630 High Street

Georgian Bay, ON P0C 1H0

Climate Action Roadmap

MacTier Public Works

EFFICIENCY ENGINEERING .COM
A Kontrol Technologies Company

TOWNSHIP OF GEORGIAN BAY

Table of Contents

1 The Executive Summary

Efficiency Engineering has performed a comprehensive Net Zero Retrofit Study at the MacTier Public Works, 630 High Street, for the Township of Georgian Bay. The Township has set aggressive greenhouse gas reduction targets. The purpose of this study is to catalogue the existing energy consuming systems at the building, analyze energy usage within the facility and provide recommendations on how to significantly reduce GHG emissions while improving the energy and water efficiency of the facility.

This study has been developed in accordance with the Federation of Canadian Municipalities (FCM) Community Building Retrofit (CBR) initiative guidelines which require the following scenarios to be studied:

- 50% GHG reductions in 10 years
- 80% GHG reductions in 20 years
- 80% GHG reductions in 5 years

A "business-as-usual" scenario will also be developed to create a 20-year cost baseline for the purposes of comparison.

1.1 Building Overview

The following table summarizes the facility details:

TABLE 1.1.1: FACILITY DETAILS

Building Name:	MacTier Public Works Shop
Client Name:	Township of Georgian Bay
Site Contact:	Jennifer Schnier
Address:	630 High Street
	Georgian Bay, ON
	P0C 1H0
Facility Area:	4,007 ft²
Building Type:	Garage/Workshop
Year Constructed:	1970's
Number of Stories:	1

1.1.1 Existing Building Profile

The MacTier Public Works is a 4,007 ft^2 facility comprised of garage space, workshop space and a small office.

Space heating for the facility is supplied by a combination of electric and propane fired heaters. Electric baseboard heaters are also present.

The facility is equipped with a single electric domestic hot water (DHW) heater tank rated at 4.5kW.

There is no central ventilation system on site, instead the building is ventilated through envelope losses via open garage bay doors and through windows. Some ceiling fans were present which help move the air within the workshop.

Lighting at the facility is provided primarily by T8 linear fluorescent lamps controlled by wall switches and breakers. Exterior lighting has a mix of LED, high pressure sodium and CFL lamps. Exterior lighting is controlled via timers.

Water fixtures (toilets, faucets, etc.) are standard flow units.

All major systems, unit heaters, tube heaters, electric baseboards and electric DHW are controlled through independent controls. Space heating equipment operates to maintain setpoint temperatures through thermostats, while the electric hot water heater tank operates to maintain a static water temperature within the tank.

1.1.2 Existing Energy & GHG Emissions

The facility's existing energy consumption and GHG emissions are summarized as follows:

TABLE 1.1.2: EXISTING ENERGY KPI DETAILS

Utility	Consumption	EUI* (ekWh/ft²)	Total Energy (ekWh)	Emissions (tCO2e)	% of Total Emissions
Electricity	53,499 kWh	13.4	53,499	1.6	8%
Propane	11,485 l	20.3	84,861	17.8	92%
Total	**N/A**	**33.7**	**138,360**	**19.4**	**100%**

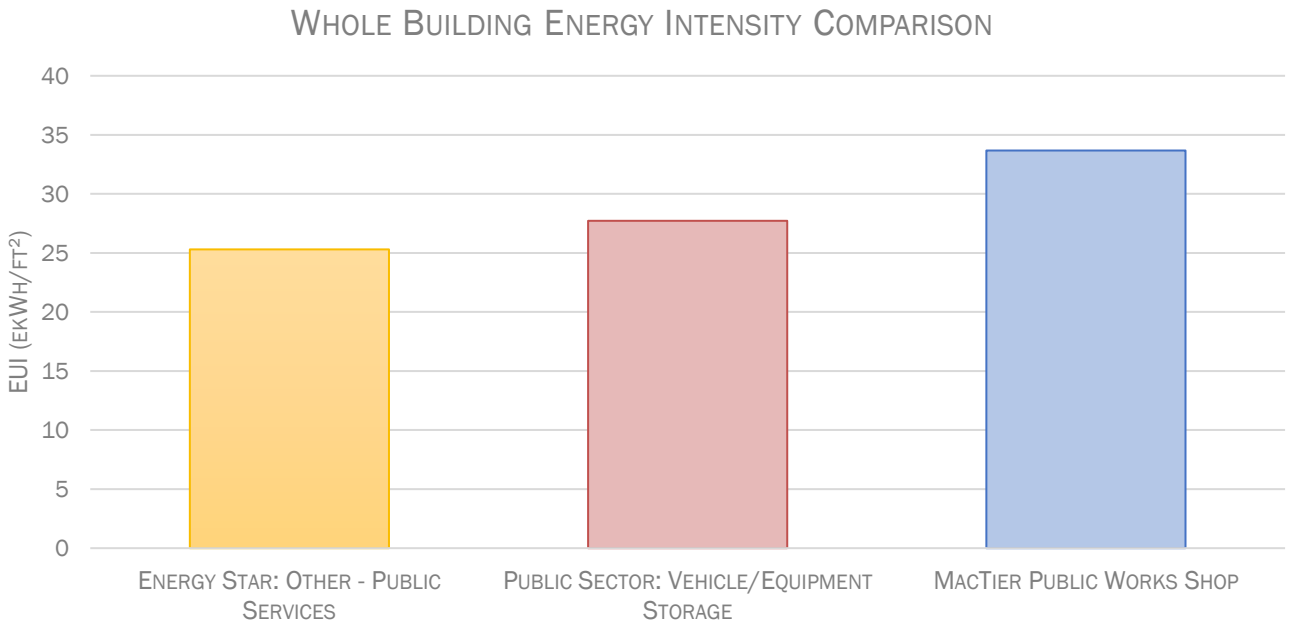
*EUI values presented throughout this report are calculated based on purchased energy and includes electricity provided by the grid, purchased propane etc.

Propane consumption at the facility is responsible for over 92% of GHG emissions at the facility. Propane fired equipment at this facility includes:

- Two (2) propane fired tube heaters used for radiant heating in equipment bays
- One (1) propane fired unit heater used for space heating in equipment bay

Addressing this equipment with a low carbon alternative will be required to achieve either the 50% or 80% GHG reduction target.

The following benchmarking graph displays the comparative energy performance of the buildings studied as a part of this project.



1.2 Master List of Measures

Opp. #	Opportunity	Demand (kW)	Electricity (kWh)	Propane (l)	Water (m^3)	GHG Emissions (tCO_2e)	Annual Savings	Project Costs	Cost per tCO_2e	Simple Payback	Capital Payback	NPV	IRR
1	Replace Tube Heaters with Electric Radiant Heaters	0	-43,850	9,472	0	13.3	-$1,089	$51,797	$244	No Payback	No Payback	($65,116)	No IRR
2	Replace Propane Unit Heater with Electric	0	-9,160	2,013	0	2.8	-$195	$14,877	$247	No Payback	No Payback	($14,030)	No IRR
3	Install Low Flow Washroom Faucets	0	420	0	7	0.0	$129	$480	$0	3.7	3.4	$1,531	32.6%
4	Upgrade Lighting to LED	0	2,110	-109	0	-0.1	$416	$2,497	$1,978	6.0	5.2	$4,177	21.6%
5	Replace DHW Heater with Hybrid ASHP Tank Heater	0	270	0	0	0.0	$61	$11,041	$34,091	180.6	24.7	($5,523)	-1.0%
6	Install a 23-kW Solar PV System	0	28,635	0	0	0.9	$6,485	$133,802	$1,619	20.6	13.9	($27,824)	4.9%
7	Install Triple Pane Windows	0	-40	103	0	0.2	$87	$25,289	$7,558	290.7	55.4	($23,896)	-14.0%
8	Install EIFS	0	920	903	0	1.4	$1,052	$591,783	$20,156	562.8	67.8	($574,853)	-17.4%
9	Electrical Service Upgrade	0	0	0	0	0.0	$0	$117,711	N/A	No Payback	No Payback	($117,711)	No IRR

1.3 GHG Reduction Pathways

The GHG Reduction Pathways tie together all aspects of the audit, providing an implementation plan which considers energy savings and the results of the financial analysis as well as the need for capital renewal and budgeting.

This study analyzes four potential roadmaps for decarbonization. Generally speaking, the Roadmaps progress from less complex measures with lower installation costs to more complex and more efficient solutions with the understanding that more expensive equipment may provide lower operating costs.

Roadmap 1 – Minimum Performance: 50% GHG Reductions over 10 Years

This includes a group of energy reduction measures that will achieve a 50% reduction in GHGs over the following 10 years. This will generally include the lowest cost measures available to achieve this target.

Roadmap 2 – Minimum Performance: 80% Reductions over 20 Years

This includes a group of energy reduction measures that will achieve a 80% reduction in GHGs over the following 20 years. This will generally require the inclusion of the most aggressive GHG reduction measures, regardless of cost.

Roadmap 3 – Aggressive Performance: 80% Reductions over 5 Years

This roadmap will include the same suite of measures that Roadmap 2 includes, but with a more accelerated timeline of 5 years.

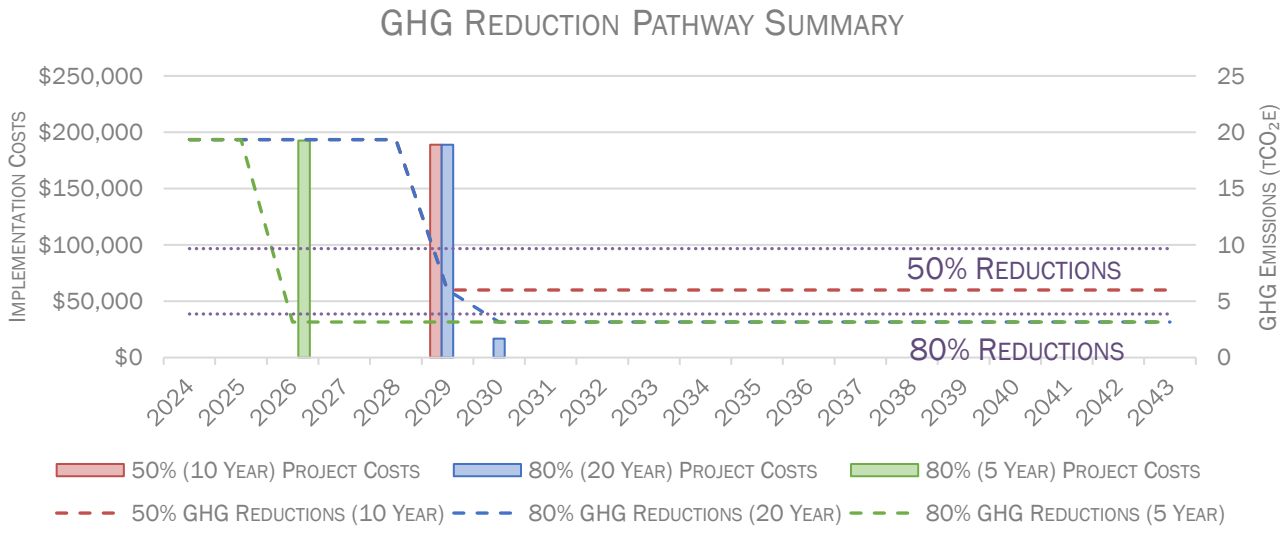
Roadmap 4 – Business-As-Usual

The Business-As-Usual Roadmap will include the project costs associated with replacing the equipment with like-for-like equivalents. This will provide a cost baseline for the other roadmaps to understand how much additional capital is required to implement the more energy efficient options.

Bundling measures into these pathways often results in interactive effects between systems. As a result, the total GHG reduction for a particular Roadmap will typically differ from the sum of the GHG reductions from individual measures. The Scenario Level Analysis accounts for these interactive effects between systems which are not represented in the Measure Level Analysis.

TABLE 1.3.1: SUMMARY OF SCENARIO LEVEL ANALYSIS

Opp. #	Opportunity	Emissions (tCO_2e)	50% Reduction Pathway (10 Year)	80% Reduction Pathway (20 Year)	80% Reduction Pathway (5 Year)
1	Replace Tube Heaters with Electric Radiant Heaters		•	•	•
2	Replace Propane Unit Heater with Electric			•	•
3	Install Low Flow Washroom Faucets				
4	Upgrade Lighting to LED				
5	Replace DHW Heater with Hybrid ASHP Tank Heater				
6	Install a 23-kW Solar PV System				
7	Install Triple Pane Windows				
8	Install EIFS				
9	Electrical Service Upgrade		•	•	•



Bundling measures into pathways, or scenarios, often results in interactive effects between systems. As a result, the total GHG reduction for a particular Roadmap will typically differ from the sum of the GHG reductions from the individual measures. The Scenario Level Analysis accounts for these interactive effects between systems which are not represented in the Measure Level Analysis.

TABLE 1.3.2: REDUCTION PATHWAY SUMMARY OF ENERGY & COSTS

	Reductions				Financials		
GHG Reduction Pathways	**Energy (ekWh)**	**Energy (%)**	**Emissions (tCO_2e)**	**Emissions (%)**	**Annual Savings**	**Project Costs**	**20-Year LC Cost**
50% Reductions (10 Year)	23,305	17%	13.3	69%	-$1,089	$169,509	$515,204
80% Reductions (20 Year)	28,416	21%	16.2	84%	-$1,285	$184,386	$526,877
80% Reductions (5 Year)	28,416	21%	16.2	84%	-$1,285	$184,386	$549,536
Business-As-Usual	$0	0%	$0	0%	$0	$15,018	$404,330

The study compares the costs of implementing multiple options or Pathways against the costs of operating the facility in a "business-as-usual" manner. The Pathways provide options to upgrade HVAC equipment and other energy consuming systems to more efficient options. However, all of the equipment addressed in this study will have to be replaced at some point - if not by more efficient equipment, then by "like-for-like" equipment replacements. By implementing these energy efficiency measures, the "like-for-like" costs are avoided.

Table 1.3.3 presents the financial details of each pathway taking into consideration the incremental costs of implementing energy efficient measures through the GMF program.

TABLE 1.3.3: REDUCTION PATHWAY SUMMARY OF LIFE CYCLE COSTS

	Financials						
Pathway	**Project Costs**	**Potential Grant**	**Avoided Cost**	**Incremental Costs**	**20-Year LC Cost**	**Incremental 20-Year LC Cost**	**Incremental LC Cost per tCO_2e**
50% Reductions in 10 Years	$169,509	$33,902	$5,884	$120,589	$515,204	$110,874	$415
80% Reductions in 20 Years	$184,386	$36,877	$0	$132,490	$526,877	$122,547	$379
80% Reductions in 5 Years	$184,386	$36,877	$0	$132,490	$549,536	$145,206	$448
Business-As-Usual	$15,018	$0	$0	$0	$404,330	$0	$0

Limited Liability

This report was prepared by Efficiency Engineering Inc. for the account of the Township of Georgian Bay. The material in it reflects our best judgment in light of the information available to us at the time of preparation. Without express written permission, any use which a third-party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Efficiency Engineering Inc. accepts no responsibility for damages, if any, suffered by any third-party as a result of decisions made or actions based on this report.

Acknowledgements

Assistance from the Township of Georgia Bay was provided by:

- Jennifer Schnier, MAES., Director of Sustainability, Township of Georgia Bay

Report prepared by Graeme St.Clair, C.Tech., LEED AP

Efficiency Engineering Inc.
225 Pinebush Road, Unit 202
Cambridge, ON N1T 1B9

2 Methodology

Efficiency Engineering utilizes a rigorous and standardized approach for all of our energy audits. We utilized a comprehensive "form based" data collection process to ensure all relevant data is collected during our site visits. Utility bills are collected and analyzed to ASHRAE14-2002 standards. Savings for each Opportunity are calculated based on sound engineering principles and always related back to actual consumptions. Costing utilizes a combination of MEANS standard costing tools, vendor quotes and our experience in design and project management.

Utility Bill Analysis

The purpose of performing a detailed utility bill analysis on the building is to:

- Normalize the consumption or demand for billing period, heating degree days (HDD), Cooling Degree Days (CDD) and any other independent variables.
- Calculate the energy use for benchmarking (comparison to typical buildings).
- Break out the consumption into weather dependent and weather independent portions.
- Calculate the heating and cooling balance point temperatures.
- Look for anomalies that may indicate heating plant efficiency, accuracy of the building automation system, building use, etc.
- Look for changes in the consumption over a period of time.
- Look for billing errors (over-billing) that may be recouped from the utility.

The utility meters have been modeled using standard modeling calculations. The utility data received has been correlated with actual weather data from the nearest weather station to produce a "best fit" equation using linear regression. The data has been normalized for billing periods, HDD, CDD as well as up to three user-defined variables. The heating and cooling balance point temperatures are adjusted to your specific building to properly model each utility.

The Modeling process creates an equation that allows us to calculate the consumption for any given period. A typical equation is as follows:

Consumption (kWh) = Days x 5,000 + HDD (13°C) x 50 + CDD (14°C) x 100
Regression (R^2 Value) = 0.92

Heating Degree Days (HDD) and Cooling Degree Days (CDD) are relative measurements of outdoor air temperature used as an index for heating and cooling energy requirements. Heating/cooling degree days are the number of degrees that the daily average temperature falls below or rises above a given balance point temperature. Coefficients are the constants in the baseline models. They are the values that are multiplied by the independent variables to get the model results, and are determined during the baseline model process. The Regression value indicates how well the actual bills match the equation, with 1.0 being a perfect fit. Typical year data (Environment Canada) is used to calculate the consumption for an average year. This consumption is used in all of the savings calculations.

Savings Methodology

Savings for opportunities are calculated using rigorous scientific modeling tools to ensure accuracy. The first step in the savings calculations is to find the existing consumption(s) of the equipment, based on equipment nameplate data, operating parameters, logged data (when available) and modeling from the utility bill analysis. The next step is to calculate the retrofit consumption once the opportunity is implemented. The savings are simply the difference between the two.

The calculation method varies depending on the Opportunity. For weather dependent savings, we would typically use a modified bin method from our own proprietary software. The underlying data used for creating the modified bins is ASHRAE WYEC (Weather Year for Energy Calculations). This ensures that the savings are based on a typical year, not an abnormally warm or abnormally cold year. When appropriate, we use other well-accepted methods such as eQUEST whole-building simulation.

Savings calculations for a particular Opportunity assume that other Opportunities listed ahead of it have been implemented. For example, if Opportunity 1 recommends upgrading to a better technology and Opportunity 2 recommends reducing lighting hours, the savings for Opportunity 2 will be based on the lighting upgrade recommended in Opportunity 1. This ensures that savings are not "double counted".

Certain Opportunities have additional annual savings or costs, such as an increase or decrease in annual maintenance. The Annual Savings noted in the financial analysis tables throughout the report includes the energy savings as well as these additional annual savings or costs.

Cost Estimates

Cost estimates are calculated based on our experience, industry standards and market conditions. Market conditions can vary significantly between the writing of this report and the actual implementation of the recommendations.

PWGSC (Public Works and Government Services Canada) has defined classes of cost estimation for building construction or renovation. We provide Class C Cost Estimates as standard, however in many instances (especially with lighting opportunities) our work is closer to Class B.

TABLE 1.3.1: CLASSES OF COST ESTIMATES

Class D	Rule of thumb costing to get an order of magnitude – for study approval.
Class C	Measured quantities based on preliminary design – for project approval.
Class B	Measured quantities based on detailed engineering sizing calculations
Class A	Measured quantities based on design drawings

The Project Cost shown in the Financial Analysis tables throughout the report includes materials and labour and contingency as well as engineering and or third-party project management where appropriate. Costing does not include any applicable taxes.

Financial Analysis

The following Financial Factors are taken into account in the life cycle costing analysis presented throughout this report. The table lists the actual values used in the calculations.

Financial Factors

- Real Dollars: Monetary units of constant purchasing power.
- Real MARR: $MARR_R$, the minimum acceptable rate of return when cash flows are expressed in real dollars.
- Actual Dollars: Monetary units at the time of payment.
- Actual MARR: $MARR_A$, The minimum acceptable rate of return for actual dollar cash flows. It is the real MARR adjusted upwards for inflation. (Also called discount rate)
- Net Present Value (NPV): Total value of all cash streams discounted to present day dollars, or Net Present Value.
- Internal Rate of Return (IRR): The IRR represents the annualized (year over year) Return on Investment (ROI) an Opportunity is expected to generate. For example, if an investment provides 10% each year over 5 years, a $1 investment turns into 1 x $(1+10\%)^5$ = $1.61. The IRR is 10%, the average annual ROI is 10% and the ROI over the five-year period is 61%.
- Inflation: The rate of increase in average prices of goods and services over a one-year period; Also, the rate year period of decrease in purchasing power of money over a one-year period
- Escalation Rate: The rate of increase in utility costs due to a combination of factors including inflation, supply, demand, environmental and political effects.
- Simple Payback: Determines the financial payback or the time taken for the cash flows from a capital investment project to equal the cash outflows. The payback is represented in years and provides a timeframe for when initial costs will be recovered
- Capital Payback: provides the time required to recover capital investment in years, while taking into consideration factors such as the time value of money and life cycle costing

TABLE 1.3.2: FINANCIAL FACTORS

$MARR_R$:	5.0%
Inflation:	2.20%
$MARR_A$:	7.31%
Interest Rate (APR):	1.9%

4 The Existing Building Profile

The following section highlights the main building details and examines each energy-consuming system, including all HVAC system, lighting, building envelope, etc. The facility details are as follows:

TABLE 3.1: FACILITY DETAILS

Building Name:	MacTier Public Works Shop
Client Name:	Township of Georgian Bay
Site Contact:	Jennifer Schnier
Address:	630 High Street
	Georgian Bay, ON
	P0C 1H0
Facility Area:	4,007 ft²
Building Type:	Garage/Workshop
Year Constructed:	1970's
Number of Stories:	1

4.1 Heating

The building is heated via a combination of propane fired tube heaters, propane fired unit heaters, electric unit heaters and baseboard heaters.

Propane Unit Heater

TABLE 4.1.1: HEATING EQUIPMENT DETAILS

Tag ID	Type	Capacity	Efficiency	Condition
Tube Heaters	Propane	125 MBH (est.)	100%	Fair
Unit Heater	Propane	200 MBH (est.)	80%	Fair
Unit Heaters	Electric	5kW	100%	Fair
Wall Heater	Electric	2kW	100%	Fair
Baseboards	Electric	1kW	100%	Fair

The heating equipment ranges in age. Most heating equipment have a life span of 15-20 years. Their replacement of older equipment should be planned and budgeted for.

4.2 Cooling

The building is not equipped with any cooling equipment.

4.3 Domestic Hot Water

A dedicated hot water heater tank provides domestic hot water (DHW) for the building.

Domestic Hot Water Heater Tank

TABLE 4.3.1: DHW EQUIPMENT DETAILS

Tag ID	Boiler Type	Capacity	Efficiency	Condition
DHWHT	Atmospheric	4.5kW	100%	Fair

The domestic hot water heater tank stores 73 US gallons of hot water until demand for DHW is called. The water temperature in the tank is kept at 60°C (140°F), but cooled to about 50°C (120°F) using a mixing valve before heading to the building.

Water for the DHW plant is made-up from the city water supply.

Piping was noted as having significant amounts of missing insulation. The heater tank was installed in 2017 and still has lots of serviceable life left. Its replacement is not required at this time.

4.4 Ventilation

There is no central ventilation system on site, instead the building is ventilated through envelope losses via open garage bay doors and through windows. Some ceiling fans were present which help move the air within the workshop.

4.5 Building Envelope

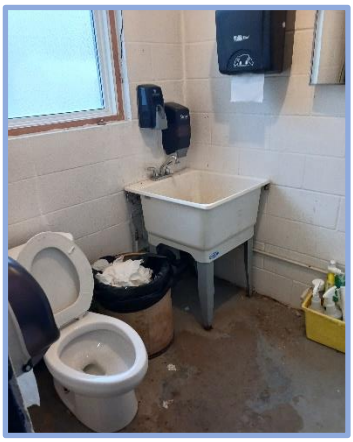
The facility was constructed in the 1970's with a concrete block façade. The roof is a wood frame construction with a metal roofing finish. Windows are generally double glazed with an air fill. Service doors and garage doors around the building are generally metal with hollow cores.


Building Envelope

As the building is 50 years old, there has been some wear and tear on the envelope. The windows seals were observed to be in fair condition, however the windows themselves are old, and their resistance properties have been reduced. The exterior doors were observed to have weather stripping for the most part, but much of the weather stripping is damaged and should be replaced. The roof was noted to be in fair condition, but its replacement should be considered.

4.6 Water Fixtures

Water fixtures in the facility were generally observed to be standard flow.



Washroom

TABLE 4.6.1: WATER FIXTURE DETAILS

Fixture	Flow
Bathroom Faucets:	2.2 GPM
Toilets:	1.6 GPF

4.7 Lighting

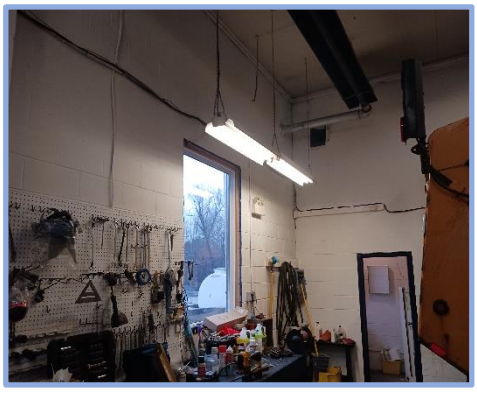
Lighting in the facility generally consists of T8 fluorescent lamps. All lighting is controlled by wall switches or circuit breakers.

TABLE 4.7.1: INTERIOR LIGHTING DETAILS

Lamp Type	Wattage	Location
T8 Fluorescent	32/59 W	Offices, storage, garage
Incandescent	60 W	Washroom

4.7.1 Exterior Lighting

Exterior lighting consists of wall packs along the exterior walls of the building, and canopy lighting underneath the garage bays. Spotlights were also present to illuminate the building lot. All exterior lighting is controlled by timers.



T8 Fluorescent Fixtures

TABLE 4.7.2: EXTERIOR LIGHTING DETAILS

Fixture Type	Lamp Type	Wattage
Wall Packs	LED/HPS	20/70 W
Canopy	HPS	70 W
Spotlights	CFL	23 W

4.8 Controls

All major systems, unit heaters, tube heaters, electric baseboards and electric DHW are controlled through independent controls. Space heating equipment operates to maintain setpoint temperatures through thermostats, while the electric hot water heater tank operates to maintain a static water temperature within the tank.

4.9 Electrical Service

The site is serviced by a 50 kVA 120V/240V pole mounted transformer. This supplies the main breaker for the facility which is rated at 200A.

No metered demand data was available at the time of this study. The calibrated energy model estimates the facility's peak electrical demand at 11.1-kW.

The facility's monthly base demand as well as the peak summer and peak winter demands are as follows:

Average Monthly Base Demand (kW)	Peak Summer Demand (kW)	Peak Winter Demand (kW)
4.3	6.8	11.1

5 The Energy Usage Report

5.1 Utility Meters

The following utility meters were modeled as part of this report:

TABLE 5.1.1: UTILITY METER DETAILS

Utility	Units	Escalation Rate	Marginal Rate ($/Unit)	GHG Emissions (Tonnes/Unit)
Demand	kW	6.0%	$11.83	0.000000
Electricity	kW	5.2%	$0.2264	0.000030
Propane	l	5.0%	$0.9334	0.001548
Water	m^3	3.0%	$4.7748	0.000000

These utility meters and account numbers can be used to cross-reference reports in *the Appendices*.

The "Effective Marginal Rate" is an average of the base marginal rates plus additional charges that the Utility Providers charge per unit of consumption or demand. This number is used in calculations to determine the utility cost savings of individual measures.

5.2 Utility Rate Structures

The following charges apply to this facility through the utility bills:

Energy Consumption Charges: typically billed monthly per unit of energy used by the building. Such charges may include customer charges, energy charges and other miscellaneous charges. These charges may vary from month to month.

Electric Demand Charges: determined by the maximum power demand in kilowatts that a building requires each month. The demand charge is based on the "peak demand" that the building required during the billing cycle. The peak demand is typically set during a period varying from 15 minutes to one hour. This can mean that very short periods of high energy demand during the billing cycle can result higher demand charges.

Regulatory Charges: the costs of administering the wholesale electricity system and maintaining the reliability of the provincial grid and include costs associated with funding Ontario Power Authority conservation and renewable energy programs.

Distribution Charges: delivering electricity from electricity generating stations across the province to your LDC, then to your facility. This includes the costs to build and maintain the transmission and distribution lines, towers and poles and operate provincial and local electricity systems.

A portion of these charges are fixed and do not change from month to month. Others are variable and increase or decrease depending on the amount of electricity used.

Power Factor Charges: "Power Factor" is the ratio of real power (kilowatt) to apparent power (kilovolt-ampere, kVA) for any given load and time. It is a measure of how much of the power being delivered to the facility is actually performing work.

Power factors for resistive loads, such as lighting and electrical heating are (ideally) 1.0, meaning that all power being supplied is performing work. Electric motors (used for pumps, fans, elevators etc.) are inductive loads which have a power factor of less than 1.0. A motor with a power factor of 0.85 effectively uses only 85% of the power being delivered.

A low power factor affects the utilization of the installed capacity of the electrical system. Additional charges for having a low or less-than-optimum power factor are often structured as additional demand charges or can be per kilovolt-ampere reactive (KVAR) charges.

Time-of-use Rates: Time-of-use rate structures use varying rates for energy costs based on the time of day. The rates are typically associated with peak, off-peak and mid-peak periods. Prices can vary based on the time of day, day of the week, or season. They are higher during peak periods and lower during off-peak periods. Since time of use rates are designed to encourage energy conservation during peak periods, load shifting strategies used in the energy model can result in significant energy cost savings.

Global Adjustment Charges: Consumers who pay the Hourly Ontario Energy Price (HOEP), or have signed a retail contract, will see their electricity bills also include a line for the Global Adjustment. This charge accounts for the differences between the market price and the rates paid to regulated and contracted generators and for conservation and demand management programs. The charge shows on bills in different ways, depending on the type of customer:

1. Class B Consumers: those with a peak demand over 50kW and under 5MW
2. Class A Consumers: those with an average hourly peak demand of 3MW or higher

Other Charges: Utilities often charge additional taxes and surcharges based on local regulations and/or programs, such as energy conservation and low-income assistance programs. Additionally, there can also be fuel adjustment charges, which are related to the cost of resource energy to the utility. Often this charge is an additional multiplier that is applied to the energy charge and will vary monthly based on fuel cost fluctuations.

5.3 Meter Modeling

Daily mean temperatures from Barrie-Oro (WMO ID 71314) were used in creating the baseline models for this facility.

5.3.1 Demand

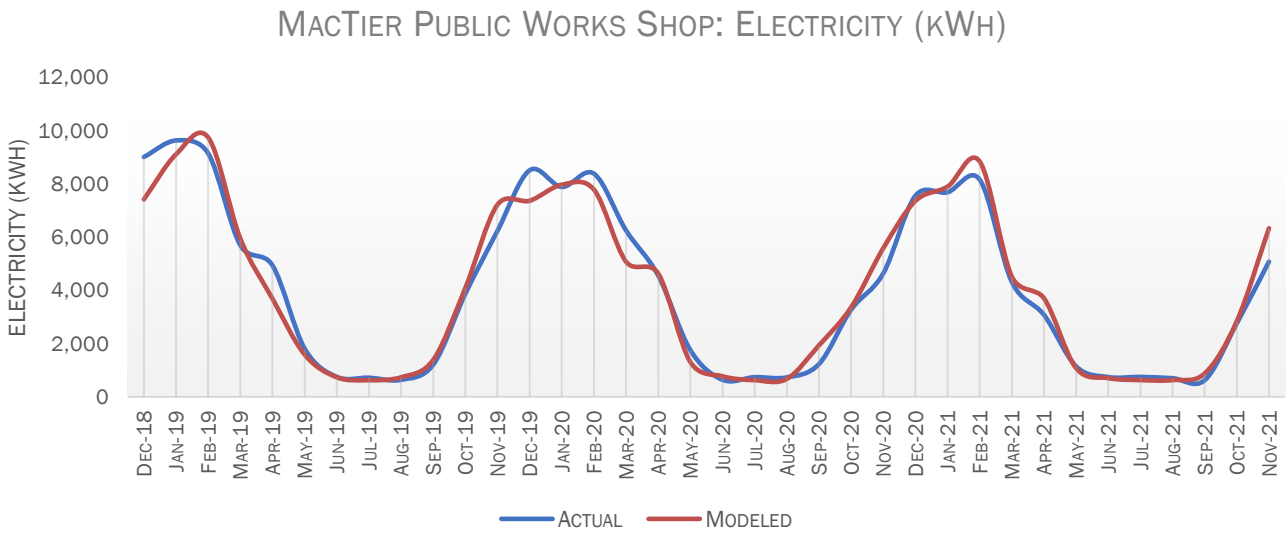
Demand data was not available at the time of this report.

5.3.2 Electricity

Baseline Equation:

Electricity (kWh) = Days x 20.86 + HDD x 12.89.
The underlying regression of this baseline equation is $R^2 = 0.9848$.
HDD (Heating Degree Days) calculated using a balance point of 14°C.
In a typical year, consumption will be 53,499 kWh.

Modeling Graphs:



Rate Structure:

Electricity for this building is provided by Hydro One. It is classified as a General Service account. This is a “Standard Rate” structure which charges electricity based on the Hourly Ontario Energy Price (HOEP) and Global Adjustment (GA). Both of these rates change from month-to-month as they are based on real-time market conditions. Regulatory Charges are also added to this cost on a per kWh basis.

Comments:

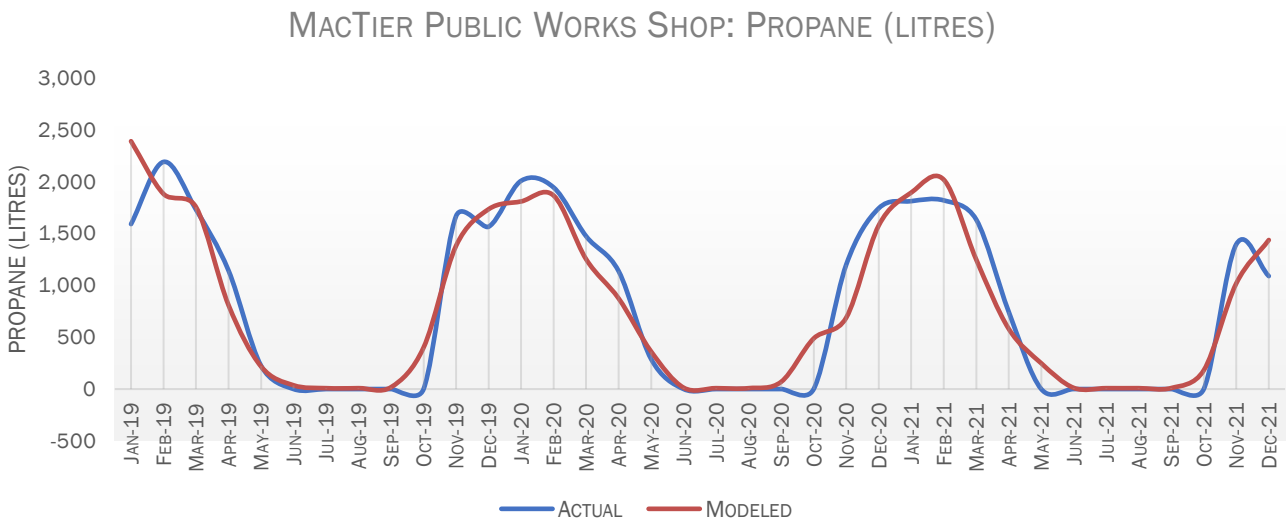
No anomalies or irregularities were noted during the modeling period of this report.

5.3.3 Propane

Baseline Equation:

Propane (litres) = Days x 0.29 + HDD x 3.8.
The underlying regression of this baseline equation is $R^2 = 0.9441$.
HDD (Heating Degree Days) calculated using a balance point of 11°C.
In a typical year, consumption will be 10,841 litres.

Modeling Graphs:



Rate Structure:

Propane for the facility is purchased and delivered by the Township's fuel provider.

Comments:

No anomalies or irregularities were noted during the modeling period of this report.

5.3.4 Water

Water data was not available at the time of this report.

5.4 Building Energy Performance

The following section provides benchmarking information for the facility.

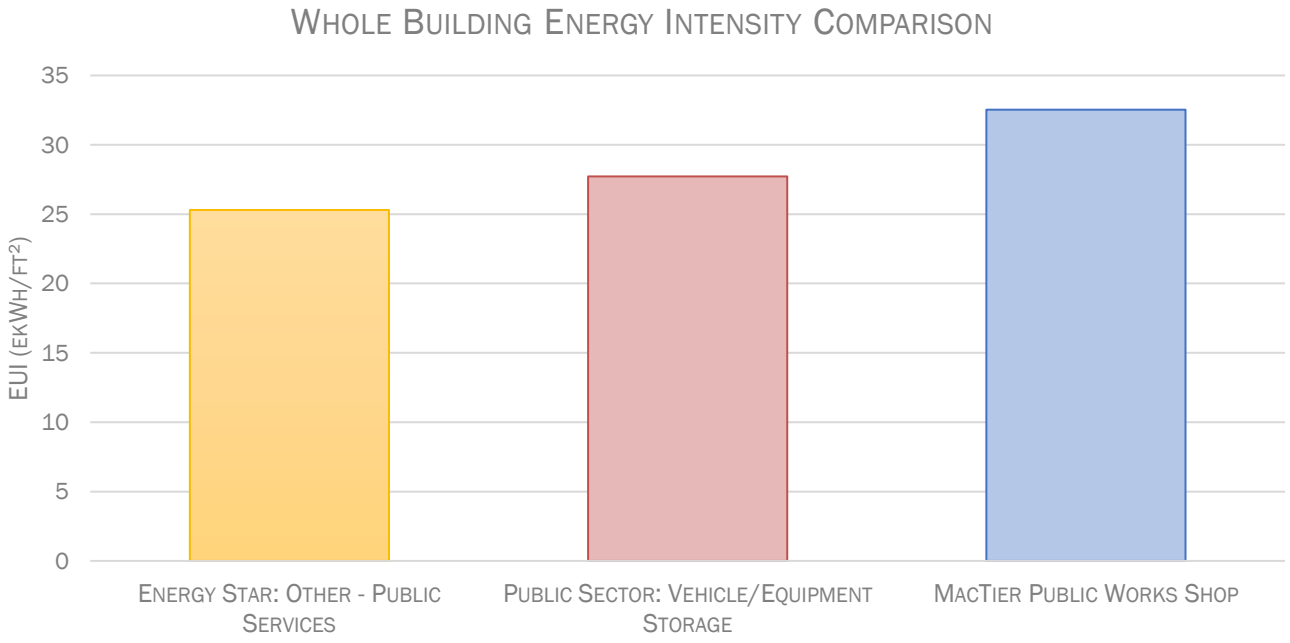
Electricity intensity for the building is 13.4 ekWh/ft² (0.52 GJ/m²). Propane intensity for the building is 20.3 ekWh/ft² (0.79 GJ/m²). Total energy intensity for the building is 33.7 ekWh/ft² (1.3 GJ/m²).

The energy performance of the MacTier Public Works is compared to buildings of similar usage or size from multiple benchmarking databases including Energy Star, Department of Energy (DOE), Ontario Broader Public Sector buildings and a database of energy use intensities maintained by Efficiency Engineering:

Benchmark	EUI	% Variance
Energy Star: Other - Public Services	25.3	33%
Public Sector: Vehicle/Equipment Storage	27.7	21%
MacTier Public Works	**33.7**	

*A positive variance indicates that the facility EUI is xx% higher than the stated benchmark. A negative variance indicates that this facility's EUI is below the indicated benchmark, consuming less energy per unit of area.

A comparison of the total energy intensity of the facility with buildings of a similar type and characteristics are shown in the chart below.



Compared to other buildings of a similar type, the overall energy intensity at the MacTier Public Works is moderate to high.

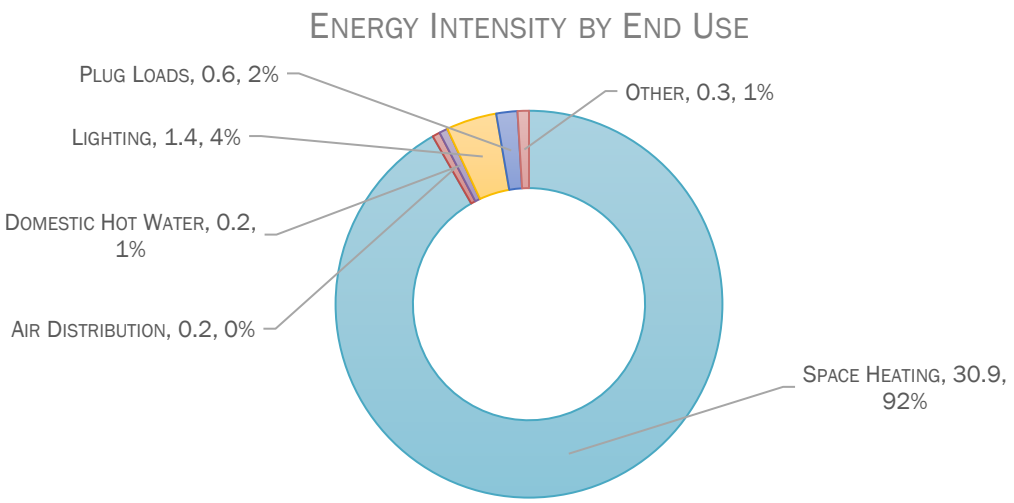
5.5 Energy Breakout by End Use

Energy consumption by end use for the facility has been calculated based on the building's overall energy consumption, calibrated energy models, nameplate information, schedules and estimated cycle times for equipment.

The end use energy breakdown for this facility is:

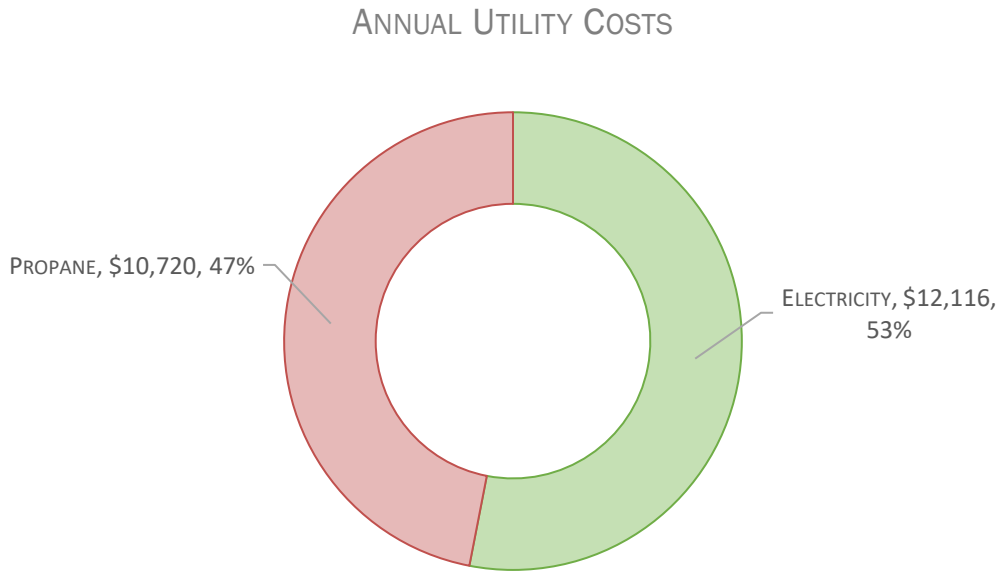
End Use	Electricity (kWh)	Propane (l)	EUI (ekWh/ft²)	GHG Emissions (Tonnes)
Space Heating	42,320	11,485	30.9	19.0
Air Distribution	860	0	0.2	0.0
Domestic Hot Water	960	0	0.2	0.0
Lighting	5,690	0	1.4	0.2
Plug Loads	2,390	0	0.6	0.1
Other	1,279	0	0.3	0.0
Total	**53,499**	**11,485**	**33.7**	**19.4**

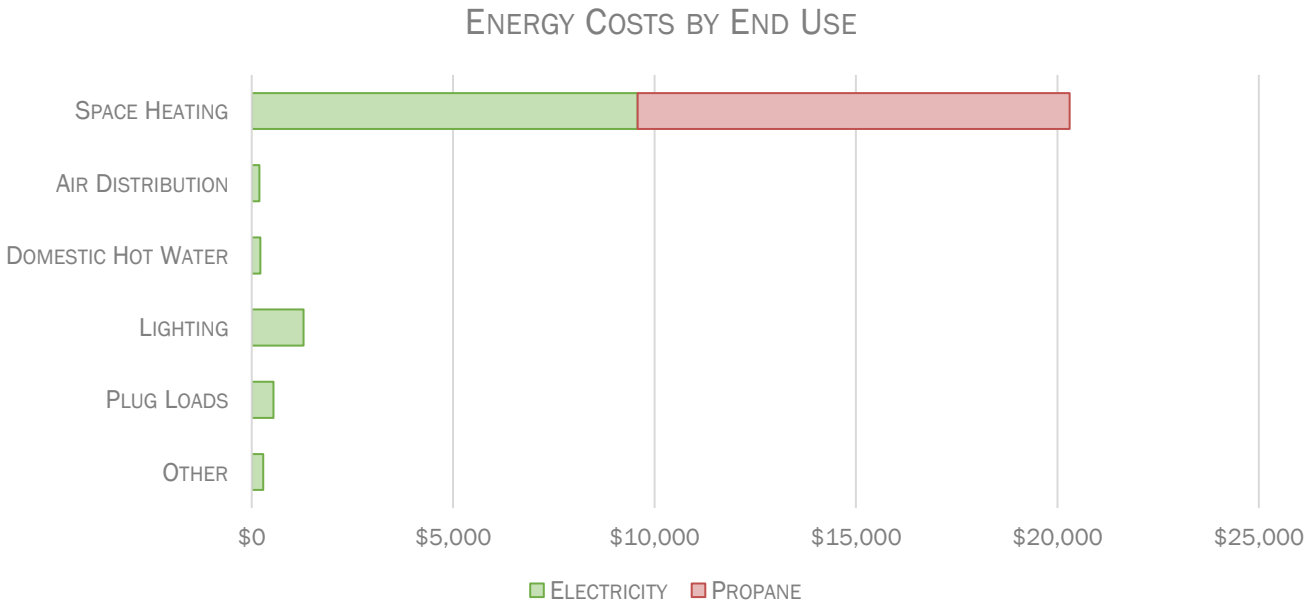
The following chart shows the energy intensity of MacTier Public Works broken out by end use.



5.6 Utility Costs

In a Typical Model Year, the building would expect to spend the following at the current utility rates. Energy costs by end use are:





6 Measure Level Analysis

The Measure Level Analysis quantifies the energy savings and implementation costs for each Opportunity (or "Measure"). As Opportunities are organized into Roadmaps, interactive effects will occur. As such, the total GHG emissions reductions may differ between the sum of the individual measures and the total for the Roadmap. Individual Opportunities may be included in multiple roadmaps.

The financial analyses for the Opportunities listed in the following section includes a Life Cycle Cost Analysis or LCCA. The LCCA provides a more detailed analysis over the lifespan of the measure and includes the following items:

- **Inflation Rate:** An annual inflation rate is included for future avoided costs and additional annual maintenance costs/savings.
- **Discount Rate:** The rate used to approximate the present-day value of future costs/savings.
- **Utility Escalation Rate:** Utility costs escalate year after year. This value increases the energy savings/costs accordingly over the 20-year period. These escalation rates can be found in Table 5.1.1.
- **Operational Costs:** Implementing some measures will require additional annual maintenance (for example, chemical treatment for a new boiler plant), while others require less annual maintenance (such as longer lasting LED lighting).
- **Avoided Costs:** If some pieces of equipment are due for replacement in the coming years, then by implementing related energy efficiency measures as a part of this project, you are avoiding the future costs associated with the replacement of this equipment.

The results of the LCCA are summarized in a single value: the Capital Payback. Where a simple payback will give you a general idea of how an Opportunity will perform economically (using first year utility savings and the upfront implementation costs), the Capital Payback identifies at what point along the 20-year LCCA the Opportunity recoups its initial investment, taking all of the above into consideration.

Further details are located in the Appendices of this report.

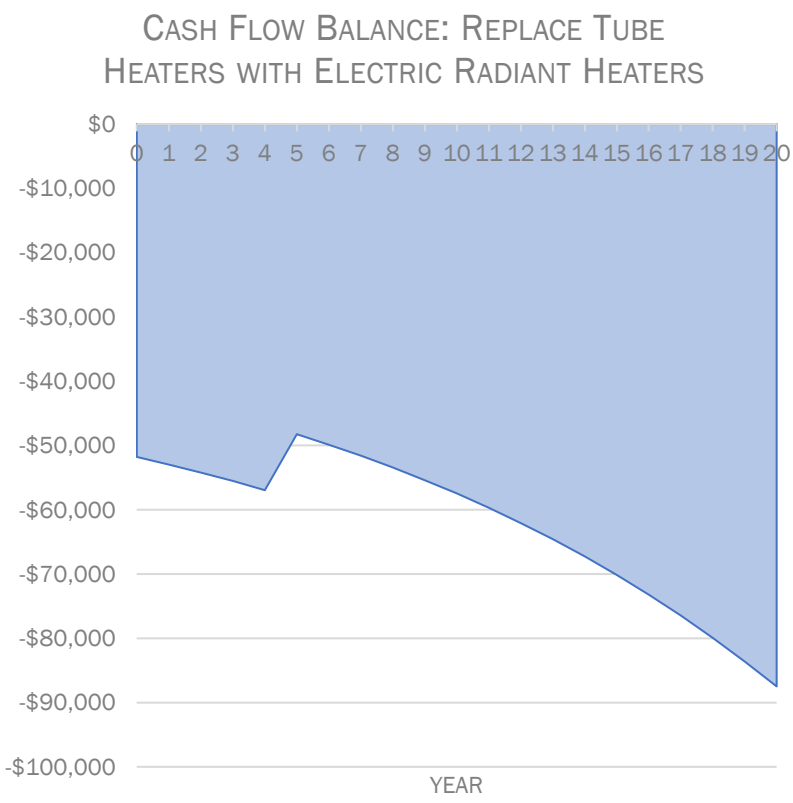
6.1 Opportunity 1: Replace Tube Heaters with Electric Radiant Heaters

The Detailed Financial Analysis

Using the Financial Factors listed in this report, this project results in the following Annual Utility Savings, Simple Payback and Net Present Value:

TABLE 6.1.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	-43,850
Propane (l):	9,472
Water (m^3):	0
Emissions (tCO_2e):	13.3
Financials	
Utility Savings:	-$1,089
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$41,438
Engineering & PM:	$6,216
Contingency:	$4,144
Project Costs:	$51,797
Simple Payback:	No Payback
Capital Payback:	No Payback
NPV:	-$65,116
IRR:	No IRR



Existing Conditions

The building is partially heated via propane fired tube heaters.

HEATING EQUIPMENT DETAILS:

Tag ID	Type	Capacity	Efficiency	Condition
Tube Heaters	Propane	125 MBH (est.)	100%	Fair

Retrofit Conditions

The tube heaters in the garage bays function to heat the building occupants rather than to heat the space itself. Because of this, and due to the location they serve, they operate for a good portion of heating season.

In order to significantly reduce GHG emissions at the facility, fuel switching measures must be undertaken.

We recommend replacing the existing propane fired tube heaters with electrical equivalents of the same size and heat output.

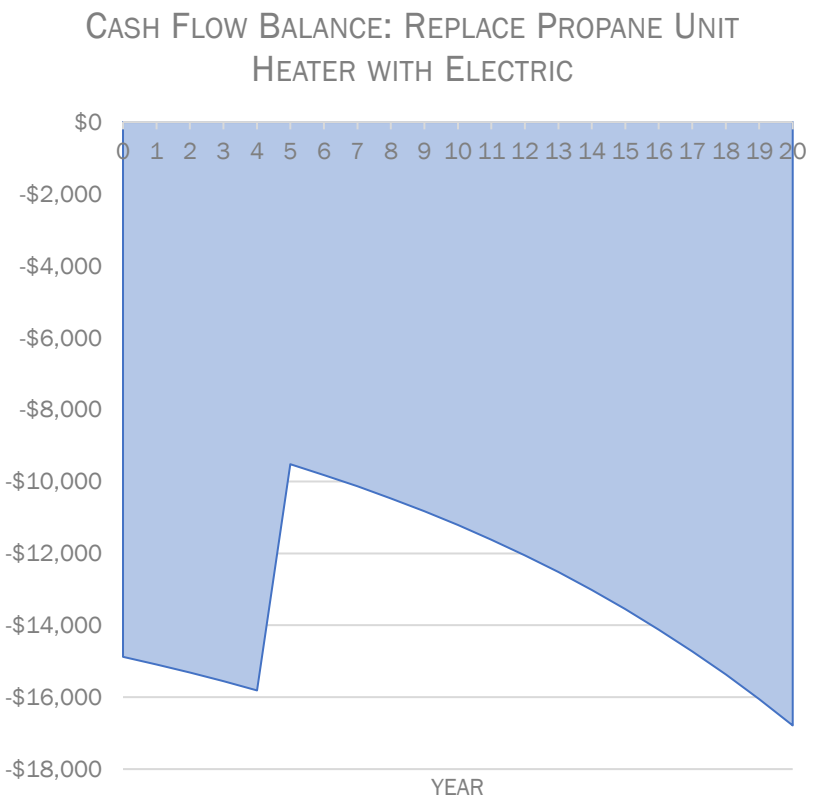
6.2 Opportunity 2: Replace Unit Heaters with Electric

The Detailed Financial Analysis

Using the Financial Factors listed in this report, this project results in the following Annual Utility Savings, Simple Payback and Net Present Value:

TABLE 6.2.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	-9,160
Propane (l):	2,013
Water (m³):	0
Emissions (tCO_2e):	2.8
Financials	
Utility Savings:	-$195
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$11,902
Engineering & PM:	$1,785
Contingency:	$1,190
Project Costs:	$14,877
Simple Payback:	No Payback
Capital Payback:	No Payback
NPV:	-$14,030
IRR:	No IRR



Existing Conditions

The building is partially heated via a single propane fired unit heater.

HEATING EQUIPMENT DETAILS

Tag ID	Type	Capacity	Efficiency	Condition
Unit Heater	Propane	200 MBH (est.)	80%	Fair

Retrofit Conditions

The unit heater in the garage bay operates to maintain relatively low setpoint temperatures. However, due to the location it serves it operates for a good portion of the year.

In order to significantly reduce GHG emissions at the facility, fuel switching measures must be undertaken.

We recommend replacing the existing propane fired unit heaters with electrical equivalents of the same size and heat output.

7 Other Measures Considered

The following Opportunities were also considered during the process of the audit; however, were not pursued due to implementation restrictions, poor financial results or other logistical challenges when viewed at a high level. Opportunities that fall within this category also are not required to hit GHG reduction targets and/or were asked to be removed from both of the scenarios presented within this report at the request of the client.

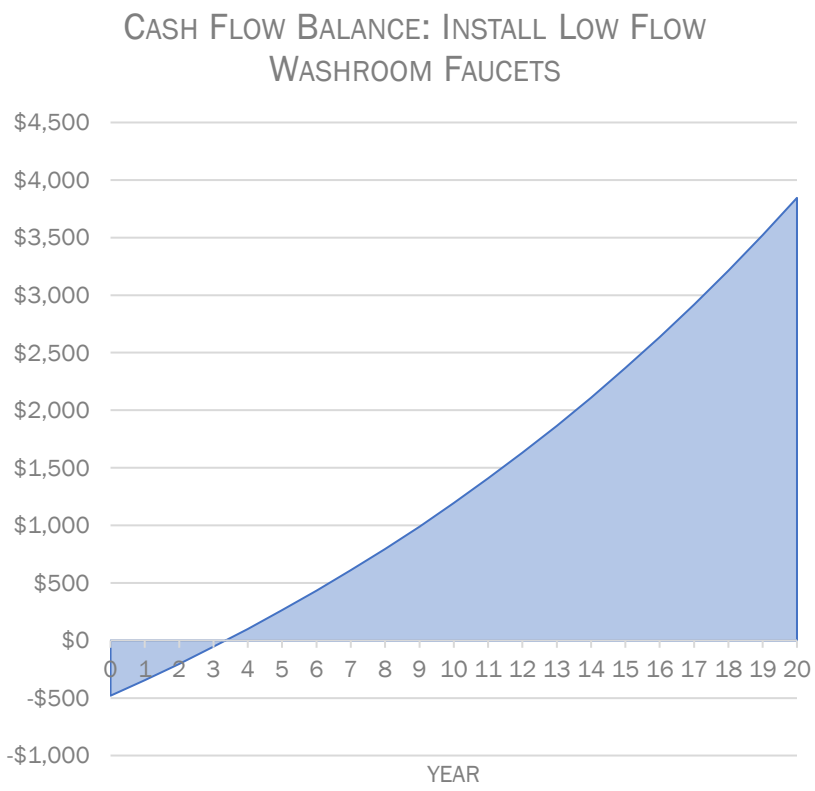
7.1 Opportunity 3: Install Low Flow Washroom Faucets

The Detailed Financial Analysis

Using the Financial Factors listed in this report, this project results in the following Annual Utility Savings, Simple Payback and Net Present Value:

TABLE 7.1.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	420
Propane (l):	0
Water (m^3):	7
Emissions (tCO_2e):	0.0
Financials	
Utility Savings:	$129
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$384
Engineering & PM:	$58
Contingency:	$38
Project Costs:	$480
Simple Payback:	3.7
Capital Payback:	3.4
NPV:	$1,531
IRR:	32.6%



Existing Conditions

Water fixtures in the facility were generally observed to be standard flow.

WATER FIXTURE DETAILS

Fixture	Flow
Bathroom Faucets:	2.2 GPM

Retrofit Conditions

We recommend installing new low-flow (1.2 GPM) faucets at the facility. These fixtures perform similarly to standard flow units but consume considerably less water and hot water resulting in significant utility savings and GHG reductions.

While it is possible (and less expensive) to install low flow aerators on the existing fixtures, aerators are easily removed or damaged, resulting in reduced savings.

Only well reviewed products from quality manufacturers should be installed. Quality fixtures will result in greater user satisfaction and reduce the risk of complaints and fixture replacement by occupants.

This measure was not recommended at this time due to its minimal reductions in GHG emissions.

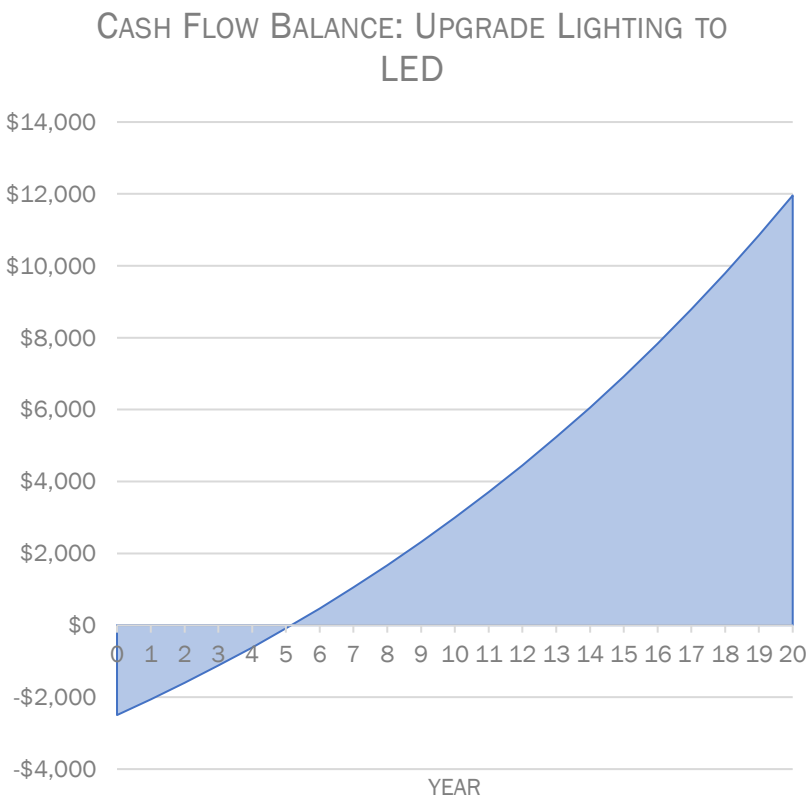
7.2 Opportunity 4: Upgrade Lighting to LED

The Detailed Financial Analysis

Using the Financial Factors listed in this report, this project results in the following Annual Utility Savings, Simple Payback and Net Present Value:

TABLE 7.2.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	2,110
Propane (l):	-109
Water (m³):	0
Emissions (tCO_2e):	-0.1
Financials	
Utility Savings:	$376
Add'l Annual Savings:	$40
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$2,171
Engineering & PM:	$109
Contingency:	$217
Project Costs:	$2,497
Simple Payback:	6.0
Capital Payback:	5.2
NPV:	$4,177
IRR:	21.6%



Existing Conditions

Interior lighting in the facility generally consists of T8 fluorescent lamps.

INTERIOR LIGHTING DETAILS

Lamp Type	Wattage	Location
T8 Fluorescent	32/59 W	Offices, storage, garage
Incandescent	60 W	Washroom

Exterior lighting consists of wall packs along the exterior walls of the building, and canopy lighting underneath the garage bays. Spotlights were also present and help to illuminate the building lot.

Exterior Lighting Details

Fixture Type	Lamp Type	Wattage
Wall Packs	LED/HPS	20/70 W
Canopy	HPS	70 W
Spotlights	CFL	23 W

Retrofit Conditions

We recommend replacing all T8, incandescent, CFL & high-pressure sodium fixtures with equivalent LED fixtures.

Advantages of LED include:

- Instant "ON/OFF"
- Work well with occupancy sensors/photocells/lighting control systems
- Dimmable
- Long Life (50,000-100,000+ hours)
- Reduced Maintenance Costs
- Good Colour Rendering (>80 CRI)
- Typical Colour Temperatures Availability from 2700K up to 5000K
- Many fixtures have option for Integrated Occupancy Sensors
- Better Uniformity of light across playing surface
- Ability to cycle lights "ON/OFF" "flash lights" with no effect to system life

In addition to the upfront energy savings, LEDs true savings lie in the reduced maintenance costs associated with lamp and ballast life. Typical LED fixtures are rated for 50,000 - 100,000+ hours as opposed to the 15,000 - 24,000 hour average lamp life for High Intensity Discharge (HID) or the 20,000 – 36,000 hour average lamp life for linear fluorescent lamps. Care should be taken in selecting a quality LED fixture which meets the needs of the application while being supported by a reputable company guaranteeing a lengthy warranty. LED fixtures should be either Design Lighting Consortium (DLC) listed or Energy Star Certified.

This measure was not recommended at this time due to its minimal reductions in GHG emissions. Although it is recommended that LED lamps or fixtures be installed as existing lighting fixtures burn out.

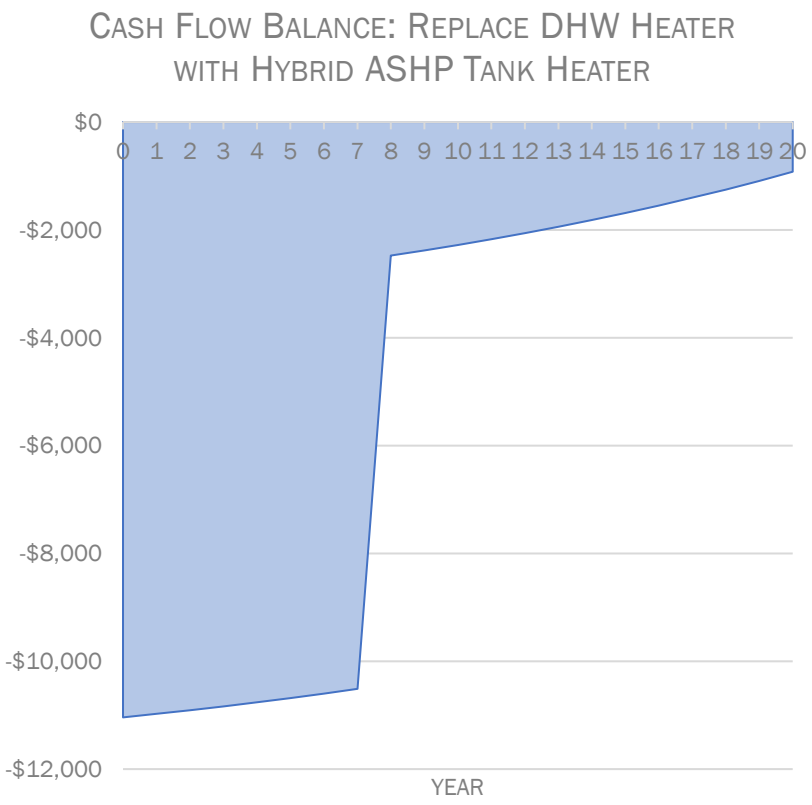
7.3 Opportunity 5: Replace DHW Heater with Hybrid ASHP Tank Heater

The Detailed Financial Analysis

Using the Financial Factors listed in this report, this project results in the following Annual Utility Savings, Simple Payback and Net Present Value:

TABLE 7.3.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	270
Propane (l):	0
Water (m³):	0
Emissions (tCO_2e):	0.0
Financials	
Utility Savings:	$61
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$8,833
Engineering & PM:	$1,325
Contingency:	$883
Project Costs:	$11,041
Simple Payback:	180.6
Capital Payback:	24.7
NPV:	-$5,523
IRR:	-1.0%



Existing Conditions

A dedicated hot water heater tank provides domestic hot water (DHW) for the building.

DHW EQUIPMENT DETAILS

Tag ID	Boiler Type	Capacity	Efficiency	Condition
DHWHT	Atmospheric	4.5kW	100%	Fair

Retrofit Conditions

The existing electric DHW heater can be replaced with residential style “hybrid” ASHP tank heater.

Multiple manufacturers currently offer residential and light commercial hybrid domestic hot water tanks which utilize a combination of an air source heat pump and electric resistance heating. The air source heat pump operates at a low capacity over longer durations of time to slowly increase or maintain tank temperatures. During times of high loads, the electric resistance heater cycles on to carry the peak loads.

This measure includes demolition and removal of the existing electric tank heater. A new hybrid tank heater would be installed in the location of the existing equipment.

This measure was not recommended at this time due to its minimal reductions in GHG emissions.

Typical Hybrid ASHP/Electric Tank Heater

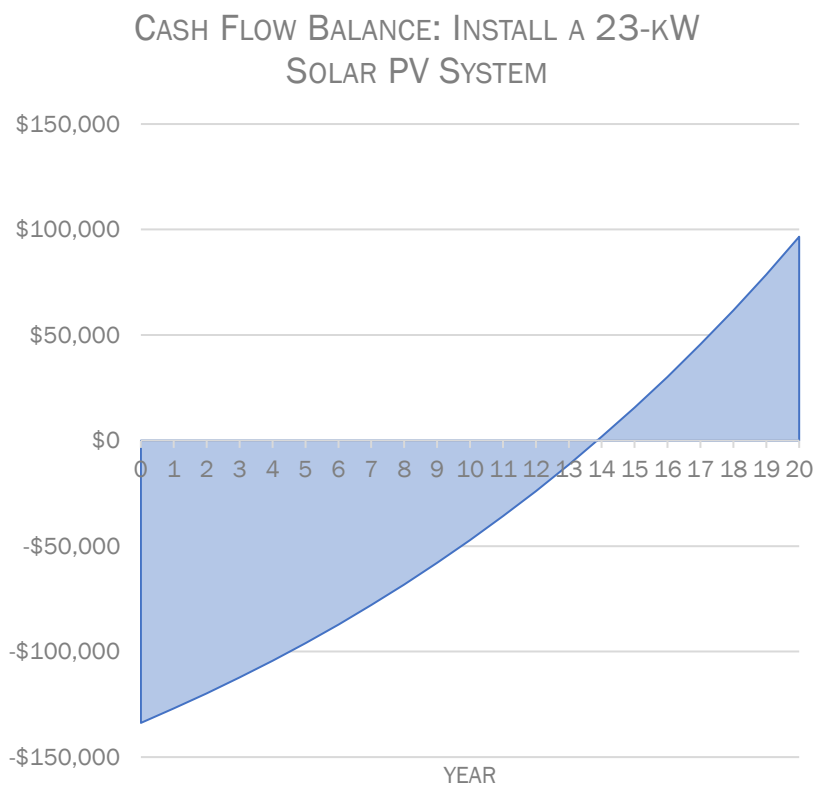
7.4 Opportunity 6: Install a 23kW-Solar PV System

The Detailed Financial Analysis

Using the Financial Factors listed in this report, this project results in the following Annual Utility Savings, Simple Payback and Net Present Value:

TABLE 7.4.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	28,635
Propane (l):	0
Water (m³):	0
():	0
():	0
Emissions (tCO_2e):	0.9
Financials	
Utility Savings:	$6,485
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$107,041
Engineering & PM:	$16,056
Contingency:	$10,704
Project Costs:	$133,802
Simple Payback:	20.6
Capital Payback:	13.9
NPV:	-$27,824
IRR:	4.9%



Existing Conditions

All electricity consumption for the facility is currently supplied by Hydro One.

Retrofit Conditions

We recommend installing a 23kW photovoltaic (PV) system on the roof. PV panels convert solar energy directly into electricity. The electricity can then be coupled to the building's electrical distribution, where it can be used within the building or sold back to the utility (with a net-metering agreement). This building has a lots of room on the roof to accommodate a PV system. Additionally, clear exposures to eastern, southern, and western skies will help maximize the electricity production of the PV system.

A 23kW system will provide about 28,635kWh of electricity per year. This accounts for approximately 53% of the building's total annual electricity consumption. With net metering, the electricity that is produced by the PV system is used by the building, but any additional electricity not used can be exported to the grid for credit.

This measure was not recommended at this time due to its minimal reductions in GHG emissions.

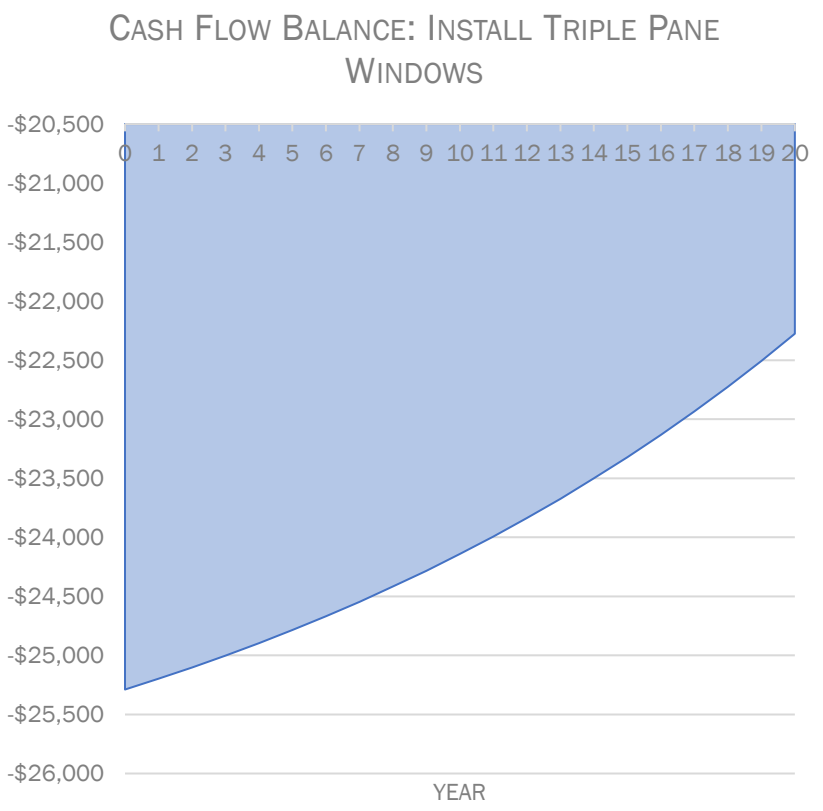
7.5 Opportunity 7: Install Triple Pane Windows

The Detailed Financial Analysis

Using the Financial Factors listed in this report, this project results in the following Annual Utility Savings, Simple Payback and Net Present Value:

TABLE 7.5.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	-40
Propane (l):	103
Water (m³):	0
Emissions (tCO_2e):	0.2
Financials	
Utility Savings:	$87
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$20,231
Engineering & PM:	$3,035
Contingency:	$2,023
Project Costs:	$25,289
Simple Payback:	290.7
Capital Payback:	55.4
NPV:	-$23,896
IRR:	-14.0%



Existing Conditions

Windows at the MacTier Public Works are generally double glazed with an air fill. Visual inspection showed that caulking around the windows was in fair condition. The window age is not known, however, as the windows age the insulation characteristics start to deteriorate.

Retrofit Conditions

We recommend that the windows be replaced with triple glaze, argon filled windows. Window frames should be made of thermally broken aluminum or fibreglass. Existing operable windows should be replaced with operable windows. Newer windows will have a higher R-value (better insulating characteristics), and will also have tighter frames resulting in less infiltration. Specify argon-filled windows with a low-emissivity interior coating to block some of the summer radiant heat gain. This measure was not recommended at this time due to its minimal reductions in GHG emissions.

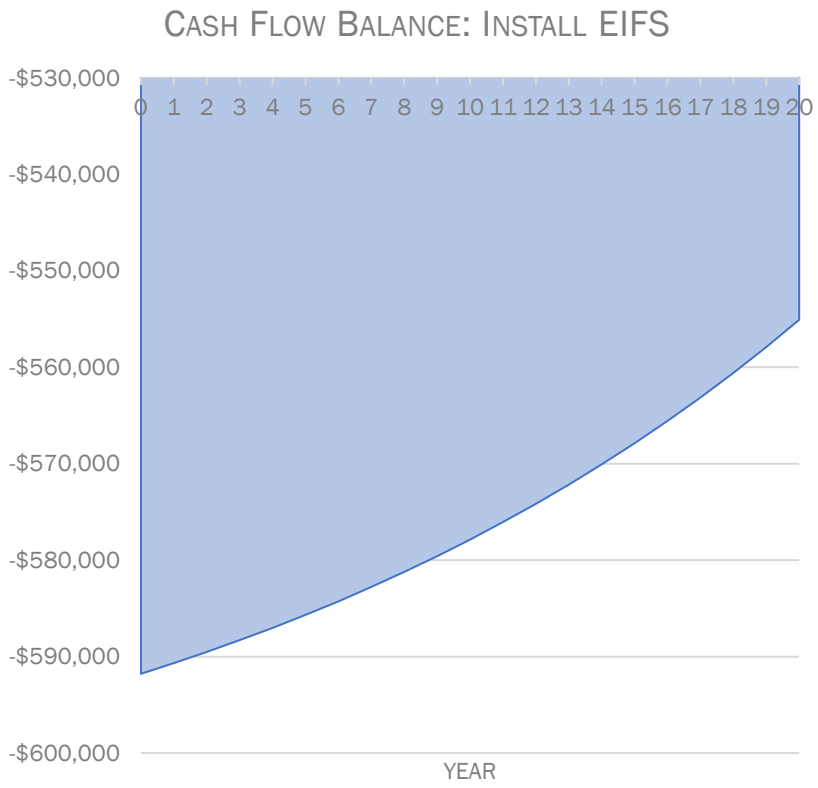
7.6 Opportunity 8: Install EIFS

The Detailed Financial Analysis

Using the Financial Factors listed in this report, this project results in the following Annual Utility Savings, Simple Payback and Net Present Value:

TABLE 7.6.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	920
Propane (l):	903
Water (m³):	0
Emissions (tCO_2e):	1.4
Financials	
Utility Savings:	$1,052
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$473,426
Engineering & PM:	$71,014
Contingency:	$47,343
Project Costs:	$591,783
Simple Payback:	562.8
Capital Payback:	67.8
NPV:	-$574,853
IRR:	-17.4%



Existing Conditions

The facility was constructed in the 1970's with a concrete block construction. Building drawings were not available at the time and it does not appear that there has been any insulation installed in the walls.

Retrofit Conditions

We recommend installing an exterior insulation and finish system (EIFS) on the exterior walls of the building. An EIFS system typically contains about 4 inches of rigid insulation. One inch of rigid insulation provides an average R-value of 5 and a total of R20 in addition to the existing insulation. The insulation will be protected by an exterior veneer.

This EIFS system will be installed and maintained by a qualified contractor. No additional staff training is required. This measure was not recommended at this time due to its large up-front cost and its minimal impact on GHG reductions.

8 Scenario Level Analysis

As per the funding guidelines set out by the Green Municipal Fund, the measures presented in this study will be grouped in the following GHG reduction target pathways:

- 50% GHG reductions in 10 years
- 80% GHG reductions in 20 years
- 80% GHG reductions in 5 years

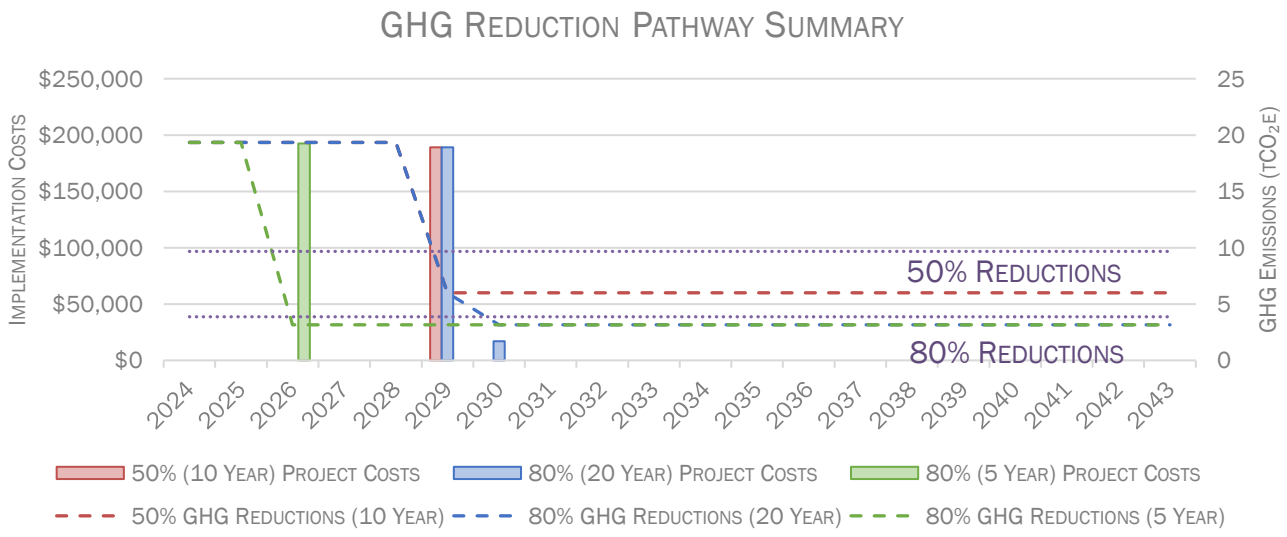
8.1 GHG Reduction Pathway Summary

The following table summarizes which measures are included in each pathway.

Opp. #	Opportunity	Emissions (tCO_2e)	50% Reduction Pathway (10 Year)	80% Reduction Pathway (20 Year)	80% Reduction Pathway (5 Year)
1	Replace Tube Heaters with Electric Radiant Heaters		•	•	•
2	Replace Propane Unit Heater with Electric			•	•
3	Install Low Flow Washroom Faucets				
4	Upgrade Lighting to LED				
5	Replace DHW Heater with Hybrid ASHP Tank Heater				
6	Install a 23-kW Solar PV System				
7	Install Triple Pane Windows				
8	Install EIFS				
9	Electrical Service Upgrade		•	•	•

Bundling measures into pathways, or scenarios, often results in interactive effects between systems. As a result, the total GHG reduction for a particular Roadmap will typically differ from the sum of the GHG reductions from individual measures. The Scenario Level Analysis accounts for these interactive effects between systems which are not represented in the Measure Level Analysis.

	Reductions				Financials		
GHG Reduction Pathways	**Energy (ekWh)**	**Energy (%)**	**Emissions (tCO_2e)**	**Emissions (%)**	**Annual Savings**	**Project Costs**	**20-Year LC Cost**
50% Reductions (10 Year)	23,305	17%	13.3	69%	-$1,089	$169,509	$515,204
80% Reductions (20 Year)	28,416	21%	16.2	84%	-$1,285	$184,386	$526,877
80% Reductions (5 Year)	28,416	21%	16.2	84%	-$1,285	$184,386	$549,536
Business-As-Usual	$0	0%	$0	0%	$0	$15,018	$404,330



Another aspect of this analysis is considering the costs associated with a "business-as-usual" approach. This study is offering upgrade options to HVAC equipment and other energy consuming systems to reduce overall GHG emissions. However, all of the equipment addressed in this study will have to be replaced at some point, if not by more efficiency equipment, then by "like-for-like" equipment replacements. By implementing these energy efficiency measures, the "like-for-like" costs are avoided.

The table below shows the financial details of each pathway taking into consideration the incremental costs of implementing energy efficient measures through the GMF program.

Financials							
Pathway	**Project Costs**	**Potential Grant**	**Avoided Cost**	**Incremental Costs**	**20-Year LC Cost**	**Incremental 20-Year LC Cost**	**Incremental LC Cost per tCO_2e**
50% Reductions in 10 Years	$169,509	$33,902	$5,884	$120,589	$515,204	$110,874	$415
80% Reductions in 20 Years	$184,386	$36,877	$0	$132,490	$526,877	$122,547	$379
80% Reductions in 5 Years	$184,386	$36,877	$0	$132,490	$549,536	$145,206	$448
Business-As-Usual	$15,018	$0	$0	$0	$404,330	$0	$0

8.2 Demand Impact Summary

A major component of achieving net-zero carbon is fuel switching from propane to a fuel source that emits comparatively less emissions, such as electricity. However, converting most or all of a building's HVAC systems from propane-fired equipment to electrical can have a significant impact on the building's electrical demand. If the building is unable to support the sudden increase in electrical demand as a result of implementing fuel-switching measures, then further investment into bolstering the building's existing electrical capacity may be necessary.

According to the eQUEST energy model, the facility's existing monthly base demand as well as the peak summer and peak winter demands are as follows:

Average Monthly Base Demand (kW)	Peak Summer Demand (kW)	Peak Winter Demand (kW)
4.3	9.7	11.1

The site is serviced by a 50 kVA 120V/240V pole mounted transformer. This supplies the main breaker for the facility which is rated at 200A. The site has approximately 57.6 kW of total electrical capacity. The demand impact of each reduction pathway are summarized in the table below.

Pathway	Demand Increase (kW)	Demand Upgrade Costs
50% Reductions in 10 Years	64	$117,711
80% Reductions in 20 Years	114	$117,711
80% Reductions in 5 Years	114	$117,711

The costs of upgrading electrical distribution to support the implementation of a measure (wiring, conduit, circuit breakers, etc.) are already included in each measure's project costs. However, if the demand impact of implementing several measures exceeds the building's installed capacity, then further electrical costs will be required. These upgrades are typically done by the utility by local distribution company (LDC) and costs are passed onto the building owner. These costs are already included in the total project costs listed in the financial tables above.

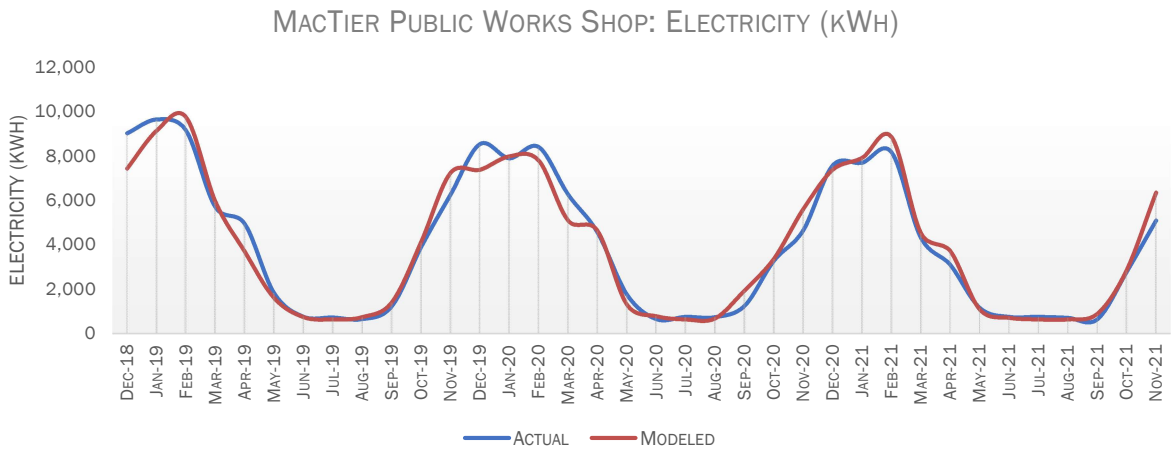
APPENDIX A

UTILITY BILL ANALYSIS

MacTier Public Works Shop: Electricity (kWh)

M02	Days	HDD	CDD	IV1	IV2	IV3
	1	2				
Dependent?:	Yes	Yes	No	No	No	No
Balance Point:	N/A	14		N/A	N/A	N/A
Calculated BP:	N/A	14		N/A	N/A	N/A
Coefficient:	20.86	12.89	0.00	0.00	0.00	0.00
T-Stat:	3.95	29.35	0.00	0.00	0.00	0.00
Adj R^2:	**0.9848**					

Electricity (kWh) = Days x 20.86 + HDD x 12.89.
The underlying regression of this baseline equation is R^2 = 0.9848.
HDD (Heating Degree Days) calculated using a balance point of 14°C.
CDD (Cooling Degree Days) calculated using a balance point of °C.
In a typical year, consumption will be 53,499 kWh.

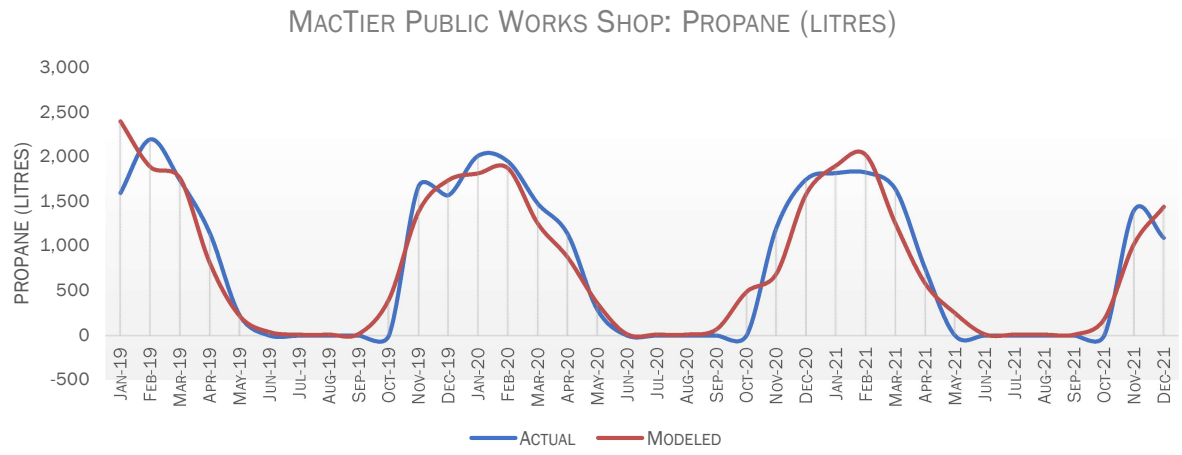


	Include in Model?	Start Date	Read Date	Electricity (kWh)	IV1	IV2	IV3	Month Allocation
1	Yes	12-Dec-18	11-Jan-19	9,016				Dec-18
2	Yes	12-Jan-19	8-Feb-19	9,637				Jan-19
3	Yes	9-Feb-19	11-Mar-19	9,153				Feb-19
4	Yes	12-Mar-19	10-Apr-19	5,700				Mar-19
5	Yes	11-Apr-19	11-May-19	4,939				Apr-19
6	Yes	12-May-19	10-Jun-19	1,813				May-19
7	Yes	11-Jun-19	11-Jul-19	748				Jun-19
8	Yes	12-Jul-19	11-Aug-19	718				Jul-19
9	Yes	12-Aug-19	10-Sep-19	640				Aug-19
10	Yes	11-Sep-19	11-Oct-19	1,209				Sep-19
11	Yes	12-Oct-19	10-Nov-19	3,877				Oct-19
12	Yes	11-Nov-19	11-Dec-19	6,241				Nov-19
13	Yes	12-Dec-19	11-Jan-20	8,516				Dec-19
14	Yes	12-Jan-20	9-Feb-20	7,889				Jan-20
15	Yes	10-Feb-20	11-Mar-20	8,388				Feb-20
16	Yes	12-Mar-20	10-Apr-20	6,253				Mar-20
17	Yes	11-Apr-20	11-May-20	4,561				Apr-20
18	Yes	12-May-20	10-Jun-20	1,754				May-20
19	Yes	11-Jun-20	11-Jul-20	642				Jun-20
20	Yes	12-Jul-20	11-Aug-20	739				Jul-20
21	Yes	12-Aug-20	10-Sep-20	731				Aug-20
22	Yes	11-Sep-20	11-Oct-20	1,231				Sep-20
23	Yes	12-Oct-20	10-Nov-20	3,275				Oct-20
24	Yes	11-Nov-20	11-Dec-20	4,639				Nov-20
25	Yes	12-Dec-20	11-Jan-21	7,555				Dec-20
26	Yes	12-Jan-21	8-Feb-21	7,689				Jan-21
27	Yes	9-Feb-21	11-Mar-21	8,166				Feb-21
28	Yes	12-Mar-21	10-Apr-21	4,320				Mar-21
29	Yes	11-Apr-21	11-May-21	3,082				Apr-21
30	Yes	12-May-21	10-Jun-21	1,144				May-21
31	Yes	11-Jun-21	11-Jul-21	742				Jun-21
32	Yes	12-Jul-21	11-Aug-21	748				Jul-21
33	Yes	12-Aug-21	10-Sep-21	700				Aug-21
34	Yes	11-Sep-21	11-Oct-21	626				Sep-21
35	Yes	12-Oct-21	10-Nov-21	2,765				Oct-21
36	Yes	11-Nov-21	11-Dec-21	5,079				Nov-21

MacTier Public Works Shop: Propane (litres)

	1	2				
M03	Days	HDD	CDD	IV1	IV2	IV3
Dependent?:	Yes	Yes	No	No	No	No
Balance Point:	N/A	11		N/A	N/A	N/A
Calculated BP:	N/A	11		N/A	N/A	N/A
Coefficient:	0.29	3.80	0.00	0.00	0.00	0.00
T-Stat:	0.14	17.37	0.00	0.00	0.00	0.00
Adj R^2:	**0.9441**					

Propane (litres) = Days x 0.29 + HDD x 3.8.
The underlying regression of this baseline equation is R^2 = 0.9441.
HDD (Heating Degree Days) calculated using a balance point of 11°C.
CDD (Cooling Degree Days) calculated using a balance point of °C.
In a typical year, consumption will be 10,841 litres.



	Include in Model?	Start Date	Read Date	Propane (litres)	IV1	IV2	IV3	Month Allocation
1	Yes	1-Jan-19	31-Jan-19	1,592				Jan-19
2	Yes	1-Feb-19	28-Feb-19	2,191				Feb-19
3	Yes	1-Mar-19	31-Mar-19	1,730				Mar-19
4	Yes	1-Apr-19	30-Apr-19	1,143				Apr-19
5	Yes	1-May-19	31-May-19	225				May-19
6	Yes	1-Jun-19	30-Jun-19	0				Jun-19
7	Yes	1-Jul-19	31-Jul-19	0				Jul-19
8	Yes	1-Aug-19	31-Aug-19	0				Aug-19
9	Yes	1-Sep-19	30-Sep-19	0				Sep-19
10	Yes	1-Oct-19	31-Oct-19	0				Oct-19
11	Yes	1-Nov-19	30-Nov-19	1,669				Nov-19
12	Yes	1-Dec-19	31-Dec-19	1,566				Dec-19
13	Yes	1-Jan-20	31-Jan-20	2,009				Jan-20
14	Yes	1-Feb-20	29-Feb-20	1,945				Feb-20
15	Yes	1-Mar-20	31-Mar-20	1,474				Mar-20
16	Yes	1-Apr-20	30-Apr-20	1,137				Apr-20
17	Yes	1-May-20	31-May-20	289				May-20
18	Yes	1-Jun-20	30-Jun-20	0				Jun-20
19	Yes	1-Jul-20	31-Jul-20	0				Jul-20
20	Yes	1-Aug-20	31-Aug-20	0				Aug-20
21	Yes	1-Sep-20	30-Sep-20	0				Sep-20
22	Yes	1-Oct-20	31-Oct-20	0				Oct-20
23	Yes	1-Nov-20	30-Nov-20	1,200				Nov-20
24	Yes	1-Dec-20	31-Dec-20	1,744				Dec-20
25	Yes	1-Jan-21	31-Jan-21	1,813				Jan-21
26	Yes	1-Feb-21	28-Feb-21	1,820				Feb-21
27	Yes	1-Mar-21	31-Mar-21	1,635				Mar-21
28	Yes	1-Apr-21	30-Apr-21	745				Apr-21
29	Yes	1-May-21	31-May-21	0				May-21
30	Yes	1-Jun-21	30-Jun-21	0				Jun-21
31	Yes	1-Jul-21	31-Jul-21	0				Jul-21
32	Yes	1-Aug-21	31-Aug-21	0				Aug-21
33	Yes	1-Sep-21	30-Sep-21	0				Sep-21
34	Yes	1-Oct-21	31-Oct-21	0				Oct-21
35	Yes	1-Nov-21	30-Nov-21	1,397				Nov-21
36	Yes	1-Dec-21	31-Dec-21	1,090				Dec-21

APPENDIX B

CALCULATIONS

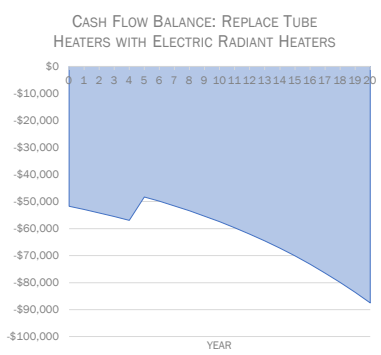
Energy Conservation Measure 2

Opp Cat:	Select
Opp Desc:	
Opp Name:	Replace Tube Heaters with Electric Radiant Heaters

Costing Setup	
Engineering & PM:	**15%**
Contingency:	**10%**
Additional Annual Costs:	
Additional Annual Savings:	
Tax Rebate (Capital Projects):	**No**
Avoided Capital Costs:	**$9,134**
Avoided Capital Year:	**5**
Financial Analysis Term (years):	**20**

Incentive Work Area			
Rate	Qty	Total	Comments
		$0	
		$0	
		$0	
		$0	
		$0	
Total:		**$0**	

Utility Savings	
Demand (kW):	0
Electricity (kWh):	-43,850
Natural Gas (litres):	9,472
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	13.3
Financials	
Annual Utility Savings:	-$1,089
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$41,438
Engineering & PM:	$6,216
Contingency:	$4,144
Project Costs:	$51,797
Simple Payback:	No Payback
Capital Payback:	No Payback
NPV:	-$65,116
IRR:	No IRR



Write-ups	
Existing:	#N/A
Retrofit:	#N/A

QC Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	244,492	210,114
% Reduction	#DIV/0!	#DIV/0!

Electrical Capacity Impact (Amps): for Ele Service Upgrades			
Base	Summer	Winter	Peak
	64.0		64

Savings: Replace Tube Heaters with Electric Radiant Heaters

Avg Temp (°F)	Avg Temp (°C)	Total Hours	Meter Selection				Occupancy	Eff. Profile
			Select	Select	Select	Select	Select	Select
-33	-36	0						0%
-28	-33	0						0%
-23	-30	0						0%
-18	-28	1						0%
-13	-25	24						0%
-8	-22	37						0%
-3	-19	68						0%
3	-16	153						0%
8	-14	201						0%
13	-11	364						0%
18	-8	506						0%
23	-5	638						0%
28	-3	605						0%
33	0	810						0%
38	3	629						0%
43	6	606						0%
48	9	646						0%
53	11	688						0%
58	14	669						0%
63	17	724						0%
68	20	625						0%
73	23	449						0%
78	25	225						0%
83	28	82						0%
88	31	10						0%
93	34	0						0%
98	36	0						0%
103	39	0						0%
Totals		**8,760**	**0**	**0**	**0**	**0**	**0**	**0**

End-Use	**Existing**			**Replace Tube Heaters with Electric Radiant Heaters**			**Savings**						
	Electricity (MWh)	**Propane (MMBTU)**	**Combined (kWh)**	**Electricity (MWh)**	**Propane (MMBTU)**	**Combined (kWh)**	**Electricity (kWh)**	**Propane (L)**					
Space Cool	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Heat Reject.	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Refrigeration	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Space Heat	42.3	277.9	123,770.8	86.2	48.7	100,446.1	-43,850	9,472					
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Hot Water	1.0	0.0	960.0	1.0	0.0	960.0	0	0					
Vent. Fans	0.9	0.0	860.0	0.9	0.0	860.0	0	0					
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Ext. Usage	2.8	0.0	2,770.0	2.8	0.0	2,770.0	0	0					
Misc. Equip	2.4	0.0	2,390.0	2.4	0.0	2,390.0	0	0					
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Area Lights	2.9	0.0	2,920.0	2.9	0.0	2,920.0	0	0					
0	**52**	**278**	**133,671**	**96**	**49**	**110,346**	**-43,850**	**9,472**	**0**	**0**	**0**	**0**	
Main Meter:	Select	Select	Select	Select	Select	Select	Select	M02	M03	Select	Select	Select	Select
Breakout Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select

General Requirements: Replace Tube Heaters with Electric Radiant Heaters

Cost Breakout: Replace Tube Heaters with Electric Radiant Heaters

Row	Division #	Section #	Division	Section	Item Description	Item	Description	Units	Source	Unit Costs			Gen Req?	Avoided Cost/ Project Cost	Qty	Material	Labour	Equipment	Total
										Materials	Labour	Equipment							
110	0	0				Demolition	Remove Existing	Each	EE Est	$0	$1,100	$0	Yes	Both	2.0	$0	$3,384	$0	$3,384
111	0	0			Replacement like for like - IR Tube Heaters	125 MBH	Propane fired	Each	Web	$1,875	$585	$0	No	Avoided	2.0	$3,750	$1,170	$0	$4,920
112	0	0														$0	$0	$0	$0
113	0	0			New electricalheater IR	4kW/13.5MBH	Electric	Each	Web	$531	$133	$0	No	Project	16.0	$8,496	$2,124	$0	$10,620
114	0	0														$0	$0	$0	$0
115	26	05.19.90	Electrical	Wire	Cu-XHHW-#12, 1 Wire, 25A, 21kW	Cu-XHHW	#12, 1 Wire, 25A, 21kW	100 LF	Means '18	$18	$43	$0	Yes	Project	24.0	$678	$1,569	$0	$2,247
116	26	05.33.13	Electrical	Conduit	PVC Conduit-3/4" (3x#6,4x#6)	PVC Conduit	3/4" (3x#6,4x#6)	LF	Means '18	$1	$3	$0	Yes	Project	800.0	$1,228	$3,950	$0	$5,178
117	26	28	Electrical	Circuit Breakers	Circuit Breaker - NEMA 1-600V, 60A	Circuit Breaker - NEMA 1	600V, 60A	Each	Means '18	$635	$166	$0	Yes	Project	16.0	$15,598	$4,085	$0	$19,683
118	26	05.33.18	Electrical	Pull Boxes	Pull Box-8"x8"x4" diam	Pull Box	8"x8"x4" diam	Each	Means '18	$13	$58	$0	Yes	Project	3.0	$58	$268	$0	$325
119	0	0														$0	$0	$0	$0
120	0	0														$0	$0	$0	$0
121	0	0											Yes	Project		$0	$0	$0	$0
122	0	0											Yes	Project		$0	$0	$0	$0
123	0	0											Yes	Project		$0	$0	$0	$0
124	0	0											Yes	Project		$0	$0	$0	$0
125	0	0											Yes	Project		$0	$0	$0	$0
126	0	0											Yes	Project		$0	$0	$0	$0
127	0	0											Yes	Project		$0	$0	$0	$0
128	0	0											Yes	Project		$0	$0	$0	$0
129	0	0											Yes	Project		$0	$0	$0	$0
130	0	0											Yes	Project		$0	$0	$0	$0
131	0	0											Yes	Project		$0	$0	$0	$0
132	0	0											Yes	Project		$0	$0	$0	$0
133	0	0											Yes	Project		$0	$0	$0	$0
134	0	0											Yes	Project		$0	$0	$0	$0
135	0	0											Yes	Project		$0	$0	$0	$0
136	0	0											Yes	Project		$0	$0	$0	$0
137	0	0											Yes	Project		$0	$0	$0	$0
138	0	0											Yes	Project		$0	$0	$0	$0
139	0	0											Yes	Project		$0	$0	$0	$0
140	0	0											Yes	Project		$0	$0	$0	$0
141	0	0											Yes	Project		$0	$0	$0	$0
142	0	0											Yes	Project		$0	$0	$0	$0
143	0	0											Yes	Project		$0	$0	$0	$0
144	0	0											Yes	Project		$0	$0	$0	$0
145	0	0											Yes	Project		$0	$0	$0	$0
146	0	0											Yes	Project		$0	$0	$0	$0
147	0	0											Yes	Project		$0	$0	$0	$0
															Totals:	**$26,058**	**$15,380**	**$0**	**$41,438**

Escalation Rates: Replace Tube Heaters with Electric Radiant Heaters

Cash Flow Balance: Replace Tube Heaters with Electric Radiant Heaters

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Year:	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Implementation Cost:	-$51,797	$0	$0	$0	$0	$10,184	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M01):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M02):		-$10,447	-$10,990	-$11,562	-$12,163	-$12,795	-$13,461	-$14,161	-$14,897	-$15,671	-$16,486	-$17,344	-$18,246	-$19,194	-$20,192	-$21,242	-$22,347	-$23,509	-$24,732	-$26,018	-$27,371
Annual Savings (M03):		$9,283	$9,747	$10,235	$10,746	$11,284	$11,848	$12,440	$13,062	$13,715	$14,401	$15,121	$15,877	$16,671	$17,505	$18,380	$19,299	$20,264	$21,277	$22,341	$23,458
Annual Savings (M04):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M05):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M06):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Incentives:	$0																				
Add'l Annual Costs:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Add'l Annual Savings:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Tax Rebate:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Total:	-$51,797	-$1,164	-$1,243	-$1,327	-$1,416	$8,673	-$1,613	-$1,720	-$1,835	-$1,956	-$2,085	-$2,223	-$2,368	-$2,523	-$2,688	-$2,863	-$3,048	-$3,245	-$3,455	-$3,677	-$3,913
Cash Balance:	-$51,797	-$52,961	-$54,204	-$55,531	-$56,947	-$48,274	-$49,887	-$51,607	-$53,442	-$55,398	-$57,483	-$59,706	-$62,074	-$64,598	-$67,285	-$70,148	-$73,196	-$76,441	-$79,896	-$83,573	-$87,486
Undepreciated Amount:	-$51,797	-$44,028	-$37,423	-$31,810	-$27,038	-$22,983	-$19,535	-$16,605	-$14,114	-$11,997	-$10,198	-$8,668	-$7,368	-$6,263	-$5,323	-$4,525	-$3,846	-$3,269	-$2,779	-$2,362	-$2,008

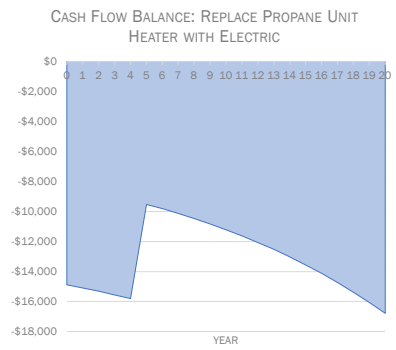
Energy Conservation Measure 3

Opp Cat:	Select
Opp Desc:	
Opp Name:	Replace Propane Unit Heater with Electric

Costing Setup	
Engineering & PM:	**15%**
Contingency:	**10%**
Additional Annual Costs:	
Additional Annual Savings:	
Tax Rebate (Capital Projects):	**No**
Avoided Capital Costs:	**$5,884**
Avoided Capital Year:	**5**
Financial Analysis Term (years):	**20**

Incentive Work Area			
Rate	Qty	Total	Comments
		$0	
		$0	
		$0	
		$0	
		$0	
Total:		**$0**	

Utility Savings	
Demand (kW):	0
Electricity (kWh):	-9,160
Natural Gas (litres):	2,013
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	2.8
Financials	
Annual Utility Savings:	-$195
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$11,902
Engineering & PM:	$1,785
Contingency:	$1,190
Project Costs:	$14,877
Simple Payback:	No Payback
Capital Payback:	No Payback
NPV:	-$14,030
IRR:	No IRR



Write-ups	
Existing:	#N/A
Retrofit:	#N/A

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	262,846	255,699
% Reduction	#DIV/0!	#DIV/0!

Electrical Capacity Impact (Amps): for Ele Service Upgrades			
Base	Summer	Winter	Peak
	50		50

Savings: Replace Propane Unit Heater with Electric

Avg Temp (°F)	Avg Temp (°C)	Total Hours	Meter Selection				Occupancy	Eff. Profile
			Select	Select	Select	Select	Select	Select
-33	-36	0						0%
-28	-33	0						0%
-23	-30	0						0%
-18	-28	1						0%
-13	-25	24						0%
-8	-22	37						0%
-3	-19	68						0%
3	-16	153						0%
8	-14	201						0%
13	-11	364						0%
18	-8	506						0%
23	-5	638						0%
28	-3	605						0%
33	0	810						0%
38	3	629						0%
43	6	606						0%
48	9	646						0%
53	11	688						0%
58	14	669						0%
63	17	724						0%
68	20	625						0%
73	23	449						0%
78	25	225						0%
83	28	82						0%
88	31	10						0%
93	34	0						0%
98	36	0						0%
103	39	0						0%
Totals		**8,760**	**0**	**0**	**0**	**0**	**0**	**0**

End-Use	Existing			Replace Propane Unit Heater with Electric			Savings						
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)					
Space Cool	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Heat Reject.	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Refrigeration	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Space Heat	42.3	277.9	123,770.8	51.5	229.2	118,654.7	-9,160	2,013					
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Hot Water	1.0	0.0	960.0	1.0	0.0	960.0	0	0					
Vent. Fans	0.9	0.0	860.0	0.9	0.0	860.0	0	0					
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Ext. Usage	2.8	0.0	2,770.0	2.8	0.0	2,770.0	0	0					
Misc. Equip	2.4	0.0	2,390.0	2.4	0.0	2,390.0	0	0					
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Area Lights	2.9	0.0	2,920.0	2.9	0.0	2,920.0	0	0					
0	**52**	**278**	**133,671**	**61**	**229**	**128,555**	**-9,160**	**2,013**	**0**	**0**	**0**	**0**	
Main Meter:	Select	Select	Select	Select	Select	Select	Select	M02	M03	Select	Select	Select	Select
Breakout Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select

General Requirements: Replace Propane Unit Heater with Electric

Cost Breakout: Replace Propane Unit Heater with Electric

Row	Division #	Section #	Division	Section	Item Description	Item	Description	Units	Source	Unit Costs			Gen Req?	Avoided Cost/ Project Cost	Qty	Material	Labour	Equipment	Total
										Materials	Labour	Equipment							
110	0	0				Demolition	Remove Existing	Each	EE Est	$0	$1,100	$0	Yes	Both	2.0	$0	$3,384	$0	$3,384
111	0	0			Unit Heater	200 MBH	Propane fired	Each	Means '23	$1,600	$365	$0	No	Avoided	1.0	$1,600	$365	$0	$1,965
112	0	0														$0	$0	$0	$0
113	0	0			Electric Unit Heater	50 kW	Electric	Each	Means '23	$5,725	$365	$0	No	Project	1.0	$5,725	$365	$0	$6,090
114	0	0														$0	$0	$0	$0
115	26	05.19.90	Electrical	Wire	Cu-XHHW-#6, 1 Wire, 65A, 54kW	Cu-XHHW	#6, 1 Wire, 65A, 54kW	100 LF	Means '18	$52	$72	$0	Yes	Project	1.0	$79	$110	$0	$189
116	26	05.33.13	Electrical	Conduit	PVC Conduit-3/4" (3x#6,4x#6)	PVC Conduit	3/4" (3x#6,4x#6)	LF	Means '18	$1	$3	$0	Yes	Project	100.0	$154	$494	$0	$647
117	26	28	Electrical	Circuit Breakers	Circuit Breaker - NEMA 1-600V, 100A	Circuit Breaker - NEMA 1	600V, 100A	Each	Means '18	$730	$202	$0	Yes	Project	1.0	$1,121	$311	$0	$1,431
118	26	05.33.18	Electrical	Pull Boxes	Pull Box-10"x10"x6" diam	Pull Box	10"x10"x6" diam	Each	Means '18	$20	$85	$0	Yes	Project	1.0	$30	$130	$0	$160
119	0	0											Yes	Project		$0	$0	$0	$0
120	0	0											Yes	Project		$0	$0	$0	$0
121	0	0											Yes	Project		$0	$0	$0	$0
122	0	0											Yes	Project		$0	$0	$0	$0
123	0	0											Yes	Project		$0	$0	$0	$0
124	0	0											Yes	Project		$0	$0	$0	$0
125	0	0											Yes	Project		$0	$0	$0	$0
126	0	0											Yes	Project		$0	$0	$0	$0
127	0	0											Yes	Project		$0	$0	$0	$0
128	0	0											Yes	Project		$0	$0	$0	$0
129	0	0											Yes	Project		$0	$0	$0	$0
130	0	0											Yes	Project		$0	$0	$0	$0
131	0	0											Yes	Project		$0	$0	$0	$0
132	0	0											Yes	Project		$0	$0	$0	$0
133	0	0											Yes	Project		$0	$0	$0	$0
134	0	0											Yes	Project		$0	$0	$0	$0
135	0	0											Yes	Project		$0	$0	$0	$0
136	0	0											Yes	Project		$0	$0	$0	$0
137	0	0											Yes	Project		$0	$0	$0	$0
138	0	0											Yes	Project		$0	$0	$0	$0
139	0	0											Yes	Project		$0	$0	$0	$0
140	0	0											Yes	Project		$0	$0	$0	$0
141	0	0											Yes	Project		$0	$0	$0	$0
142	0	0											Yes	Project		$0	$0	$0	$0
143	0	0											Yes	Project		$0	$0	$0	$0
144	0	0											Yes	Project		$0	$0	$0	$0
145	0	0											Yes	Project		$0	$0	$0	$0
146	0	0											Yes	Project		$0	$0	$0	$0
147	0	0											Yes	Project		$0	$0	$0	$0
															Totals:	**$7,108**	**$4,793**	**$0**	**$11,902**

Escalation Rates: Replace Propane Unit Heater with Electric

Year:	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Demand ($/kW):	11.8277	12.5374	13.2896	14.0870	14.9322	15.8281	16.7778	17.7845	18.8516	19.9827	21.1816	22.4525	23.7997	25.2276	26.7413	28.3458	30.0465	31.8493	33.7603	35.7859	37.9330
Electricity ($/kWh):	0.2265	0.2382	0.2506	0.2637	0.2774	0.2918	0.3070	0.3229	0.3397	0.3574	0.3760	0.3955	0.4161	0.4377	0.4605	0.4844	0.5096	0.5361	0.5640	0.5933	0.6242
Natural Gas ($/litres):	0.9334	0.9801	1.0291	1.0805	1.1346	1.1913	1.2508	1.3134	1.3791	1.4480	1.5204	1.5964	1.6763	1.7601	1.8481	1.9405	2.0375	2.1394	2.2463	2.3587	2.4766
Water ($/m³):	4.7748	4.9180	5.0656	5.2176	5.3741	5.5353	5.7014	5.8724	6.0486	6.2300	6.4169	6.6094	6.8077	7.0120	7.2223	7.4390	7.6622	7.8920	8.1288	8.3726	8.6238
Natural Gas ($/m³):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
($/):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GHG Emissions (tCO2e):	0.000031	0.000043	0.000047	0.000054	0.000071	0.000072	0.000075	0.000069	0.000077	0.000083	0.000079	0.000079	0.000079	0.000077	0.000081	0.000082	0.000087	0.000088	0.000093	0.000093	0.000093

Cash Flow Balance: Replace Propane Unit Heater with Electric

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Year:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Implementation Cost:	-$14,877	$0	$0	$0	$0	$6,560	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M01):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M02):		-$2,182	-$2,296	-$2,415	-$2,541	-$2,673	-$2,812	-$2,958	-$3,112	-$3,274	-$3,444	-$3,623	-$3,811	-$4,010	-$4,218	-$4,437	-$4,668	-$4,911	-$5,166	-$5,435	-$5,718
Annual Savings (M03):		$1,973	$2,072	$2,175	$2,284	$2,398	$2,518	$2,644	$2,776	$2,915	$3,061	$3,214	$3,374	$3,543	$3,720	$3,906	$4,101	$4,307	$4,522	$4,748	$4,985
Annual Savings (M04):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M05):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M06):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Incentives:	$0																				
Add'l Annual Costs:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Add'l Annual Savings:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Tax Rebate:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Total:	-$14,877	-$209	-$224	-$240	-$257	$6,285	-$294	-$314	-$336	-$359	-$383	-$409	-$437	-$467	-$498	-$531	-$567	-$604	-$644	-$687	-$732
Cash Balance:	-$14,877	-$15,087	-$15,311	-$15,551	-$15,808	-$9,522	-$9,816	-$10,131	-$10,466	-$10,825	-$11,209	-$11,618	-$12,055	-$12,522	-$13,020	-$13,551	-$14,118	-$14,722	-$15,367	-$16,054	-$16,786
Undepreciated Amount:	-$14,877	-$12,646	-$10,749	-$9,137	-$7,766	-$6,601	-$5,611	-$4,769	-$4,054	-$3,446	-$2,929	-$2,490	-$2,116	-$1,799	-$1,529	-$1,300	-$1,105	-$939	-$798	-$678	-$577

Energy Conservation Measure 5

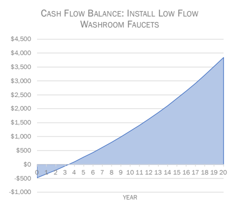
Opp Cat:	Select
Opp Desc:	
Opp Name:	Install Low Flow Washroom Faucets

Costing Setup	
Engineering & PM:	**15%**
Contingency:	**10%**
Additional Annual Costs:	
Additional Annual Savings:	
Tax Rebate (Capital Projects):	**No**
Avoided Capital Costs:	**$0**
Avoided Capital Year:	
Financial Analysis Term (years):	**20**

Incentive Work Area

Rate	Qty	Total	Comments
		$0	
		$0	
		$0	
		$0	
		$0	
Total:		**$0**	

Utility Savings	
Demand (kW):	0
Electricity (kWh):	420
Natural Gas (litres):	0
Water (m^3):	7
Natural Gas (m^3):	0
():	0
Emissions (Tonnes of CO_2e):	0.0
Financials	
Annual Utility Savings:	$129
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$384
Engineering & PM:	$58
Contingency:	$38
Project Costs:	$480
Simple Payback:	3.7
Capital Payback:	3.4
NPV:	$1,531
IRR:	32.6%



Write-ups	
Existing:	#N/A
Retrofit:	#N/A

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	270,679	271,099
% Reduction	#DIV/0!	#DIV/0!

Electrical Capacity Impact (Amps): for Ele Service Upgrades			
Base	Summer	Winter	Peak

Savings: Install Low Flow Washroom Faucets

			Meter Selection				Occupancy	Eff. Profile
Avg Temp (°F)	Avg Temp (°C)	Total Hours	Select	Select	Select	Select	Select	Select
-33	-36	0						0%
-28	-33	0						0%
-23	-30	0						0%
-18	-28	1						0%
-13	-25	24						0%
-8	-22	37						0%
-3	-19	68						0%
3	-16	153						0%
8	-14	201						0%
13	-11	364						0%
18	-8	506						0%
23	-5	638						0%
28	-3	605						0%
33	0	810						0%
38	3	629						0%
43	6	606						0%
48	9	646						0%
53	11	688						0%
58	14	669						0%
63	17	724						0%
68	20	625						0%
73	23	449						0%
78	25	225						0%
83	28	82						0%
88	31	10						0%
93	34	0						0%
98	36	0						0%
103	39	0						0%
Totals		**8,760**	**0**	**0**	**0**	**0**	**0**	**0**

End-Use	Existing			Install Low Flow Washroom Faucets			Savings			Existing												Retrofit					Savings			
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)		User	Fixture	Flow Rate (GPM/GPF)	Time/use (min)	# of Occupants	Uses/ person/day	Days/Year	% Hot Water	Water Cons. (m^3/yr)	Hot Water Cons - m^3/yr	Electricity Cons - kWh		Flow Rate (GPM/GPF)	Water Cons. (m^3/yr)	Hot Water Cons - m^3/yr	Electricity Cons - kWh		Water Cons. (m^3/yr)	Hot Water Cons - m^3/yr	Electricity Cons - kWh	
Space Cool	0.0	0.0	0.0	0.0	0.0	0.0	0	0		FTE (M)	Lavatory Faucet	2.2	1	5	3	252	1	16	8	482		1.2	9	4	263		7	4	219	
Heat Reject.	0.0	0.0	0.0	0.0	0.0	0.0	0	0		FTE (M)	Water Closet	1.6	1	5	1	252	0	8	0	0										
Refrigeration	0.0	0.0	0.0	0.0	0.0	0.0	0	0		FTE (F)	Lavatory Faucet	2.2	1	5	3	252	1	16	8	482		1.2	9	4	263		7	4	219	
Space Heat	42.3	277.9	123,770.8	42.3	277.9	123,770.8	0	0		FTE (F)	Water Closet	1.6	1	5	3	252	0	23	0	0										
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0																						
Hot Water	1.0	0.0	960.0	0.5	0.0	540.0	420	0																						
Vent. Fans	0.9	0.0	860.0	0.9	0.0	860.0	0	0																						
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0																						
Ext. Usage	2.8	0.0	2,770.0	2.8	0.0	2,770.0	0	0																						
Misc. Equip	2.4	0.0	2,390.0	2.4	0.0	2,390.0	0	0																						
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0																						
Area Lights	2.9	0.0	2,920.0	2.9	0.0	2,920.0	0	0																						
0	**52**	**278**	**133,671**	**52**	**278**	**133,251**	**420**	**0**	**0**	**0**	**0**	**8**	**3**	**20**	**10**	**1,008**	**1**	**62**	**16**	**964**	**0**	**2**	**17**	**9**	**526**	**0**	**14**	**7**	**438**	**0**
Main Meter: Select	Select	Select	Select	Select	Select	Select	M02	M03	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	M04	Select	Select
Breakout Meter: Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	M04 Base	Select	Select

General Requirements: Install Low Flow Washroom Faucets

Cost Breakout: Install Low Flow Washroom Faucets

Row	Division #	Section #	Division	Section	Item Description	Item	Description	Units	Source	Unit Costs			Gen Req?	Avoided Cost/ Project Cost	Qty	Material	Labour	Equipment	Total
										Materials	Labour	Equipment							
110	0	0				Bathroom Faucet	1.2 GPM	Each	Web Estimate >1	$200	$50		Yes	Project	1	$307	$77	$0	$384
111	0	0											Yes	Project		$0	$0	$0	$0
112	0	0											Yes	Project		$0	$0	$0	$0
113	0	0											Yes	Project		$0	$0	$0	$0
114	0	0											Yes	Project		$0	$0	$0	$0
115	0	0											Yes	Project		$0	$0	$0	$0
116	0	0											Yes	Project		$0	$0	$0	$0
117	0	0											Yes	Project		$0	$0	$0	$0
118	0	0											Yes	Project		$0	$0	$0	$0
119	0	0											Yes	Project		$0	$0	$0	$0
120	0	0											Yes	Project		$0	$0	$0	$0
121	0	0											Yes	Project		$0	$0	$0	$0
122	0	0											Yes	Project		$0	$0	$0	$0
123	0	0											Yes	Project		$0	$0	$0	$0
124	0	0											Yes	Project		$0	$0	$0	$0
125	0	0											Yes	Project		$0	$0	$0	$0
126	0	0											Yes	Project		$0	$0	$0	$0
127	0	0											Yes	Project		$0	$0	$0	$0
128	0	0											Yes	Project		$0	$0	$0	$0
129	0	0											Yes	Project		$0	$0	$0	$0
130	0	0											Yes	Project		$0	$0	$0	$0
131	0	0											Yes	Project		$0	$0	$0	$0
132	0	0											Yes	Project		$0	$0	$0	$0
133	0	0											Yes	Project		$0	$0	$0	$0
134	0	0											Yes	Project		$0	$0	$0	$0
135	0	0											Yes	Project		$0	$0	$0	$0
136	0	0											Yes	Project		$0	$0	$0	$0
137	0	0											Yes	Project		$0	$0	$0	$0
138	0	0											Yes	Project		$0	$0	$0	$0
139	0	0											Yes	Project		$0	$0	$0	$0
140	0	0											Yes	Project		$0	$0	$0	$0
141	0	0											Yes	Project		$0	$0	$0	$0
142	0	0											Yes	Project		$0	$0	$0	$0
143	0	0											Yes	Project		$0	$0	$0	$0
144	0	0											Yes	Project		$0	$0	$0	$0
145	0	0											Yes	Project		$0	$0	$0	$0
146	0	0											Yes	Project		$0	$0	$0	$0
147	0	0											Yes	Project		$0	$0	$0	$0
															Totals:	**$307**	**$77**	**$0**	**$384**

Escalation Rates: Install Low Flow Washroom Faucets

Cash Flow Balance: Install Low Flow Washroom Faucets

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Year:	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**																				
Implementation Cost:	-$480	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M01):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M02):		$100	$105	$111	$116	$123	$129	$136	$143	$150	$158	$166	$175	$184	$193	$203	$214	$225	$237	$249	$262	$276	$290	$305	$321	$338	$355	$374	$393	$414	$435	$458	$482	$507	$533	$561	$590	$621	$653
Annual Savings (M03):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M04):		$35	$36	$37	$38	$40	$41	$42	$43	$45	$46	$47	$49	$50	$52	$53	$55	$56	$58	$60	$62	$64	$65	$67	$69	$72	$74	$76	$78	$81	$83	$85	$88	$91	$93	$96	$99	$102	$105
Annual Savings (M05):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M06):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Incentives:	$0																																						
Add'l Annual Costs:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Add'l Annual Savings:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Tax Rebate:		$0	$2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Total:	-$480	$135	$142	$148	$155	$162	$170	$178	$186	$195	$204	$213	$223	$234	$245	$257	$269	$282	$295	$309	$324	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cash Balance:	-$480	-$345	-$203	-$55	$100	$262	$432	$609	$795	$990	$1,194	$1,407	$1,631	$1,865	$2,110	$2,366	$2,635	$2,917	$3,212	$3,521	$3,845	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Undepreciated Amount:	-$480	-$408	-$347	-$295	-$251	-$213	-$181	-$154	-$131	-$111	-$94	-$80	-$68	-$58	-$49	-$42	-$36	-$30	-$26	-$22	-$19	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

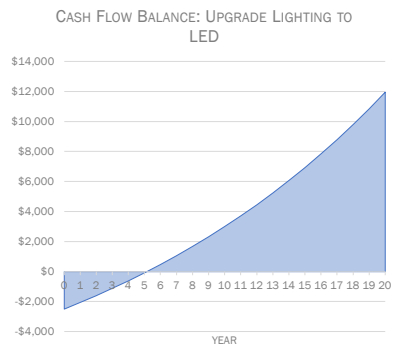
Energy Conservation Measure 9

Opp Cat:	Select
Opp Desc:	
Opp Name:	Upgrade Lighting to LED

Costing Setup	
Engineering & PM:	**5%**
Contingency:	**10%**
Additional Annual Costs:	
Additional Annual Savings:	**$40**
Tax Rebate (Capital Projects):	**No**
Avoided Capital Costs:	**$0**
Avoided Capital Year:	
Financial Analysis Term (years):	**20**

Incentive Work Area			
Rate	Qty	Total	Comments
		$0	
		$0	
		$0	
		$0	
		$0	
Total:		**$0**	

Utility Savings	
Demand (kW):	0
Electricity (kWh):	2,110
Natural Gas (litres):	-109
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	-0.1
Financials	
Annual Utility Savings:	$376
Add'l Annual Savings:	$40
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$2,171
Engineering & PM:	$109
Contingency:	$217
Project Costs:	$2,497
Simple Payback:	6.0
Capital Payback:	5.2
NPV:	$4,177
IRR:	21.6%



Write-ups	
Existing:	#N/A
Retrofit:	#N/A

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	271,344	273,345
% Reduction	#DIV/0!	#DIV/0!

Electrical Capacity Impact (Amps): for Ele Service Upgrades			
Base	Summer	Winter	Peak

Savings: Upgrade Lighting to LED

Avg Temp (°F)	Avg Temp (°C)	Total Hours	Meter Selection				Occupancy	Eff. Profile
			Select	Select	Select	Select	Select	Select
-33	-36	0						0%
-28	-33	0						0%
-23	-30	0						0%
-18	-28	1						0%
-13	-25	24						0%
-8	-22	37						0%
-3	-19	68						0%
3	-16	153						0%
8	-14	201						0%
13	-11	364						0%
18	-8	506						0%
23	-5	638						0%
28	-3	605						0%
33	0	810						0%
38	3	629						0%
43	6	606						0%
48	9	646						0%
53	11	688						0%
58	14	669						0%
63	17	724						0%
68	20	625						0%
73	23	449						0%
78	25	225						0%
83	28	82						0%
88	31	10						0%
93	34	0						0%
98	36	0						0%
103	39	0						0%
Totals		**8,760**	**0**	**0**	**0**	**0**	**0**	**0**

End-Use	Existing			Upgrade Lighting to LED			Savings		From Lighting Spreadsheet			
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)	Interior Savings (kWh)	Exterior Savings (kWh)	Total Savings (kWh)	
Space Cool	0.0	0.0	0.0	0.0	0.0	0.0	0	0	1,186	1,153	2,339	
Heat Reject.	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Refrigeration	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Space Heat	42.3	277.9	123,770.8	42.5	280.6	124,754.5	-210	-109				
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Hot Water	1.0	0.0	960.0	1.0	0.0	960.0	0	0				
Vent. Fans	0.9	0.0	860.0	0.9	0.0	870.0	-10	0				
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Ext. Usage	2.8	0.0	2,770.0	1.6	0.0	1,620.0	1,150	0				
Misc. Equip	2.4	0.0	2,390.0	2.4	0.0	2,390.0	0	0				
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Area Lights	2.9	0.0	2,920.0	1.7	0.0	1,740.0	1,180	0				
0	**52**	**278**	**133,671**	**50**	**281**	**132,335**	**2,110**	**-109**	**1,186**	**1,153**	**2,339**	**0**
Main Meter:	Select	Select	Select	Select	Select	Select	Select	M02	M03	Select	Select	Select	Select
Breakout Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select

General Requirements: Upgrade Lighting to LED

Cost Breakout: Upgrade Lighting to LED

Row	Division #	Section #	Division	Section	Item Description	Item	Description	Units	Source	Unit Costs			Gen Req?	Avoided Cost/ Project Cost	Qty	Material	Labour	Equipment	Total
										Materials	Labour	Equipment							
110	0	0											Yes	Project		$0	$0	$0	$0
111	0	0											Yes	Project		$0	$0	$0	$0
112	0	0											Yes	Project		$0	$0	$0	$0
113	0	0											Yes	Project		$0	$0	$0	$0
114	0	0											Yes	Project		$0	$0	$0	$0
115	0	0											Yes	Project		$0	$0	$0	$0
116	0	0											Yes	Project		$0	$0	$0	$0
117	0	0											Yes	Project		$0	$0	$0	$0
118	0	0											Yes	Project		$0	$0	$0	$0
119	0	0											Yes	Project		$0	$0	$0	$0
120	0	0											Yes	Project		$0	$0	$0	$0
121	0	0											Yes	Project		$0	$0	$0	$0
122	0	0											Yes	Project		$0	$0	$0	$0
123	0	0											Yes	Project		$0	$0	$0	$0
124	0	0											Yes	Project		$0	$0	$0	$0
125	0	0											Yes	Project		$0	$0	$0	$0
126	0	0											Yes	Project		$0	$0	$0	$0
127	0	0											Yes	Project		$0	$0	$0	$0
128	0	0											Yes	Project		$0	$0	$0	$0
129	0	0											Yes	Project		$0	$0	$0	$0
130	0	0											Yes	Project		$0	$0	$0	$0
131	0	0											Yes	Project		$0	$0	$0	$0
132	0	0											Yes	Project		$0	$0	$0	$0
133	0	0											Yes	Project		$0	$0	$0	$0
134	0	0											Yes	Project		$0	$0	$0	$0
135	0	0											Yes	Project		$0	$0	$0	$0
136	0	0											Yes	Project		$0	$0	$0	$0
137	0	0											Yes	Project		$0	$0	$0	$0
138	0	0											Yes	Project		$0	$0	$0	$0
139	0	0											Yes	Project		$0	$0	$0	$0
140	0	0											Yes	Project		$0	$0	$0	$0
141	0	0											Yes	Project		$0	$0	$0	$0
142	0	0											Yes	Project		$0	$0	$0	$0
143	0	0											Yes	Project		$0	$0	$0	$0
144	0	0											Yes	Project		$0	$0	$0	$0
145	0	0											Yes	Project		$0	$0	$0	$0
146	0	0											Yes	Project		$0	$0	$0	$0
147	0	0											Yes	Project		$0	$0	$0	$0
															Totals:	**$0**	**$0**	**$0**	**$0**

Escalation Rates: Upgrade Lighting to LED

Cash Flow Balance: Upgrade Lighting to LED

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Year:	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Implementation Cost:	-$2,497	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M01):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M02):		$503	$529	$556	$585	$616	$648	$681	$717	$754	$793	$835	$878	$924	$972	$1,022	$1,075	$1,131	$1,190	$1,252	$1,317
Annual Savings (M03):		-$107	-$112	-$118	-$124	-$130	-$136	-$143	-$150	-$158	-$166	-$174	-$183	-$192	-$202	-$212	-$222	-$233	-$245	-$257	-$270
Annual Savings (M04):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M05):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M06):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Incentives:	$0																				
Add'l Annual Costs:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Add'l Annual Savings:		$41	$42	$43	$44	$45	$46	$47	$48	$49	$50	$51	$52	$53	$54	$55	$57	$58	$59	$60	$62
Tax Rebate:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Total:	-$2,497	$437	$458	$481	$505	$530	$557	$585	$614	$645	$677	$711	$747	$785	$824	$866	$910	$956	$1,004	$1,055	$1,109
Cash Balance:	-$2,497	-$2,060	-$1,602	-$1,121	-$615	-$85	$472	$1,056	$1,670	$2,315	$2,992	$3,703	$4,450	$5,235	$6,059	$6,925	$7,835	$8,791	$9,795	$10,850	$11,959
Undepreciated Amount:	-$2,497	-$2,122	-$1,804	-$1,533	-$1,303	-$1,108	-$942	-$800	-$680	-$578	-$492	-$418	-$355	-$302	-$257	-$218	-$185	-$158	-$134	-$114	-$97

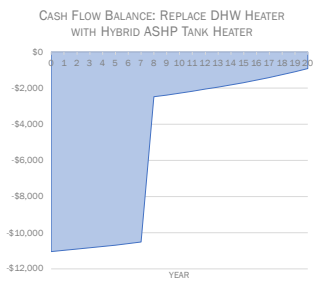
Energy Conservation Measure 6

Opp Cat:	Select
Opp Desc:	
Opp Name:	Replace DHW Heater with Hybrid ASHP Tank Heater

Costing Setup	
Engineering & PM:	15%
Contingency:	10%
Additional Annual Costs:	
Additional Annual Savings:	
Tax Rebate (Capital Projects):	No
Avoided Capital Costs:	$6,676
Avoided Capital Year:	8
Financial Analysis Term (years):	20

Incentive Work Area			
Rate	Qty	Total	Comments
		$0	
		$0	
		$0	
		$0	
		$0	
Total:		$0	

Utility Savings	
Demand (kW):	0
Electricity (kWh):	270
Natural Gas (litres):	0
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	0.0
Financials	
Annual Utility Savings:	$61
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$8,833
Engineering & PM:	$1,325
Contingency:	$883
Project Costs:	$11,041
Simple Payback:	180.6
Capital Payback:	24.7
NPV:	-$5,523
IRR:	-1.0%



Write-ups	
Existing:	#N/A
Retrofit:	#N/A

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	200,019	200,289
% Reduction	#DIV/0!	#DIV/0!

Electrical Capacity Impact (Amps); for Ele Service Upgrades			
Base	Summer	Winter	Peak

Savings: Replace DHW Heater with Hybrid ASHP Tank Heater

Avg Temp (°F)	Avg Temp (°C)	Total Hours	Meter Selection				Occupancy	Eff. Profile
			Select	Select	Select	Select	Select	Select
-33	-36	0						0%
-28	-33	0						0%
-23	-30	0						0%
-18	-28	1						0%
-13	-25	24						0%
-8	-22	37						0%
-3	-19	68						0%
3	-16	153						0%
8	-14	201						0%
13	-11	364						0%
18	-8	506						0%
23	-5	638						0%
28	-3	605						0%
33	0	810						0%
38	3	629						0%
43	6	606						0%
48	9	646						0%
53	11	688						0%
58	14	669						0%
63	17	724						0%
68	20	625						0%
73	23	449						0%
78	25	225						0%
83	28	82						0%
88	31	10						0%
93	34	0						0%
98	36	0						0%
103	39	0						0%
Totals		8,760	0	0	0	0	0	0

End-Use	Existing			Manual Calc			Savings		Existing	Retrofit						Savings
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)	DHW Htg Cons - kWh	Adj DHW HTG Cons - kWh	Adj DHW Cons - kWh	ASHP Offset	ASHP Avg COP	Electric Backup Htg - kWh	ASHP Cons - kWh	DHW Cons - kWh
Space Cool	0.0	0.0	0.0	0.0	0.0	0.0	0	0	960	540	540	75%	3.0	135	135	270
Heat Reject.	0.0	0.0	0.0	0.0	0.0	0.0	0	0								
Refrigeration	0.0	0.0	0.0	0.0	0.0	0.0	0	0								
Space Heat	42.3	277.9	123,770.8	0.0	0.0	0.0	42,320	11,485								
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0								
Hot Water	1.0	0.0	960.0	0.0	0.0	0.0	960	0								
Vent. Fans	0.9	0.0	860.0	0.0	0.0	0.0	860	0								
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0								
Ext. Usage	2.8	0.0	2,770.0	0.0	0.0	0.0	2,770	0								
Misc. Equip	2.4	0.0	2,390.0	0.0	0.0	0.0	2,390	0								
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0								
Area Lights	2.9	0.0	2,920.0	0.0	0.0	0.0	2,920	0								
	0	52	278	133,671	0	0	0	52,220	11,485	960	540	540	1	3	135	135	270
Main Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	M02
Breakout Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select

General Requirements: Replace DHW Heater with Hybrid ASHP Tank Heater

Cost Breakout: Replace DHW Heater with Hybrid ASHP Tank Heater

Row	Division #	Section #	Division	Section	Item Description	Item	Description	Units	Source	Unit Costs			Gen Req?	Avoided Cost/ Project Cost	Qty	Material	Labour	Equipment	Total
										Materials	Labour	Equipment							
110	0	0				Demolition	Remove Existing	Each	EE Est	$0	$750	$0	Yes	Both	1	$0	$1,154	$0	$1,154
111	0	0				Hybrid Tank Heater	80 Gal 4.5 kW	Each	Web Search	$4,000	$1,000	$0	Yes	Project	1	$6,141	$1,538	$0	$7,679
112	0	0											Yes	Project		$0	$0	$0	$0
113	0	0				Electric Tank Heater	4.5 kW	Each	Web Search	$2,200	$1,000	$0	Yes	Avoided	1	$3,377	$1,538	$0	$4,916
114	0	0											Yes	Project		$0	$0	$0	$0
115	0	0											Yes	Project		$0	$0	$0	$0
116	0	0											Yes	Project		$0	$0	$0	$0
117	0	0											Yes	Project		$0	$0	$0	$0
118	0	0											Yes	Project		$0	$0	$0	$0
119	0	0											Yes	Project		$0	$0	$0	$0
120	0	0											Yes	Project		$0	$0	$0	$0
121	0	0											Yes	Project		$0	$0	$0	$0
122	0	0											Yes	Project		$0	$0	$0	$0
123	0	0											Yes	Project		$0	$0	$0	$0
124	0	0											Yes	Project		$0	$0	$0	$0
125	0	0											Yes	Project		$0	$0	$0	$0
126	0	0											Yes	Project		$0	$0	$0	$0
127	0	0											Yes	Project		$0	$0	$0	$0
128	0	0											Yes	Project		$0	$0	$0	$0
129	0	0											Yes	Project		$0	$0	$0	$0
130	0	0											Yes	Project		$0	$0	$0	$0
131	0	0											Yes	Project		$0	$0	$0	$0
132	0	0											Yes	Project		$0	$0	$0	$0
133	0	0											Yes	Project		$0	$0	$0	$0
134	0	0											Yes	Project		$0	$0	$0	$0
135	0	0											Yes	Project		$0	$0	$0	$0
136	0	0											Yes	Project		$0	$0	$0	$0
137	0	0											Yes	Project		$0	$0	$0	$0
138	0	0											Yes	Project		$0	$0	$0	$0
139	0	0											Yes	Project		$0	$0	$0	$0
140	0	0											Yes	Project		$0	$0	$0	$0
141	0	0											Yes	Project		$0	$0	$0	$0
142	0	0											Yes	Project		$0	$0	$0	$0
143	0	0											Yes	Project		$0	$0	$0	$0
144	0	0											Yes	Project		$0	$0	$0	$0
145	0	0											Yes	Project		$0	$0	$0	$0
146	0	0											Yes	Project		$0	$0	$0	$0
147	0	0											Yes	Project		$0	$0	$0	$0
															Totals:	**$6,141**	**$2,692**	**$0**	**$8,833**

Escalation Rates: Replace DHW Heater with Hybrid ASHP Tank Heater

Year:	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
Demand ($/kW):	11.8277	12.5374	13.2896	14.0870	14.9322	15.8281	16.7778	17.7845	18.8516	19.9827	21.1816	22.4525	23.7997	25.2276	26.7413	28.3458	30.0465	31.8493	33.7603	35.7859	37.9330	40.2090	42.6216	45.1789	47.8896
Electricity ($/kWh):	0.2265	0.2382	0.2506	0.2637	0.2774	0.2918	0.3070	0.3229	0.3397	0.3574	0.3760	0.3955	0.4161	0.4377	0.4605	0.4844	0.5096	0.5361	0.5640	0.5933	0.6242	0.6566	0.6908	0.7267	0.7645
Natural Gas ($/litres):	0.9334	0.9801	1.0291	1.0805	1.1346	1.1913	1.2508	1.3134	1.3791	1.4480	1.5204	1.5964	1.6763	1.7601	1.8481	1.9405	2.0375	2.1394	2.2463	2.3587	2.4766	2.6004	2.7304	2.8670	3.0103
Water ($/m³):	4.7748	4.9180	5.0656	5.2176	5.3741	5.5353	5.7014	5.8724	6.0486	6.2300	6.4169	6.6094	6.8077	7.0120	7.2223	7.4390	7.6622	7.8920	8.1288	8.3726	8.6238	8.8825	9.1490	9.4235	9.7062
Natural Gas ($/m³):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
($/):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GHG Emissions (tCO2e):	0.000031	0.000043	0.000047	0.000054	0.000071	0.000072	0.000075	0.000069	0.000077	0.000083	0.000079	0.000079	0.000079	0.000077	0.000081	0.000082	0.000087	0.000088	0.000093	0.000093	0.000093	0.000093	0.000093	0.000093	0.000093

Cash Flow Balance: Replace DHW Heater with Hybrid ASHP Tank Heater

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Year:	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**				
Implementation Cost:	-$11,041	$0	$0	$0	$0	$0	$0	$0	$7,946	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M01):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M02):		$64	$68	$71	$75	$79	$83	$87	$92	$96	$102	$107	$112	$118	$124	$131	$138	$145	$152	$160	$169	$177	$187	$196	$206
Annual Savings (M03):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M04):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M05):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M06):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Incentives:	$0																								
Add'l Annual Costs:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Add'l Annual Savings:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Tax Rebate:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Total:	-$11,041	$64	$68	$71	$75	$79	$83	$87	$8,038	$96	$102	$107	$112	$118	$124	$131	$138	$145	$152	$160	$169	$0	$0	$0	$0
Cash Balance:	-$11,041	-$10,976	-$10,909	-$10,838	-$10,763	-$10,684	-$10,601	-$10,514	-$2,476	-$2,380	-$2,278	-$2,172	-$2,059	-$1,941	-$1,817	-$1,686	-$1,548	-$1,404	-$1,251	-$1,091	-$923	$0	$0	$0	$0
Undepreciated Amount:	-$11,041	-$9,385	-$7,977	-$6,780	-$5,763	-$4,899	-$4,164	-$3,539	-$3,009	-$2,557	-$2,174	-$1,848	-$1,570	-$1,335	-$1,135	-$964	-$820	-$697	-$592	-$503	-$428	$0	$0	$0	$0

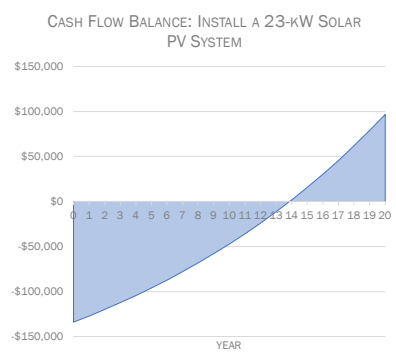
Energy Conservation Measure 11

Opp Cat:	Select
Opp Desc:	
Opp Name:	Install a 23-kW Solar PV System

Costing Setup	
Engineering & PM:	**15%**
Contingency:	**10%**
Additional Annual Costs:	
Additional Annual Savings:	
Tax Rebate (Capital Projects):	**No**
Avoided Capital Costs:	**$0**
Avoided Capital Year:	
Financial Analysis Term (years):	**20**

Incentive Work Area			
Rate	Qty	Total	Comments
		$0	
		$0	
		$0	
		$0	
		$0	
Total:		**$0**	

Utility Savings	
Demand (kW):	0
Electricity (kWh):	28,635
Natural Gas (litres):	0
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	0.9
Financials	
Annual Utility Savings:	$6,485
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$107,041
Engineering & PM:	$16,056
Contingency:	$10,704
Project Costs:	$133,802
Simple Payback:	20.6
Capital Payback:	13.9
NPV:	-$27,824
IRR:	4.9%



Write-ups	
Existing:	#N/A
Retrofit:	#N/A

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	197,706	226,341
% Reduction	#DIV/0!	#DIV/0!

Electrical Capacity Impact (Amps): for Ele Service Upgrades			
Base	Summer	Winter	Peak

Savings: Install a 23-kW Solar PV System

Avg Temp (°F)	Avg Temp (°C)	Total Hours	Meter Selection				Occupancy	Eff. Profile
			Select	Select	Select	Select	Select	Select
-33	-36	0						0%
-28	-33	0						0%
-23	-30	0						0%
-18	-28	1						0%
-13	-25	24						0%
-8	-22	37						0%
-3	-19	68						0%
3	-16	153						0%
8	-14	201						0%
13	-11	364						0%
18	-8	506						0%
23	-5	638						0%
28	-3	605						0%
33	0	810						0%
38	3	629						0%
43	6	606						0%
48	9	646						0%
53	11	688						0%
58	14	669						0%
63	17	724						0%
68	20	625						0%
73	23	449						0%
78	25	225						0%
83	28	82						0%
88	31	10						0%
93	34	0						0%
98	36	0						0%
103	39	0						0%
Totals		**8,760**	**0**	**0**	**0**	**0**	**0**	**0**

End-Use	Existing			Manual Calc			Savings		Savings from RETScreen			
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)	Elec Cons. (kWh)			
Space Cool	0.0	0.0	0.0	0.0	0.0	0.0	0	0	28,635			
Heat Reject.	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Refrigeration	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Space Heat	42.3	277.9	123,770.8	0.0	0.0	0.0	42,320	11,485				
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Hot Water	1.0	0.0	960.0	0.0	0.0	0.0	960	0				
Vent. Fans	0.9	0.0	860.0	0.0	0.0	0.0	860	0				
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Ext. Usage	2.8	0.0	2,770.0	0.0	0.0	0.0	2,770	0				
Misc. Equip	2.4	0.0	2,390.0	0.0	0.0	0.0	2,390	0				
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Area Lights	2.9	0.0	2,920.0	0.0	0.0	0.0	2,920	0				
0	**52**	**278**	**133,671**	**0**	**0**	**0**	**52,220**	**11,485**	**28,635**	**0**	**0**	**0**
Main Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	M02	Select	Select	Select
Breakout Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select

General Requirements: Install a 23-kW Solar PV System

Cost Breakout: Install a 23-kW Solar PV System

Row	Division #	Section #	Division	Section	Item Description	Item	Description	Units	Source	Unit Costs			Gen Req?	Avoided Cost/ Project Cost	Qty	Material	Labour	Equipment	Total
										Materials	Labour	Equipment							
110	0	0				Solar PV System	kW	Per W Installed		$2.00	$0.70		Yes	Project	23400	$71,847	$25,196	$0	$97,043
111	0	0											Yes	Project		$0	$0	$0	$0
112	0	0				Structural Analysis		Each	EE Est	$0	$6,500	$0	Yes	Project	1	$0	$9,998	$0	$9,998
113	0	0											Yes	Project		$0	$0	$0	$0
114	0	0											Yes	Project		$0	$0	$0	$0
115	0	0											Yes	Project		$0	$0	$0	$0
116	0	0											Yes	Project		$0	$0	$0	$0
117	0	0											Yes	Project		$0	$0	$0	$0
118	0	0											Yes	Project		$0	$0	$0	$0
119	0	0											Yes	Project		$0	$0	$0	$0
120	0	0											Yes	Project		$0	$0	$0	$0
121	0	0											Yes	Project		$0	$0	$0	$0
122	0	0											Yes	Project		$0	$0	$0	$0
123	0	0											Yes	Project		$0	$0	$0	$0
124	0	0											Yes	Project		$0	$0	$0	$0
125	0	0											Yes	Project		$0	$0	$0	$0
126	0	0											Yes	Project		$0	$0	$0	$0
127	0	0											Yes	Project		$0	$0	$0	$0
128	0	0											Yes	Project		$0	$0	$0	$0
129	0	0											Yes	Project		$0	$0	$0	$0
130	0	0											Yes	Project		$0	$0	$0	$0
131	0	0											Yes	Project		$0	$0	$0	$0
132	0	0											Yes	Project		$0	$0	$0	$0
133	0	0											Yes	Project		$0	$0	$0	$0
134	0	0											Yes	Project		$0	$0	$0	$0
135	0	0											Yes	Project		$0	$0	$0	$0
136	0	0											Yes	Project		$0	$0	$0	$0
137	0	0											Yes	Project		$0	$0	$0	$0
138	0	0											Yes	Project		$0	$0	$0	$0
139	0	0											Yes	Project		$0	$0	$0	$0
140	0	0											Yes	Project		$0	$0	$0	$0
141	0	0											Yes	Project		$0	$0	$0	$0
142	0	0											Yes	Project		$0	$0	$0	$0
143	0	0											Yes	Project		$0	$0	$0	$0
144	0	0											Yes	Project		$0	$0	$0	$0
145	0	0											Yes	Project		$0	$0	$0	$0
146	0	0											Yes	Project		$0	$0	$0	$0
147	0	0											Yes	Project		$0	$0	$0	$0
															Totals:	**$71,847**	**$35,194**	**$0**	**$107,041**

Escalation Rates: Install a 23-kW Solar PV System

Cash Flow Balance: Install a 23-kW Solar PV System

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Year:	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Implementation Cost:	-$133,802	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M01):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M02):		$6,822	$7,177	$7,550	$7,943	$8,356	$8,790	$9,247	$9,728	$10,234	$10,766	$11,326	$11,915	$12,534	$13,186	$13,872	$14,593	$15,352	$16,150	$16,990	$17,874
Annual Savings (M03):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M04):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M05):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M06):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Incentives:	$0																				
Add'l Annual Costs:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Add'l Annual Savings:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Tax Rebate:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Total:	-$133,802	$6,822	$7,177	$7,550	$7,943	$8,356	$8,790	$9,247	$9,728	$10,234	$10,766	$11,326	$11,915	$12,534	$13,186	$13,872	$14,593	$15,352	$16,150	$16,990	$17,874
Cash Balance:	-$133,802	-$126,980	-$119,803	-$112,253	-$104,310	-$95,955	-$87,165	-$77,918	-$68,190	-$57,956	-$47,190	-$35,864	-$23,949	-$11,415	$1,771	$15,643	$30,236	$45,588	$61,738	$78,728	$96,602
Undepreciated Amount:	-$133,802	-$113,731	-$96,672	-$82,171	-$69,845	-$59,369	-$50,463	-$42,894	-$36,460	-$30,991	-$26,342	-$22,391	-$19,032	-$16,177	-$13,751	-$11,688	-$9,935	-$8,445	-$7,178	-$6,101	-$5,186

Site reference conditions

Climate data location: Canada - Ontario - Beausoleil

Facility location: Canada - ON - Georgian Bay

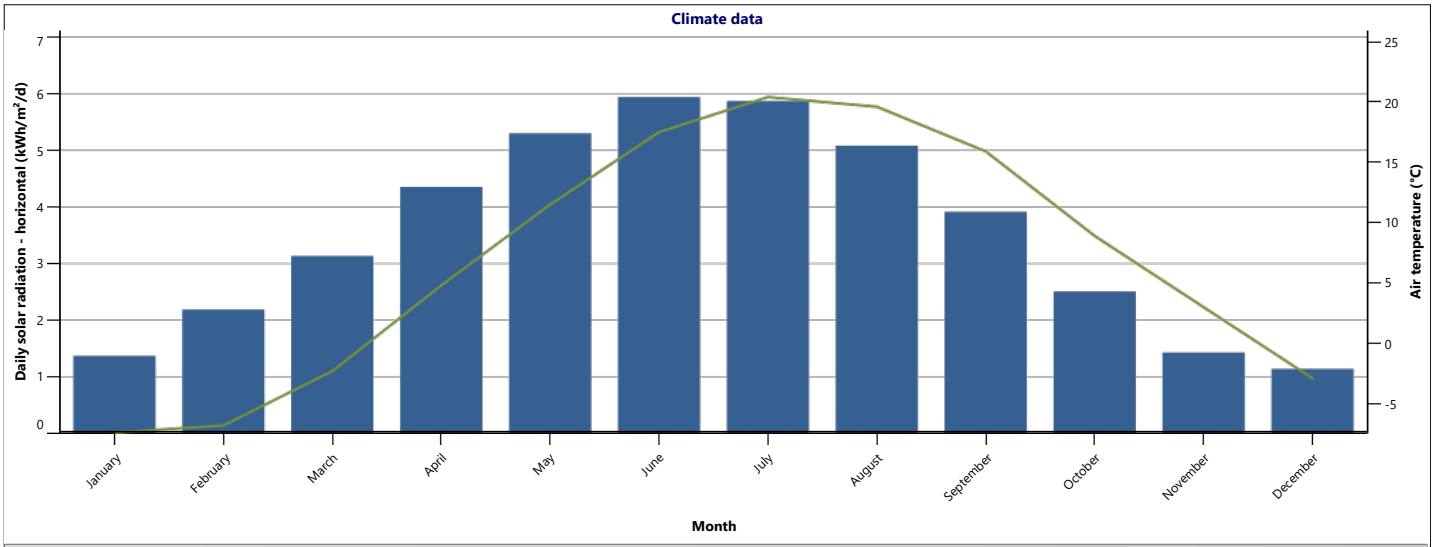
Legend

Facility location

Climate data location

	Unit	Climate data location	Facility location	Source
Latitude		44.8	45.1	
Longitude		-79.9	-79.8	
Climate zone		6A - Cold - Humid		Ground+NASA
Elevation	m	183	237	Ground – Map
Heating design temperature	°C	-20.4		Ground
Cooling design temperature	°C	28.1		Ground
Earth temperature amplitude	°C	22.1		NASA

Month	Air temperature	Relative humidity	Precipitation	Daily solar radiation - horizontal	Atmospheric pressure	Wind speed	Earth temperature	Heating degree-days 18 °C	Cooling degree-days 10 °C
	°C	%	mm	kWh/m²/d	kPa	m/s	°C	°C-d	°C-d
January	-7.4	85.1%	46.50	1.36	98.6	2.6	-5.7	787	0
February	-6.8	80.9%	38.92	2.18	98.7	2.4	-6.0	694	0
March	-2.3	78.6%	42.78	3.13	98.7	2.4	-2.1	629	0
April	4.8	74.4%	48.60	4.35	98.5	2.5	4.1	396	0
May	11.5	78.5%	59.21	5.30	98.6	2.3	9.6	202	47
June	17.5	81.5%	59.40	5.94	98.5	2.0	14.9	15	225
July	20.4	80.9%	58.59	5.87	98.6	1.9	18.9	0	322
August	19.6	81.9%	58.59	5.08	98.7	1.9	18.9	0	298
September	15.9	83.5%	69.90	3.91	98.8	2.1	15.2	63	177
October	8.9	83.9%	67.27	2.50	98.7	2.3	8.9	282	0
November	3.0	86.1%	62.70	1.42	98.7	2.7	3.2	450	0
December	-2.9	87.1%	50.84	1.13	98.7	2.7	-2.3	648	0
Annual	**6.9**	**81.9%**	**663.30**	**3.52**	**98.6**	**2.3**	**6.5**	**4,167**	**1,069**
Source	Ground	Ground	NASA	NASA	NASA	Ground	NASA	Ground	Ground
Measured at					m	10	0		

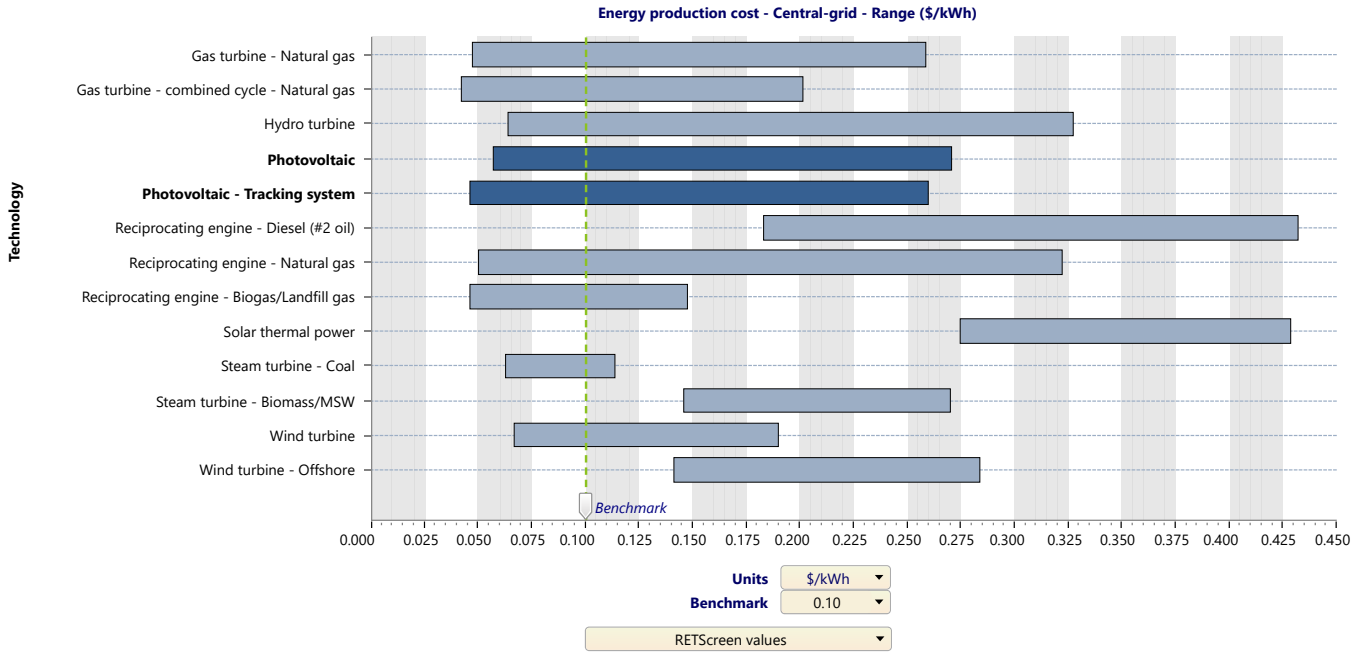


Facility information

Facility type	Power plant
Type	Photovoltaic
Description	Solar PV System
Prepared for	Township of Georgian Bay
Prepared by	Efficiency Engineering
Facility name	MacTier Public Works
Address	630 High St
City/Municipality	Georgian Bay
Province/State	ON
Country	Canada

Photo | Image - Windwärts Energie, CC BY-NC-ND 2.0

Benchmark - Power plants



Units	$/kWh
Benchmark	0.10

RETScreen values

Note: Typical cost values in Canadian $ as of January 1, 2019.
Purchasing power parity (Exchange rate) approximately 1.25 CAD = 1 USD.

Power plant - Solar PV System - Photovoltaic

- **Fuels & schedules**
  - Electricity and fuels
- **Technology**
  - Power
    - Photovoltaic
- **Summary**
  - Include system?
  - Comparison

Photovoltaic

Description: Photovoltaic

Note:

Level: Level 1 | Level 2

eLearning

Photovoltaic - Level 2

Resource assessment

Solar tracking mode		Fixed
Slope	°	20
Azimuth	°	45

Show data

Photovoltaic

Type		mono-Si
Power capacity	kW	23.4
Manufacturer		Canadian Solar
Model		mono-Si - CS6X-300M - MaxPower
Number of units		78
Efficiency	%	15.63%
Nominal operating cell temperature	°C	45
Temperature coefficient	% / °C	0.4%
Solar collector area	m²	150
Bifacial cell adjustment factor	%	5%
Miscellaneous losses	%	5%

Inverter

Efficiency	%	95%
Capacity	kW	60
Miscellaneous losses	%	5%

Summary

Capacity factor	%	14%
Initial costs	$/kW	
	$	
O&M costs (savings)	$/kW-year	
	$	
Electricity export rate		Electricity export rate - annual
	$/kWh	0.10
Electricity exported to grid	kWh	28,635
Electricity export revenue	$	2,864

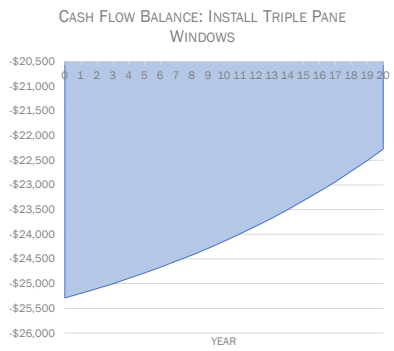
Energy Conservation Measure 1

Opp Cat:	
Opp Desc:	
Opp Name:	Install Triple Pane Windows

Costing Setup	
Engineering & PM:	**15%**
Contingency:	**10%**
Additional Annual Costs:	
Additional Annual Savings:	
Tax Rebate (Capital Projects):	**No**
Avoided Capital Costs:	**$0**
Avoided Capital Year:	
Financial Analysis Term (years):	**20**

Incentive Work Area			
Rate	Qty	Total	Comments
		$0	
		$0	
		$0	
		$0	
		$0	
Total:		**$0**	

Utility Savings	
Demand (kW):	0
Electricity (kWh):	-40
Natural Gas (litres):	103
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	0.2
Financials	
Annual Utility Savings:	$87
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$20,231
Engineering & PM:	$3,035
Contingency:	$2,023
Project Costs:	$25,289
Simple Payback:	290.7
Capital Payback:	55.4
NPV:	-$23,896
IRR:	-14.0%



Write-ups	
Existing:	#N/A
Retrofit:	#N/A

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	267,310	267,372
% Reduction	#DIV/0!	#DIV/0!

Electrical Capacity Impact (Amps): for Ele Service Upgrades			
Base	Summer	Winter	Peak

Savings: Install Triple Pane Windows

			Meter Selection				Occupancy	Eff. Profile
Avg Temp (°F)	Avg Temp (°C)	Total Hours	M03 Winter	Select	Select	Select	Select	Select
-33	-36	0	0					0%
-28	-33	0	0					0%
-23	-30	0	0					0%
-18	-28	1	6					0%
-13	-25	24	135					0%
-8	-22	37	195					0%
-3	-19	68	323					0%
3	-16	153	662					0%
8	-14	201	782					0%
13	-11	364	1,260					0%
18	-8	506	1,526					0%
23	-5	638	1,645					0%
28	-3	605	1,293					0%
33	0	810	1,376					0%
38	3	629	791					0%
43	6	606	496					0%
48	9	646	244					0%
53	11	688	0					0%
58	14	669	0					0%
63	17	724	0					0%
68	20	625	0					0%
73	23	449	0					0%
78	25	225	0					0%
83	28	82	0					0%
88	31	10	0					0%
93	34	0	0					0%
98	36	0	0					0%
103	39	0	0					0%
Totals		**8,760**	**10,735**	**0**	**0**	**0**	**0**	**0**

End-Use	Existing			Install Triple Pane Windows			Savings					
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)				
Space Cool	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Heat Reject.	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Refrigeration	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Space Heat	42.3	277.9	123,770.8	42.4	275.4	123,081.0	-40	103				
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Hot Water	1.0	0.0	960.0	1.0	0.0	960.0	0	0				
Vent. Fans	0.9	0.0	860.0	0.9	0.0	860.0	0	0				
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Ext. Usage	2.8	0.0	2,770.0	2.8	0.0	2,770.0	0	0				
Misc. Equip	2.4	0.0	2,390.0	2.4	0.0	2,390.0	0	0				
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Area Lights	2.9	0.0	2,920.0	2.9	0.0	2,920.0	0	0				
0	**52**	**278**	**133,671**	**52**	**275**	**132,981**	**-40**	**103**	**0**	**0**	**0**	**0**
Main Meter:	Select	Select	Select	Select	Select	Select	Select	M02	M03	Select	Select	Select	Select
Breakout Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select

1%

General Requirements: Install Triple Pane Windows

Cost Breakout: Install Triple Pane Windows

Row	Division #	Section #	Division	Section	Item Description	Item	Description	Units	Source	Unit Costs			Gen Req?	Avoided Cost/ Project Cost	Qty	Material	Labour	Equipment	Total
										Materials	Labour	Equipment							
110	0	0				Triple Glazed		per sqft of	Pinpoint	$91	$18	$0	Yes	Project	120.64	$16,854	$3,377	$0	$20,231
111	0	0											Yes	Project		$0	$0	$0	$0
112	0	0											Yes	Project		$0	$0	$0	$0
113	0	0											Yes	Project		$0	$0	$0	$0
114	0	0											Yes	Project		$0	$0	$0	$0
115	0	0											Yes	Project		$0	$0	$0	$0
116	0	0											Yes	Project		$0	$0	$0	$0
117	0	0											Yes	Project		$0	$0	$0	$0
118	0	0											Yes	Project		$0	$0	$0	$0
119	0	0											Yes	Project		$0	$0	$0	$0
120	0	0											Yes	Project		$0	$0	$0	$0
121	0	0											Yes	Project		$0	$0	$0	$0
122	0	0											Yes	Project		$0	$0	$0	$0
123	0	0											Yes	Project		$0	$0	$0	$0
124	0	0											Yes	Project		$0	$0	$0	$0
125	0	0											Yes	Project		$0	$0	$0	$0
126	0	0											Yes	Project		$0	$0	$0	$0
127	0	0											Yes	Project		$0	$0	$0	$0
128	0	0											Yes	Project		$0	$0	$0	$0
129	0	0											Yes	Project		$0	$0	$0	$0
130	0	0											Yes	Project		$0	$0	$0	$0
131	0	0											Yes	Project		$0	$0	$0	$0
132	0	0											Yes	Project		$0	$0	$0	$0
133	0	0											Yes	Project		$0	$0	$0	$0
134	0	0											Yes	Project		$0	$0	$0	$0
135	0	0											Yes	Project		$0	$0	$0	$0
136	0	0											Yes	Project		$0	$0	$0	$0
137	0	0											Yes	Project		$0	$0	$0	$0
138	0	0											Yes	Project		$0	$0	$0	$0
139	0	0											Yes	Project		$0	$0	$0	$0
140	0	0											Yes	Project		$0	$0	$0	$0
141	0	0											Yes	Project		$0	$0	$0	$0
142	0	0											Yes	Project		$0	$0	$0	$0
143	0	0											Yes	Project		$0	$0	$0	$0
144	0	0											Yes	Project		$0	$0	$0	$0
145	0	0											Yes	Project		$0	$0	$0	$0
146	0	0											Yes	Project		$0	$0	$0	$0
147	0	0											Yes	Project		$0	$0	$0	$0
															Totals:	**$16,854**	**$3,377**	**$0**	**$20,231**

Escalation Rates: Install Triple Pane Windows

Year:	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Demand ($/kW):	11.8277	12.5374	13.2896	14.0870	14.9322	15.8281	16.7778	17.7845	18.8516	19.9827	21.1816	22.4525	23.7997	25.2276	26.7413	28.3458	30.0465	31.8493	33.7603	35.7859	37.9330
Electricity ($/kWh):	0.2265	0.2382	0.2506	0.2637	0.2774	0.2918	0.3070	0.3229	0.3397	0.3574	0.3760	0.3955	0.4161	0.4377	0.4605	0.4844	0.5096	0.5361	0.5640	0.5933	0.6242
Natural Gas ($/litres):	0.9334	0.9801	1.0291	1.0805	1.1346	1.1913	1.2508	1.3134	1.3791	1.4480	1.5204	1.5964	1.6763	1.7601	1.8481	1.9405	2.0375	2.1394	2.2463	2.3587	2.4766
Water ($/m³):	4.7748	4.9180	5.0656	5.2176	5.3741	5.5353	5.7014	5.8724	6.0486	6.2300	6.4169	6.6094	6.8077	7.0120	7.2223	7.4390	7.6622	7.8920	8.1288	8.3726	8.6238
Natural Gas ($/m³):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
($/):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GHG Emissions (tCO_2e):	0.000031	0.000043	0.000047	0.000054	0.000071	0.000072	0.000075	0.000069	0.000077	0.000083	0.000079	0.000079	0.000079	0.000077	0.000081	0.000082	0.000087	0.000088	0.000093	0.000093	0.000093

Cash Flow Balance: Install Triple Pane Windows

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Year:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Implementation Cost:	-$25,289	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M01):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M02):		-$10	-$10	-$11	-$11	-$12	-$12	-$13	-$14	-$14	-$15	-$16	-$17	-$18	-$18	-$19	-$20	-$21	-$23	-$24	-$25
Annual Savings (M03):		$101	$106	$111	$117	$123	$129	$135	$142	$149	$156	$164	$172	$181	$190	$200	$210	$220	$231	$243	$255
Annual Savings (M04):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M05):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M06):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Incentives:	$0																				
Add'l Annual Costs:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Add'l Annual Savings:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Tax Rebate:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Total:	-$25,289	$91	$96	$101	$106	$111	$116	$122	$128	$135	$141	$148	$156	$164	$172	$180	$189	$199	$209	$219	$230
Cash Balance:	-$25,289	-$25,198	-$25,102	-$25,001	-$24,895	-$24,785	-$24,668	-$24,546	-$24,418	-$24,283	-$24,141	-$23,993	-$23,837	-$23,674	-$23,502	-$23,321	-$23,132	-$22,934	-$22,725	-$22,506	-$22,276
Undepreciated Amount:	-$25,289	-$21,496	-$18,271	-$15,531	-$13,201	-$11,221	-$9,538	-$8,107	-$6,891	-$5,857	-$4,979	-$4,232	-$3,597	-$3,058	-$2,599	-$2,209	-$1,878	-$1,596	-$1,357	-$1,153	-$980

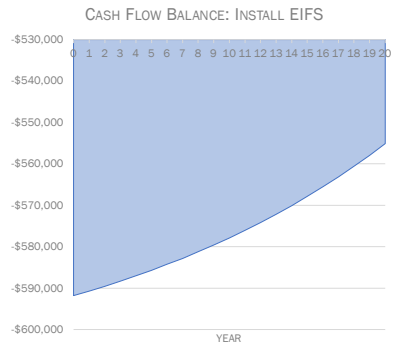
Energy Conservation Measure 10

Opp Cat:	Select
Opp Desc:	
Opp Name:	Install EIFS

Costing Setup	
Engineering & PM:	**15%**
Contingency:	**10%**
Additional Annual Costs:	
Additional Annual Savings:	
Tax Rebate (Capital Projects):	**No**
Avoided Capital Costs:	**$0**
Avoided Capital Year:	
Financial Analysis Term (years):	**20**

Incentive Work Area			
Rate	Qty	Total	Comments
		$0	
		$0	
		$0	
		$0	
		$0	
Total:		**$0**	

Utility Savings	
Demand (kW):	0
Electricity (kWh):	920
Natural Gas (litres):	903
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	1.4
Financials	
Annual Utility Savings:	$1,052
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$473,426
Engineering & PM:	$71,014
Contingency:	$47,343
Project Costs:	$591,783
Simple Payback:	562.8
Capital Payback:	67.8
NPV:	-$574,853
IRR:	-17.4%



Write-ups	
Existing:	#N/A
Retrofit:	#N/A

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	260,652	262,476
% Reduction	#DIV/0!	#DIV/0!

Electrical Capacity Impact (Amps): for Ele Service Upgrades			
Base	Summer	Winter	Peak

Savings: Install EIFS

Avg Temp (°F)	Avg Temp (°C)	Total Hours	Meter Selection: M03 Winter	Select	Select	Select	Occupancy: Select	Eff. Profile: Select
-33	-36	0	0					0%
-28	-33	0	0					0%
-23	-30	0	0					0%
-18	-28	1	6					0%
-13	-25	24	135					0%
-8	-22	37	195					0%
-3	-19	68	323					0%
3	-16	153	662					0%
8	-14	201	782					0%
13	-11	364	1,260					0%
18	-8	506	1,526					0%
23	-5	638	1,645					0%
28	-3	605	1,293					0%
33	0	810	1,376					0%
38	3	629	791					0%
43	6	606	496					0%
48	9	646	244					0%
53	11	688	0					0%
58	14	669	0					0%
63	17	724	0					0%
68	20	625	0					0%
73	23	449	0					0%
78	25	225	0					0%
83	28	82	0					0%
88	31	10	0					0%
93	34	0	0					0%
98	36	0	0					0%
103	39	0	0					0%
Totals		**8,760**	**10,735**	**0**	**0**	**0**	**0**	**0**

End-Use	Existing: Electricity (MWh)	Existing: Propane (MMBTU)	Existing: Combined (kWh)	Install EIFS: Electricity (MWh)	Install EIFS: Propane (MMBTU)	Install EIFS: Combined (kWh)	Savings: Electricity (kWh)	Savings: Propane (L)					
Space Cool	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Heat Reject.	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Refrigeration	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Space Heat	42.3	277.9	123,770.8	41.4	256.1	116,444.0	920	903					
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Hot Water	1.0	0.0	960.0	1.0	0.0	960.0	0	0					
Vent. Fans	0.9	0.0	860.0	0.9	0.0	860.0	0	0					
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Ext. Usage	2.8	0.0	2,770.0	2.8	0.0	2,770.0	0	0					
Misc. Equip	2.4	0.0	2,390.0	2.4	0.0	2,390.0	0	0					
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Area Lights	2.9	0.0	2,920.0	2.9	0.0	2,920.0	0	0					
0	**52**	**278**	**133,671**	**51**	**256**	**126,344**	**920**	**903**	**0**	**0**	**0**	**0**	
Main Meter:	Select	Select	Select	Select	Select	Select	Select	M02	M03	Select	Select	Select	Select
Breakout Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select

General Requirements: Install EIFS

Cost Breakout: Install EIFS

Row	Division #	Section #	Division	Section	Item Description	Item	Description	Units	Source	Unit Costs			Gen Req?	Avoided Cost/ Project Cost	Qty	Material	Labour	Equipment	Total
										Materials	Labour	Equipment							
110	0	0				EIFS	Whole Building	per sqft	MTE Quote	$69	$17		Yes	Project	3562.16	$378,593	$94,833	$0	$473,426
111	0	0											Yes	Project		$0	$0	$0	$0
112	0	0											Yes	Project		$0	$0	$0	$0
113	0	0											Yes	Project		$0	$0	$0	$0
114	0	0											Yes	Project		$0	$0	$0	$0
115	0	0											Yes	Project		$0	$0	$0	$0
116	0	0											Yes	Project		$0	$0	$0	$0
117	0	0											Yes	Project		$0	$0	$0	$0
118	0	0											Yes	Project		$0	$0	$0	$0
119	0	0											Yes	Project		$0	$0	$0	$0
120	0	0											Yes	Project		$0	$0	$0	$0
121	0	0											Yes	Project		$0	$0	$0	$0
122	0	0											Yes	Project		$0	$0	$0	$0
123	0	0											Yes	Project		$0	$0	$0	$0
124	0	0											Yes	Project		$0	$0	$0	$0
125	0	0											Yes	Project		$0	$0	$0	$0
126	0	0											Yes	Project		$0	$0	$0	$0
127	0	0											Yes	Project		$0	$0	$0	$0
128	0	0											Yes	Project		$0	$0	$0	$0
129	0	0											Yes	Project		$0	$0	$0	$0
130	0	0											Yes	Project		$0	$0	$0	$0
131	0	0											Yes	Project		$0	$0	$0	$0
132	0	0											Yes	Project		$0	$0	$0	$0
133	0	0											Yes	Project		$0	$0	$0	$0
134	0	0											Yes	Project		$0	$0	$0	$0
135	0	0											Yes	Project		$0	$0	$0	$0
136	0	0											Yes	Project		$0	$0	$0	$0
137	0	0											Yes	Project		$0	$0	$0	$0
138	0	0											Yes	Project		$0	$0	$0	$0
139	0	0											Yes	Project		$0	$0	$0	$0
140	0	0											Yes	Project		$0	$0	$0	$0
141	0	0											Yes	Project		$0	$0	$0	$0
142	0	0											Yes	Project		$0	$0	$0	$0
143	0	0											Yes	Project		$0	$0	$0	$0
144	0	0											Yes	Project		$0	$0	$0	$0
145	0	0											Yes	Project		$0	$0	$0	$0
146	0	0											Yes	Project		$0	$0	$0	$0
147	0	0											Yes	Project		$0	$0	$0	$0
															Totals:	**$378,593**	**$94,833**	**$0**	**$473,426**

Escalation Rates: Install EIFS

Cash Flow Balance: Install EIFS

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Year:	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Implementation Cost:	-$591,783	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M01):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M02):		$219	$231	$243	$255	$268	$282	$297	$313	$329	$346	$364	$383	$403	$424	$446	$469	$493	$519	$546	$574
Annual Savings (M03):		$885	$930	$976	$1,025	$1,076	$1,130	$1,186	$1,246	$1,308	$1,374	$1,442	$1,514	$1,590	$1,670	$1,753	$1,841	$1,933	$2,029	$2,131	$2,237
Annual Savings (M04):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M05):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Savings (M06):		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Incentives:	$0																				
Add'l Annual Costs:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Add'l Annual Savings:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Tax Rebate:		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Total:	-$591,783	$1,105	$1,160	$1,219	$1,280	$1,345	$1,412	$1,484	$1,558	$1,637	$1,719	$1,806	$1,897	$1,993	$2,093	$2,199	$2,309	$2,426	$2,548	$2,677	$2,812
Cash Balance:	-$591,783	-$590,678	-$589,518	-$588,299	-$587,019	-$585,675	-$584,262	-$582,779	-$581,220	-$579,583	-$577,864	-$576,058	-$574,161	-$572,168	-$570,075	-$567,876	-$565,567	-$563,141	-$560,593	-$557,916	-$555,105
Undepreciated Amount:	-$591,783	-$503,016	-$427,563	-$363,429	-$308,914	-$262,577	-$223,191	-$189,712	-$161,255	-$137,067	-$116,507	-$99,031	-$84,176	-$71,550	-$60,817	-$51,695	-$43,941	-$37,349	-$31,747	-$26,985	-$22,937