71 Lone Pine Rd

Georgian Bay, ON L0K 1S0

Climate Action Roadmap

Community Services Building

EFFICIENCY ENGINEERING .COM
A Kontrol Technologies Company

TOWNSHIP OF
GEORGIAN BAY

EE Project #: 23-014

February 2024

Table of Contents

1 The Executive Summary

Efficiency Engineering has performed a comprehensive Net Zero Retrofit Study at the Community Services Building, 71 Lone Pine Rd in Port Severn, 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 (CFM) 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:	Community Services Building
Client Name:	Township of Georgian Bay
Site Contact:	Jennifer Schnier
Address:	71 Lone Pine Rd
	Port Severn, ON
	L0K 1S0
Facility Area:	3,600 ft²
Building Type:	Community Centre
Year Constructed:	2010
Number of Stories:	1

1.1.1 Existing Building Profile

The Community Services Building is a 3,600 ft² facility comprised of offices, meeting spaces and a public library.

Space heating and cooling for the facility is supplied by a single roof top unit. Heating in the buildings entrance vestibule is supplied by electric force flow heaters. The rooftop unit is also responsible for providing ventilation to the building. The rooftop unit is equipped with an energy

recovery ventilator (ERV) to help recover both sensible and latent heat that is exhausted from the building. The rooftop unit is estimated to be 14 years old.

The facility is equipped with a single electric domestic hot water (DHW) heater. The tank heater is rated at 4.5kW with 73.7 gallons of storage capacity.

Lighting at the facility is provided primarily by T8 fixtures controlled by localized wall switches. Exterior lighting was noted to be LED retrofit lamps in pot lights.

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

All major equipment (RTUs and DHW) at the building are controlled through on-board independent control systems.

1.1.2 Previous Energy Conservation Measures

The facility has previously implemented the following energy conservation measures:

- Installation of ERV to recovery exhaust heat from the building
- Exterior LED lighting

1.1.3 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	22,630 kWh	6.3	22,630	0.7	7.6%
Propane	5,519 litres	10.9	40,780	8.5	92.4%
Total	**N/A**	**17.2**	**63,410**	**9.2**	**100%**

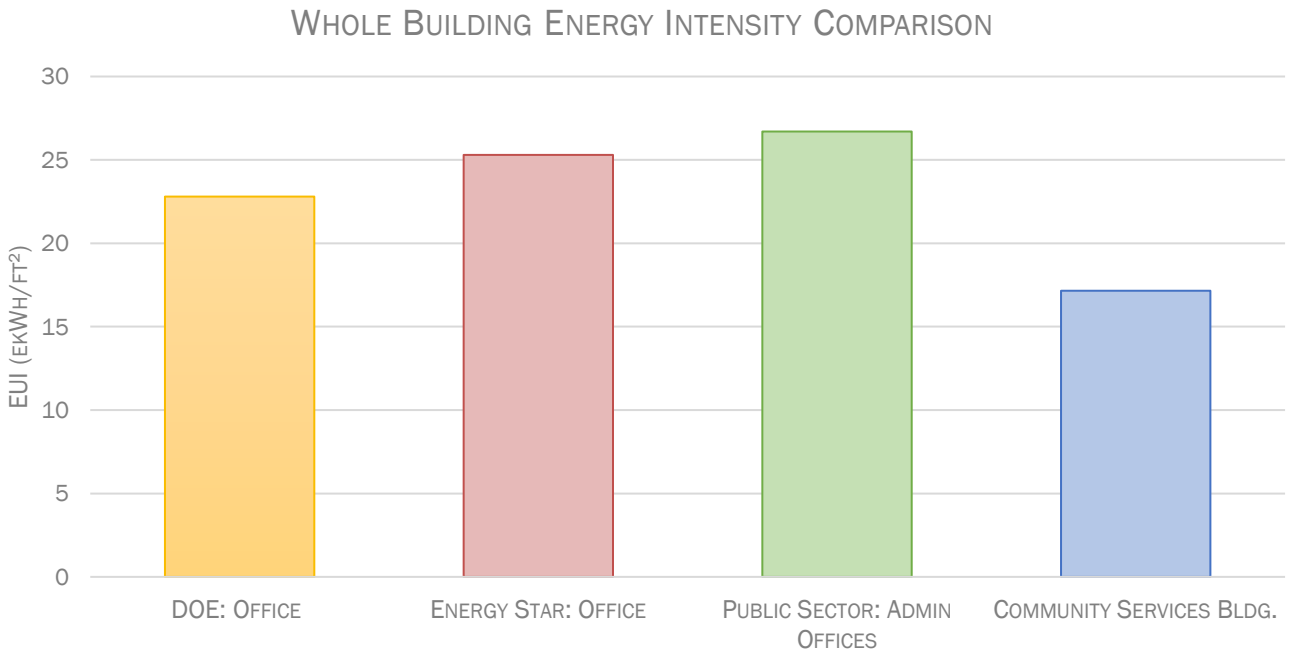
*EUI values presented throughout this report are calculated based on purchased energy and includes electricity provided by the grid, purchased propane etc.

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

- One (1) propane fired rooftop unit used for space heating/cooling & ventilation

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	Install Low Flow Washroom Faucets	0	1,110	0	0	0.0	$226	$1,800	$0	7.9	6.5	$1,901	16.8%
2	Replace RTU with ASHP RTU & Propane Backup	0	-13,210	4,445	0	6.5	$1,454	$114,810	$345	79.0	20.9	($44,797)	-0.4%
3	Replace RTU with ASHP RTU & Electric Backup	0	-18,270	5,521	0	8.0	$1,426	$112,458	$270	78.9	0.4	($43,198)	-0.4%
4	Replace DHW Heater with Hybrid ASHP Tank Heater	0	1,082	0	0	0.0	$221	$11,041	$3,773	50.0	11.2	($2,450)	4.0%
5	Install a 7.5-kW Solar PV System	0	8,610	0	0	0.3	$1,757	$35,769	$1,367	20.4	13.7	($7,062)	5.0%
6	Replace RTU with Electric	0	-25,730	5,521	0	7.8	-$96	$95,046	$326	No Payback	No Payback	($50,658)	No IRR
7	Upgrade Lighting to LED	0	1,790	0	0	0.1	$436	$3,012	$0	6.9	5.9	$3,841	18.7%
8	Install a Building Automation System	0	1,261	321	0	0.5	$557	$48,373	$3,684	86.9	33.2	($39,367)	-6.7%
9	Install Triple Pane Windows	0	2,660	338	0	0.6	$858	$71,691	$4,787	83.5	32.5	($57,759)	-6.4%
10	Install EIFS	0	730	220	0	0.4	$354	$277,604	$37,582	784.6	73.8	($271,883)	-19.0%

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.

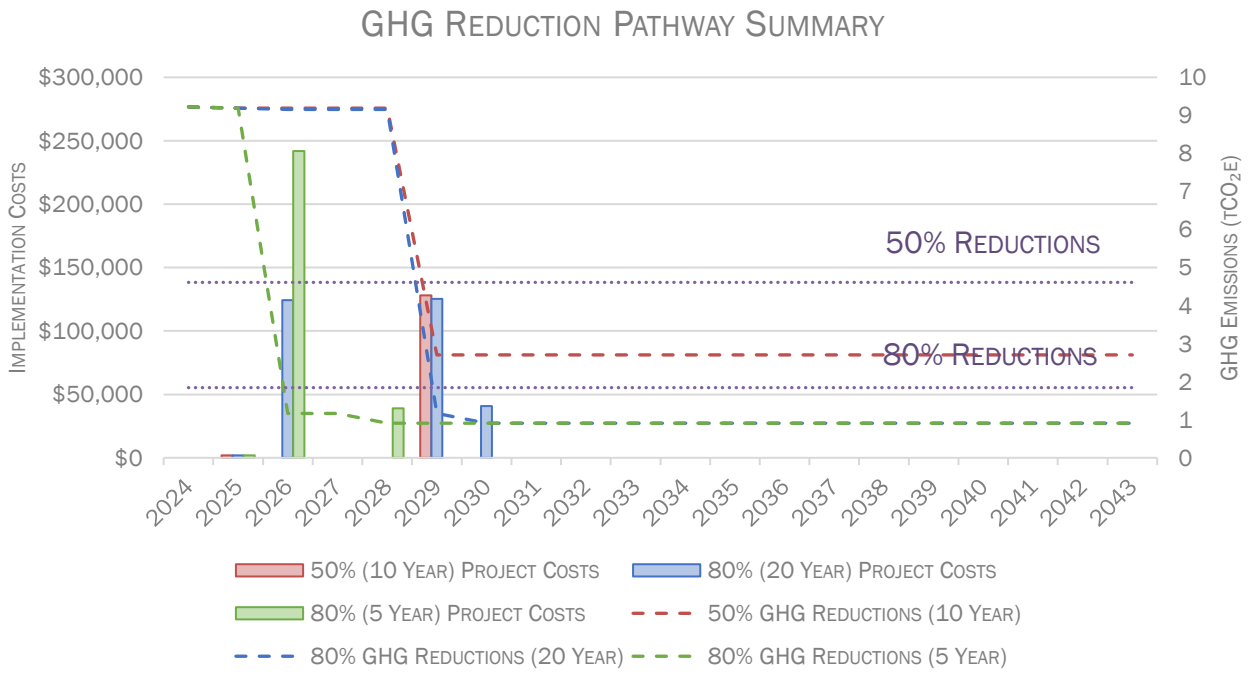
Roadmap 4 – Business-As-Usual

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	Install Low Flow Washroom Faucets	0.0	•	•	•
2	Replace RTU with ASHP RTU & Propane Backup	6.5	•	•	•
3	Replace RTU with ASHP RTU & Electric Backup	8.0		•	•
4	Replace DHW Heater with Hybrid ASHP Tank Heater	0.0		•	•
5	Install a 7.5-kW Solar PV System	0.3		•	•
6	Replace RTU with Electric	7.8			
7	Upgrade Lighting to LED	0.1			
8	Install a Building Automation System	0.5			
9	Install Triple Pane Windows	0.6			
10	Install EIFS	0.4			



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)	19,412	31%	6.5	71%	$1,680	$116,610	($220,445)
80% Reductions (20 Year)	31,344	51%	8.3	90%	$3,630	$269,053	($303,502)
80% Reductions (5 Year)	31,344	51%	8.3	90%	$3,630	$269,053	($309,640)
Business-As-Usual	$0	0%	$0	0%	$0	$64,428	($219,155)

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**	**LC Cost**	**Incremental 20-Year LC Cost**	**Incremental LC Cost per tCO_2e**
50% Reductions in 10 Years	$116,610	$23,322	$57,752	$35,536	($220,445)	($1,289)	($10)
80% Reductions in 20 Years	$269,053	$53,811	$64,428	$150,815	($303,502)	($84,347)	($507)
80% Reductions in 5 Years	$269,053	$53,811	$64,428	$150,815	($309,640)	($90,485)	($544)
Business-As-Usual	$64,428	$0	$0	$64,428	($219,155)	$0	N/A

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 Georgian 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:	Community Services Building
Client Name:	Township of Georgian Bay
Site Contact:	Jennifer Schnier
Address:	71 Lone Pine Rd
	Port Severn, ON
	L0K 1S0
Facility Area:	3,600 ft²
Building Type:	Community Centre
Year Constructed:	2010
Number of Stories:	1

4.1 Heating

The building is heated via a single rooftop unit (RTU):

TABLE 4.1.1: HEATING EQUIPMENT DETAILS

Tag ID	Type	Capacity	Efficiency	Condition
RTU-1	Propane	180 MBH	80%	Fair

The RTU was installed in 2010 and is approaching its end of service life. Its replacement should be planned and budgeted for.

RTU

4.2 Cooling

The building is cooled via the single RTU located at the back of the building:

TABLE 4.2.1: COOLING EQUIPMENT DETAILS

Tag ID	Compressor Type	Capacity	COP	Condition
RTU	Scroll	6 tons	3.3	Fair

4.3 Domestic Hot Water

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

Electric DHWHT

TABLE 4.3.1: DHW EQUIPMENT DETAILS

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

The heater tank holds 73.7 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.

All piping was observed to be properly insulated. The domestic hot water heater tank is original to the building and has reached its serviceable life. Its replacement should be planned and budgeted for.

4.4 Ventilation

Ventilation is provided to the building via the single rooftop unit. The unit tempers a portion of outdoor air, typically 20% and distributes it to the interior spaces. The rooftop unit is equipped with an energy recovery ventilator (ERV) which helps recover heat from the exhaust stream and then redistributes it to the interior spaces.

Energy Recovery Ventilator

TABLE 4.4.1: VENTILATION EQUIPMENT DETAILS

Tag ID	Capacity	HP	Airflow	Condition
RTU	180 MBH	2	1,000 CFM	Fair

The RTU and ERV are original to the building and have exceeded their serviceable life. Their replacement should be planned and budgeted for.

4.5 Building Envelope

The facility was constructed in 2010 with a brick and wood façade. The roof is a wood frame construction with blow in fiberglass insulation and an asphalt shingle finish. Windows are generally triple glazed with an air fill. Front entrance doors are mostly glass with aluminum frames. Services doors around the building are generally metal with hollow cores.

As the building is 15 years old, there hasn't been much wear and tear on the envelope. The windows seals were noted to be in fair condition and the exterior doors were observed to have weather stripping for the most part, but some of it is damaged. The roof was observed to be in good condition.

4.6 Water Fixtures

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

TABLE 4.6.1: WATER FIXTURE DETAILS

Fixture	Flow
Bathroom Faucets:	2.0 GPM
Toilets:	1.6 GPF

Washroom Faucet

4.7 Lighting

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

TABLE 4.7.1: INTERIOR LIGHTING DETAILS

Lamp Type	Wattage	Location
T8 Fluorescent	32 W	Library, offices, mechanical rooms, washrooms

4.7.1 Exterior Lighting

Exterior lighting consist of LED retrofit lamps located in pot lights around the building. All exterior lighting is controlled by timers.

TABLE 4.7.2: EXTERIOR LIGHTING DETAILS

Fixture Type	Lamp Type	Wattage
Pot Lights	LED	12 W

Exterior Pot Lights

4.8 Controls

The building is not equipped with a building automation system (BAS). Instead, the rooftop unit (RTU) operates on its own on-board controls which are connected to numerous thermostats inside the building. The electric force flow heaters in the vestibule operate in a similar fashion and only turn on to maintain the setpoint temperatures within the space they serve.

4.9 Electrical Service

The site is serviced by a 37.5 kVA 600V/347V transformer. This supplies the main disconnect for the facility which is rated at 175A.

No metered demand data was available at the time of this study. The calibrated energy model estimates the facility's peak electrical demand at 10.9-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)
10.3	10.3	10.9

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%	N/A	0.000000
Electricity	kW	5.2%	$0.2040	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 Toronto International Airport (WMO ID 71624) were used in creating the baseline models for this facility.

5.3.1 Demand

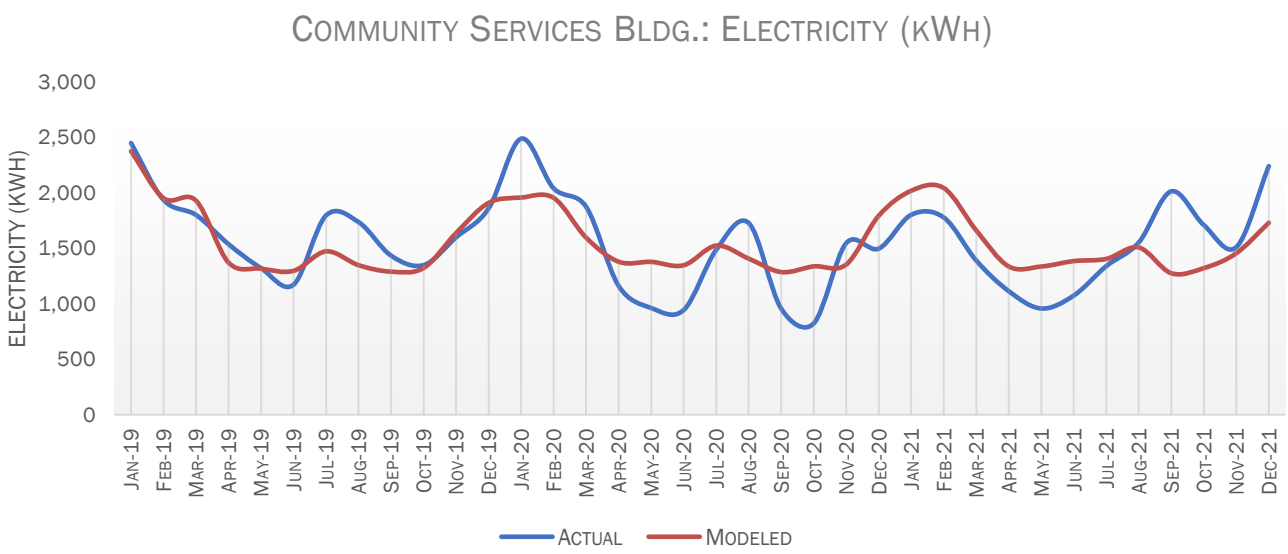
Demand data was not available at the time of this report.

5.3.2 Electricity

Baseline Equation:

Electricity (kWh) = Days x 43.93 + HDD x 2.74 + CDD x 1.89.
The underlying regression of this baseline equation is $R^2 = 0.9628$.
HDD (Heating Degree Days) calculated using a balance point of 3°C.
CDD (Cooling Degree Days) calculated using a balance point of 18°C.
In a typical year, consumption will be 20,004 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:

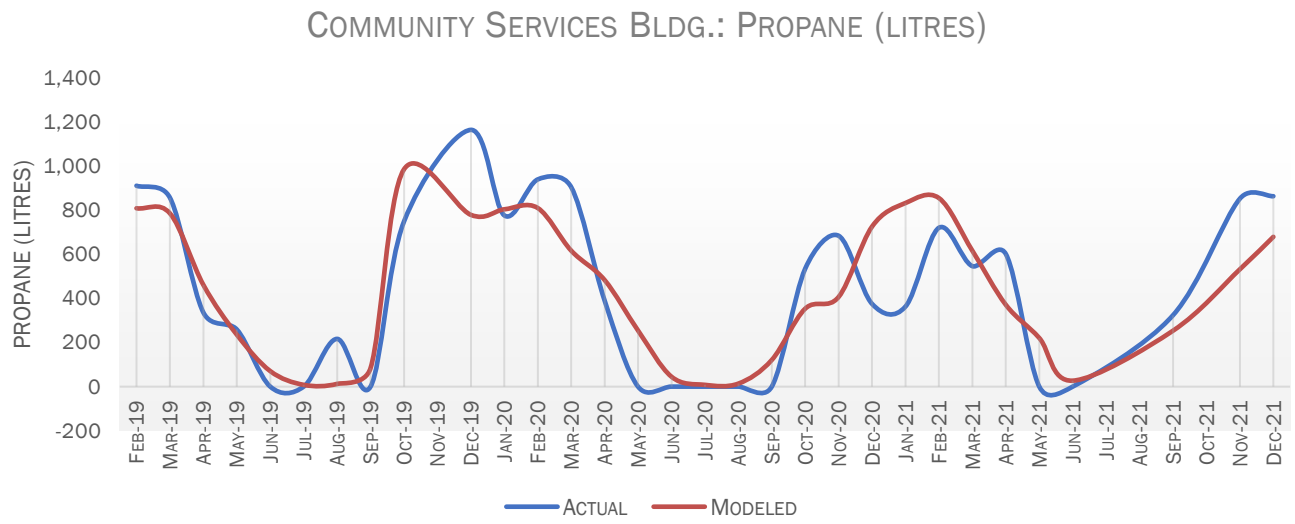
No anomalies or irregularities were noted during the modeling period of this report.

5.3.3 Propane

Baseline Equation:

Propane (litres) = Days x 0.27 + HDD x 1.28.
The underlying regression of this baseline equation is $R^2 = 0.87$.
HDD (Heating Degree Days) calculated using a balance point of 16°C.
In a typical year, consumption will be 5,345 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.

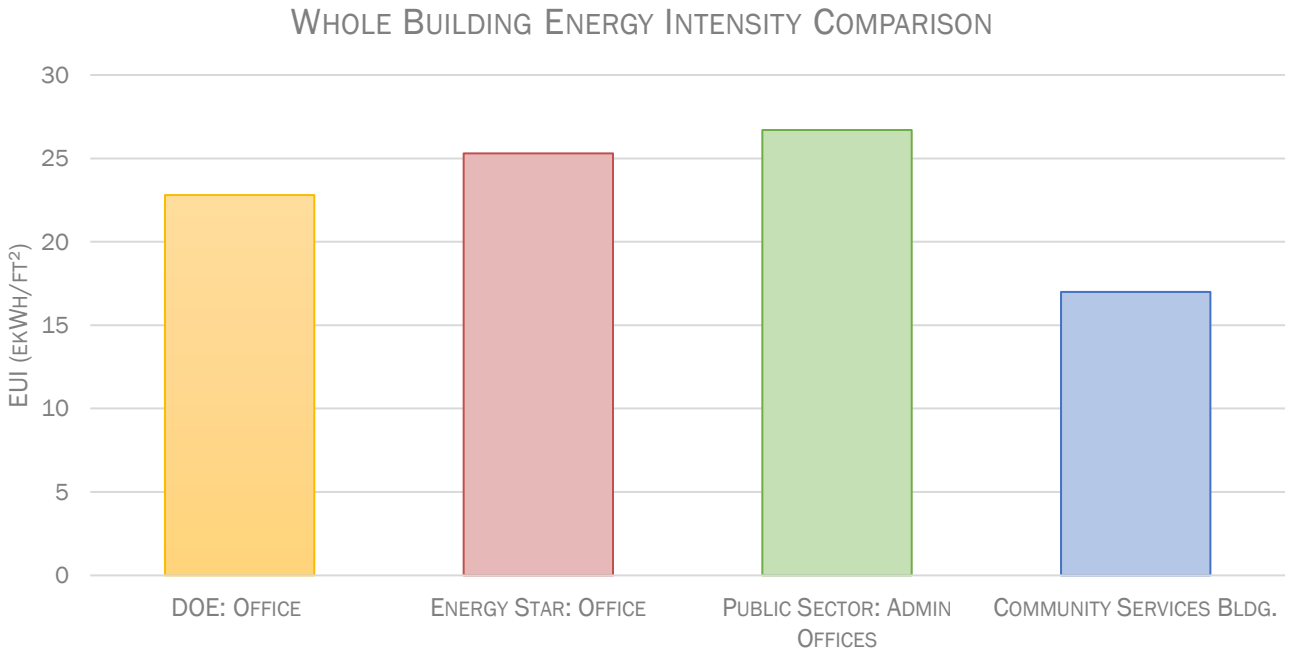
Electricity intensity for the building is 6.3 ekWh/ft² (0.24 GJ/m²). Propane intensity for the building is 10.9 ekWh/ft² (0.42 GJ/m²). Total energy intensity for the building is 17.2 ekWh/ft² (0.66 GJ/m²).

The energy performance of the Community Services Building 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
DOE: Office	22.8	-25%
Energy Star: Office	25.3	-32%
Public Sector: Admin Offices	26.7	-36%
Community Services Building	**17.2**	

*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 Community Services Building is low.

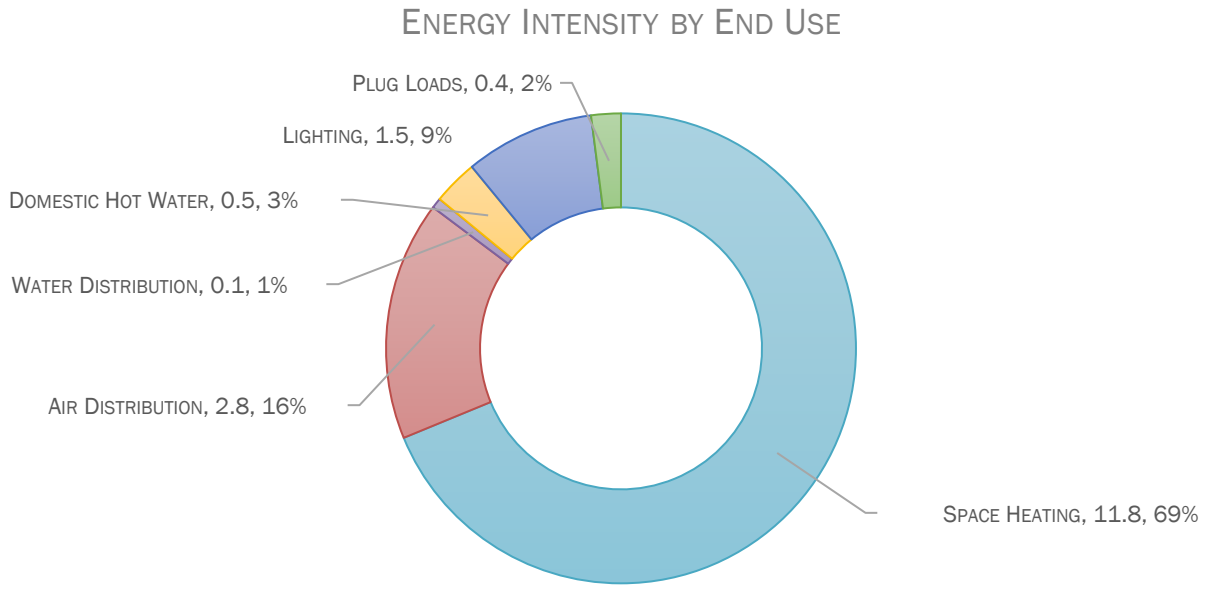
5.5 Energy Breakout by End Use

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:

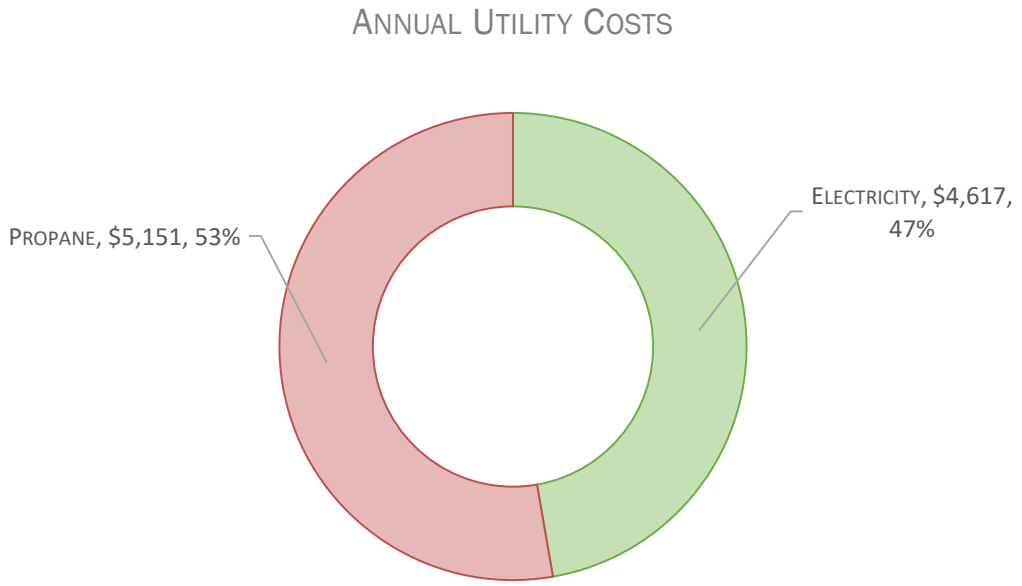
End Use	Electricity (kWh)	Propane (l)	EUI (ekWh/ft²)	GHG Emissions (Tonnes)
Space Heating	3,350	5,519	11.8	8.6
Air Distribution	10,170	0	2.8	0.3
Water Distribution	440	0	0.1	0.0
Domestic Hot Water	1,910	0	0.5	0.1
Lighting	5,500	0	1.5	0.2
Plug Loads	1,260	0	0.4	0.0
Total	**22,630**	**5,519**	**17.2**	**9.2**

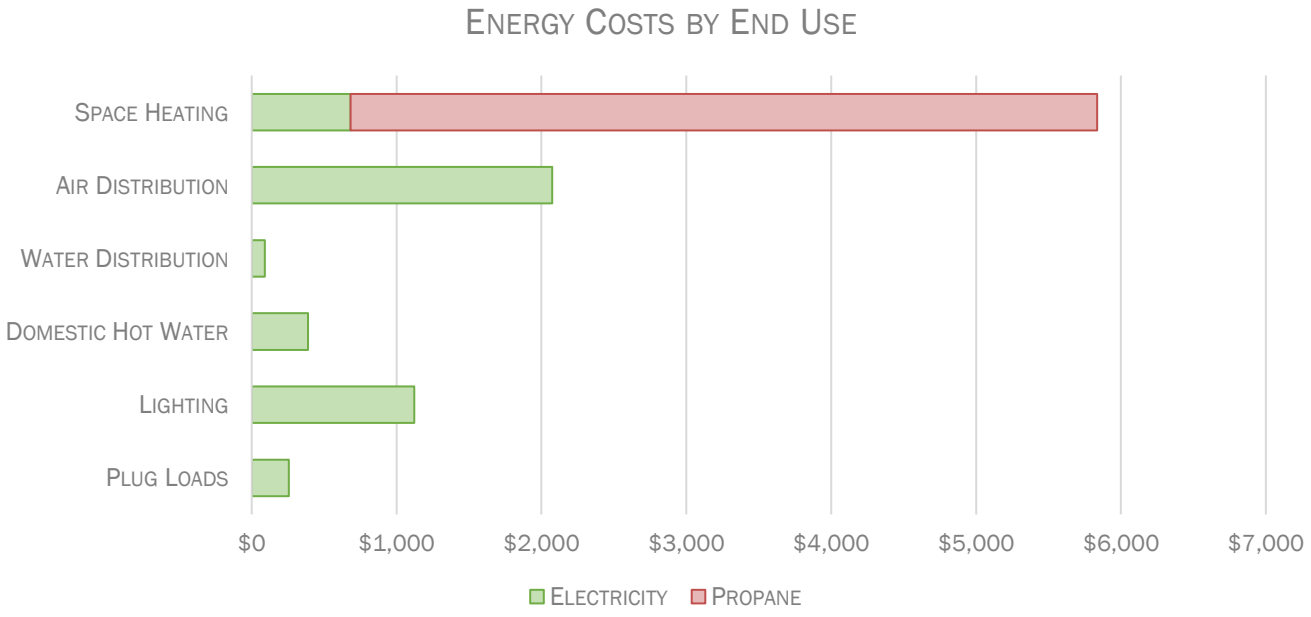
The following chart shows the energy intensity of the Community Services Building broken out by end use.



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.

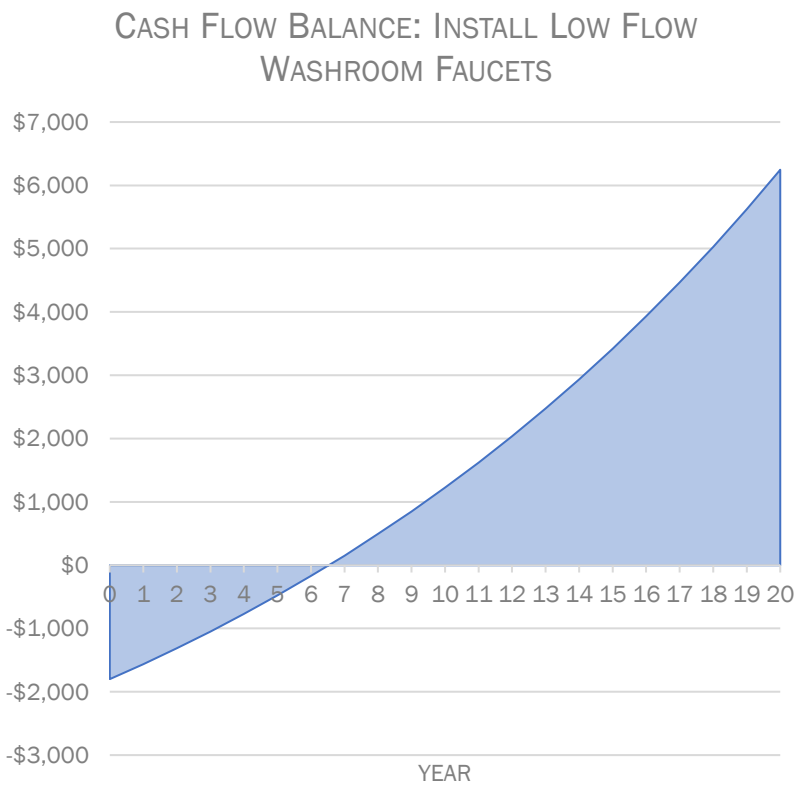
6.1 Opportunity 1: Install Low Flow Washroom Faucets

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 6.1.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	1,110
Propane (l):	0
Water (m^3):	0
Emissions (tCO_2e):	0
Financials	
Utility Savings:	$226
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$1,440
Engineering & PM:	$216
Contingency:	$144
Project Costs:	$1,800
Simple Payback:	7.9
Capital Payback:	6.5
NPV:	$1,901
IRR:	16.8%



Existing Conditions

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

Fixture	Flow
Bathroom Faucets:	2.0 GPM

Retrofit Conditions

We recommend installing new low-flow (0.5 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 will have no measurable impact on operations and maintenance at the facility.

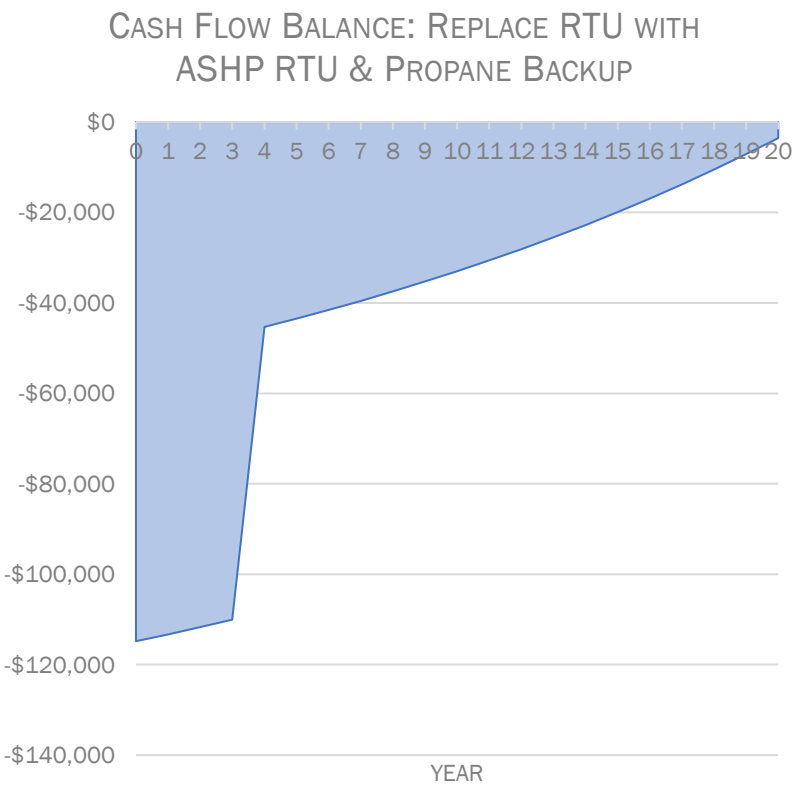
6.2 Opportunity 2: Replace RTU with ASHP RTU & Propane Backup

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):	-13,210
Propane (l):	4,445
Water (m^3):	0
Emissions (tCO_2e):	6.5
Financials	
Utility Savings:	$1,454
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$91,848
Engineering & PM:	$13,777
Contingency:	$9,185
Project Costs:	$114,810
Simple Payback:	79.0
Capital Payback:	20.9
NPV:	-$44,797
IRR:	-0.4%



Existing Conditions

The building is heated via a single rooftop unit (RTU):

Tag ID	Type	Capacity	Efficiency	Condition
RTU-1	Propane	180 MBH	80%	Fair

The RTU was installed in 2010 and is approaching its end of service life. Its replacement should be planned and budgeted for.

Retrofit Conditions

This measure includes replacing the existing propane fired rooftop units with an air source heat pump rooftop unit equipped with propane fired backup heat.

The rooftop unit will be replaced by ASHP rooftop unit sized to the cooling capacity of the existing unit. This minimizes the demand impact of the new equipment and allows for implementation without the need to upgrade the building's electrical service. The 6-ton rooftop unit will be replaced with 6-ton ASHP rooftop unit. Backup heating will be sized to match the existing heating capacity.

Typical Dual Fuel Heat Pump Rooftop Unit

Rather than generating heat, heat pumps primarily operate by transferring heat from one medium (the source) to another (the load). In heating mode, air source heat pumps extract heat from the atmosphere (the source) and transfer it to the occupied space within the building (the load). Since the heat pump is not actually generating the heat, just transferring it, they're able to supply heating energy much more efficiently than propane fired equipment.

As outdoor temperatures drop below the operating envelope of the air source heat pumps, an alternate or backup source of heat must be used. When outdoor temperatures fall below the operating temperature of the units, propane fired backup heating will carry the heating load. Analysis shows that sizing the units based on the above strategy would offset approximately 83% of the propane consumption of the existing rooftop units.

Weight is always a consideration when replacing rooftop equipment. ASHP rooftop units are available from multiple manufacturers. Weights will vary by capacity, manufacturer, size and model. The exact weight of the replacement rooftop units will not be known until the project is designed, tendered and products selected.

The average weight of ASHP rooftop units is typically slightly higher than that for standard rooftop units when comparing similar compressor capacities.

To account for potential structural issues, costing for this measure includes increased allowances for structural evaluations of the roof structure and increased costs for structural reinforcement which may be required.

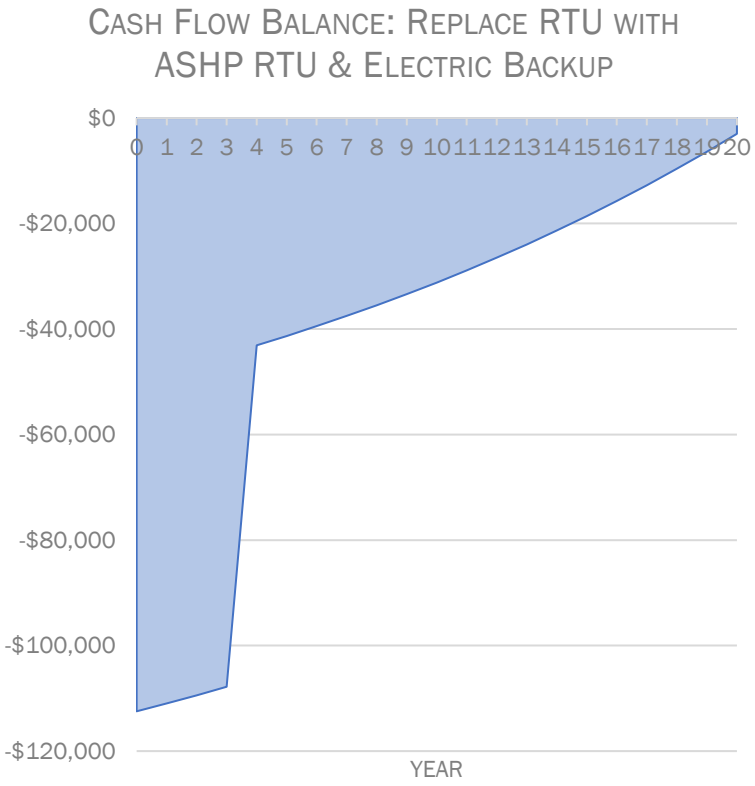
6.3 Opportunity 3: Replace RTU with ASHP RTU & Electric Backup

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 6.3.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	-18,270
Propane (l):	5,521
Water (m^3):	0
Emissions (tCO_2e):	8.0
Financials	
Utility Savings:	$1,426
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$89,966
Engineering & PM:	$13,495
Contingency:	$8,997
Project Costs:	$112,458
Simple Payback:	78.9
Capital Payback:	0.4
NPV:	-$43,198
IRR:	-0.4%



Existing Conditions

The building is heated via a single rooftop unit (RTU):

Tag ID	Type	Capacity	Efficiency	Condition
RTU-1	Propane	180 MBH	80%	Fair

The RTU was installed in 2010 and is approaching its end of service life. Its replacement should be planned and budgeted for.

Retrofit Conditions

This measure includes replacing the existing propane fired rooftop unit with an air source heat pump rooftop unit equipped with electric backup heat.

Typical Dual Fuel Heat Pump Rooftop Unit

The rooftop units will be replaced by ASHP rooftop units sized to the cooling capacity of the existing units. The 6-ton rooftop unit will be replaced with 6-ton ASHP rooftop unit. Backup electric heating will be sized to match the existing heating capacity.

Rather than generating heat, heat pumps primarily operate by transferring heat from one medium (the source) to another (the load). In heating mode, air source heat pumps extract heat from the atmosphere (the source) and transfer it to the occupied space within the building (the load). Since the heat pump is not actually generating the heat, just transferring it, they're able to supply heating energy much more efficiently than propane fired equipment.

As outdoor temperatures drop below the operating envelope of the air source heat pumps, an alternate or backup source of heat must be used. When outdoor temperatures fall below the operating temperature of the units, electric resistance heating will carry the heating load thereby offsetting 100% of the propane consumed by the existing rooftop units.

Weight is always a consideration when replacing rooftop equipment. ASHP rooftop units are available from multiple manufacturers. Weights will vary by capacity, manufacturer, size and model. The exact weight of the replacement rooftop units will not be known until the project is designed, tendered and products selected.

The average weight of ASHP rooftop units is typically slightly higher than that for standard rooftop units when comparing similar compressor capacities.

To account for potential structural issues, costing for this measure includes increased allowances for structural evaluations of the roof structure and increased costs for structural reinforcement which may be required.

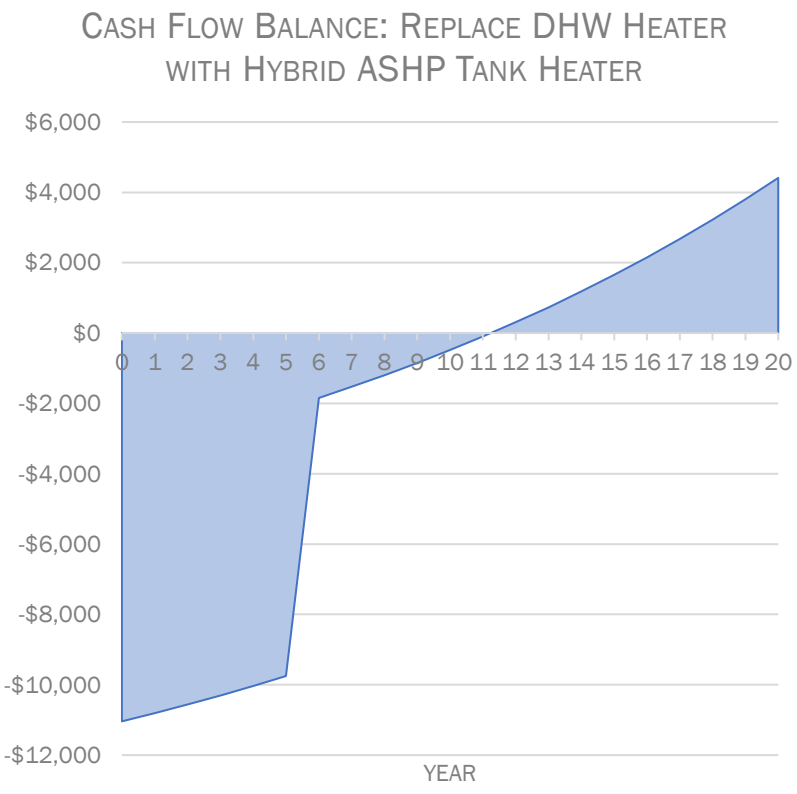
6.4 Opportunity 4: Replace DHW Heater with Hybrid ASHP Tank Heater

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 6.4.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	1,082
Propane (l):	0
Water (m^3):	0
Emissions (tCO_2e):	0
Financials	
Utility Savings:	$221
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:	50.0
Capital Payback:	11.2
NPV:	-$2,450
IRR:	4.0%



Existing Conditions

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

Tag ID	Boiler Type	Capacity	Efficiency	Condition
DHWHT	Electric	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.

Typical Hybrid ASHP/Electric Tank Heater

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 will have no measurable impact on operations and maintenance at the facility.

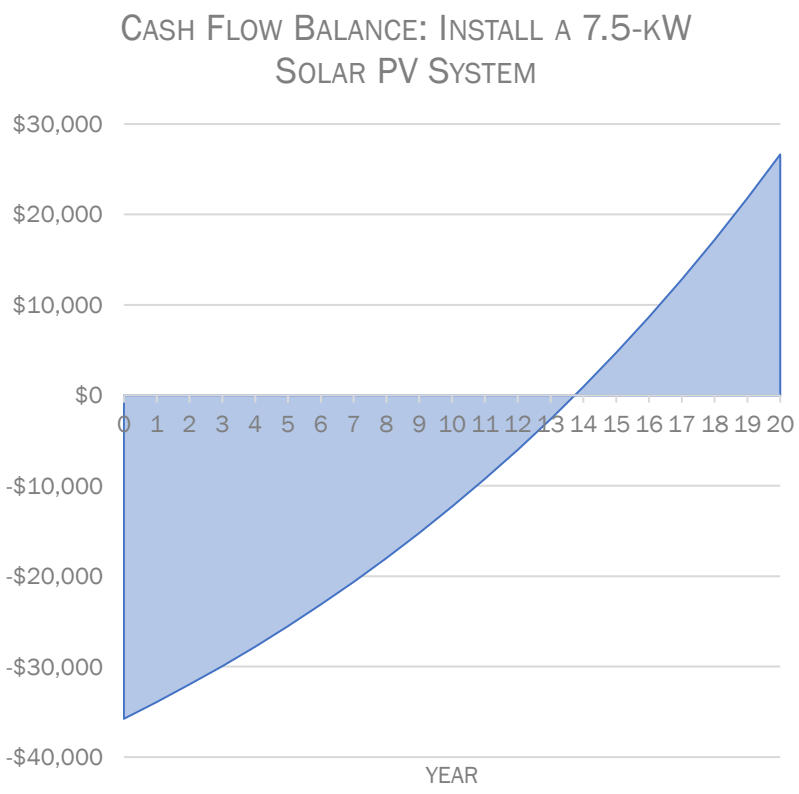
6.5 Opportunity 5: Install a 7.5kW Solar PV System

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 6.5.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	8,610
Propane (l):	0
Water (m³):	0
Emissions (tCO_2e):	0.3
Financials	
Utility Savings:	$1,757
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$31,104
Engineering & PM:	$1,555
Contingency:	$3,110
Project Costs:	$35,769
Simple Payback:	20.4
Capital Payback:	13.7
NPV:	-$7,062
IRR:	5.0%



Existing Conditions

All electricity consumption for the facility is currently supplied by the local LDC.

Retrofit Conditions

We recommend installing a 7.5kW 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 lot 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 7.5kW system will provide about 8,610 kWh of electricity per year. This accounts for approximately 43% 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 will have a minor impact on operations and maintenance at the facility as the solar panels may need to be cleared of snow during the winter months.

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.

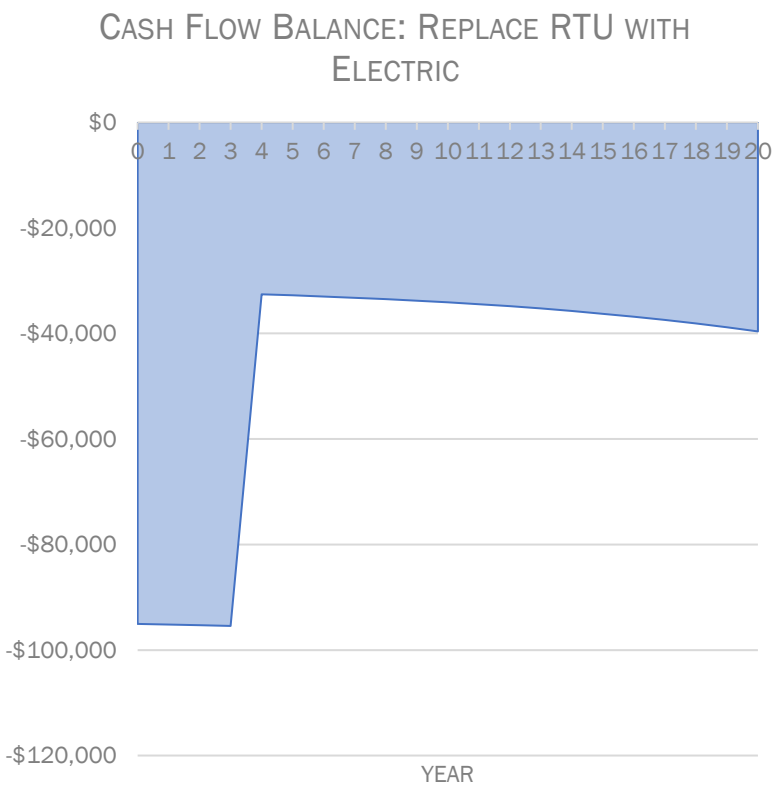
7.1 Opportunity 6: Replace RTU with Electric

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 7.1.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	-25,730
Propane (l):	5,521
Water (m^3):	0
Emissions (tCO_2e):	7.8
Financials	
Utility Savings:	-$96
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$76,037
Engineering & PM:	$11,406
Contingency:	$7,604
Project Costs:	$95,046
Simple Payback:	No Payback
Capital Payback:	No Payback
NPV:	-$50,658
IRR:	No IRR



Existing Conditions

The building is heated via a single rooftop unit (RTU):

Tag ID	Type	Capacity	Efficiency	Condition
RTU-1	Propane	180 MBH	80%	Fair

The RTU was installed in 2010 and is approaching its end of service life. Its replacement should be planned and budgeted for.

Retrofit Conditions

This measure includes replacing the existing propane fired rooftop unit with a rooftop unit equipped with electric resistance heating & DX cooling. The unit would be sized to the nominal heating & cooling capacities of the existing rooftop units.

The average weight of newer/more efficient rooftop units is typically slightly higher than that for standard rooftop units when comparing similar capacities. To account for potential structural issues, costing for this measure includes increased allowances for structural evaluations of the roof structure and increased costs for structural reinforcement which may be required.

Costs also include the installation of new electrical feeds from the rooftop units to their respective electrical panels.

This measure was not at this time due to poorer financial results when compare to either the ASHP RTU with Propane Backup or ASHP RTU with Electric Backup options.

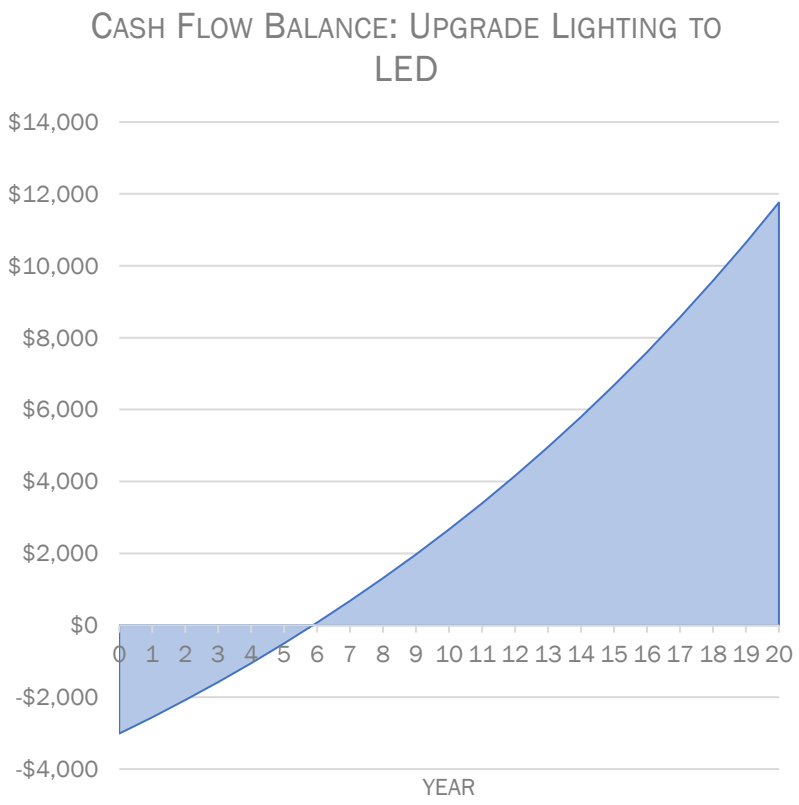
7.2 Opportunity 7: Upgrade Lighting to LED

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):	1,790
Propane (l):	0
Water (m^3):	0
Emissions (tCO_2e):	0.1
Financials	
Utility Savings:	$365
Add'l Annual Savings:	$71
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$2,619
Engineering & PM:	$131
Contingency:	$262
Project Costs:	$3,012
Simple Payback:	6.9
Capital Payback:	5.9
NPV:	$3,841
IRR:	18.7%



Existing Conditions

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

Lamp Type	Wattage	Location
T8 Fluorescent	32 W	Library, offices, mechanical rooms, washrooms

Retrofit Conditions

We recommend replacing all interior fluorescent fixtures with equivalent LED fixtures.

Many LED fixtures now have occupancy sensors integral to the fixture. Installing fixtures with individual integral sensors or networked sensors maximizes the savings that can be achieved in large areas with inconsistent/infrequent activity such as multipurpose rooms, meeting rooms and fitness rooms.

Advantages of LED

- 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 poor financial performance when compared to the “Install Low Flow Washroom Faucets” measure. It is recommended that lamps be retrofitted with LED equivalents as they burn out.

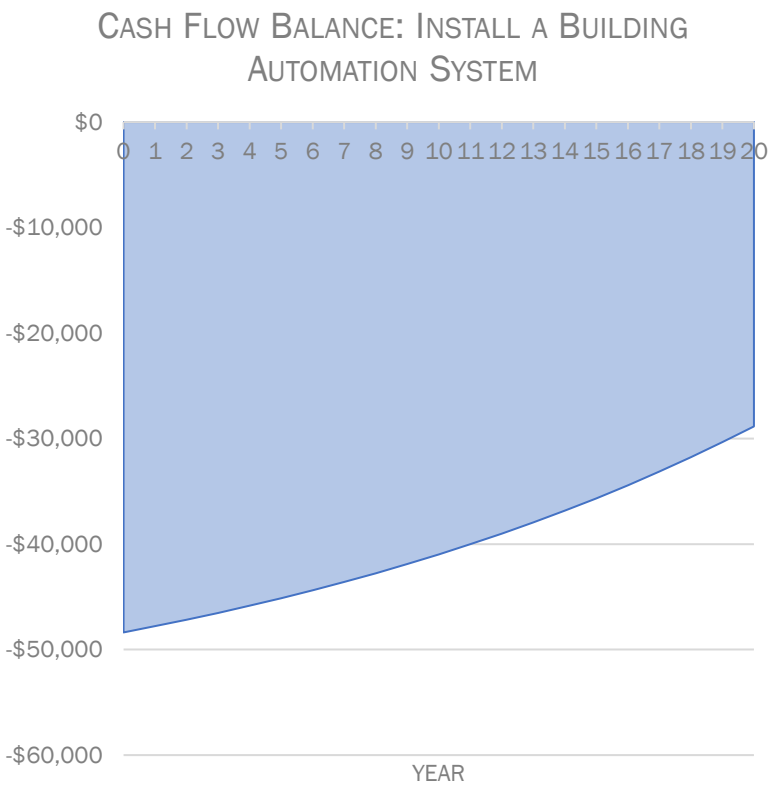
7.3 Opportunity 8: Install a Building Automation System

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 7.3.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	1,261
Propane (l):	321
Water (m^3):	0
Emissions (tCO_2e):	0.5
Financials	
Utility Savings:	$557
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$38,698
Engineering & PM:	$5,805
Contingency:	$3,870
Project Costs:	$48,373
Simple Payback:	86.9
Capital Payback:	33.2
NPV:	-$39,367
IRR:	-6.7%



Existing Conditions

The building is not equipped with a building automation system (BAS). Instead the rooftop unit (RTU) operates on its own on-board controls which are connected to numerous thermostats inside the building. The electric force flow heaters in the vestibule operate in a similar fashion and only turn on to maintain the setpoint temperatures within the space.

Retrofit Conditions

Building automation systems (BAS) can be thought of as computer networks, with miniature computers controlling the important pieces of mechanical equipment within a given facility. These computers talk to each other through the network to enable interaction with one another according to central control logic and to allow central oversight and centrally-managed features.

A building automation system (BAS) could be installed at the facility and programmed to operate the major HVAC and lighting systems at the facility. The system would be programmed at the time of installation according to energy-conserving strategies specified by the design engineer.

BAS systems can include many safety and convenience features such as full graphic terminal operation, remote access via internet, dial out/e-mail of alarms, security monitoring, and trending of energy and equipment data. To get all the features of a full BAS system can be quite expensive, however it is possible to start small and expand the control network over time. For the purpose of this study, we are recommending the most cost-effective approach, which is the installation of a BAS system intended to save energy. Further components can be added at a later date.

The cost of a system is closely tied to the number of control "points": physical input and output devices such as temperature sensors and relays. Costing for this measure includes points to enable the BAS to control the following:

- One heating/cooling rooftop unit
- Exhaust fans
- Interior and exterior lighting (zones)
- The DHW systems (monitoring only)

The BAS will allow for the following improvements to equipment control:

- Schedule heating and cooling setback temperatures during unoccupied hours
- Schedule ventilation rates to ensure building is not over-ventilated during unoccupied hours
- Turn fans (RTUs & exhaust) off during unoccupied hours (unless called for heating or cooling)
- Enable/disable lighting on a zone-by-zone basis
- Lock out cooling during unoccupied hours
- Lock out simultaneous heating and cooling

BAS systems can include many safety and convenience features such as full graphic terminal operation, remote access via phone line, ethernet LANs, WANs, internet, intranet for alarms, security monitoring, and trending of energy and equipment data.

This measure was not recommended at this time due to its poor financial performance and minimal GHG emission savings.

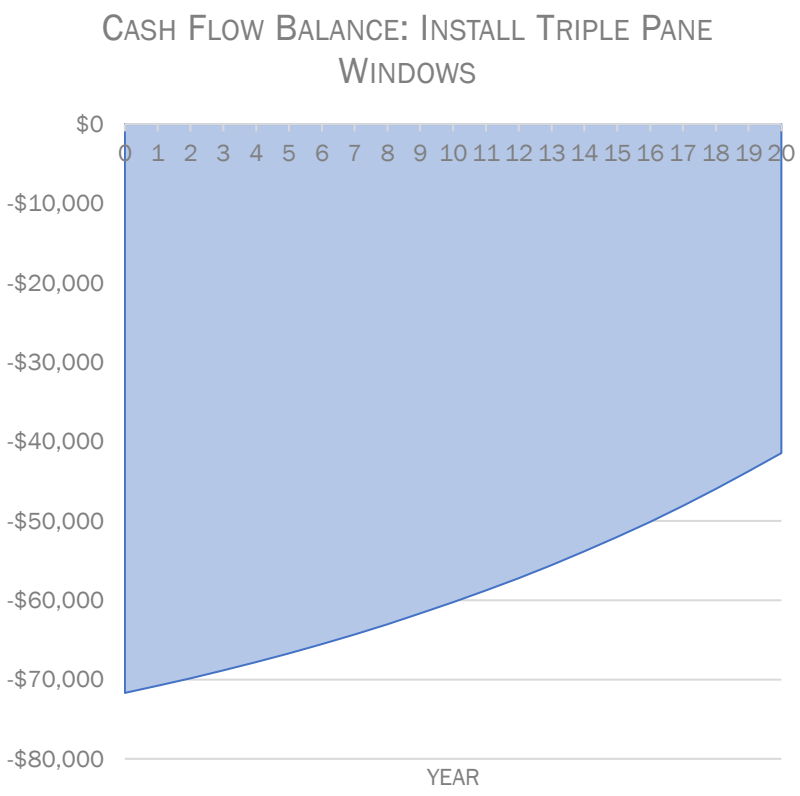
7.4 Opportunity 9: Install Triple Pane Windows

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 7.4.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	2,660
Propane (l):	338
Water (m^3):	0
Emissions (tCO_2e):	0.6
Financials	
Utility Savings:	$858
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$57,353
Engineering & PM:	$8,603
Contingency:	$5,735
Project Costs:	$71,691
Simple Payback:	83.5
Capital Payback:	32.5
NPV:	-$57,759
IRR:	-6.4%



Existing Conditions

Visual inspection showed that caulking around the windows was in fair condition. The windows are approaching the 15-year mark, and the windows insulation characteristics are not what they used to be.

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 poor financial performance and minimal GHG emission savings.

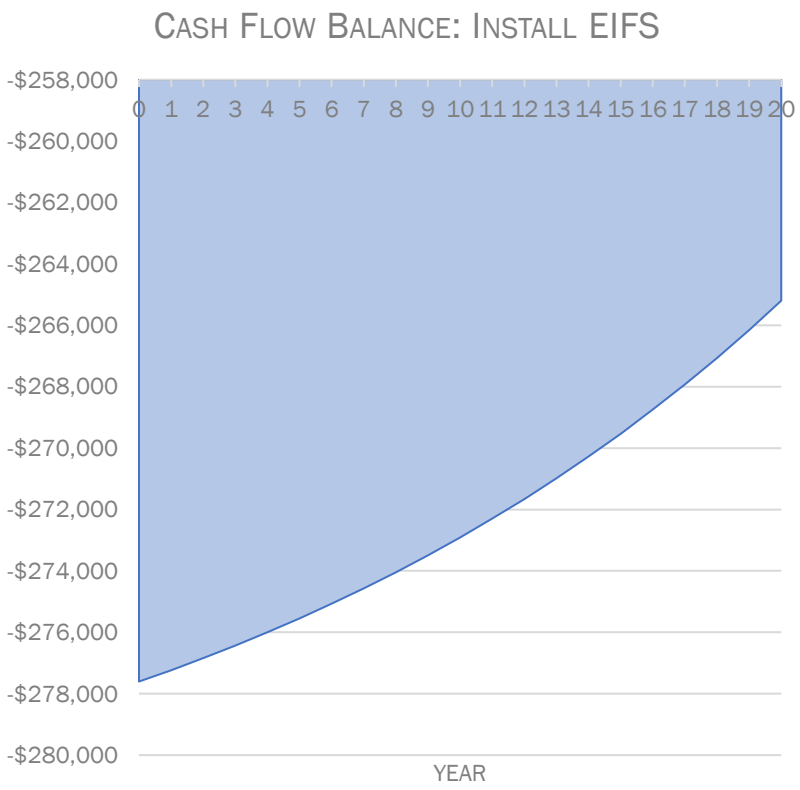
7.5 Opportunity 10: Install EIFS

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 7.5.1: DETAILED FINANCIAL ANALYSIS

Utility Savings	
Demand (kW):	0
Electricity (kWh):	730
Propane (l):	220
Water (m^3):	0
Emissions (tCO_2e):	0.4
Financials	
Utility Savings:	$354
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$222,083
Engineering & PM:	$33,312
Contingency:	$22,208
Project Costs:	$277,604
Simple Payback:	784.6
Capital Payback:	73.8
NPV:	-$271,883
IRR:	-19.0%



Existing Conditions

The exterior wall structure of the building is a brick and wood veneer overtop wood sheathing. Based on the building drawings, the walls contain about R20 batt fiberglass insulation. While this is considered an acceptable amount of insulation, it can be improved upon.

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 will have no measurable impact on operations and maintenance costs at the facility and will have no impact on occupancy comfort or safety.

This measure was not recommended at this time due to its poor financial performance and minimal GHG emission savings.

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

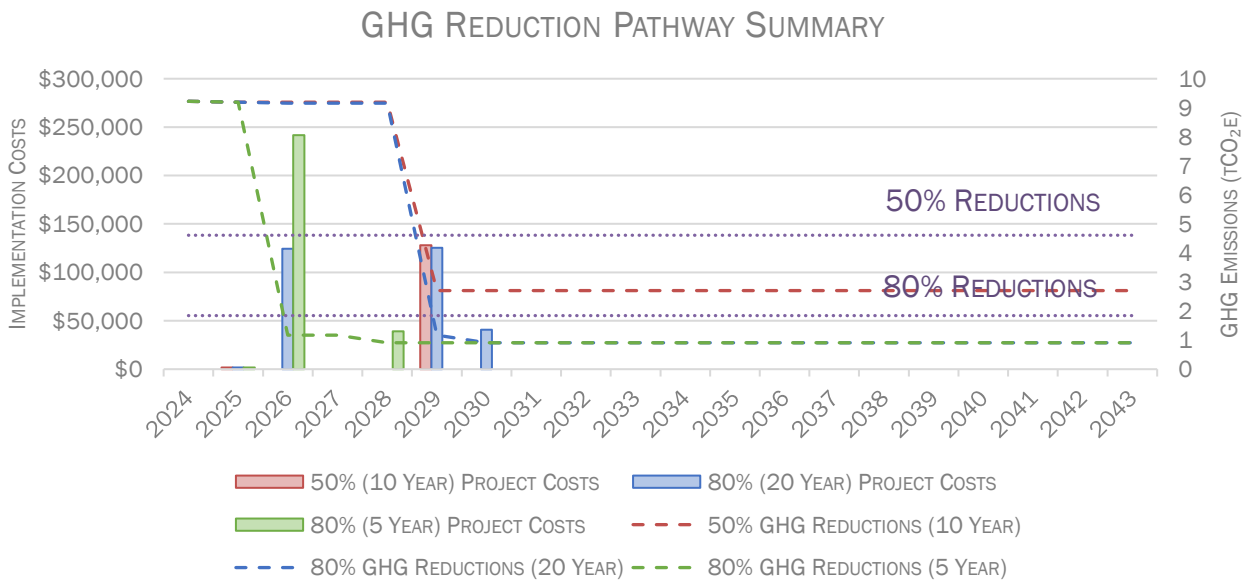
8.1 GHG Reduction Pathway Summary

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	Install Low Flow Washroom Faucets	0.0	•	•	•
2	Replace RTU with ASHP RTU & Propane Backup	6.5	•		
3	Replace RTU with ASHP RTU & Electric Backup	8.0		•	•
4	Replace DHW Heater with Hybrid ASHP Tank Heater	0.0		•	•
5	Install a 7.5-kW Solar PV System	0.3		•	•
6	Replace RTU with Electric	7.8			
7	Upgrade Lighting to LED	0.1			
8	Install a Building Automation System	0.5			
9	Install Triple Pane Windows	0.6			
10	Install EIFS	0.4			

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)	19,412	31%	6.5	71%	$1,680	$116,610	($220,445)
80% Reductions (20 Year)	31,344	51%	8.3	90%	$3,630	$269,053	($303,502)
80% Reductions (5 Year)	31,344	51%	8.3	90%	$3,630	$269,053	($309,640)
Business-As-Usual	$0	0%	$0	0%	$0	$64,428	($219,155)



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**	**LC Cost**	**Incremental 20-Year LC Cost**	**Incremental LC Cost per tCO_2e**
50% Reductions in 10 Years	$116,610	$23,322	$57,752	$35,536	($220,445)	($1,289)	($10)
80% Reductions in 20 Years	$269,053	$53,811	$64,428	$150,815	($303,502)	($84,347)	($507)
80% Reductions in 5 Years	$269,053	$53,811	$64,428	$150,815	($309,640)	($90,485)	($544)
Business-As-Usual	$64,428	$0	$0	$64,428	($219,155)	$0	N/A

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 utility bills, 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)
10.3	10.3	10.9

The site is serviced by a 37.5 kVA 600V/347V transformer. This supplies the main disconnect for the facility which is rated at 175A. The site has approximately 145 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	0	$0
80% Reductions in 20 Years	35	$107,986
80% Reductions in 5 Years	35	$107,986

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

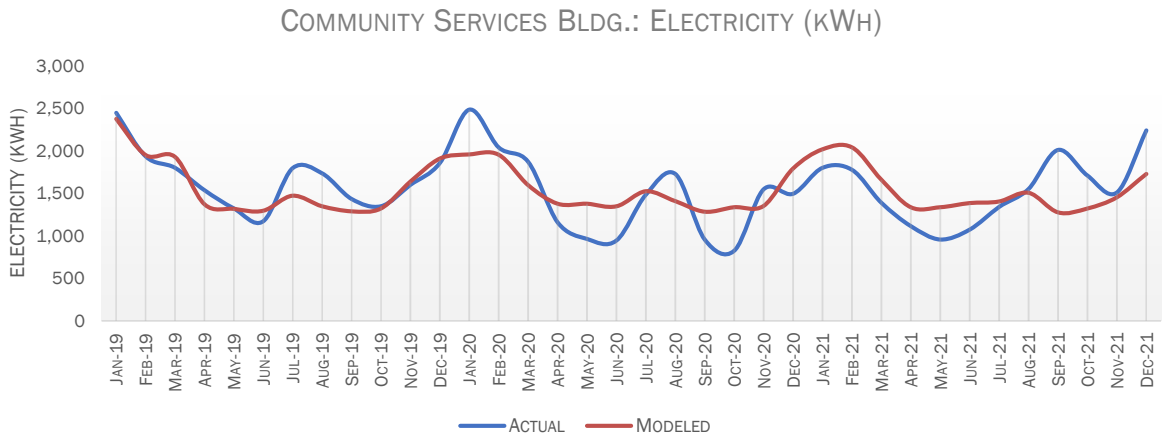
APPENDIX B

CALCULATIONS

Community Services Bldg.: Electricity (kWh)

	1	2	3			
M02	Days	HDD	CDD	IV1	IV2	IV3
Dependent?:	Yes	Yes	Yes	No	No	No
Balance Point:	N/A	3	18	N/A	N/A	N/A
Calculated BP:	N/A	3		N/A	N/A	N/A
Coefficient:	43.93	2.74	1.89	0.00	0.00	0.00
T-Stat:	16.19	5.52	0.98	0.00	0.00	0.00
Adj R^2:	**0.9628**					

Electricity (kWh) = Days x 43.93 + HDD x 2.74 + CDD x 1.89.
The underlying regression of this baseline equation is R^2 = 0.9628.
HDD (Heating Degree Days) calculated using a balance point of 3°C.
CDD (Cooling Degree Days) calculated using a balance point of 18°C.
In a typical year, consumption will be 20,004 kWh.

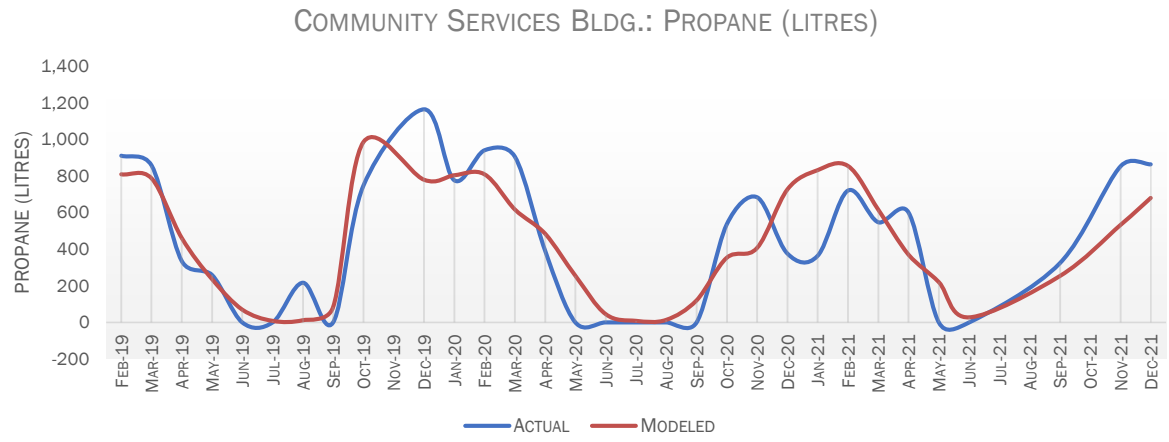


	Include in Model?	Start Date	Read Date	Electricity (kWh)	IV1	IV2	IV3	Month Allocation
1	Yes	1-Jan-19	31-Jan-19	2,451				Jan-19
2	Yes	1-Feb-19	28-Feb-19	1,938				Feb-19
3	Yes	1-Mar-19	31-Mar-19	1,802				Mar-19
4	Yes	1-Apr-19	30-Apr-19	1,538				Apr-19
5	Yes	1-May-19	31-May-19	1,322				May-19
6	Yes	1-Jun-19	30-Jun-19	1,174				Jun-19
7	Yes	1-Jul-19	31-Jul-19	1,798				Jul-19
8	Yes	1-Aug-19	31-Aug-19	1,738				Aug-19
9	Yes	1-Sep-19	30-Sep-19	1,435				Sep-19
10	Yes	1-Oct-19	31-Oct-19	1,349				Oct-19
11	Yes	1-Nov-19	30-Nov-19	1,600				Nov-19
12	Yes	1-Dec-19	31-Dec-19	1,861				Dec-19
13	Yes	1-Jan-20	31-Jan-20	2,490				Jan-20
14	Yes	1-Feb-20	29-Feb-20	2,042				Feb-20
15	Yes	1-Mar-20	31-Mar-20	1,875				Mar-20
16	Yes	1-Apr-20	30-Apr-20	1,162				Apr-20
17	Yes	1-May-20	31-May-20	963				May-20
18	Yes	1-Jun-20	30-Jun-20	944				Jun-20
19	Yes	1-Jul-20	31-Jul-20	1,487				Jul-20
20	Yes	1-Aug-20	31-Aug-20	1,729				Aug-20
21	Yes	1-Sep-20	30-Sep-20	957				Sep-20
22	Yes	1-Oct-20	31-Oct-20	823				Oct-20
23	Yes	1-Nov-20	30-Nov-20	1,548				Nov-20
24	Yes	1-Dec-20	31-Dec-20	1,498				Dec-20
25	Yes	1-Jan-21	31-Jan-21	1,803				Jan-21
26	Yes	1-Feb-21	28-Feb-21	1,779				Feb-21
27	Yes	1-Mar-21	31-Mar-21	1,391				Mar-21
28	Yes	1-Apr-21	30-Apr-21	1,115				Apr-21
29	Yes	1-May-21	31-May-21	958				May-21
30	Yes	1-Jun-21	30-Jun-21	1,075				Jun-21
31	Yes	1-Jul-21	31-Jul-21	1,340				Jul-21
32	Yes	1-Aug-21	31-Aug-21	1,554				Aug-21
33	Yes	1-Sep-21	30-Sep-21	2,015				Sep-21
34	Yes	1-Oct-21	31-Oct-21	1,711				Oct-21
35	Yes	1-Nov-21	30-Nov-21	1,512				Nov-21
36	Yes	1-Dec-21	31-Dec-21	2,242				Dec-21

Community Services Bldg.: Propane (litres)

	1	2				
M03	Days	HDD	CDD	IV1	IV2	IV3
Dependent?:	Yes	Yes	No	No	No	No
Balance Point:	N/A	16		N/A	N/A	N/A
Calculated BP:	N/A	1		N/A	N/A	N/A
Coefficient:	0.27	1.28	0.00	0.00	0.00	0.00
T-Stat:	0.17	9.39	0.00	0.00	0.00	0.00
Adj R²:	**0.8700**					

Propane (litres) = Days x 0.27 + HDD x 1.28.
The underlying regression of this baseline equation is R² = 0.87.
HDD (Heating Degree Days) calculated using a balance point of 16°C.
CDD (Cooling Degree Days) calculated using a balance point of °C.
In a typical year, consumption will be 5,345 litres.



	Include in Model?	Start Date	Read Date	Propane (litres)	IV1	IV2	IV3	Month Allocation
	No	1-Jan-19	31-Jan-19	3,864				Jan-19
1	Yes	1-Feb-19	28-Feb-19	912				Feb-19
2	Yes	1-Mar-19	31-Mar-19	857				Mar-19
3	Yes	1-Apr-19	30-Apr-19	336				Apr-19
4	Yes	1-May-19	31-May-19	259				May-19
5	Yes	1-Jun-19	30-Jun-19	0				Jun-19
6	Yes	1-Jul-19	31-Jul-19	0				Jul-19
7	Yes	1-Aug-19	31-Aug-19	217				Aug-19
8	Yes	1-Sep-19	30-Sep-19	0				Sep-19
9	Yes	1-Oct-19	30-Nov-19	749				Oct-19
	No	1-Nov-19	30-Nov-19	749				Nov-19
10	Yes	1-Dec-19	31-Dec-19	1,165				Dec-19
11	Yes	1-Jan-20	31-Jan-20	777				Jan-20
12	Yes	1-Feb-20	29-Feb-20	940				Feb-20
13	Yes	1-Mar-20	31-Mar-20	905				Mar-20
14	Yes	1-Apr-20	30-Apr-20	391				Apr-20
15	Yes	1-May-20	31-May-20	0				May-20
16	Yes	1-Jun-20	30-Jun-20	0				Jun-20
17	Yes	1-Jul-20	31-Jul-20	0				Jul-20
18	Yes	1-Aug-20	31-Aug-20	0				Aug-20
19	Yes	1-Sep-20	30-Sep-20	0				Sep-20
20	Yes	1-Oct-20	31-Oct-20	536				Oct-20
21	Yes	1-Nov-20	30-Nov-20	685				Nov-20
22	Yes	1-Dec-20	31-Dec-20	375				Dec-20
23	Yes	1-Jan-21	31-Jan-21	364				Jan-21
24	Yes	1-Feb-21	28-Feb-21	721				Feb-21
25	Yes	1-Mar-21	31-Mar-21	547				Mar-21
26	Yes	1-Apr-21	30-Apr-21	602				Apr-21
27	Yes	1-May-21	31-May-21	0.10				May-21
28	Yes	1-Jun-21	30-Jun-21	0.10				Jun-21
	No	1-Jul-21	31-Jul-21	324				Jul-21
29	Yes	1-Aug-21	31-Oct-21	324				Sep-21
	No	1-Sep-21	30-Sep-21	0.10				Sep-21
	No	1-Oct-21	31-Oct-21	0.10				Oct-21
30	Yes	1-Nov-21	30-Nov-21	853				Nov-21
31	Yes	1-Dec-21	31-Dec-21	864				Dec-21

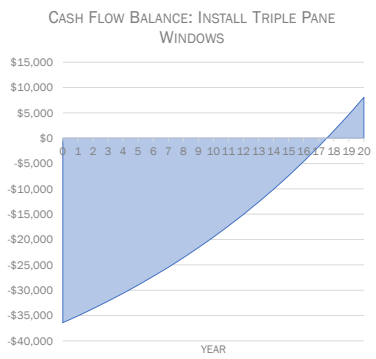
Energy Conservation Measure 1

Opp Cat:	Select
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):	915
Propane (litres):	1,179
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	1.9
Financials	
Annual Utility Savings:	$1,277
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$29,136
Engineering & PM:	$4,370
Contingency:	$2,914
Project Costs:	$36,420
Simple Payback:	28.5
Capital Payback:	#NAME?
NPV:	-$15,879
IRR:	1.7%



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

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	566,971	569,064
% 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	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 Triple Pane Windows			Savings						
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)					
Space Cool	5.9	0.0	5,930.0	5.8	0.0	5,810.0	120	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	28.9	672.5	226,012.6	28.3	659.9	221,684.4	650	519					
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Hot Water	14.7	0.0	14,730.0	14.7	0.0	14,730.0	0	0					
Vent. Fans	11.8	0.0	11,750.0	11.7	0.0	11,690.0	60	0					
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Ext. Usage	3.2	0.0	3,190.0	3.2	0.0	3,190.0	0	0					
Misc. Equip	3.3	0.0	3,330.0	3.3	0.0	3,330.0	0	0					
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Area Lights	23.3	0.0	23,320.0	23.3	0.0	23,320.0	0	0					
0	**91**	**672**	**288,263**	**85**	**660**	**277,944**	**830**	**519**	**0**	**0**	**0**	**0**	

Main Meter:	Select	Select	Select	Select	M02	M03	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 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											Yes	Project		$0	$0	$0	$0
111	0	0											Yes	Project		$0	$0	$0	$0
112	0	0				HE Windows	Triple pane, low e argon	ft2	Pinpoint	$68	$23	$0	Yes	Project	208	$21,841	$7,295	$0	$29,136
113	0	0				Potential Structural		Each	EE Est	$50,000	$12,500	$0	Yes	Project	0	$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:	**$21,841**	**$7,295**	**$0**	**$29,136**

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):	0.1935	0.2036	0.2142	0.2253	0.2370	0.2494	0.2623	0.2760	0.2903	0.3054	0.3213	0.3380	0.3556	0.3741	0.3935	0.4140	0.4355	0.4581	0.4820	0.5070	0.5334
Propane ($/litres):	0.9334	0.9801	1.0291	1.0805	1.1346	1.1913	1.2508	1.3134	1.3791	1.4480	1.5204	1.5964	1.6763	1.7601	1.8481	1.9405	2.0375	2.1394	2.2463	2.3587	2.4766
Water ($/m³):	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
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:	-$36,420	$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):		$186	$196	$206	$217	$228	$240	$252	$265	$279	$294	$309	$325	$342	$360	$379	$398	$419	$441	$464	$488
Annual Savings (M03):		$1,155	$1,213	$1,274	$1,337	$1,404	$1,474	$1,548	$1,626	$1,707	$1,792	$1,882	$1,976	$2,075	$2,178	$2,287	$2,402	$2,522	$2,648	$2,780	$2,919
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:	-$36,420	$1,341	$1,409	$1,480	$1,554	$1,632	$1,714	$1,801	$1,891	$1,986	$2,086	$2,191	$2,301	$2,417	$2,538	$2,666	$2,800	$2,941	$3,089	$3,244	$3,407
Cash Balance:	-$36,420	-$35,079	-$33,670	-$32,190	-$30,636	-$29,004	-$27,289	-$25,489	-$23,598	-$21,612	-$19,525	-$17,335	-$15,033	-$12,617	-$10,078	-$7,412	-$4,612	-$1,672	$1,417	$4,661	$8,068
Undepreciated Amount:	-$36,420	-$30,957	-$26,314	-$22,367	-$19,012	-$16,160	-$13,736	-$11,675	-$9,924	-$8,436	-$7,170	-$6,095	-$5,180	-$4,403	-$3,743	-$3,181	-$2,704	-$2,299	-$1,954	-$1,661	-$1,412

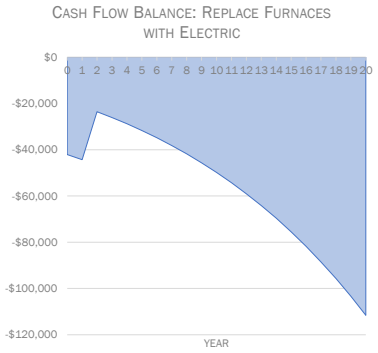
Energy Conservation Measure 2

Opp Cat:	Space_Heating
Opp Desc:	
Opp Name:	Replace Furnaces with Electric

Costing Setup	
Engineering & PM:	**15%**
Contingency:	**10%**
Additional Annual Costs:	
Additional Annual Savings:	
Tax Rebate (Capital Projects):	**No**
Avoided Capital Costs:	**$22,055**
Avoided Capital Year:	**2**
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):	-144,480
Propane (litres):	27,801
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	38.7
Financials	
Annual Utility Savings:	-$2,011
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$33,705
Engineering & PM:	$5,056
Contingency:	$3,371
Project Costs:	$42,132
Simple Payback:	No Payback
Capital Payback:	No Payback
NPV:	-$62,836
IRR:	No IRR



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

QC Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	524,912	408,233
% Reduction	#DIV/0!	#DIV/0!

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

Savings: Replace Furnaces with Electric

			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			Replace Furnaces with Electric			Savings					
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)				
Space Cool	5.9	0.0	5,930.0	6.1	0.0	6,060.0	-130	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	28.9	672.5	226,012.6	173.3	0.0	173,270.0	-144,350	27,801				
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Hot Water	14.7	0.0	14,730.0	14.7	0.0	14,730.0	0	0				
Vent. Fans	11.8	0.0	11,750.0	11.8	0.0	11,750.0	0	0				
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Ext. Usage	3.2	0.0	3,190.0	3.2	0.0	3,190.0	0	0				
Misc. Equip	3.3	0.0	3,330.0	3.3	0.0	3,330.0	0	0				
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Area Lights	23.3	0.0	23,320.0	23.3	0.0	23,320.0	0	0				
0	**91**	**672**	**288,263**	**236**	**0**	**235,650**	**-144,480**	**27,801**	**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 Furnaces with Electric

Cost Breakout: Replace Furnaces 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	$750	$0	Yes	Both	3	$0	$3,461	$0	$3,461
111	0	0				120 MBH	Gas Fired	Each	Means '24	$3,500	$875	$0	No	Avoided	2	$7,000	$1,750	$0	$8,750
112	0	0				140 MBH	Gas Fired	Each	Means '24	$4,083	$1,021	$0	Yes	Avoided	1	$6,269	$1,570	$0	$7,839
113	0	0				30 kW Furnace	Electric	Each	Means '24	$3,500	$875	$0	Yes	Project	2	$10,746	$2,692	$0	$13,438
114	0	0				34 kW Furnace	Electric	Each	Means '24	$3,719	$930	$0	Yes	Project	1	$5,709	$1,430	$0	$7,139
115	0	0											Yes	Project		$0	$0	$0	$0
116	26	05.19.90	Electrical	Wire	Cu-XHHW-#4, 1 Wire, 85A, 71kW	Cu-XHHW	#4, 1 Wire, 85A, 71kW	100 LF	Means '18	$79	$88	$0	Yes	Project	12	$1,455	$1,624	$0	$3,080
117	26	05.33.13	Electrical	Conduit	PVC Conduit-1" (3x#2, 4x#4)	PVC Conduit	1" (3x#2, 4x#4)	LF	Means '18	$2	$4	$0	Yes	Project	300	$700	$1,717	$0	$2,417
118	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	3	$2,925	$766	$0	$3,691
119	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	3	$90	$390	$0	$480
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:	**$21,626**	**$12,080**	**$0**	**$33,705**

Escalation Rates: Replace Furnaces with Electric

Cash Flow Balance: Replace Furnaces 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:	-$42,132	$0	$23,036	$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):		-$29,415	-$30,944	-$32,553	-$34,246	-$36,027	-$37,900	-$39,871	-$41,944	-$44,125	-$46,420	-$48,834	-$51,373	-$54,044	-$56,855	-$59,811	-$62,921	-$66,193	-$69,635	-$73,256	-$77,066
Annual Savings (M03):		$27,247	$28,609	$30,040	$31,542	$33,119	$34,775	$36,514	$38,339	$40,256	$42,269	$44,382	$46,602	$48,932	$51,378	$53,947	$56,645	$59,477	$62,451	$65,573	$68,852
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:	-$42,132	-$2,168	$20,701	-$2,513	-$2,704	-$2,908	-$3,125	-$3,357	-$3,605	-$3,869	-$4,151	-$4,451	-$4,771	-$5,113	-$5,476	-$5,864	-$6,277	-$6,716	-$7,185	-$7,683	-$8,214
Cash Balance:	-$42,132	-$44,299	-$23,598	-$26,111	-$28,816	-$31,723	-$34,849	-$38,206	-$41,811	-$45,680	-$49,831	-$54,282	-$59,053	-$64,166	-$69,642	-$75,506	-$81,783	-$88,500	-$95,684	-$103,367	-$111,581
Undepreciated Amount:	-$42,132	-$35,812	-$30,440	-$25,874	-$21,993	-$18,694	-$15,890	-$13,506	-$11,481	-$9,758	-$8,295	-$7,050	-$5,993	-$5,094	-$4,330	-$3,680	-$3,128	-$2,659	-$2,260	-$1,921	-$1,633

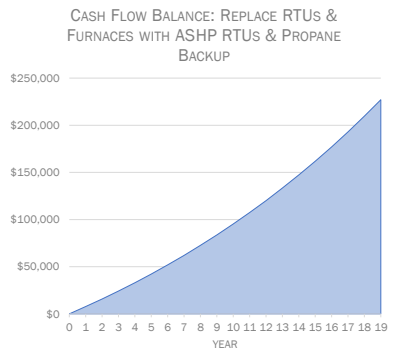
Energy Conservation Measure 3

Opp Cat:	Select
Opp Desc:	
Opp Name:	Replace RTUs & Furnaces with ASHP RTUs & Propane Backup

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):	-64,070
Propane (litres):	21,163
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	30.8
Financials	
Annual Utility Savings:	$7,354
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$0
Engineering & PM:	$0
Contingency:	$0
Project Costs:	$0
Simple Payback:	Instant
Capital Payback:	Instant
NPV:	$114,210
IRR:	No IRR



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

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	491,645	448,738
% Reduction	#DIV/0!	#DIV/0!

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

Savings: Replace RTUs & Furnaces with ASHP RTUs & Propane Backup

			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			Replace RTUs & Furnaces with ASHP RTUs & Propane Ba			Savings					
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)				
Space Cool	5.9	0.0	5,930.0	6.1	0.0	6,050.0	-120	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	28.9	672.5	226,012.6	87.4	160.6	134,503.3	-58,520	21,163				
HP Supp.	0.0	0.0	0.0	5.4	0.0	5,430.0	-5,430	0				
Hot Water	14.7	0.0	14,730.0	14.7	0.0	14,730.0	0	0				
Vent. Fans	11.8	0.0	11,750.0	11.8	0.0	11,750.0	0	0				
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Ext. Usage	3.2	0.0	3,190.0	3.2	0.0	3,190.0	0	0				
Misc. Equip	3.3	0.0	3,330.0	3.3	0.0	3,330.0	0	0				
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Area Lights	23.3	0.0	23,320.0	23.3	0.0	23,320.0	0	0				
0	**91**	**672**	**288,263**	**155**	**161**	**202,303**	**-64,070**	**21,163**	**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 RTUs & Furnaces with ASHP RTUs & Propane Backup

Cost Breakout: Replace RTUs & Furnaces with ASHP RTUs & Propane Backup

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: Replace RTUs & Furnaces with ASHP RTUs & Propane Backup

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):	0.1935	0.2036	0.2142	0.2253	0.2370	0.2494	0.2623	0.2760	0.2903	0.3054	0.3213	0.3380	0.3556	0.3741	0.3935	0.4140	0.4355	0.4581	0.4820	0.5070	0.5334
Propane ($/litres):	0.9334	0.9801	1.0291	1.0805	1.1346	1.1913	1.2508	1.3134	1.3791	1.4480	1.5204	1.5964	1.6763	1.7601	1.8481	1.9405	2.0375	2.1394	2.2463	2.3587	2.4766
Water ($/m³):	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
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 RTUs & Furnaces with ASHP RTUs & Propane Backup

	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:	$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
Annual Savings (M02):		-$13,044	-$13,722	-$14,436	-$15,186	-$15,976	-$16,807	-$17,681	-$18,600	-$19,567	-$20,585	-$21,655	-$22,781	-$23,966	-$25,212	-$26,523	-$27,903	-$29,354	-$30,880	-$32,486	-$34,175
Annual Savings (M03):		$20,741	$21,778	$22,867	$24,010	$25,211	$26,471	$27,795	$29,184	$30,644	$32,176	$33,784	$35,474	$37,247	$39,110	$41,065	$43,119	$45,274	$47,538	$49,915	$52,411
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:	$0	$7,697	$8,056	$8,431	$8,824	$9,234	$9,664	$10,114	$10,584	$11,076	$11,591	$12,129	$12,692	$13,281	$13,897	$14,542	$15,216	$15,921	$16,658	$17,429	$18,236
Cash Balance:	$0	$7,697	$15,752	$24,183	$33,007	$42,241	$51,905	$62,019	$72,603	$83,679	$95,270	$107,399	$120,091	$133,373	$147,270	$161,812	$177,028	$192,949	$209,607	$227,036	$245,272
Undepreciated Amount:	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

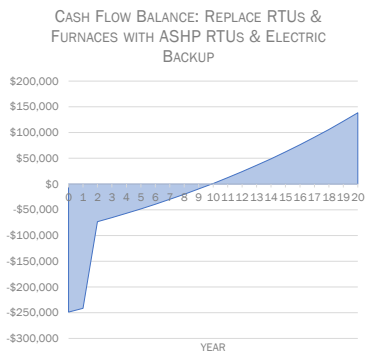
Energy Conservation Measure 4

Opp Cat:	Select
Opp Desc:	
Opp Name:	Replace RTUs & Furnaces with ASHP RTUs & Electric Backup

Costing Setup	
Engineering & PM:	**15%**
Contingency:	**10%**
Additional Annual Costs:	
Additional Annual Savings:	
Tax Rebate (Capital Projects):	**No**
Avoided Capital Costs:	**$153,938**
Avoided Capital Year:	**2**
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):	-98,090
Propane (litres):	27,801
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	40.1
Financials	
Annual Utility Savings:	$6,967
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$199,072
Engineering & PM:	$29,861
Contingency:	$19,907
Project Costs:	$248,840
Simple Payback:	35.7
Capital Payback:	#NAME?
NPV:	-$3,206
IRR:	7.0%



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

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	478,476	408,187
% Reduction	#DIV/0!	#DIV/0!

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

Savings: Replace RTUs & Furnaces with ASHP RTUs & Electric Backup

			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			Replace RTUs & Furnaces with ASHP RTUs & Electric Ba			Savings						
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)					
Space Cool	5.9	0.0	5,930.0	6.1	0.0	6,050.0	-120	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	28.9	672.5	226,012.6	87.4	0.0	87,440.0	-58,520	27,801					
HP Supp.	0.0	0.0	0.0	39.5	0.0	39,450.0	-39,450	0					
Hot Water	14.7	0.0	14,730.0	14.7	0.0	14,730.0	0	0					
Vent. Fans	11.8	0.0	11,750.0	11.8	0.0	11,750.0	0	0					
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Ext. Usage	3.2	0.0	3,190.0	3.2	0.0	3,190.0	0	0					
Misc. Equip	3.3	0.0	3,330.0	3.3	0.0	3,330.0	0	0					
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Area Lights	23.3	0.0	23,320.0	23.3	0.0	23,320.0	0	0					
0	**91**	**672**	**288,263**	**189**	**0**	**189,260**	**-98,090**	**27,801**	**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 RTUs & Furnaces with ASHP RTUs & Electric Backup

Cost Breakout: Replace RTUs & Furnaces with ASHP RTUs & Electric Backup

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				ASHP RTU	10 Ton Nominal c/w Electric Backup	each	Means '23	$21,635	$4,327	$0	Yes	Both	2	$66,428	$13,312	$0	$79,740
114	0	0				Structural Analysis		Each	EE Est	$0	$7,500	$0	Yes	Project	1	$0	$11,537	$0	$11,537
115	0	0				DeMeans	Demo Existing	Each	Means '23	$0	$2,750	$0	Yes	Both	2	$0	$8,460	$0	$8,460
116	0	0				Craning	Craning - 40 ton truck mounted	Per Day	Means '23	$0	$475	$3,286	Yes	Both	1	$0	$731	$5,054	$5,785
117	0	0				Structural Reinforcement		Each	EE Est.	$7,500	$1,500	$0	Yes	Project		$0	$0	$0	$0
118	0	0				Roof Curb		Each	EE Est.	$20,000	$4,000	$0	Yes	Project		$0	$0	$0	$0
119	0	0				Controls							Yes	Project		$0	$0	$0	$0
120	0	0				Analog Inputs	Duct Temperature	Each	Means '22	$349	$116	$0	Yes	Both	8	$4,283	$1,431	$0	$5,714
121	0	0				Analog Outputs	Electric (Not incl. Device)	Each	Means '22	$285	$95	$0	Yes	Both	4	$1,750	$585	$0	$2,335
122	0	0				Digital Inputs	Current Sensor	Each	Means '22	$326	$109	$0	Yes	Both	4	$2,003	$669	$0	$2,673
123	0	0				Digital Outputs	Start/Stop	Each	Means '22	$255	$85	$0	Yes	Both	4	$1,566	$523	$0	$2,089
124	0	0				DDC Controller	16 Point Controller	Each	Means '22	$2,456	$819	$0	Yes	Both	2	$7,542	$2,519	$0	$10,060
125	0	0				DDC Front End	Calibration Labour	Point	Means '22	$90	$30	$0	Yes	Both	22	$3,040	$1,015	$0	$4,055
126	0	0				DDC Front End	Start-up Labour	Point	Means '22	$90	$30	$0	Yes	Both	22	$3,040	$1,015	$0	$4,055
127	0	0				Electrical							Yes	Project		$0	$0	$0	$0
128	0	0				Cu-XHHW	#1/0, 1 Wire, 150A, 125kW	100 LF	Means '23	$300	$163	$0	Yes	Project	12	$5,527	$3,009	$0	$8,535
129	0	0				Circuit Breaker	Enclosed, 100 Amp	each	Means '23	$650	$234	$0	Yes	Project	2	$1,996	$720	$0	$2,716
130	0	0				Conduit	1 1/2" PVC	LF	Means '23	$6	$4	$0	Yes	Project	300	$2,763	$1,624	$0	$4,388
131	0	0				Pull Box	10"x10"	Each	Means '23	$24	$77	$0	Yes	Project	2	$72	$237	$0	$309
132	0	0											Yes	Project		$0	$0	$0	$0
133	0	0											Yes	Project		$0	$0	$0	$0
134	0	0				34 kW Furnace	Electric	Each	Means '24	$3,719	$930	$0	Yes	Both	1	$5,709	$1,430	$0	$7,139
135	26	05.19.90	Electrical	Wire	Cu-XHHW-#4, 1 Wire, 85A, 71kW	Cu-XHHW	#4, 1 Wire, 85A, 71kW	100 LF	Means '18	$79	$88	$0	Yes	Project	4	$485	$541	$0	$1,027
136	26	05.33.13	Electrical	Conduit	PVC Conduit-1" (3x#2, 4x#4)	PVC Conduit	1" (3x#2, 4x#4)	LF	Means '18	$2	$4	$0	Yes	Project	100	$233	$572	$0	$806
137	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	3	$2,925	$766	$0	$3,691
138	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	3	$90	$390	$0	$480
139	0	0											Yes	Project		$0	$0	$0	$0
140	0	0				Remote Condensing Unit	10 ton	EACH	Means '24	$6,625	$2,650	$0	Yes	Project	1	$10,171	$4,076	$0	$14,247
141	0	0				Refrigerant Piping		Each	EE Est	$750	$188	$0	Yes	Project	1	$1,151	$288	$0	$1,440
142	23	82.16	HVAC	Air Coils	2 Row Flanged Coil-30"Hx45"L, 4700cfm	2 Row Flanged Coil	30"Hx45"L, 4700cfm	Each	Means '24	$2,600	$400	$0	Yes	Project	1	$3,992	$615	$0	$4,607
143	0	0				Concrete Pad for CU		each	EE Est	$2,500	$625	$0	Yes	Project	1	$3,838	$961	$0	$4,799
144	0	0				34 kW Furnace	Electric	Each	Means '24	$2,656	$664	$0	Yes	Project	1	$4,078	$1,021	$0	$5,099
145	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	6	$474	$660	$0	$1,134
146	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	150	$230	$741	$0	$971
147	26	28	Electrical	Circuit Breakers	Circuit Breaker - NEMA 1-600V, 30A	Circuit Breaker - NEMA 1	600V, 30A	Each	Means '18	$520	$146	$0	Yes	Project	1	$798	$225	$0	$1,023
148	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	$30	$130	$0	$160
149	0	0											Yes	Project		$0	$0	$0	$0
150	0	0				140 MBH	Gas Fired	Each	Means '24	$4,083	$1,021	$0	Yes	Avoided	1	$6,269	$1,570	$0	$7,839
151	0	0											Yes	Project		$0	$0	$0	$0
152	0	0											Yes	Project		$0	$0	$0	$0
153	0	0											Yes	Project		$0	$0	$0	$0
154	0	0											Yes	Project		$0	$0	$0	$0
155	0	0											Yes	Project		$0	$0	$0	$0
															Totals:	**$134,215**	**$59,803**	**$5,054**	**$199,072**

Escalation Rates: Replace RTUs & Furnaces with ASHP RTUs & Electric Backup

Cash Flow Balance: Replace RTUs & Furnaces with ASHP RTUs & Electric Backup

	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:	-$248,840	$0	$160,786	$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):		-$19,970	-$21,008	-$22,101	-$23,250	-$24,459	-$25,731	-$27,069	-$28,477	-$29,957	-$31,515	-$33,154	-$34,878	-$36,692	-$38,600	-$40,607	-$42,718	-$44,940	-$47,277	-$49,735	-$52,321
Annual Savings (M03):		$27,247	$28,609	$30,040	$31,542	$33,119	$34,775	$36,514	$38,339	$40,256	$42,269	$44,382	$46,602	$48,932	$51,378	$53,947	$56,645	$59,477	$62,451	$65,573	$68,852
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:	-$248,840	$7,277	$168,386	$7,939	$8,292	$8,660	$9,044	$9,445	$9,863	$10,299	$10,754	$11,228	$11,724	$12,240	$12,779	$13,340	$13,926	$14,537	$15,174	$15,838	$16,531
Cash Balance:	-$248,840	-$241,563	-$73,177	-$65,238	-$56,946	-$48,286	-$39,243	-$29,798	-$19,936	-$9,637	$1,117	$12,346	$24,069	$36,309	$49,088	$62,428	$76,354	$90,891	$106,065	$121,903	$138,434
Undepreciated Amount:	-$248,840	-$211,514	-$179,787	-$152,819	-$129,896	-$110,412	-$93,850	-$79,772	-$67,807	-$57,636	-$48,990	-$41,642	-$35,395	-$30,086	-$25,573	-$21,737	-$18,477	-$15,705	-$13,349	-$11,347	-$9,645

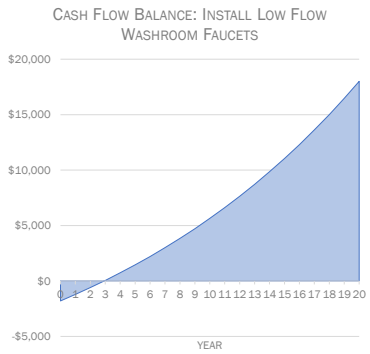
Energy Conservation Measure 5

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):	2,880
Propane (litres):	0
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	0.1
Financials	
Annual Utility Savings:	$557
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$1,440
Engineering & PM:	$216
Contingency:	$144
Project Costs:	$1,800
Simple Payback:	3.2
Capital Payback:	#NAME?
NPV:	$7,309
IRR:	37.6%



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

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	575,170	578,050
% 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					
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)				
Space Cool	5.9	0.0	5,930.0	5.9	0.0	5,930.0	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	28.9	672.5	226,012.6	28.9	672.5	226,012.6	0	0				
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Hot Water	14.7	0.0	14,730.0	11.9	0.0	11,850.0	2,880	0				
Vent. Fans	11.8	0.0	11,750.0	11.8	0.0	11,750.0	0	0				
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Ext. Usage	3.2	0.0	3,190.0	3.2	0.0	3,190.0	0	0				
Misc. Equip	3.3	0.0	3,330.0	3.3	0.0	3,330.0	0	0				
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Area Lights	23.3	0.0	23,320.0	23.3	0.0	23,320.0	0	0				
0	**91**	**672**	**288,263**	**88**	**672**	**285,383**	**2,880**	**0**	**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 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											Yes	Project		$0	$0	$0	$0
111	0	0				Washroom Faucets	0.5 GPM	Eah	Web Search	$125	$31	$0	Yes	Project	6	$1,151	$288	$0	$1,440
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:	**$1,151**	**$288**	**$0**	**$1,440**

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
Year:	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Implementation Cost:	-$1,800	$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):		$586	$617	$649	$683	$718	$755	$795	$836	$880	$925	$973	$1,024	$1,077	$1,133	$1,192	$1,254	$1,319	$1,388	$1,460	$1,536
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:	-$1,800	$586	$617	$649	$683	$718	$755	$795	$836	$880	$925	$973	$1,024	$1,077	$1,133	$1,192	$1,254	$1,319	$1,388	$1,460	$1,536
Cash Balance:	-$1,800	-$1,213	-$597	$52	$735	$1,453	$2,209	$3,003	$3,839	$4,719	$5,644	$6,618	$7,642	$8,719	$9,852	$11,045	$12,299	$13,618	$15,006	$16,467	$18,003
Undepreciated Amount:	-$1,800	-$1,530	-$1,300	-$1,105	-$939	-$799	-$679	-$577	-$490	-$417	-$354	-$301	-$256	-$218	-$185	-$157	-$134	-$114	-$97	-$82	-$70

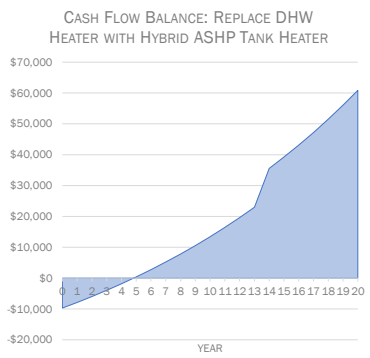
Energy Conservation Measure 6

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

Costing Setup	
Engineering & PM:	
Contingency:	**10%**
Additional Annual Costs:	
Additional Annual Savings:	
Tax Rebate (Capital Projects):	**No**
Avoided Capital Costs:	**$6,676**
Avoided Capital Year:	**14**
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):	8,943
Propane (litres):	0
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	0.3
Financials	
Annual Utility Savings:	$1,731
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$8,833
Engineering & PM:	$0
Contingency:	$883
Project Costs:	$9,716
Simple Payback:	5.6
Capital Payback:	#NAME?
NPV:	$21,941
IRR:	24.1%



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

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	324,277	333,221
% 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

			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				Existing	Retrofit					Savings	
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)		DHW Cons - kWh	Adj DHW Cons - kWh	ASHP Offset	ASHP Avg COP	Electric Backup Htg - kWh	ASHP Cons - kWh	DHW Cons - kWh	
Space Cool	5.9	0.0	5,930.0		14,730	14,730	85%	3.5	2,210	3,577	8,943	
Heat Reject.	0.0	0.0	0.0									
Refrigeration	0.0	0.0	0.0									
Space Heat	28.9	672.5	226,012.6									
HP Supp.	0.0	0.0	0.0									
Hot Water	14.7	0.0	14,730.0									
Vent. Fans	11.8	0.0	11,750.0									
Pumps & Aux	0.0	0.0	0.0									
Ext. Usage	3.2	0.0	3,190.0									
Misc. Equip	3.3	0.0	3,330.0									
Task Lights	0.0	0.0	0.0									
Area Lights	23.3	0.0	23,320.0									
0	**91**	**672**	**288,263**	**0**	**14,730**	**14,730**	**1**	**4**	**2,210**	**3,577**	**8,943**	**0**
Main Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	M02	Select
Breakout Meter:	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
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):	0.1935	0.2036	0.2142	0.2253	0.2370	0.2494	0.2623	0.2760	0.2903	0.3054	0.3213	0.3380	0.3556	0.3741	0.3935	0.4140	0.4355	0.4581	0.4820	0.5070	0.5334
Propane ($/litres):	0.9334	0.9801	1.0291	1.0805	1.1346	1.1913	1.2508	1.3134	1.3791	1.4480	1.5204	1.5964	1.6763	1.7601	1.8481	1.9405	2.0375	2.1394	2.2463	2.3587	2.4766
Water ($/m³):	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
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 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
Year:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Implementation Cost:	-$9,716	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$9,054	$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):		$1,821	$1,915	$2,015	$2,120	$2,230	$2,346	$2,468	$2,596	$2,731	$2,873	$3,023	$3,180	$3,345	$3,519	$3,702	$3,895	$4,097	$4,310	$4,535	$4,770
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:	-$9,716	$1,821	$1,915	$2,015	$2,120	$2,230	$2,346	$2,468	$2,596	$2,731	$2,873	$3,023	$3,180	$3,345	$12,573	$3,702	$3,895	$4,097	$4,310	$4,535	$4,770
Cash Balance:	-$9,716	-$7,895	-$5,980	-$3,965	-$1,845	$385	$2,731	$5,199	$7,795	$10,527	$13,400	$16,423	$19,603	$22,948	$35,521	$39,224	$43,118	$47,216	$51,526	$56,061	$60,831
Undepreciated Amount:	-$9,716	-$8,259	-$7,020	-$5,967	-$5,072	-$4,311	-$3,664	-$3,115	-$2,647	-$2,250	-$1,913	-$1,626	-$1,382	-$1,175	-$999	-$849	-$721	-$613	-$521	-$443	-$377

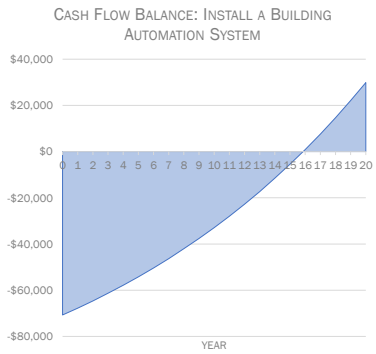
Energy Conservation Measure 7

Opp Cat:	Select
Opp Desc:	
Opp Name:	Install a Building Automation 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):	14,628
Propane (litres):	0
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	0.4
Financials	
Annual Utility Savings:	$2,831
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$56,569
Engineering & PM:	$8,485
Contingency:	$5,657
Project Costs:	$70,711
Simple Payback:	25.0
Capital Payback:	#NAME?
NPV:	-$24,449
IRR:	3.1%



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

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	415,811	430,438
% Reduction	#DIV/0!	#DIV/0!

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

Savings: Install a Building Automation System

			Meter Selection				Occupancy	Eff. Profile
Avg Temp (°F)	Avg Temp (°C)	Total Hours	M02 Base	M02 Winter	M02 Summer	Select	Select	Select
-33	-36	0	0	0	0			0%
-28	-33	0	0	0	0			0%
-23	-30	0	0	0	0			0%
-18	-28	1	7	16	0			0%
-13	-25	24	150	340	0			0%
-8	-22	37	236	493	0			0%
-3	-19	68	427	818	0			0%
3	-16	153	963	1,683	0			0%
8	-14	201	1,266	1,996	0			0%
13	-11	364	2,298	3,230	0			0%
18	-8	506	3,190	3,937	0			0%
23	-5	638	4,026	4,281	0			0%
28	-3	605	3,814	3,403	0			0%
33	0	810	5,111	3,687	0			0%
38	3	629	3,968	2,184	0			0%
43	6	606	3,822	1,450	0			0%
48	9	646	4,073	850	0			0%
53	11	688	4,338	163	0			0%
58	14	669	4,217	0	0			0%
63	17	724	4,568	0	0			0%
68	20	625	3,939	0	0			0%
73	23	449	2,835	0	0			0%
78	25	225	1,421	0	3,214			0%
83	28	82	517	0	2,595			0%
88	31	10	62	0	482			0%
93	34	0	0	0	0			0%
98	36	0	0	0	0			0%
103	39	0	0	0	0			0%
Totals		**8,760**	**55,248**	**28,530**	**6,291**	**0**	**0**	**0**

End-Use	Existing			Install Low Flow Washroom Faucets			Savings		Retrofit			Savings
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)	% Reduction	Ele - kWh	Propane - l	kWh
Space Cool	5.9	0.0	5,930.0	0.0	0.0	0.0	5,930	0	15%	890	0	890
Heat Reject.	0.0	0.0	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		0	0	0
Space Heat	28.9	672.5	226,012.6	0.0	0.0	0.0	28,920	27,801	4%	1,157	1,067	9,038
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0		0	0	0
Hot Water	14.7	0.0	14,730.0	0.0	0.0	0.0	14,730	0		0	0	0
Vent. Fans	11.8	0.0	11,750.0	0.0	0.0	0.0	11,750	0	40%	4,700	0	4,700
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0		0	0	0
Ext. Usage	3.2	0.0	3,190.0	0.0	0.0	0.0	3,190	0		0	0	0
Misc. Equip	3.3	0.0	3,330.0	0.0	0.0	0.0	3,330	0		0	0	0
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0		0	0	0
Area Lights	23.3	0.0	23,320.0	0.0	0.0	0.0	23,320	0		0	0	0
0	**91**	**672**	**288,263**	**0**	**0**	**0**	**91,170**	**27,801**	**1**	**6,746**	**1,067**	**14,628**
Main Meter:	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

Equipment	Quantity	AI	AO	DI	DO
Exhaust Fans	2	0	0	2	2
Furnaces	3	3	3	3	3
RTUs	2	2	2	4	4
Misc.	2	2	2	2	2
		7	7	11	11

General Requirements: Install a Building Automation System

Cost Breakout: Install a Building Automation 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											Yes	Project		$0	$0	$0	$0
111	23	09.23	HVAC	Controls	Analog Inputs-Duct Temperature	Analog Inputs	Duct Temperature	Each	Means '22	$349	$116	$0	Yes	Project	7	$3,748	$1,252	$0	$5,000
112	23	09.23	HVAC	Controls	Analog Outputs-Electric (Not incl. Device)	Analog Outputs	Electric (Not incl. Device)	Each	Means '22	$285	$95	$0	Yes	Project	7	$3,063	$1,023	$0	$4,086
113	23	09.23	HVAC	Controls	Digital Inputs-Current Sensor	Digital Inputs	Current Sensor	Each	Means '22	$326	$109	$0	Yes	Project	11	$5,509	$1,840	$0	$7,350
114	23	09.23	HVAC	Controls	Digital Outputs-Start/Stop	Digital Outputs	Start/Stop	Each	Means '22	$255	$85	$0	Yes	Project	11	$4,306	$1,438	$0	$5,744
115	23	09.23	HVAC	Controls	DDC Controller-16 Point Controller	DDC Controller	16 Point Controller	Each	Means '22	$2,456	$819	$0	Yes	Project	3	$11,313	$3,778	$0	$15,091
116	23	09.23	HVAC	Controls	DDC Front End-Colour Graphics Software	DDC Front End	Colour Graphics Software	Each	Means '22	$2,944	$981	$0	Yes	Project	1	$4,519	$1,509	$0	$6,029
117	23	09.23	HVAC	Controls	DDC Front End-Calibration Labour	DDC Front End	Calibration Labour	Point	Means '22	$90	$30	$0	Yes	Project	36	$4,974	$1,661	$0	$6,635
118	23	09.23	HVAC	Controls	DDC Front End-Start-up Labour	DDC Front End	Start-up Labour	Point	Means '22	$90	$30	$0	Yes	Project	36	$4,974	$1,661	$0	$6,635
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
																$42,406	**$14,163**	**$0**	**$56,569**

Escalation Rates: Install a Building Automation System

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):	0.1935	0.2036	0.2142	0.2253	0.2370	0.2494	0.2623	0.2760	0.2903	0.3054	0.3213	0.3380	0.3556	0.3741	0.3935	0.4140	0.4355	0.4581	0.4820	0.5070	0.5334
Propane ($/litres):	0.9334	0.9801	1.0291	1.0805	1.1346	1.1913	1.2508	1.3134	1.3791	1.4480	1.5204	1.5964	1.6763	1.7601	1.8481	1.9405	2.0375	2.1394	2.2463	2.3587	2.4766
Water ($/m³):	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
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: Install a Building Automation 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:	-$70,711	$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):		$2,978	$3,133	$3,296	$3,467	$3,647	$3,837	$4,037	$4,247	$4,467	$4,700	$4,944	$5,201	$5,472	$5,756	$6,056	$6,370	$6,702	$7,050	$7,417	$7,802
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:	-$70,711	$2,978	$3,133	$3,296	$3,467	$3,647	$3,837	$4,037	$4,247	$4,467	$4,700	$4,944	$5,201	$5,472	$5,756	$6,056	$6,370	$6,702	$7,050	$7,417	$7,802
Cash Balance:	-$70,711	-$67,733	-$64,600	-$61,305	-$57,837	-$54,190	-$50,353	-$46,316	-$42,069	-$37,602	-$32,902	-$27,958	-$22,757	-$17,285	-$11,529	-$5,474	$897	$7,598	$14,648	$22,065	$29,868
Undepreciated Amount:	-$70,711	-$60,105	-$51,089	-$43,426	-$36,912	-$31,375	-$26,669	-$22,668	-$19,268	-$16,378	-$13,921	-$11,833	-$10,058	-$8,549	-$7,267	-$6,177	-$5,250	-$4,463	-$3,793	-$3,224	-$2,741

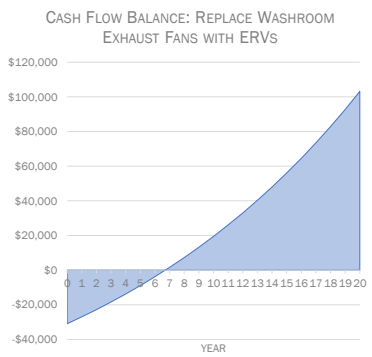
Energy Conservation Measure 8

Opp Cat:	Select
Opp Desc:	
Opp Name:	Replace Washroom Exhaust Fans with ERVs

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):	19,506
Propane (litres):	0
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO₂e):	0.6
Financials	
Annual Utility Savings:	$3,775
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$24,763
Engineering & PM:	$3,714
Contingency:	$2,476
Project Costs:	$30,953
Simple Payback:	8.2
Capital Payback:	#NAME?
NPV:	$30,737
IRR:	16.3%



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

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	525,761	545,266
% Reduction	#DIV/0!	#DIV/0!

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

Savings: Replace Washroom Exhaust Fans with ERVs

			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			Replace Washroom Exhaust Fans with ERVs			Savings			Existing		
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)		dT	Exhausted Heat - MBTUs	Avg Furnace Efficiency
Space Cool	5.9	0.0	5,930.0	0.0	0.0	0.0	5,930	0		103	0	80%
Heat Reject.	0.0	0.0	0.0	0.0	0.0	0.0	0	0		98	0	
Refrigeration	0.0	0.0	0.0	0.0	0.0	0.0	0	0		93	0	
Space Heat	28.9	672.5	226,012.6	0.0	0.0	0.0	28,920	27,801		88	39	
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0		83	850	
Hot Water	14.7	0.0	14,730.0	0.0	0.0	0.0	14,730	0		78	1,252	
Vent. Fans	11.8	0.0	11,750.0	0.0	0.0	0.0	11,750	0		73	2,118	
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0		68	4,453	
Ext. Usage	3.2	0.0	3,190.0	0.0	0.0	0.0	3,190	0		63	5,420	
Misc. Equip	3.3	0.0	3,330.0	0.0	0.0	0.0	3,330	0		58	9,052	
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0		53	11,471	
Area Lights	23.3	0.0	23,320.0	0.0	0.0	0.0	23,320	0		48	13,099	
										43	11,102	
										38	13,128	
										33	8,834	
										28	7,199	
										23	6,278	
										18	5,200	
										13	3,611	
										8	2,347	
										3	675	
										0	0	
										0	0	
										0	0	
										0	0	
										0	0	
										0	0	
0	**91**	**672**	**288,263**	**0**	**0**	**0**	**91,170**	**27,801**	**0**	**1,103**	**106,127**	**1**
Main Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select
Breakout Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select

BTU/cfm/F	1.08
EF Floa - cfm	400
Avg EA Temp - F	70
Propane Winter Extra - l	25,350

General Requirements: Replace Washroom Exhaust Fans with ERVs

Cost Breakout: Replace Washroom Exhaust Fans with ERVs

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 Ex.	Each	EE Est		$250		Yes	Project	2	$0	$769	$0	$769
111	26	05.19.90	Electrical	Wire	Cu-XHHW-#10, 1 Wire, 35A, 29kW	Cu-XHHW	#10, 1 Wire, 35A, 29kW	100 LF	Means '18	$29	$47	$0	Yes	Project	6	$263	$429	$0	$692
112	26	05.33.13	Electrical	Conduit	PVC Conduit-1/2" (3x#8,4x#10)	PVC Conduit	1/2" (3x#8,4x#10)	LF	Means '18	$1	$2	$0	Yes	Project	150	$205	$565	$0	$770
113	26	28	Electrical	Circuit Breakers	Circuit Breaker - NEMA 1-600V, 30A	Circuit Breaker - NEMA 1	600V, 30A	Each	Means '18	$520	$146	$0	Yes	Project	1	$798	$225	$0	$1,023
114	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	$30	$130	$0	$160
115	0	0											Yes	Project		$0	$0	$0	$0
116	0	0				HRV	800 CFM	Each	Web Search	$4,700	$1,175	$0	No	Project	2	$9,400	$2,350	$0	$11,750
117	0	0											Yes	Project		$0	$0	$0	$0
118	0	0				Ductwork Mods		Each	EE Est	$2,500	$625	$0	Yes	Project	2	$7,676	$1,923	$0	$9,599
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:		$18,372	$6,391	$0	$24,763

Escalation Rates: Replace Washroom Exhaust Fans with ERVs

Cash Flow Balance: Replace Washroom Exhaust Fans with ERVs

	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:	-$30,953	$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):		$3,971	$4,178	$4,395	$4,623	$4,864	$5,117	$5,383	$5,663	$5,957	$6,267	$6,593	$6,936	$7,296	$7,676	$8,075	$8,495	$8,937	$9,401	$9,890	$10,404
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:	-$30,953	$3,971	$4,178	$4,395	$4,623	$4,864	$5,117	$5,383	$5,663	$5,957	$6,267	$6,593	$6,936	$7,296	$7,676	$8,075	$8,495	$8,937	$9,401	$9,890	$10,404
Cash Balance:	-$30,953	-$26,982	-$22,805	-$18,410	-$13,786	-$8,922	-$3,806	$1,577	$7,240	$13,197	$19,464	$26,057	$32,993	$40,289	$47,965	$56,040	$64,535	$73,471	$82,872	$92,762	$103,167
Undepreciated Amount:	-$30,953	-$26,310	-$22,364	-$19,009	-$16,158	-$13,734	-$11,674	-$9,923	-$8,435	-$7,169	-$6,094	-$5,180	-$4,403	-$3,742	-$3,181	-$2,704	-$2,298	-$1,954	-$1,661	-$1,411	-$1,200

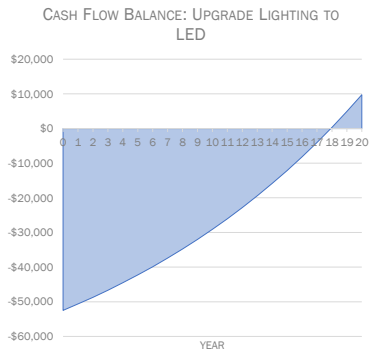
Energy Conservation Measure 9

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

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):	9,050
Propane (litres):	0
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	0.3
Financials	
Annual Utility Savings:	$1,751
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$41,988
Engineering & PM:	$6,298
Contingency:	$4,199
Project Costs:	$52,485
Simple Payback:	30.0
Capital Payback:	#NAME?
NPV:	-$23,863
IRR:	1.4%



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

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	575,737	584,787
% Reduction	#DIV/0!	#DIV/0!

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

Savings: Upgrade Lighting to LED

			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			Upgrade Lighting to LED			Savings					
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)				
Space Cool	5.9	0.0	5,930.0	5.1	0.0	5,110.0	820	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	28.9	672.5	226,012.6	30.1	699.2	234,972.1	-1,140	-1,103				
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Hot Water	14.7	0.0	14,730.0	14.7	0.0	14,730.0	0	0				
Vent. Fans	11.8	0.0	11,750.0	11.7	0.0	11,710.0	40	0				
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Ext. Usage	3.2	0.0	3,190.0	3.2	0.0	3,190.0	0	0				
Misc. Equip	3.3	0.0	3,330.0	3.3	0.0	3,330.0	0	0				
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Area Lights	23.3	0.0	23,320.0	14.0	0.0	13,990.0	9,330	0				
0	**91**	**672**	**288,263**	**82**	**699**	**287,032**	**9,050**	**-1,103**	**0**	**0**	**0**	**0**
Main Meter:	Select	Select	Select	Select	Select	Select	Select	M02	Select	Select	Select	Select	Select
Breakout Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select

Arena 0.78 $ 3.44

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				Lighting Retrofit	LED	per sqft	EE Database	$3	$1	$0	Yes	Project	7944	$31,475	$10,512	$0	$41,988
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:	**$31,475**	**$10,512**	**$0**	**$41,988**

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:	-$52,485	$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):		$1,842	$1,938	$2,039	$2,145	$2,257	$2,374	$2,497	$2,627	$2,764	$2,908	$3,059	$3,218	$3,385	$3,561	$3,746	$3,941	$4,146	$4,362	$4,589	$4,827
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:	-$52,485	$1,842	$1,938	$2,039	$2,145	$2,257	$2,374	$2,497	$2,627	$2,764	$2,908	$3,059	$3,218	$3,385	$3,561	$3,746	$3,941	$4,146	$4,362	$4,589	$4,827
Cash Balance:	-$52,485	-$50,642	-$48,704	-$46,665	-$44,520	-$42,263	-$39,889	-$37,392	-$34,764	-$32,000	-$29,093	-$26,034	-$22,816	-$19,431	-$15,869	-$12,123	-$8,182	-$4,035	$326	$4,915	$9,742
Undepreciated Amount:	-$52,485	-$44,612	-$37,920	-$32,232	-$27,397	-$23,288	-$19,795	-$16,825	-$14,302	-$12,156	-$10,333	-$8,783	-$7,466	-$6,346	-$5,394	-$4,585	-$3,897	-$3,312	-$2,816	-$2,393	-$2,034

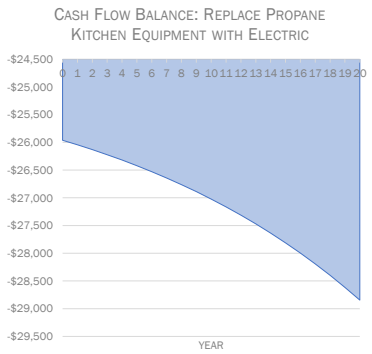
Energy Conservation Measure 10

Opp Cat:	Renewables
Opp Desc:	Install Solar Photovoltaic System
Opp Name:	Replace Propane Kitchen Equipment with Electric

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):	-1,158
Propane (litres):	157
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	0.2
Financials	
Annual Utility Savings:	-$78
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$20,769
Engineering & PM:	$3,115
Contingency:	$2,077
Project Costs:	$25,961
Simple Payback:	No Payback
Capital Payback:	No Payback
NPV:	-$27,277
IRR:	No IRR



Write-ups	
Existing:	All electricity
Retrofit:	We recommend

Work Check	Main Meter	Breakout Meter
	M02	Select
Existing	0	0
Savings	-1,158	406,996
% Reduction	#DIV/0!	#DIV/0!

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

Savings: Replace Propane Kitchen Equipment with Electric

			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			Replace Propane Kitchen Equipment with Electric			Savings		Existing	Retrofit		
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)	Kitchen Eq Propane Cons - l	Kitchen Eq Propane Cons - kWh		
Space Cool	5.9	0.0	5,930.0	0.0	0.0	0.0	5,930	0	157	-1,158		
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	28.9	672.5	226,012.6	0.0	0.0	0.0	28,920	27,801				
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Hot Water	14.7	0.0	14,730.0	0.0	0.0	0.0	14,730	0				
Vent. Fans	11.8	0.0	11,750.0	0.0	0.0	0.0	11,750	0				
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Ext. Usage	3.2	0.0	3,190.0	0.0	0.0	0.0	3,190	0				
Misc. Equip	3.3	0.0	3,330.0	0.0	0.0	0.0	3,330	0				
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0				
Area Lights	23.3	0.0	23,320.0	0.0	0.0	0.0	23,320	0				
0	**91**	**672**	**288,263**	**0**	**0**	**0**	**91,170**	**27,801**	**157**	**-1,158**	**0**	**0**

Main Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	M03	M02	Select	Select
Breakout Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select

General Requirements: Replace Propane Kitchen Equipment with Electric

Cost Breakout: Replace Propane Kitchen Equipment 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		Each	EE Est		$500		Yes	Project	1	$0	$769	$0	$769
111	0	0				Electric Oven/Stove	Commercial	Each	Web Search	$19,500	$500	$0	No	Project	1	$19,500	$500	$0	$20,000
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:	**$19,500**	**$1,269**	**$0**	**$20,769**

Escalation Rates: Replace Propane Kitchen Equipment with Electric

Cash Flow Balance: Replace Propane Kitchen Equipment 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:	-$25,961	$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):		-$236	-$248	-$261	-$274	-$289	-$304	-$320	-$336	-$354	-$372	-$391	-$412	-$433	-$456	-$479	-$504	-$530	-$558	-$587	-$618
Annual Savings (M03):		$154	$161	$169	$178	$187	$196	$206	$216	$227	$238	$250	$263	$276	$290	$304	$319	$335	$352	$370	$388
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:	-$25,961	-$82	-$87	-$92	-$97	-$102	-$108	-$114	-$120	-$127	-$134	-$141	-$149	-$157	-$166	-$175	-$185	-$195	-$206	-$217	-$230
Cash Balance:	-$25,961	-$26,044	-$26,130	-$26,222	-$26,318	-$26,421	-$26,528	-$26,642	-$26,762	-$26,889	-$27,023	-$27,164	-$27,313	-$27,470	-$27,636	-$27,811	-$27,996	-$28,192	-$28,398	-$28,615	-$28,845
Undepreciated Amount:	-$25,961	-$22,067	-$18,757	-$15,944	-$13,552	-$11,519	-$9,791	-$8,323	-$7,074	-$6,013	-$5,111	-$4,344	-$3,693	-$3,139	-$2,668	-$2,268	-$1,928	-$1,639	-$1,393	-$1,184	-$1,006

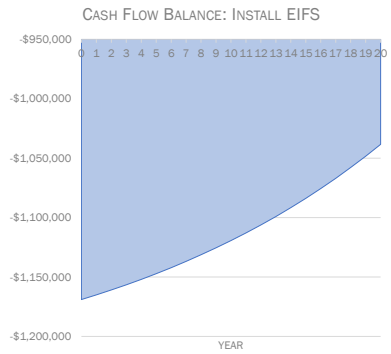
Energy Conservation Measure 11

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):	2,610
Propane (litres):	3,478
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	5.5
Financials	
Annual Utility Savings:	$3,751
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$935,185
Engineering & PM:	$140,278
Contingency:	$93,519
Project Costs:	$1,168,982
Simple Payback:	311.6
Capital Payback:	#NAME?
NPV:	-$1,108,661
IRR:	-14.3%



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

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	550,702	556,789
% Reduction	#DIV/0!	#DIV/0!

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

Savings: Install EIFS

			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 EIFS			Savings						
	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (MWh)	Propane (MMBTU)	Combined (kWh)	Electricity (kWh)	Propane (L)					
Space Cool	5.9	0.0	5,930.0	5.8	0.0	5,770.0	160	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	28.9	672.5	226,012.6	26.5	588.4	198,948.5	2,410	3,478					
HP Supp.	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Hot Water	14.7	0.0	14,730.0	14.7	0.0	14,730.0	0	0					
Vent. Fans	11.8	0.0	11,750.0	11.7	0.0	11,710.0	40	0					
Pumps & Aux	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Ext. Usage	3.2	0.0	3,190.0	3.2	0.0	3,190.0	0	0					
Misc. Equip	3.3	0.0	3,330.0	3.3	0.0	3,330.0	0	0					
Task Lights	0.0	0.0	0.0	0.0	0.0	0.0	0	0					
Area Lights	23.3	0.0	23,320.0	23.3	0.0	23,320.0	0	0					
0	**91**	**672**	**288,263**	**89**	**588**	**260,998**	**2,610**	**3,478**	**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											Yes	Project		$0	$0	$0	$0
111	0	0				EIFS	Whole Building	per sqft	MTE Quote	$69			Yes	Project	8799.1032	$935,185	$0	$0	$935,185
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:	**$935,185**	**$0**	**$0**	**$935,185**

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:	-$1,168,982	$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):		$531	$559	$588	$619	$651	$685	$720	$758	$797	$839	$882	$928	$976	$1,027	$1,080	$1,137	$1,196	$1,258	$1,323	$1,392
Annual Savings (M03):		$3,408	$3,579	$3,758	$3,946	$4,143	$4,350	$4,567	$4,796	$5,036	$5,287	$5,552	$5,829	$6,121	$6,427	$6,748	$7,086	$7,440	$7,812	$8,202	$8,613
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:	-$1,168,982	$3,940	$4,138	$4,346	$4,564	$4,794	$5,035	$5,288	$5,554	$5,833	$6,126	$6,434	$6,757	$7,097	$7,454	$7,829	$8,222	$8,636	$9,070	$9,526	$10,005
Cash Balance:	-$1,168,982	-$1,165,042	-$1,160,904	-$1,156,559	-$1,151,994	-$1,147,201	-$1,142,166	-$1,136,878	-$1,131,325	-$1,125,492	-$1,119,366	-$1,112,932	-$1,106,175	-$1,099,078	-$1,091,624	-$1,083,795	-$1,075,573	-$1,066,937	-$1,057,867	-$1,048,341	-$1,038,337
Undepreciated Amount:	-$1,168,982	-$993,634	-$844,589	-$717,901	-$610,216	-$518,683	-$440,881	-$374,749	-$318,536	-$270,756	-$230,143	-$195,621	-$166,278	-$141,336	-$120,136	-$102,115	-$86,798	-$73,778	-$62,712	-$53,305	-$45,309

Energy Conservation Measure 12

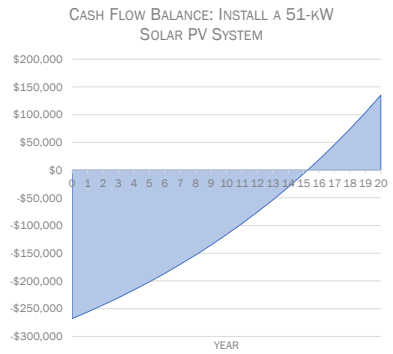
Opp Cat:	Renewables
Opp Desc:	Install Solar Photovoltaic System
Opp Name:	Install a 51-kW Solar PV System

Costing Setup	
Engineering & PM:	**0%**
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):	58,600
Propane (litres):	0
Water (m³):	0
Natural Gas (m³):	0
():	0
Emissions (Tonnes of CO_2e):	1.8
Financials	
Annual Utility Savings:	$11,341
Add'l Annual Savings:	$0
Add'l Annual Costs:	$0
Incentives:	$0
Materials & Labour:	$243,496
Engineering & PM:	$0
Contingency:	$24,350
Project Costs:	$267,845
Simple Payback:	23.6
Capital Payback:	#NAME?
NPV:	-$82,512
IRR:	3.6%

0.650608539



Write-ups	
Existing:	All electricity
Retrofit:	We recommend

Work Check	Main Meter	Breakout Meter
	Select	Select
Existing	0	0
Savings	2,814	61,414
% Reduction	#DIV/0!	#DIV/0!

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

Savings: Install a 51-kW Solar PV System

			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**

Roof Area - m2	Buffer	Usable Area - m2	System Size - m2	% of Area Used	System Capacity kW	System Generation - kWh						
1373	56%	771	616.8	80%	51.5	58600						
1,373	**1**	**771**	**617**	**1**	**52**	**58,600**	**0**	**0**	**0**	**0**	**0**	**0**
Main Meter:	Select	Select	Select	Select	Select	Select	M02	Select	Select	Select	Select	Select	Select
Breakout Meter:	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select	Select

Total Roof Area

Total Roof area Main Building	807	m2
Total Roof area Out Sk rink	566	m2
	1,373	**m2**

Area useful

Roof second FL Main Building	353	m2
Roof first FL Main Building	142	m2
Total Roof area Out Sk rink	276	m2
	771	**m2**

General Requirements: Install a 51-kW Solar PV System

Cost Breakout: Install a 51-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	$1		Yes	Project	51500	$158,126	$79,217	$0	$237,343
111	0	0											Yes	Project		$0	$0	$0	$0
112	0	0				Structural Analysis		Each	EE Est	$0	$4,000	$0	Yes	Project	1	$0	$6,153	$0	$6,153
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:	**$158,126**	**$85,370**	**$0**	**$243,496**

Escalation Rates: Install a 51-kW Solar PV System

Cash Flow Balance: Install a 51-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:	-$267,845	$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):		$11,930	$12,551	$13,203	$13,890	$14,612	$15,372	$16,171	$17,012	$17,897	$18,828	$19,807	$20,836	$21,920	$23,060	$24,259	$25,520	$26,847	$28,244	$29,712	$31,257
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:	-$267,845	$11,930	$12,551	$13,203	$13,890	$14,612	$15,372	$16,171	$17,012	$17,897	$18,828	$19,807	$20,836	$21,920	$23,060	$24,259	$25,520	$26,847	$28,244	$29,712	$31,257
Cash Balance:	-$267,845	-$255,915	-$243,364	-$230,161	-$216,271	-$201,659	-$186,287	-$170,116	-$153,103	-$135,206	-$116,379	-$96,572	-$75,736	-$53,816	-$30,756	-$6,497	$19,023	$45,871	$74,114	$103,827	$135,084
Undepreciated Amount:	-$267,845	-$227,668	-$193,518	-$164,490	-$139,817	-$118,844	-$101,018	-$85,865	-$72,985	-$62,038	-$52,732	-$44,822	-$38,099	-$32,384	-$27,526	-$23,397	-$19,888	-$16,905	-$14,369	-$12,214	-$10,382