

# **Energy Conservation and Demand Management Plan**

**2023- 2024 to 2027-2028**

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## Education Sector Background

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### 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 1<sup>st</sup> to August 31<sup>st</sup>), 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

## **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	44	41	3
Total Number of Portables/Portapaks	6	13	7
Total Floor Area	2,407,965	2,348,891	59,074
Average Operating Hours	76	76	0
Average Daily Enrolment	12,608	13,940	1,332
% of Total Floor Area Air Conditioned	10	10	0
Number of Facilities with Mechanical Ventilation	8- fully 32- partial	33- fully 7- partial	24
Other Relevant Changes in the Operation of Assets: Hepa units in every school	0	1,200	1,200

### **B. Energy Usage Data for the Board**

The following table lists the “metered”<sup>1</sup> 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)	12,207,473	12,884,055
Total Natural Gas (ekWh)	36,937,192	32,406,388
Total Heating Fuel (Type 1 and 2) (ekWh)	2,976,438	2,395,452

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<sup>1</sup> Metered consumption is the quantity of energy used and does not include a loss adjustment value (the quantity of energy lost in transmission).

Utility	Fiscal Year 2017 to 2018 (Baseline year)	Fiscal Year 2022 to 2023
Total Propane (ekWh)	369,076	970,315

### 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)<sup>2</sup> and Cooling Degree Days (CDD)<sup>3</sup> 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<sup>4</sup> 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).

<sup>2</sup> 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.

<sup>3</sup> 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.

<sup>4</sup> 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)	49,655,504	40,721,656
Energy Intensity (ekWh/ft <sup>2</sup> )	20.62	17.2
Total GHG Emissions (kgCO <sub>2</sub> )	7,692,549	5,791,010
Emissions Intensity (kgCO <sub>2</sub> /ft <sup>2</sup> )	3.19	2.47
Emissions Intensity (kgCO <sub>2</sub> /m <sup>2</sup> )	35.25	26.53

**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/ft <sup>2</sup>	Conservation Goal Percentage	Actual Energy Savings ekWh/ft <sup>2</sup>	Actual Energy Percentage
2018 to 2019	0.2	0.91	14.56	29.3
2019 to 2020	0.33	1.5	19.14	-24
2020 to 2021	0.15	0.70	17.4	9.1
2021-2022	0.32	1.49	17.55	-0.85
2022 to 2023	0.25	1.14	17.2	1.99

**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<sup>2</sup> – 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)	Variance
Forecasted Cumulative Energy Intensity Conservation Goal of Fiscal Year 2018 to 2019 through Fiscal Year 2022 to 2023 <a href="#">Source: Board's 2019 Plan (to be input by Board)</a>	1.25	Do not write in this cell
Forecasted Cumulative Energy Intensity Conservation Goal as a Percentage <a href="#">Source: Board's 2019 Plan (to be input by Board)</a>	Do not write in this cell	5.74
Actual Cumulative Energy Intensity Reduced or Increased from Fiscal Year 2018 to 2019 through Fiscal Year 2022 to 2023 – Weather Normalized	3.42	Do not write in this cell
Variance between 2019 Forecast Cumulative Conservation Goal and Actual Cumulative	2.17	Do not write in this cell

Cumulative Energy Intensity	(ekWh/ft2)	Variance
Energy Intensity– Weather Normalized		
% of Cumulative Energy Intensity Conservation Goal Achieved - Weather Normalized	Do not write in this cell	173%

**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. 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. To date the Board's energy management strategy has included the following:

#### Design, Construction and Retrofit Strategies

2. 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

3. 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

## 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 <sup>2</sup>	0.81	0.50	0.30	0.42	0.21
ekW/m <sup>2</sup>	8.75	5.41	3.23	4.52	2.24

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	3.92	2.43	1.45	2.03	1.00

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 <sup>2</sup>	2.24
ekWh/m <sup>2</sup>	24.15
Percentage Decrease	10.83

## **B. Environmental Programs**

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

1. Eco Schools:  
41 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 \$ 254,000 in 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 [Click or tap here to enter text.](#)

#### **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: [Click or tap here to enter text.](#)

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: [Click or tap here to enter text.](#)

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

☐ Yes

☒ No

If yes,

1. ☐ Ontario Education Collaborative Marketplace's (also known as OECM)

2. ☐ Other:

Provide Name of Consortia: [Click or tap here to enter text.](#)

## **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. Carbon Reduction strategies**

1. The board has in place a strategy to switch the fuel currently used to one with a better emissions factor.

☒ fuel oil to propane

Number of facilities 2

2. The board plans to introduce ventilation controls:

☐ Heat Wheel Recovery

Number of facilities Click or tap here to enter text.

☐ CO2 controls / on demand

Number of facilities Click or tap here to enter text.

3. Board is limited by options to move to “cleaner” fuel based on availability, lack of infrastructure, or equipment/mechanical system constraints.

To manage energy consumption, the board has in place the following set point temperatures:

Category	Definition	Winter		Summer	
		Applicable Dates	Set Point	Applicable Dates	Set Point
<b>Occupied</b>	6a.m. to 11 p.m.	October to May	23C	May to October	19C
<b>Unoccupied</b>	11 p.m. to 6 a.m.	All year	18 C	All year	18 C

**G. 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: Adam Guilbault

Job Title: Superintendent of Business

Date: May 8<sup>th</sup>, 2024



## INSTRUCTIONS AND BACKGROUND INFORMATION

1. The spreadsheet is made up of 7 tabs - 2 tabs for informational support; 5 tabs for boards to populate:

Instructions - Information for boards

UNIFORMAT Codes - Information for boards

App A - **Renewable Energy** - board to populate

App B - **Design, Construction, Retrofit** - board to populate

App C - **Operations & Maintenance** - board to populate

App D - **Occupant Behaviour** - board to populate

NOTE

App E - **Conservation Goals** - board must enter Total Floor Area & Energy Consumption from latest FY (top left corner); all other data fields are automatically populated based on the data entered into Appendices A, B, C & D

2. Users should calculate the total investment across the board's asset portfolio for each row, on each tab

NOTE

\* VFA Board Expenditure Report is useful in calculating many of these values

3. The equation for calculating the estimated energy savings is shown in the Word template, page 19

4. the following fields have been pre-populated for the sector, but can be changed by the user:

\* Quantity of Time the Measure will be in place (years)

\* Energy Payback Period

\* % related to electricity (automatically calculates % of natural gas)

\* unit cost of electricity and natural gas

### 5. Unit Costs

\* this template has been prepopulated with the **provincial weighted average** electricity and natural gas unit costs from the **FY2022- Sector Energy Cost Analysis Report**

\* boards can use another value if they choose

Option # 1 - use your **board's** unit costs from the **FY2022 Sector Energy Cost Analysis Report** (found in the UCD at the **MEC\_EDU level**, under the **Document** tab

Option # 2 - use the **Utility Cost Analysis Report (EDU 09)** for FY2022 or FY2023 (Note: if using FY2023, you need to ensure all consumption data is updated in the UCD before generating or your values will be skewed) (found in the UCD, at your **board portfolio level**, under the **Export** tab) and manually enter the utility expenditures for each facility

### UNIFORMAT NOTES

- some projects may be attributed to another UNIFORMAT code because of their main purpose

#### Examples

1. LED exterior signage upgrade project could be attributed to code G204005 - Site Development - Signage
  2. replacement of rooftop HVAC device may have more than one UNIFORMAT code due to multiple work areas
- D304007 - Distribution Systems - Exhaust Systems  
D304008 - Air Handling Units  
D306002 - Controls and Instrumentation - Electronic

### List of UNIFORMAT codes and values used by Boards in expenditure reports in VFA

H.V.A.C.	
D30	HVAC
D3010	Energy Supply
D301001	Energy Supply System Oil
D301002	Energy Supply System Natural Gas
D301005	Energy Supply System Hot Water from Central Plant
D301006	Energy Supply System Solar
D301007	Energy Supply System Wind
D301010	Energy Supply System Propane
D3012	Gas Supply System
D3020	Heat Generating Systems
D302001	Heat Generating Steam Boilers
D302002	Heat Generating Hot Water Boilers
D302003	Heat Generating Furnaces
D302004	Heat Generating Fuel Fired Unit Heaters
D302006	Heat Generating Equipment Thermal Insulation
D302050	Auxiliary Equipment Chemical
D302051	Auxiliary Equipment Expansion Tanks

D302052	Auxiliary Equipment Heat Exchanger
D302053	Auxiliary Equipment Humidifiers
D302054	Auxiliary Equipment HVAC Pumps
D302055	Auxiliary Equipment Stacks & Breaching
D302056	Auxiliary Equipment Variable Frequency Drives (VFD)
D302057	Auxiliary Equipment Glycol
D302097	Heat Generating MakeUp AHU
D302098	Heat Generating Roof Top AHU Heat & Cool
D302099	Heat Generating Other
D3030	Cooling Generating Systems
D303011	Chilled Water Systems Chillers
D303012	Chilled Water Systems Cooling Towers
D303099	Cooling Generating Systems Other
D3040	Distribution Systems
D304001	Distribution Systems Air Distribution, Heating & Cooling
D304002	Distribution Systems Steam Distribution Systems
D304003	Distribution Systems Heated Water Distribution Systems
D304005	Distribution Systems Glycol Distribution Systems
D304006	Distribution Systems Chilled Water Distribution Systems
D304007	Distribution Systems Exhaust Systems
D304008	Air Handling Units
D304009	Distribution Systems Heat/Enthalpy Recovery Ventilation
D3050	Terminal and Package Units
D305001	Terminal and Package Units Unit Ventilators
D305002	Terminal and Package Units Unit Heaters
D305003	Terminal and Package Units Fan Coil Units
D305004	Terminal and Package Units Fin Tube Radiation
D305006	Terminal and Package Units Package Units
D305007	Terminal and Package Units Heat Pumps
D305099	Terminal and Package Units Other
D3060	Controls and Instrumentation
D306002	Controls and Instrumentation Electronic
D306003	Controls and Instrumentation Pneumatic
D306004	Building Automation System (F105002)

D3090	Other HVAC Systems and Equipment
D309002	Other HVAC Systems and Equipment Refrigeration Systems
D2020	Domestic Water Distribution
D202001	Domestic Water Distribution Pipes and Fittings
D202030	Domestic Water Distribution Natural Gas DWH
D202031	Domestic Water Distribution Electric DWH
D202032	Domestic Water Distribution Instantaneous Hot Water Heaters
D202033	Domestic Water Distribution Pumps
D202034	Domestic Water Distribution Water Storage Tanks
D202035	Domestic Water Distribution Water Treatment Systems
D202099	Domestic Water Distribution Other Supply
D2023	Domestic Water Supply Equipment
<b>Controls</b>	
D50	Electrical
D5010	Electrical Service and Distribution
D501001	Electrical Service and Distribution Main Transformer
D501002	Electrical Service and Distribution Secondary Transformer
D501003	Electrical Service and Distribution Main Switchboard
D501004	Electrical Service and Distribution Interior Distribution Transformer
D501005	Electrical Service and Distribution Panel
D501007	Electrical Service and Distribution Motor Control Centre
D501099	Electrical Service and Distribution Other
<b>Lighting</b>	
D5020	Lighting and Branch Wiring
D502001	Lighting and Branch Wiring Branch Wiring
D502003	Lighting and Branch Wiring Interior Lighting
D502004	Lighting and Branch Wiring Exterior Lighting
D502005	Lighting and Branch Wiring Exit Lighting and Signs
D502006	Lighting and Branch Wiring Stage Lighting
D502007	Lighting and Branch Wiring Emergency Lighting
D5021	Branch Wiring Devices
D5022	Lighting Equipment

Building Envelope	
B30	Roofing
B3010	Roof Coverings
B3020	Roof Openings
B302006	Roof Openings Skylight
B3021	Glazed Roof Openings
B3022	Roof Hatches
B2010	Exterior Walls
B2020	Exterior Windows



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.

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	\$ -	-	\$ 100,000	91,166	\$ 100,000	91,166	\$ 100,000	91,166	\$ 100,000	91,166	91,1660	7	100	0	
Outdoor Lighting (D502204)	30	\$ -	-	\$ -	12,416	\$ -	11,319	\$ -	50,939	\$ -	46,439	80,397	7	100	0	
Occupancy Sensors (D5021, D5022)	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	5	100	0	
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	0		100	

H.V.A.C.	Quantity of Time that Measure will be in place (years)	2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28		Energy Payback Period	%related to Electricity	%related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)				
Efficient Boilers (near condensing) (D3020, D302001, D302002)	30	\$ 1,000,000	1,475,664	\$ 300,000	442,689	\$ -	-	\$ 220,714	325,700	\$ -	-	9,800,615	16	5	95	
High-efficiency Boilers (condensing) (D3020, D302001, D302002)	15	-	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	10	5	95	
High-efficiency Boiler Burners (D3020)	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	5	5	95	
Geothermal (D30209 )	25	\$ -	-	\$ 54,665	9,967	\$ 54,665	9,967	\$ 54,665	9,967	\$ 54,665	9,967	99,672	35	100	0	
Heat Recovery/Enthalpy Wheels (D3030)	20	\$ 400,000	159,271	\$ -	-	\$ -	-	\$ -	-	\$ -	-	795,353	40	20	80	
Economizers (D306002)	15	\$ -	-	\$ 300,000	408,147	\$ 324,952	300,000	\$ 300,000	408,147	\$ 100,000	136,048	3,555,795	7.5	50	50	
Energy Efficient HVAC systems (D3050,D3040)	35	\$ -	-	\$ -	-	\$ -	-	\$ 347,079	47,220	\$ -	-	-	94,440	75	50	50
Energy Efficient Rooftop Units (D302098)	25	\$ 1,000,000	182,208	\$ -	-	\$ -	-	\$ -	-	\$ -	-	911,042	56	50	50	
High Efficiency Domestic Hot Water (D22020)	10	\$ -	-	\$ -	-	\$ -	-	\$ 10,258	16,023	\$ -	-	35,045	10	15	85	
Efficient Chillers and Controls (D3030, D303011, D303012)	25	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	100	100	0	
High-efficiency Motors (D304007, D303011)	20	\$ -	-	\$ 99,329	63,388	\$ -	-	\$ -	-	\$ -	-	253,552	10	100	0	
VFD (D302056)	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	5	75	25	
Demand Ventilation (D3048)	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	5	50	50	
Entrance Heater Controls (D302099)	20	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	5	50	50	
Destratification Fans (D3090)	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	7	100	0	
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	0		100	

Controls		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28		Energy Payback Period	%related to Electricity	%related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)				
Building 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	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	3	50	50	
Voltage Harmonizers (D501001)	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	7	100	0	
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	0		100	

Building Envelope	Quantity of Time that Measure will be in place	2023-2024		2024-2025		2025-2026		2026-27		2027-2028		Estimated Total Accumulated Energy Savings (ekWh)	Energy Payback Period	%related to Electricity	%related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)				
Glazing (B30206, B2020, B3021)	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	80	20	80
Increased Wall Insulation (B2010)	50	\$ -	-	\$ 200,000	79,635	\$ 200,000	79,635	\$ -	-	\$ 109,603	43,641	601,088	40	20	80
New Roof (B3019, B3020)	22	\$ 400,000	31,854	\$ 390,180	31,072	\$ 390,180	31,072	\$ 31,072	1,323,770	\$ 108,419	544,938	200	20	80	
New Windows (B2020)	32	\$ 300,000	59,726	\$ 278,551	55,496	\$ 783,278	155,941	\$ 277,637	55,274	\$ 277,637	55,274	1,154,105	80	20	80
Treatments	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	10	20	80
Shading Devices	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	20	100	0
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	0		100

Design, Construction & Retrofit Strategies Total	Quantity of Time that Measure will be in place	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)	
Total		\$ 3,100,000	1,908,723	\$ 1,722,725	1,161,531	\$ 1,779,388	704,053	\$ 1,700,533	986,569	\$ 2,016,614	487,956	10,842,993	

Keys	
colour yellow	= Default value
colour blue	= Calculated Value
\$0.1967	= cost of 1 ekWh electricity
0.0303	= cost of 1 ekWh natural gas
0.0090	m³ = 1 ekWh (as per NRCan conversion table)
\$0.4116	= cost of 1 m³ of natural gas

Table 2023-2024 Operations and Maintenance Strategies

Measure and Implementation Strategies		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28		Energy Payback Period	%related to Electricity	%related to Natural Gas
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	50	50
Day and Night Temperature Guidelines for all Schools	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	5	20	60
Nighttime Blackout of Sites - Interior	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	7	100	-
Nighttime Blackout of Sites - Exterior	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	7	100	-
Procure Only Energy Star Certified Appliances	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	5	100	-
Demand Ventilation (revising) (D3020,D3030, D3040)	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	5	50	50
HVAC Optimization (cool down, re-calibration of equipment) (D3020)	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	2	50	50
Commissioning (redo and re)	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	10	50	50
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	0		100

Energy Audits	Quantity of Time that Measure will be in place	2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28		Energy Payback Period	%related to Electricity	%related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)				
Walk Through Audit	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	100	50	50
Engineering Audit	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	100	50	50
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	0		100

Operations and Maintenance Strategies Total		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28				
Total		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)				

Keys	
\$6.1567	= cost of 1 ekWh electricity
\$0.0003	= cost of 1 ekWh natural gas
\$0.4116	= cost of 1 m³ of natural gas

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

Occupant Behaviour Strategies

Training and Education	Quantity of Time that Measure will be in place (years)	2023-2024		2019-2020 2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28	Energy Payback Period	% related to Electricity	% related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)			
Building Operator Training	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	3	60	40
Energy Benchmarking Program	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	1000	50	50
Building Automation Training (site specific)	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	1	60	40
Ongoing Training and Awareness Programs for Energy Conservation	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	10	90	10
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	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	1000	50	50
Participate in Environmental Programs, such as EcoSchools, Earthcare	1		-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	5	90	10
Other Tools (Define)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	0		100
Occupant Behaviour Strategies Total		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-			

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)		218,211	Enter from UCD - use square meters
Total Building Area (includes portables) (ft²)		2,348,891	Enter from UCD - use square feet
Energy Consumption for the board (ekWh)		48,656,210	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	\$ 3,100,000	1,908,723	\$ 1,722,725	1,181,531	\$ 1,779,388	704,053	\$ 1,700,533	986,569	\$ 2,016,614	487,956	18,842,993
Appendix C: Operations and Maintenance Strategies Total	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	0
Appendix D: Occupant Behaviour Strategies Total	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	0
TOTAL	\$ 3,100,000	1,908,723	\$ 1,722,725	1,181,531	\$ 1,779,388	704,053	\$ 1,700,533	986,569	\$ 2,016,614	487,956	18,842,993
Percentage reduction		3.92		2.43		1.45		2.03		1.00	10.83
Conservation Goal (ekWh/m²)		8.75		5.41		3.23		4.52		2.24	24.15
Conservation Goal (ekWh/ft²)		0.81		0.50		0.30		0.42		0.21	2.24
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		

End of worksheet.

**Please note:**

- some projects could be attributed to another UNIFORMAT code because of their main purpose

(LED exterior signage upgrade project could be attributed to code G204005 - Site Development - Signage)

- some projects like replacing rooftop HVAC device related to more than one UNIFORMAT code due to multiple work areas

(D304007 - Distribution Systems - Exhaust Systems, D304008 - Air Handling Units, D306002 - Controls and Instrumentation - Electronic .etc..)

## INSTRUCTIONS AND BACKGROUND INFORMATION

1. The spreadsheet is made up of 7 tabs - 2 tabs for informational support; 5 tabs for boards to populate:

Instructions - Information for boards

UNIFORMAT Codes - Information for boards

App A - **Renewable Energy** - board to populate

App B - **Design, Construction, Retrofit** - board to populate

App C - **Operations & Maintenance** - board to populate

App D - **Occupant Behaviour** - board to populate

NOTE

App E - **Conservation Goals** - board must enter Total Floor Area & Energy Consumption from latest FY (top left corner); all other data fields are automatically populated based on the data entered into Appendices A, B, C & D

2. Users should calculate the total investment across the board's asset portfolio for each row, on each tab

NOTE

\* VFA Board Expenditure Report is useful in calculating many of these values

3. The equation for calculating the estimated energy savings is shown in the Word template, page 19

4. the following fields have been pre-populated for the sector, but can be changed by the user:

\* Quantity of Time the Measure will be in place (years)

\* Energy Payback Period

\* % related to electricity (automatically calculates % of natural gas)

\* unit cost of electricity and natural gas

### 5. Unit Costs

\* this template has been prepopulated with the **provincial weighted average** electricity and natural gas unit costs from the **FY2022- Sector Energy Cost Analysis Report**

\* boards can use another value if they choose

Option # 1 - use your **board's** unit costs from the **FY2022 Sector Energy Cost Analysis Report** (found in the UCD at the **MEC\_EDU level**, under the **Document** tab)

Option # 2 - use the **Utility Cost Analysis Report (EDU 09)** for FY2022 or FY2023 (Note: if using FY2023, you need to ensure all consumption data is updated in the UCD before generating or your values will be skewed) (found in the UCD, at your **board portfolio level**, under the **Export** tab) and manually enter the utility expenditures for each facility

### UNIFORMAT NOTES

- some projects may be attributed to another UNIFORMAT code because of their main purpose

#### Examples

1. LED exterior signage upgrade project could be attributed to code G204005 - Site Development - Signage
  2. replacement of rooftop HVAC device may have more than one UNIFORMAT code due to multiple work areas
- D304007 - Distribution Systems - Exhaust Systems  
D304008 - Air Handling Units  
D306002 - Controls and Instrumentation - Electronic

### List of UNIFORMAT codes and values used by Boards in expenditure reports in VFA

H.V.A.C.	
D30	HVAC
D3010	Energy Supply
D301001	Energy Supply System Oil
D301002	Energy Supply System Natural Gas
D301005	Energy Supply System Hot Water from Central Plant
D301006	Energy Supply System Solar
D301007	Energy Supply System Wind
D301010	Energy Supply System Propane
D3012	Gas Supply System
D3020	Heat Generating Systems
D302001	Heat Generating Steam Boilers
D302002	Heat Generating Hot Water Boilers
D302003	Heat Generating Furnaces
D302004	Heat Generating Fuel Fired Unit Heaters
D302006	Heat Generating Equipment Thermal Insulation
D302050	Auxiliary Equipment Chemical
D302051	Auxiliary Equipment Expansion Tanks



D302052	Auxiliary Equipment Heat Exchanger
D302053	Auxiliary Equipment Humidifiers
D302054	Auxiliary Equipment HVAC Pumps
D302055	Auxiliary Equipment Stacks & Breaching
D302056	Auxiliary Equipment Variable Frequency Drives (VFD)
D302057	Auxiliary Equipment Glycol
D302097	Heat Generating MakeUp AHU
D302098	Heat Generating Roof Top AHU Heat & Cool
D302099	Heat Generating Other
D3030	Cooling Generating Systems
D303011	Chilled Water Systems Chillers
D303012	Chilled Water Systems Cooling Towers
D303099	Cooling Generating Systems Other
D3040	Distribution Systems
D304001	Distribution Systems Air Distribution, Heating & Cooling
D304002	Distribution Systems Steam Distribution Systems
D304003	Distribution Systems Heated Water Distribution Systems
D304005	Distribution Systems Glycol Distribution Systems
D304006	Distribution Systems Chilled Water Distribution Systems
D304007	Distribution Systems Exhaust Systems
D304008	Air Handling Units
D304009	Distribution Systems Heat/Enthalpy Recovery Ventilation
D3050	Terminal and Package Units
D305001	Terminal and Package Units Unit Ventilators
D305002	Terminal and Package Units Unit Heaters
D305003	Terminal and Package Units Fan Coil Units
D305004	Terminal and Package Units Fin Tube Radiation
D305006	Terminal and Package Units Package Units
D305007	Terminal and Package Units Heat Pumps
D305099	Terminal and Package Units Other
D3060	Controls and Instrumentation
D306002	Controls and Instrumentation Electronic
D306003	Controls and Instrumentation Pneumatic
D306004	Building Automation System (F105002)

D3090	Other HVAC Systems and Equipment
D309002	Other HVAC Systems and Equipment Refrigeration Systems
D2020	Domestic Water Distribution
D202001	Domestic Water Distribution Pipes and Fittings
D202030	Domestic Water Distribution Natural Gas DWH
D202031	Domestic Water Distribution Electric DWH
D202032	Domestic Water Distribution Instantaneous Hot Water Heaters
D202033	Domestic Water Distribution Pumps
D202034	Domestic Water Distribution Water Storage Tanks
D202035	Domestic Water Distribution Water Treatment Systems
D202099	Domestic Water Distribution Other Supply
D2023	Domestic Water Supply Equipment
<b>Controls</b>	
D50	Electrical
D5010	Electrical Service and Distribution
D501001	Electrical Service and Distribution Main Transformer
D501002	Electrical Service and Distribution Secondary Transformer
D501003	Electrical Service and Distribution Main Switchboard
D501004	Electrical Service and Distribution Interior Distribution Transformer
D501005	Electrical Service and Distribution Panel
D501007	Electrical Service and Distribution Motor Control Centre
D501099	Electrical Service and Distribution Other
<b>Lighting</b>	
D5020	Lighting and Branch Wiring
D502001	Lighting and Branch Wiring Branch Wiring
D502003	Lighting and Branch Wiring Interior Lighting
D502004	Lighting and Branch Wiring Exterior Lighting
D502005	Lighting and Branch Wiring Exit Lighting and Signs
D502006	Lighting and Branch Wiring Stage Lighting
D502007	Lighting and Branch Wiring Emergency Lighting
D5021	Branch Wiring Devices
D5022	Lighting Equipment

Building Envelope	
B30	Roofing
B3010	Roof Coverings
B3020	Roof Openings
B302006	Roof Openings Skylight
B3021	Glazed Roof Openings
B3022	Roof Hatches
B2010	Exterior Walls
B2020	Exterior Windows

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.

Design, Construction and Retrofit Strategies

Lighting	Quantity of Time that Measure will be in place (years)	2023-2024		2024-2025		2025-2026		2026-27		2027-2028		Estimated Total Accumulated Energy Savings (ekWh)	Energy Payback Period	% related to Electricity	% related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Annual Energy Saving (ekWh)					
High Efficiency Lighting Systems (D5020, D502001, D502003, D502004)	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	7	100	0
Outdoor Lighting (D502004)	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	7	100	0
Occupancy Sensors (D5021, D5022)	10	\$ -	30,000	\$ -	38,290	\$ -	-	\$ -	-	\$ -	-	191,449	5	100	0
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	0	100	100

H.V.A.C.	Quantity of Time that Measure will be in place (years)	2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28		Energy Payback Period	%related to Electricity	%related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)				
Efficient Boilers (near condensing) (D3020, D302001, D302002)	30	\$ 2,130,000	3,143,164	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	16,715,819	16	5	95
High-efficiency Boilers (condensing) (D3020, D302001, D302002)	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	10	5	95
High-efficiency Boiler Burners (D3020)	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	5	5	95
Geothermal (D302091)	25	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	35	100	0
Heat Recovery/Enthalpy Wheels (D3030)	20	\$ 1,700,000	676,900	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	3,384,500	40	20	80
Economizers (D306002)	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	7.5	50	50
Energy Efficient HVAC systems (D3050,D3040)	35	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	75	50	50
Energy Efficient Rooftop Units (D302098)	25	\$ 3,650,000	665,061	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	3,325,305	56	50	50
High Efficiency Domestic Hot Water (D2020)	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	10	15	85
Efficient Chillers and Controls (D3010, D303011, D303012)	25	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	100	100	0
High-efficiency Motors (D304007, D303011)	20	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	10	100	0
VFD (D302056)	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	5	75	25
Demand Ventilation (D3048)	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	5	50	50
Entrance Heater Controls (D302099)	20	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	5	50	50
Destratification Fans (D3090)	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	7	100	0
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	0	100	100

Controls		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28		Energy Payback Period	%related to Electricity	%related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)				
Building 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	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	3	50	50
Voltage Harmonizers (D501001)	15	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	7	100	0
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	0	100	100

Building Envelope	Quantity of Time that Measure will be in place	2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28		Energy Payback Period	%related to Electricity	%related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)				
Glazing (B302006, B2020, B3021)	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	80	20	80
Increased Wall Insulation (B2010)	50	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	40	20	80
New Roof (B3010, B3020)	22	\$ 400,000	31,854	\$ -	-	\$ -	-	\$ -	-	\$ -	-	159,271	200	20	80	
New Windows (B2020)	32	\$ 300,000	59,726	\$ -	-	\$ -	-	\$ -	-	\$ -	-	268,632	80	20	80	
Treatments	10	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	10	20	80	
Shading Devices	30	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	20	100	0	
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	0		100	

Design, Construction & Retrofit Strategies Total	Quantity of Time that Measure will be in place	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)	
Total		\$ 8,210,000	4,614,995	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	23,074,975

Keys	
colour: yellow	= Default value
colour: blue	= Calculated Value
\$5,1967	= cost of 1 ekWh electricity
0.0303	= cost of 1 ekWh natural gas
0.0090	m³ = 1 ekWh (as per NRCan conversion table)
\$0.4116	= cost of 1 m³ of natural gas

Table 2023-2024 Operations and Maintenance Strategies

Policy and Planning		2023-2024	2024-2025	2025-2026	2026-27	2027-2028	2023/24-2027/28	Energy Payback Period	%related to Electricity	%related to Natural Gas
Quantity of Time that Measure will be in place (years)	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 Total Accumulated Energy Savings (ekWh)			
New School Design/Construction Guidelines and Specifications	5	\$ -	\$ -	\$ -	\$ -	\$ -	-	5	50	50
Day and Night Temperature Guidelines for all Schools	10	\$ -	\$ -	\$ -	\$ -	\$ -	-	5	20	60
Nighttime Blackout of Sites - Interior	10	\$ -	\$ -	\$ -	\$ -	\$ -	-	7	100	-
Nighttime Blackout of Sites - Exterior	10	\$ -	\$ -	\$ -	\$ -	\$ -	-	7	100	-
Procure Only Energy Star Certified Appliances	5	\$ -	\$ -	\$ -	\$ -	\$ -	-	5	100	-
Demand Ventilation (revising) (D3020, D3030, D3040)	3	\$ -	\$ -	\$ -	\$ -	\$ -	-	5	50	50
HVAC Optimization (cool down, re-calibration of equipment) (D3020)	3	\$ -	\$ -	\$ -	\$ -	\$ -	-	2	50	50
Commissioning (redo and re)	10	\$ -	\$ -	\$ -	\$ -	\$ -	-	10	50	50
Other (Describe)		\$ -	\$ -	\$ -	\$ -	\$ -	-	0		100

Energy Audits	Quantity of Time that Measure will be in place	2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28		Energy Payback Period	%related to Electricity	%related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)				
Walk Through Audit	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	100	50	50
Engineering Audit	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	100	50	50
Other (Describe)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	-	0		100

Operations and Maintenance Strategies Total		2023-2024		2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28				
Total		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)				

Keys	
\$6.1567	= cost of 1 ekWh electricity
\$0.0003	= cost of 1 ekWh natural gas
\$0.4116	= cost of 1 m³ of natural gas

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

Occupant Behaviour Strategies

Training and Education	Quantity of Time that Measure will be in place (years)	2023-2024		2019-2020 2024-2025		2025-2026		2026-27		2027-2028		2023/24-2027/28	Energy Payback Period	% related to Electricity	% related to Natural Gas
		Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Cost of Implementation	Estimated Annual Energy Savings from all projects (ekWh)	Estimated Total Accumulated Energy Savings (ekWh)			
Building Operator Training	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	3	60	40
Energy Benchmarking Program	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	1000	50	50
Building Automation Training (site specific)	3	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	1	60	40
Ongoing Training and Awareness Programs for Energy Conservation	5	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	10	90	10
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	\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	1000	50	50
Participate in Environmental Programs, such as EcoSchools, Earthcare	1	\$ 25,000	34,492	\$ -	-	\$ -	-	\$ -	-	\$ -	-	172,460	5	90	10
Other Tools (Define)		\$ -	-	\$ -	-	\$ -	-	\$ -	-	\$ -	-	-	0		100
Occupant Behaviour Strategies Total		\$ 25,000	34,492	\$ -	-	\$ -	-	\$ -	-	\$ -	-	172,460			

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)		-	Enter from UCD - use square meters
Total Building Area (includes portables) (ft²)		2,348,891	Enter from UCD - use square feet
Energy Consumption for the board (ekWh)		48,656,210	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	\$ 8,210,000	4,614,995	\$ -	0	\$ -	0	\$ -	0	\$ -	0	23,074,975
Appendix C: Operations and Maintenance Strategies Total	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	0
Appendix D: Occupant Behaviour Strategies Total	\$ 25,000	34,492	\$ -	0	\$ -	0	\$ -	0	\$ -	0	172,460
TOTAL	\$ 8,235,000	4,649,487	\$ -	0	\$ -	0	\$ -	0	\$ -	0	23,247,435
Percentage reduction		9.56		-		-		-		-	9.56
Conservation Goal (ekWh/m²)		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!	#DIV/0!
Conservation Goal (ekWh/ft²)		1.98		-		-		-		-	1.98

Note  
Check the total in cell B15 to confirm validity of estimated amount to be spent during that year

Note  
Check the total in cell D15 to confirm validity of estimated amount to be spent during that year

Note  
Check the total in cell F15 to confirm validity of estimated amount to be spent during that year

Note  
Check the total in cell H15 to confirm validity of estimated amount to be spent during that year

Note  
Check the total in cell J15 to confirm validity of estimated amount to be spent during that year

End of worksheet.



**Please note:**

- some projects could be attributed to another UNIFORMAT code because of their main purpose

(LED exterior signage upgrade project could be attributed to code G204005 - Site Development - Signage)

- some projects like replacing rooftop HVAC device related to more than one UNIFORMAT code due to multiple work areas

(D304007 - Distribution Systems - Exhaust Systems, D304008 - Air Handling Units, D306002 - Controls and Instrumentation - Electronic .etc..)