Efficient Chillers and Controls (D3030, D303011, D303012)	$ -	$ -	$ -	$ -	$ -
High-efficiency Motors (D304007, D303011)	$ -	$ -	$ -	$ 100,000	$ 130,000
VFD (D302056)	$ -	$ -	$ -	$ -	$ -
Demand Ventilation (D3040)	$ -	$ -	$ -	$ -	$ -
Entrance Heater Controls (D302099)	$ -	$ -	$ -	$ -	$ -
Destratification Fans (D3090)					
Other (Describe)	$ -	$ -	$ -	$ -	$ -

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
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)	$ 3,269	$ 94,159	$ 26,580	$ 199,015	$ 203,166
Real-time energy data for operators to identify and diagnose building issues					
Voltage Harmonizers (D501001)					
Other (Describe)	$ -	$ -	$ -	$ -	$ -

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
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)	$ 20,000	$ -	$ -	$ -	$ -
Increased Wall Insulation (B2010)	$ 28,732	$ 22,124	$ 725,089	$ 1,023,789	$ 238,671
New Roof (B3010, B3020)	$ -	$ 18,287	$ 1,571,752	$ 55,000	$ 644,337
New Windows (B2020)	$ 20,000	$ -	$ -	$ 80,000	$ 448,529
Treatments	$ -	$ -	$ -	$ -	$ -
Shading Devices	$ -	$ -	$ -	$ -	$ -
Bilding Envelope	$ 56,442	$ 127,448	$ 65,300	$ 19,130	$ -
Total Investment in Design, Construction and Retrofit Strategies	**$ 464,225**	**$ 695,355**	**$ 2,771,424**	**$ 3,027,873**	**$ 2,291,322**

Investments in Energy Management Strategies

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)					
Daylight Harvesting (servicing)	$ -	$ -	$ -	$ -	$ -
Demand Ventilation (servicing)	$ -	$ -	$ -	$ -	$ -
Water Leak Detection System					
Other (Describe)	$ -	$ -	$ -	$ -	$ -

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
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	$ -	$ -	$ -	$ -	$ -

Investments in Energy Management Strategies

Occupant Behaviour Strategies

	2018-2019	2019-2020	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					
Provide Detailed Information on Energy Consumption (e.g. via the Utility Consumption Database or other database)	$ -	$ -	$ -	$ -	$ -
Participate in Environmental Programs, such as EcoSchools, Earthcare	$ -	$ -	$ -	$ -	$ -
Other tools (Define)	$ -	$ -	$ -	$ -	$ -
Total Investment in Occupant Behaviour Strategies	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

Investments in Energy Management Strategies

	Investment in Renewable Energy Technology ($)						
Type of Renewable Energy	**Fiscal Year 2018-2019**	**Fiscal Year 2019-2020**	**Fiscal Year 2020-2021**	**Fiscal Year 2021-2022**	**Fiscal Year 2022-2023**	**Number of systems added**	**Capacity Added (kW)**
Solar Photovoltaic	$ -	$ -	$ -	$ -	$ -		
Solar Air	$ -	$ -	$ -	$ -	$ -		
Solar Water	$ -	$ -	$ -	$ -	$ -		
Wind Turbine	$ -	$ -	$ -	$ -	$ -		
Biomass	$ -	$ -	$ -	$ -	$ -		
Other	$ -	$ -	$ -	$ -	$ -		
Total	$ -	$ -	$ -	$ -	$ -		

Investments in Energy Management Strategies

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	$ 464,225	$ 695,355	$ 2,771,424	$ 3,027,873	$ 2,291,322	9,250,199
Operations and Maintenance Investments Total	$ -	$ -	$ -	$ -	$ -	0
Occupant Behaviour Investments Total	$ -	$ -	$ -	$ -	$ -	0
Renewable Energy Investments Total	$ -	$ -	$ -	$ -	$ -	0
Total Investment Per Fiscal Year	$ 464,225	$ 695,355	$ 2,771,424	$ 3,027,873	$ 2,291,322	9,250,199

Calculating Energy Conservation Goals for FY 2019 to FY 2023

Press TAB to move to input area. Press UP or DOWN ARROW in column A to read through the document.

Renewable Energy			Estimated number of systems installed						Estimated total number of ekWh generated annually					
Type of Renewable Energy	Define	Number of existing systems in asset portfolio (owned)	Fiscal Year 2023-2024	Fiscal Year 2024-2025	Fiscal Year 2025-2026	Fiscal Year 2026-2027	Fiscal Year 2027-2028	Fiscal Year 2023 - 2024	Fiscal Year 2024 - 2025	Fiscal Year 2025 - 2026	Fiscal Year 2026 - 2027	Fiscal Year 2027 - 2028	Total Size (kW)	Actual or Estimated Total Generation (ekWh)
Solar photovoltaic														0
Solar air														0
Solar water														0
Wind Turbine														0
Biomass														0
Other														0

End of worksheet.

Calculating Energy Conservation Goals for FY 2019 to FY 2023

Design, Construction and Retrofit Strategies

		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)**	**Energy Payback Period**	**% related to Electricity**	**% related to Natural Gas**
High Efficiency Lighting Systems (D5020, D502001, D502003, D502004)	30	$ -	-	$ -	-	$ -	-	$ -	-		-	-	7	100	0
Outdoor Lighting (D502004)	30	$ -	-	$ -	-	$ -	-	$ -	-		-	-	7	100	0
Occupancy Sensors (D5021, D5022)	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	5	100	0
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	0		100

		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28			
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)**	**Energy Payback Period**	**% related to Electricity**	**% related to Natural Gas**
Efficient Boilers (near condensing) (D3020, D302001, D302002)	30	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	15	5	95
High-efficiency Boilers (condensing). (D3020, D302001, D302002)	15	$ 25,000	55,337	$ 25,000	55,337	$ 25,000	55,337	$ 25,000	55,337	$ 25,000	55,337	830,061	10	5	95
High-efficiency Boiler Burners (D3020)	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	5	5	95
Geothermal (D302099)	25	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	35	100	0
Heat Recovery/Enthalpy Wheels (D3090)	20	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	8	20	80
Economizers (D306002)	15	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	7.5	50	50
Energy Efficient HVAC systems (D3050,D3040)	35	$ 20,000	2,721	$ 20,000	2,721	$ 20,000	2,721	$ 20,000	2,721	$ 20,000	2,721	40,815	75	50	50
Energy Efficient Rooftop Units (D302098)	25	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	30	50	50
High Efficiency Domestic Hot Water (D2020)	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	10	15	85
Efficient Chillers and Controls (D3030, D303011, D303012)	25	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	100	100	0
High-efficiency Motors (D304007, D303011)	20	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	10	100	0
VFD (D302056)	10	$ 10,000	15,705	$ 10,000	15,705	$ 10,000	15,705	$ 10,000	15,705	$ 10,000	15,705	235,568	5	75	25
Demand Ventilation (D3040)	15	$ 5,000	10,204	$ 5,000	10,204	$ 5,000	10,204	$ 5,000	10,204	$ 5,000	10,204	153,058	5	50	50
Entrance Heater Controls (D302099)	20	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	5	50	50
Destratification Fans (D3090)	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	7	100	0
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	0		100

		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28			
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)**	**Energy Payback Period**	**% related to Electricity**	**% related to Natural Gas**
Building Automation Systems - New (D3060)	15	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	15	50	50
Building Automation Systems - Upgrade (D3060)	15	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	15	50	50
Real-time energy data for operators to identify and diagnose building issues	10	$ 10,000	34,012	$ 10,000	34,012	$ 10,000	34,012	$ 10,000	34,012	$ 10,000	34,012	510,184	3	50	50
Voltage Harmonizers (D501001)	15	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	7	100	0
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	0		100

		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28			
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)**	**Energy Payback Period**	**% related to Electricity**	**% related to Natural Gas**
Glazing (B302006, B2020, B3021)	30	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	80	20	80
Increased Wall Insulation (B2010)	50	$ 10,000	3,982	$ 557,090	221,829	$ 10,000	3,982	$ 10,000	3,982	$ 10,000	3,982	931,080	40	20	80
New Roof (B3010, B3020)	22	$ 3,460,000	275,538	$ 5,199,982	414,103	-	-	-	-	-	-	3,034,107	200	20	80
New Windows (B2020)	32	$ 20,000	3,982	$ 2,772,000	551,873	$ 20,000	3,982	$ 20,000	3,982	$ 20,000	3,982	2,251,289	80	20	80
Treatments	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	10	20	80
Shading Devices	30	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	20	100	0
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	0		100

		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28
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		**$ 3,560,000**	**401,480**	**$ 8,599,082**	**1,305,774**	**$ 100,000**	**125,942**	**$ 100,000**	**125,942**	**$ 100,000**	**125,942**	**7,986,153**

Keys	
colour: yellow	= Default value
colour: blue	= Calculated Value
$0.1567	= cost of 1 ekWh electricity
$ 0.0393	= cost of 1 ekWh natural gas
0.0952	= m³ = 1 ekWh (as per NRCan conversion table)
$0.4116	= cost of 1 m³ of natural gas

Calculating Energy Conservation Goals for FY 2019 to FY 2023

Press TAB to move to input area. Press UP or DOWN ARROW to scroll and to read through the document.

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)	Energy Payback Period	% related to Electricity	% related to Natural Gas
New School Design/Construction Guidelines and Specifications	5	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	5	50	50
Day and Night Temperature Guidelines for all Schools	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	5	20	80
Nighttime Blackout of Sites - Interior	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	7	100	-
Nighttime Blackout of Sites - Exterior	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	7	100	-
Procures Only Energy Star Certified Appliances	5	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	5	100	-
Demand Ventilation (servicing) (D3020,D3030, D3040)	3	$ 10,000	20,407	$ 20,000	40,815	$ 20,000	40,815	$ 20,000	40,815	$ 20,000	40,815	510,184	5	50	50
HVAC Optimization (coil cleaning, re-calibration of equipment) (D3020)	3	$ 10,000	51,018	$ -	-	$ -	-	$ -	-	$ -	-	255,092	2	50	50
Commissioning (retro and re)	10	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	10	50	50
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	0		100

		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28			
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)	Energy Payback Period	% related to Electricity	% related to Natural Gas
Walk Through Audit	5	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	1000	50	50
Engineering Audit	5	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	1000	50	50
Other (Describe)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	0	-	100

		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28			
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		$ 20,000	71,425	$ 20,000	81,631	$ 20,000	40,815	$ 20,000	40,815	$ 20,000	40,815	765,276			

Keys	
$0.1567	= cost of 1 ekWh electricity
$0.0393	= cost of 1 ekWh natural gas
0.0035	m³ = 1 ekWh
$0.4116	= cost of 1 m³ of natural gas

End of work sheet.

Press TAB to move to input area. Press UP or DOWN ARROW in column A to read through the document.

Occupant Behaviour Strategies

		2023-2024		~~2019-2020~~ 2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28			
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)**	**Energy Payback Period**	**% related to Electricity**	**% related to Natural Gas**
Building Operator Training	3	$ 2,000	6,075	$ 2,000	6,075	$ 2,000	6,075	$ 2,000	6,075	$ 2,000	6,075	91,122	3	60	40
Energy Benchmarking Program	5	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	1000	50	50
Building Automation Training (site specific)	3	$ 1,000	9,112	$ 1,000	9,112	$ 1,000	9,112	$ 1,000	9,112	$ 1,000	9,112	136,683	1	60	40
Ongoing Training and Awareness Programs for Energy Conservation	5	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	10	90	10
Detailed Information on Building Operational Costs	1	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	1000	50	50
Detailed Information on Energy Consumption (e.g. via the Utility Consumption Database or other database)	1	$ 10,000	102	$ 10,000	102	$ 10,000	102	$ 10,000	102	$ 10,000	102	1,531	1000	50	50
Participate in Environmental Programs, such as EcoSchools, Earthcare	1	$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	5	90	10
Other Tools (Define)		$ -	-	$ -	-	$ -	-	$ -	-	$ -	-	-	0		100
Occupant Behaviour Strategies Total		**$ 13,000**	**15,289**	**$ 13,000**	**15,289**	**$ 13,000**	**15,289**	**$ 13,000**	**15,289**	**$ 13,000**	**15,289**	**229,335**			

Keys	
$0.1567	= cost of 1 ekWh electricity
$0.0393	= cost of 1 ekWh natural gas
0.0955	m³ = 1 ekWh
$0.4116	= cost of 1 m³ of natural gas

End of worksheet.

Calculating Energy Conservation Goals for FY 2019 to FY 2023

Press TAB to move to input area. Press UP or DOWN ARROW in column A to read through the document.

Conservation Goal

	FY 2018	
Total Building Area (includes portables) (m²)	89,314	**Enter from UCD. - use square meters**
Total Building Area (includes portables) (ft²)	961,822	**Enter from UCD - use square feet**
Energy Consumption for the board (ekWh)	18,973,700	**Enter from UCD**

1 ft² = 0.0929 m²

	2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28
	Estimated Cost of Implementation	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Cost of Implementation**	**Estimated Annual Energy Savings from all projects (ekWh)**	**Estimated Total Accumulated Energy Savings (ekWh)**
Appendix B: Design, Construction and Retrofit Strategies Total	$ 3,560,000	401,480	$ 8,599,082	1,305,774	$ 100,000	125,942	$ 100,000	125,942	$ 100,000	125,942	7,986,153
Appendix C: Operations and Maintenance Strategies Total	$ 20,000	71,426	$ 20,000	40,815	$ 20,000	40,815	$ 20,000	40,815	$ 20,000	40,815	765,276
Appendix D: Occupant Behaviour Strategies Total	$ 13,000	15,289	$ 13,000	15,289	$ 13,000	15,289	$ 13,000	15,289	$ 13,000	15,289	229,335
TOTAL	**$ 3,593,000**	**488,195**	**$ 8,632,082**	**1,361,878**	**$ 133,000**	**182,046**	**$ 133,000**	**182,046**	**$ 133,000**	**182,046**	**8,980,764**
Percentage reduction		**2.57**		**7.18**		**0.96**		**0.96**		**0.96**	**12.63**
Conservation Goal (ekWh/m²)		**5.47**		**15.25**		**2.04**		**2.04**		**2.04**	**26.83**
Conservation Goal (ekWh/ft²)		**0.51**		**1.42**		**0.19**		**0.19**		**0.19**	**2.49**

Note	Note	Note	Note	Note
Check the total in cell B15 to confirm validity of estimated amount to be spent during that year	**Check the total in cell D15 to confirm validity of estimated amount to be spent during that year**	**Check the total in cell F15 to confirm validity of estimated amount to be spent during that year**	**Check the total in cell H15 to confirm validity of estimated amount to be spent during that year**	**Check the total in cell J15 to confirm validity of estimated amount to be spent during that year**

End of worksheet.