Nova Group

Inspired Solutions by Nova Group

MERP Level 1 Energy Assessment

PREPARED FOR

DEPARTMENT OF BUILDINGS & GENERAL SERVICES - STATE OF VERMONT
133 STATE STREET
MONTPELIER, VT 05633

POMFRET - TOWN HALL
5233 POMFRET RD
POMFRET, VT 05053

Nova Group Carbon Neutral Report

novagroupgbc.com/carbonneutral

September 17, 2024

Department of Buildings & General Services - State of Vermont
133 State Street
Montpelier, VT 05633

Re: MERP Level 1 Energy Assessment
Pomfret - Town Hall
5233 Pomfret Rd
Pomfret, VT 05053
Nova Project No.: SE24-1103

Nova Group, GBC has completed a MERP Level 1 Energy Assessment in accordance with the State of Vermont ACT 172 at Pomfret - Town Hall located at 5233 Pomfret Rd in Pomfret, VT. Nova Group, GBC visited the site on February 21, 2024.

The assessment was performed at the Client's request using methods and procedures consistent with MERP Level 1 Energy Assessment and using methods and procedures as outlined in Nova Group, GBC Proposal.

This report has been prepared for and is exclusively for the use and benefit of the Client identified on the cover page of this report. The purpose for which this report shall be used shall be limited to the use as stated in the contract between the client and Nova Group, GBC.

This report, or any of the information contained therein, is not for the use or benefit of, nor may it be relied upon by any other person or entity, for any purpose without the advance written consent of Nova Group, GBC. Any reuse or distribution without such consent shall be at the client's or recipient's sole risk, without liability to Nova Group, GBC.

Estimated installation costs are based on Nova Group, GBC experience on similar projects and industry standard cost estimating tools including *RS Means*. Since actual installed costs may vary widely for particular installation based on labor & material rates at time of installation, Nova Group, GBC does not guarantee installed cost estimates and shall in no event be liable should actual installed costs vary from the estimated costs herein. We strongly encourage the owner to confirm these cost estimates independently. Nova Group, GBC does not guarantee the costs savings estimated in this report. Nova Group, GBC shall in no event be liable should the actual energy savings vary from the savings estimated herein.

Nova Group, GBC certifies that Nova Group, GBC has no undisclosed interest in the subject property and that Nova Group, GBC employment and compensation are not contingent upon the findings or estimated costs to remedy any deficiencies due to deferred maintenance and any noted component or system replacements.

Respectfully submitted,

NOVA GROUP, GBC

Reviewed by:

Myles Bennett
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Inspired Solutions by Nova Group

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Table of Contents

1.0 EXECUTIVE SUMMARY

The purpose of this MERP Level 1 Energy Assessment is to provide the State of Vermont - Building and General Services and Pomfret - Town Hall with energy efficiency opportunities at the facility and specific recommendations for Energy and Conservation Measures (ECM's). Information obtained from these analyses may be used to support a future application to an Energy Conservation Program, Utility grants towards energy conservation, or as a basis for replacement of equipment or systems.

Building Type/Name	# Stories	Year Built/Renovated	Building Size	Estimated Occupancy
Pomfret - Town Hall	One (1)	1845	2,914 sqft	One (1) Person, Varies

The study included a review of the building's construction features, historical energy and water consumption and costs, review of the building envelope, HVAC equipment, heat distribution systems, lighting, and the building's operational and maintenance practices.

Percentage of Area Cooled	0%
Percentage of Area Heated	100%

1.1 Energy Conservation Measures

Simple Payback Period –The number of years required for the cumulative value of energy cost savings less future non-fuel costs to equal the investment costs of the building energy system, without consideration of discount rates. ECMs with a payback period greater than the Expected Useful Life (EUL) of the project are not typically recommended for loan-funded energy projects, as the cost of the project will not be recovered during the lifespan of the equipment; however they will be considered for energy projects funded by the MERP Implementation Grant. These ECMs are recommended for implementation during future system replacement. At that time, replacement may be evaluated based on the premium cost of installing energy efficient equipment.

$$\textit{Simple Payback} = \frac{\textit{Initial Cost}}{\textit{Annual Savings}}$$

Interactive Energy Conservation Measures - This analysis excludes the interactive effects of Energy Conservation Measures. Due to the significant interactive effects between the ECMs that include the replacement or modification of the Heating Ventilation and Air Conditioning Systems and the other recommended ECM's, the HVAC ECMs are presented independently of the ECMs that do not include the replacement or modification of HVAC equipment. Furthermore, a 10% discount in energy savings was applied to account for the interactive effects amongst the ECMs. In addition to the consideration of the interactive effects, Nova Group, GBC has applied a 15% contingency to the implementation costs to account for potential cost overruns during the implementation of the ECMs.

Interactive Energy Conservation Measures - The change in resultant energy saving estimates due to implementing multiple Energy Conservation Measure's that have indirect impacts on one another.

1.1.1 Recommendations

Nova Group, GBC has recommended two (2) HVAC Energy Conservation measure packages and eleven (11) Energy Conservation Measures (ECMs) that do not modify or replace the existing HVAC.

The current HVAC boiler is heating oil furnace.

HVAC option one (1) includes installing a new pellet furnace to replace the heating oil furnace.

HVAC option two (2) includes installing ductless cold climate split system heat pumps. Keep the the heating oil furnace in place for back-up heat.

The savings for each measure is calculated using standard engineering methods followed in the industry.

The following table summarizes the recommended ECMs in terms of description, investment cost, energy consumption reduction, and cost savings.

Evaluated Energy Conservation Measures: Financial Impact			
	HVAC Option #1 - Pellet Furnace	**HVAC Option #2 - Cold Climate Heat Pumps**	**ECM Package Excluding HVAC**
Total Projected Initial ECM Investment	$ 51,750	$ 38,333	$ 59,703
Estimated Annual Cost Savings Related to all ECMs	$ 459	$ (132)	$ 781
Estimated Annual Cost Savings-Electricity	N/A	$ (1,436)	$ 504
Estimated Annual Cost Savings-Propane	N/A	N/A	$ 28
Estimated Annual Cost Savings-Natural Gas	N/A	N/A	N/A
Estimated Annual Cost Savings-Heating Oil	$ 1,534	$ 1,304	$ 248
Estimated Annual Cost Savings-Wood Pellets	$ (1,076)	N/A	N/A
Net Effective ECM Payback	112.86 Years	N/A	76.48 Years
Estimated Annual Energy Savings	(1.2)%	25.9%	25.4%
Estimated Annual Utility Cost Savings (excluding water)	17.6%	(5.0)%	29.9%

1.1.2 Solar and Battery Analysis

Nova Group, GBC has evaluated the site for a two (2) potential combined solar and battery systems, estimated at $44,130 and $87,710 respectively (Total Investment Cost).

Option one (1) includes a 5.18 kW rated solar panel system and a 30 kWh storage battery system, sized for the current electric demand.

Option two (2) includes a 11.47 kW rated solar panel system and a 69 kWh storage battery system, sized for the future electric demand if heat pumps were implemented.

The electrical panel will likely need upgrading, a licensed electrical engineer should be consulted to verify.

The system was designed with a depth of discharge at 50% and a cold weather factor of 1.3 to provide energy for one (1) full day of power. The system assumes that net metering will be available as an option if the building needs are met. For additional information please see Appendix D.

On Site RENEWABLE GENERATION Solar Photovoltaic Analysis with Battery		
	Option One (1) - Current Demand	Option Two (2) - Cold Climate Heat Pumps
Estimated number of panels	14	31
Estimated kW Rating	5.18 kW	11.47 kW
Potential Annual kWh Produced	5,848 kWh solar system with a 30.0 kWh battery storage system	12,948 kWh solar system with a 69.0 kWh battery storage system
% of Current Electricity Demand	109%	101%
New Roof Cost	N/A	N/A
New Electrical Panel Cost	$5,000	$5,000
Battery Investment Cost	$21,000	$48,300
Solar System Investment Cost	$18,130	$34,410
Federal Investment Tax Credit (FITC)	$11,739	$24,813
Total Investment Cost (Solar+ Battery + Electrical Panel + Roof)	$44,130	$87,710
Estimated Annual Energy Cost Savings	$1,129	$2,500
Payback without Incentives	39.09 Years	35.09 Years
Payback with all Incentives	28.69 Years	25.16 Years

1.2 Assumptions

Nova Group, GBC has made the following assumptions in calculation of the Energy Conservation Measures.

- Building operating hours are assumed to be 40 hours per week.
- The facility occupancy is assumed to be one (1) person.
- Annual Heating Equipment Operating Hours are derived from actual consumption and equipment input rates to be 5,634 hours/year.
- Annual Cooling Equipment Operating Hours are derived from actual consumption and equipment input rates to be 0 hours/year.

1.3 ECM Recommendations

HVAC Energy Conservation Measures

Evaluated HVAC Energy Conservation Measures with Savings												
ECM #	Description of ECM	Projected Initial Investment ($)	Natural Gas (Therms)	Propane (gal)	Heating Oil (gal)	Wood Pellets (Tons)	Electricity (kWh)	Energy Savings (kBTU)	% Savings (Energy)	Estimated Annual Maintenance Savings	Total Estimated Annual Cost Savings ($)	Simple Payback (Years)
Evaluated Measures												
1a	Replace the existing heating oil furnace with a wood pellet furnace, 92% AFUE.	$ 45,000	N/A	N/A	371	(3)	N/A	3,912	5.5%	N/A	$ 556	80.88
	Totals	$ 45,000	N/A	N/A	371	(3)	N/A	3,912	5.5%	N/A	$ 556	80.88
	Interactive Savings Discount @ 10%	N/A	N/A	N/A	371	(3)	N/A	(838)	-1.2%	N/A	$ 459	112.86
	Total Contingency Expenses @ 15%	$ 51,750	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Totals for Improvements	$ 51,750	N/A	N/A	371	(3)	N/A	(838)	-1.2%	N/A	$ 459	112.86
2a	Install cold climate heat pumps, 9 HSPF and 18 SEER, and keep the heating oil-burning furnace as a backup heating system.	$ 33,333	N/A	N/A	316	N/A	(6,761)	20,639	29.2%	N/A	$ (1)	N/A
	Totals	$ 33,333	N/A	N/A	316	N/A	(6,761)	20,639	29.2%	N/A	$ (1)	N/A
	Interactive Savings Discount @ 10%	N/A	N/A	N/A	316	N/A	(7,437)	18,332	25.9%	N/A	$ (132)	N/A
	Total Contingency Expenses @ 15%	$ 38,333	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Totals for Improvements	$ 38,333	N/A	N/A	316	N/A	(7,437)	18,332	25.9%	N/A	$ (132)	N/A

Energy Conservation Measures

Evaluated Energy Conservation Measures with Savings												
ECM #	Description of ECM	Projected Initial Investment ($)	Heating	Propane (gal)	Heating Oil (gal)	Steam (ML)	Wood (Tons)	Electricity (kWh)	Energy Savings (kBTU)	% Savings (Energy)	Estimated Annual Maintenance Savings	Total Estimated Annual Cost Savings ($)	Simple Payback (Years)
Evaluated Measures													

Evaluated Energy Conservation Measures with Savings													
1	Insulate exposed domestic hot water lines with R-4 or greater insulation.	$ 50	N/A	2	N/A	N/A	N/A	211	913	1.3%	N/A	$ 48	1.04
2	Install low flow, 1.0 GPM WaterSense certified aerators in the bathroom.	$ 20	N/A	N/A	N/A	N/A	N/A	62	210	0.3%	N/A	$ 12	1.68
3	Install low flow, 1.0 GPM WaterSense certified aerators in the kitchen.	$ 10	N/A	1	N/A	N/A	N/A	N/A	103	0.1%	N/A	$ 4	2.50
4	Install a programmable thermostat to control the heating system.	$ 200	N/A	N/A	15	N/A	N/A	N/A	2,049	2.9%	N/A	$ 61	3.27
5	Upgrade lighting with ENERGY STAR or DLC certified LED technologies. Please see the lighting tool for specific recommendations.	$ 900	N/A	N/A	N/A	N/A	N/A	940	3,207	4.5%	$ 63	$ 181	3.68
6	Insulate exposed domestic hot water tanks with R-8 or greater insulation.	$ 100	N/A	3	N/A	N/A	N/A	46	454	0.6%	N/A	$ 20	4.91
7	Replace the existing refrigerator with a new ENERGY STAR rated refrigerator.	$ 5,100	N/A	N/A	N/A	N/A	N/A	1,427	4,869	6.9%	N/A	$ 275	18.51
8	Add loose fill roof insulation to the original building roof to achieve a uniform R-49 coverage.	$ 8,742	N/A	N/A	10	N/A	N/A	204	2,078	2.9%	N/A	$ 81	108.47
9	Improve air sealing by reducing infiltration by sealing doorways, windows, and any other openings or penetrations.	$ 14,570	N/A	N/A	32	N/A	N/A	N/A	4,394	6.2%	N/A	$ 131	111.12
10	Replace the current single-paned windows in the kitchen with new ENERGY STAR rated double pane windows, minimums U-value .35, minimum SHGC .50.	$ 4,824	N/A	N/A	10	N/A	N/A	N/A	1,401	2.0%	N/A	$ 42	115.40
11	Replace the current DHW Systems with two (2) new point of use water heaters, .98 EF	$ 2,400	N/A	3	N/A	N/A	N/A	14	334	0.5%	N/A	$ 14	173.40
12	Install a new level two electric vehicle charger and new electrical panel to support the load	$ 15,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0%	$ (100)	N/A	N/A
Totals		$ 51,916	N/A	10	67	N/A	N/A	2,903	20,012	28.3%	$ (37)	$ 870	59.68
Interactive Savings Discount @ 10%		N/A	N/A	8	60	N/A	N/A	2,613	17,951	25.4%	$ (37)	$ 781	76.48
Total Contingency Expenses @ 15%		$ 59,703	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Totals for Improvements		$ 59,703	N/A	8	60	N/A	N/A	2,613	17,951	25.4%	$ (37)	$ 781	76.48

2.0 SITE UTILITIES

2.1 Utility Rates

The following utility rates were used for the purposes of savings analysis.

Average Utility Rates			
Electricity	**Natural Gas**	**Wood**	**Propane/No. 2 Oil**
Average Rate	Average Rate	Average Rate	Average Rate
$0.19306/kWh	N/A	N/A	Propane: $3.548/Gal Oil: $4.133/Gal

2.2 Site Utility Analysis

Site Utilities	
Facility Electric Service Size	100 AMPS
Onsite Transformer	None
Electric Meter Location	Exterior Wall Mount

Utility Analysis						
Utility Type	**Utility Provider**	**Meter Quantity**	**Energy/Water Uses**	**Annual Consumption**	**Est./Act.**	**Annual Cost**
Electric (Grid)	Green Mountain Power	One (1)	DHW, Appliances, Lighting and Plug Load	5,383 kWh	Estimated	$ 1,039
Propane	Irving Propane	One (1) tank	DHW	8 Gal	Estimated	$ 30
No. 2 Oil	Johnson & Dix Oil and Propane	One (1) tank	Furnace	371 Gal	Estimated	$ 1,534

2.3 On-Site Utility Storage

Onsite Utility Storage	
Battery Storage	
Storage Capacity	None
Year Installed	N/A
Location Installed	N/A
Space Served	N/A
Fossil Fuel Storage	
No. 2 Oil	One (1) – 275 Gal Above Ground Tank
Propane Gas	One (1)- 25 Gal Above Ground Tank
Wood Chips/Pellet	None

2.4 On-Site Generation

Solar Rooftop Photovoltaic System	
Installed Capacity	None
Year Installed	N/A
Location Installed	N/A
Space Served	N/A

Emergency Backup Generators	
Generator Capacity	None
Year Installed	N/A
Location Installed	N/A
Space served	N/A
Generator Fuel	N/A
Make	N/A

2.5 On-site Electric Vehicle Charging

Onsite Electric Vehicle Charging	
Installed Chargers	None
Electrical Charger Type	N/A
Location Installed	N/A
Charger Manufacturer	N/A
Electric Metering to Chargers	N/A
Recommendations	There is sufficient parking for an on-site electric vehicle charger. An electrical upgrade will likely be needed. A licensed electrical engineer should be consulted to verify.

3.0 INTRODUCTION

The purpose of this Energy Assessment is to provide the State of Vermont - Building and General Services and Pomfret - Town Hall with a baseline of energy usage, the relative energy efficiency of the facility, and specific recommendations for Energy Conservation Measures. Information obtained from these analyses may be used to support a future application to an Energy Conservation Program, Federal and Utility grants towards energy conservation, as well as support performance contracting, justify a municipal bond-funded improvement program, or as a basis for replacement of equipment or systems.

The energy assessment consisted of an onsite visual assessment to determine current conditions, itemize the energy consuming equipment (i.e. Boilers, Make-Up Air Units, DWH equipment); review lighting systems both exterior and interior; and review efficiency of all such equipment. The study also included interviews and consultation with operational and maintenance personnel. The following is a summary of the tasks and reporting that make up the Energy Assessment portion of the report.

The following is a summary of the tasks and reporting that make up the Energy Assessment portion of the report.

Energy and Water Using Equipment

Nova Group, GBC has surveyed the tenant spaces, common areas, offices, maintenance facilities and mechanical rooms to document utility-related equipment, including heating systems, cooling systems, air handling systems and lighting systems.

Building Envelope

Nova Group, GBC has reviewed the characteristics and conditions of the building envelope, checking insulation values and conditions where accessible. This review also includes an inspection of the condition of walls, windows, doors, roof areas, insulation and special use areas.

Recommendations for Energy Savings Opportunities

Based on the information gathered during the on-site assessment, the utility rates, as well as recent consumption data and engineering analysis, Nova Group, GBC has identified opportunities to save energy and provide probable construction costs, projected energy/utility savings and provide a simple payback analysis.

Energy Assessment Process

- Interviewing staff and review plans and past upgrades
- Performing an energy assessment for each use type. Performing a preliminary evaluation of the utility system
- Making preliminary recommendations for system energy improvements and measures
- Estimating initial cost

Reporting

The Nova Group, GBC Energy Assessment Report includes:

- A comprehensive study identifying all applicable Energy Conservation Measures (ECMs) and priorities, based on initial cost.

4.0 FACILITY OVERVIEW AND EXISTING CONDITIONS

4.1 Building Occupancy and Point of Contact

Facility Schedule	
Building Type/Name	Town Hall
# of Stories	One (1)
Year Built/Renovated	1845
Building Size	2,300
Hours of Operations/Week	Ten (10) on average, additional hours on weeks with town hall meetings or other events.
Operational Weeks/Year	48
Estimated Facility Occupancy	One (1) normally, Fifty (50) for town hall meetings

Facility Contact	
Point of Contact Name	Meg Emmons
Point of Contact Title	Facilities Manager
Point of Contact - Contact Number	(802)-359-3589

4.2 Building Envelope

The building envelope consists of the exterior shell, made up of the walls, windows, roof, and floor. The envelope provides building integrity and separates the exterior from the interior conditioned space.

Building Foundation	
Foundation Type	Building foundations appear to be unfinished basements
Basement	Poured Concrete
Basement Wall Insulation	12" Fiberglass Batt, R-38

Primary Roof			
Finish	Building sloped roofs are dark-painted, corrugated metal.	Coatings	None
Roof Type/Geometry	Buildings on site are constructed with gable roofs	Roof Drains	None
Maintenance	Roof was replaced in 2016. There is no maintenance schedule.	Main Ventilation Source	Natural Ventilation
Insulation	Loose Fill Fiberglass	Roof/Attic Insulation	R-26

Exterior Walls	
Primary Finish	Wood Siding
Wall Insulation	6" Fiberglass Batt, R-19

ENVELOPE INSULATION			
Crawlspace	**Basement Walls**	**Above Grade Walls**	**Roof/Attic**
N/A12" Fiberglass Batt, R-38	N/A	6" Fiberglass Batt, R-19	8" Loose Fill Fiberglass, R-26

Exterior Windows		
Location	**Window Framing**	**Glazing**
Lobby	Windows are wood framed.	Windows are double glazed.
Kitchens	Windows are wood framed.	Windows are single-glazed.
Storage rooms	Windows are wood framed.	Windows are double glazed.

Exterior Doors		
Building Doors	**Material**	**Quantity**
Main Entrance Doors	Solid core wood	One (1)
Secondary Entrance Doors	Solid core wood	One (1)
Service Doors	N/A	N/A
Overhead Doors	N/A	N/A

4.2.1 Envelope Comments:

Nova Group, GBC recommends engaging a BPI accredited air sealing contractor to complete air sealing measures as follows:

- Replacing/adding weather stripping around all exterior and overhead doors
- Replacing/adding weather stripping around all windows
- infiltration points on the basement walls

The attic should be supplemented with loose fill insulation to achieve a uniform R-49 coverage.

Air sealing opportunities were identified in the basement with several infiltrations points exposing the interior of the basement to outdoor elements.

The single paned windows in the kitchen should be replaced with double-paned windows.

4.3 Building Heating, Ventilation and Air Conditioning (HVAC)

Overall System Description:

One (1) oil burning furnace is installed in the basement and serves the entire building. There is no cooling provided.

Building Central Heating System	
Primary Heating System Type	Thermo Pride
Heating Fuel	Oil #2
Location of Major Equipment	Basement
Spaces Served by System	Entire building
Heating System Input/Output Capacity	250 MBU
Manufacturer's Rated Efficiency	85% AFUE
Heating Plant Age	30+ years old (assumed)
Heating Plant Condition	Fair

Building Central Cooling System	
Primary Cooling System Type	None
Refrigerant	N/A
Cooling Towers	N/A
Location of Major Equipment	N/A
Spaces Served by System	N/A
Cooling System Input Capacity	N/A
Manufacturer's Rated Efficiency	N/A
Cooling Plant Age	N/A
Cooling Plant Condition	N/A

HVAC Comments

We recommend to replace the existing heating oil furnace and install a wood pellet furnace to serve the entire building.

As an alternative option, we recommend installing cold climate split system heat pumps to serve the entire building and keep the heating oil furnace as a backup heating source. . This option would provide the building with cooling capabilities.

It is recommended to install programmable thermostat on the oil burning furnace.

4.4 Building Lighting

Space Lighting:

Interior lighting consists of 40-60W incandescent lamps in the hallway, main hall, restrooms, and storage rooms. Interior lighting in the kitchen consists of 32W T-8 Fluorescent lighting fixtures. Lighting in the basement consist if 9W LED fixtures.

Lighting Controls:

The facility doesn't have any automatic lighting controls on internal light fixtures**.**

Emergency Lighting:

The two (2) EXIT signs in the facility consist of incandescent lamp-based fixtures.

Exterior Lighting:

Property-owned surface-mounted light fixtures on the exterior walls provide the exterior building with site illumination. Ceiling light fixtures are located in the exterior soffits.

The exterior lighting primarily consists of incandescent fixtures.

4.5 Building Appliances & Laundry

Appliances are typically replaced on as needed basis:

Breakroom Appliances			
Item	**Type**	**Estimated Age & Condition**	**ENERGY STAR Certified**
Stove	Manufacturer: Kenmore Electric range with one (1) oven and four (4) burners	Eight (8) Years (fair)	N/A
Refrigerator	72 cubic feet Freezer location: Bottom Manufacturer/s: Foster Estimated Annual Consumption: 2,500 KWh (assumed)	Thirty (30) Years (poor)	Not ENERGY STAR Certified

4.6 Building Domestic Water

Domestic Water Distribution & Common Area Fixtures	
Type	**Description**
Restroom Fixtures	Toilets, and sinks of residential grade
Common Area Toilet GPF	1.6 GPF *(Wt. Avg)*
Common Area Faucet GPM	3.0 GPM *(Wt. Avg) for one (1) bath faucet (2.0 GPM measured) and one (1) bath faucet is not equipped with an aerator (4.0 GPM assumed) 2.0 GPM for one (1) kitchen faucet*

Central Domestic Hot Water		
	Type #1	**Type #2**
Areas Served	Kitchen	Restrooms
Components	Tank - Direct	Tank - Direct
Fuel	Propane	Electricity
Age	Thirteen (13) years old	36 years old
Distribution Pumps	None	None
Supplementary Storage Tanks	None	Yes, one (1) 40 gallon (estimated) storage tank is connected to the DHW system
Domestic Hot Water System Capacity	40 Gals	15 Gals
Manufacturer's Rated Efficiency	0.62 EF	0.90 EF
Hot Water Piping	Domestic hot water piping was observed to be uninsulated where exposed.	Domestic hot water piping was observed to be uninsulated where exposed.
Quantity	One (1)	One (1)

Plumbing Comments:

The aerator for the faucets can be reduced to a 1.0 GPM aerator, which would decrease the water use in the facility.

It is recommended to replace the domestic hot water systems with two (2) point of use hot water heaters.

The domestic hot water piping should be fully-insulated to prevent unwanted heat loss.

5.0 RECOMMENDED OPERATIONS AND MAINTENANCE PLAN

The quality of the maintenance and the operation of the facility's energy systems have a direct effect on its overall energy efficiency. Energy-efficiency needs to be a consideration when implementing facility modifications, equipment replacements, and general corrective actions. The following is a list of activities that should be performed as part of the routine maintenance program for the property.

BEST PRACTICES TO IMPROVE ENERGY PERFORMANCE

LOW-COST O&M CHECKLIST

Use the following checklist of low-cost O&M practice to identify opportunities, assign responsibility and track progress toward goals at your facility.

	Opportunity Exists	Target Reduction	Who is Responsible?	Target Date to Complete	Actual Date Completed	Notes
OPERATIONS & MAINTENANCE						
Ensure all equipment is functioning as designed	Y					
Calibrate thermostats	Y					
Adjust dampers	Y					
Implement janitorial best practices	Y					
Properly maintain existing equipment	Y					
Review ENERGY STAR Registry of Labeled Buildings for ideas	Y					
OCCUPANTS' BEHAVIOR						
Turn off equipment	Y					
Institute an energy awareness program	Y					
Adopt a procurement policy for ENERGY STAR qualified equipment	Y					
Maximize use of daylight	Y					
Install task lighting	Y					
Train staff	Y					
LIGHTING						
Change incandescents to CFLs	Y					
Change T12s to T8 or T5	Y					
Install occupancy sensors in back-of-the house, infrequently used areas						
Install high efficiency LED exit signs	Y					
Periodically clean the bulbs with a dry cloth	Y					
De-lamp where illumination is excessive	Y					
Only use lights that are needed	Y					

www.energystar.gov/benchmark

E-mail: energystarbuildings@epa.gov

	Opportunity Exists?	Target Reduction	Who is Responsible?	Target Date to Complete	Actual Date Completed	Notes
KITCHENS						
Pre-heat ovens no more than 15 minutes prior to use	Y					
Keep refrigerator coils clean and free of obstructions	Y					
Bleach clean with warm water	Y					
Use fan hood only when cooking						
Purchase ENERGY STAR commercial cooking equipment	Y					
COMPUTERS AND OFFICE EQUIPMENT						
Utilize power down feature on computers	Y					
Purchase ENERGY STAR office equipment	Y					
Install energy control devices on vending machines						
HVAC AND PLANT SYSTEMS						
Adjust thermostats for seasonal changes and occupancy	Y					
Balance air and water systems						
Replace boiler burners						
Unblock air flow from unit ventilators						
Clean centrifugal chiller water tubes						
Clean and repair chilled water plants or package units						
Repair leaking steam traps						
Repair pipe and vessel insulation from steam and hot water distribution lines						
Repair malfunctioning dampers on unit ventilators						
Chemically treat feedwater						
Annually test combustion efficiency	Y					
Clean and lubricate moveable surfaces and check actuator movement and set-points in the damper and economizer						
Perform boiler tune-ups						
Clean filters and fans						
Clean air conditional evaporator and condenser coil fins						
Align and adjust belts						

	Opportunity Exists?	Target Reduction	Who is Responsible?	Target Date to Complete	Actual Date Completed	Notes
HVAC AND PLANT SYSTEMS (CONTINUED)						
Check for air leaks in equipment cabinets and ducts	Y					
Ensure proper operation of air damper	Y					
Clean condenser and evaporator coils						
Properly charge refrigerant						
Install VFDs and energy efficient motors	Y					
FANS						
Clean fan blades	Y					
Inspect bearings						
Adjust/change belts						
Check fan current						
BUILDING ENVELOPE						
Regularly inspect doors and windows for air leaks	Y					
Periodically inspect building for water leaks	Y					
Check the caulking and weather stripping for leaks	Y					
WATER HEATING						
Adjust water temperature to lower legal limit	Y					
Periodically check the hot water systems for leaks	Y					
Test the burners of gas or oil fired water heaters annually	Y					
Periodically flush fixtures to prevent bacteria growth	Y					
Annually flush storage-type hot water tanks	Y					
Periodic maintenance on the hot water system	Y					
Install or repair pipe insulation	Y					

APPENDIX A: PHOTOGRAPHIC RECORD

Photographs

Building Exterior North Elevation

Building Exterior Northeast Elevation

Building Exterior Entrance

Building Signage

Building Exterior (Kitchen)

Building Exterior South Elevation

Building Exterior South Elevation

Building Exterior South Elevation

Building Exterior East Elevation

Building Exterior Northeast Elevation

Wood Siding Facade

Deteriorating Wood Siding

Building Entry Door

Typical Corrugated Metal Roofing

Building Gable Ventalation

Typical Main Hall Window

Kitchen Window Type #1

Kitchen Window Type #2

Typical Storage Room Window

On-site Parking Area

On-site Parking Area

Chimney Deterioration

Deteriorating Wall from Chimney Moisture

Main Hall Overview

Main Hall Overview

Typical Restroom Overview

Kitchen Overview

Building Foundation

Attic Entry Door

Attic Overview

Attic Insulation

Basement Wall Insulation

Air Sealing Opportunity

Basement Air Sealing Opportunity

Main Hall Window Frame

Main Hall Window Glazing

Kitchen Window Framing

Oil Burning Furnace

Oil Burning Furnace Nameplate

Oil Burning Furnace Control System

Non-programmable Thermostat

275 Gallon Oil Tank

Oil Tank Nameplate

Main Hall Stage Incandescent Lighting

Kitchen Ventilation System

Hanging Ceiling Lighting Pendant

Typical Wall-Mounted Lighting Fixture

Typical Restroom Fixture

Typical Incandescent Lamp Stamp Rating

Kitchen Lighting Fixtures

Kitchen Lighting Fixtures

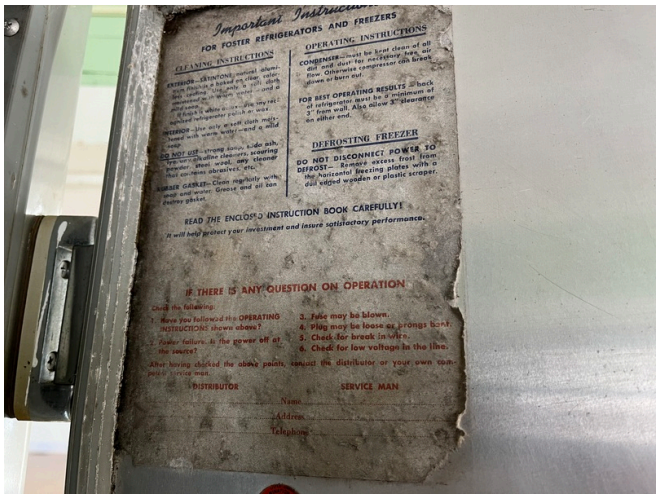
Typical Storage Room Fixture

Typical Exterior Flood Light Fixture

Typical Exterior Ceiling-Mount Fixture

Typical Exit Sign

Kitchen Refrigerator



Refrigerator Nameplate

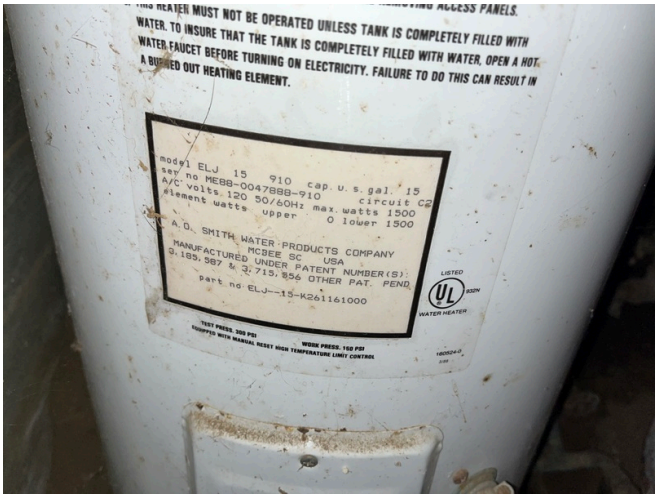
Kitchen Electric Range

Propane DHW Tank

Propane DHW Tank Nameplate

Un-Insulated Distribution Lines

Electric DHW System



Electric DHW System Nameplate

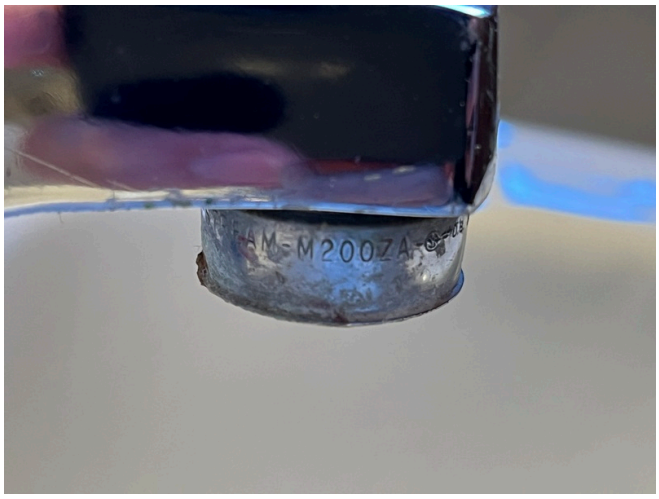
DHW Storage Tank

Un-Insulated Distribution Line

Typical Toilet

1.6 GPF Rating Stamp

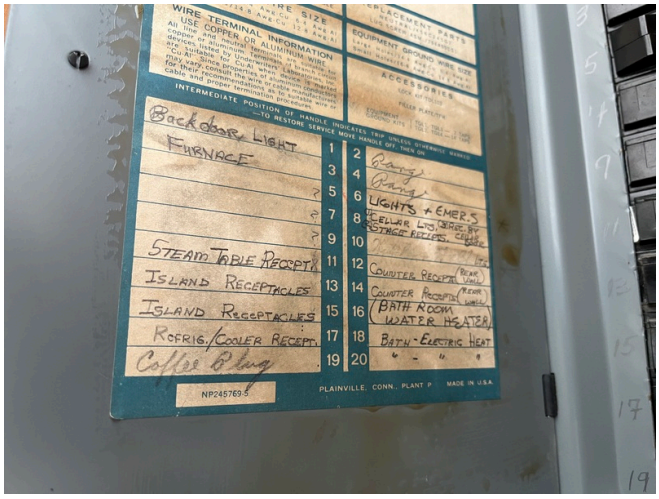
Typical Bath Faucet



2.0 GPM Rating Stamp

Kitchen Faucet

Electric Panel



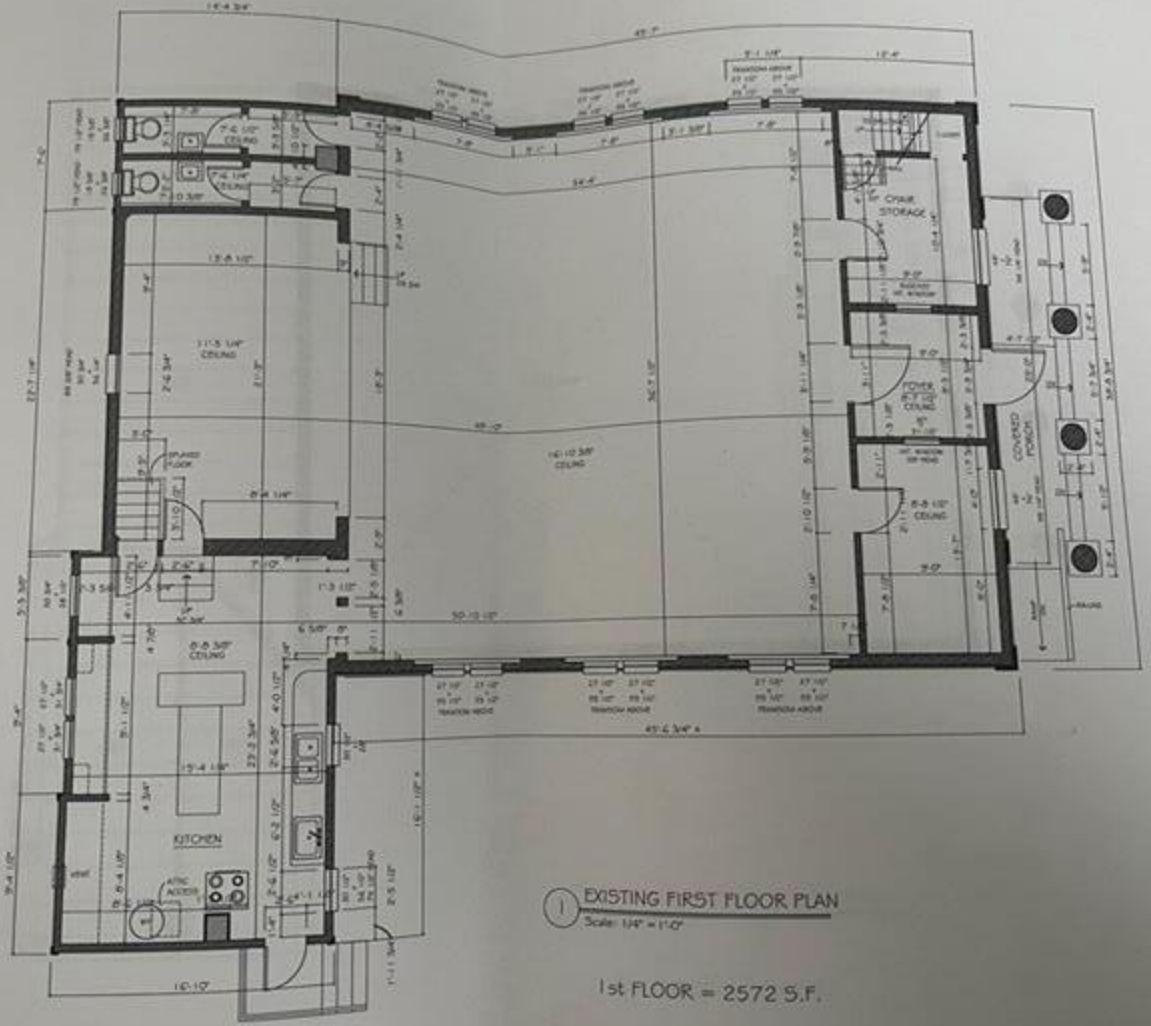
Panel Schedule

Building Electric Meter

25 Gallon Propane Tank

APPENDIX B: SITE AND FLOOR PLANS

PROJECT NORTH

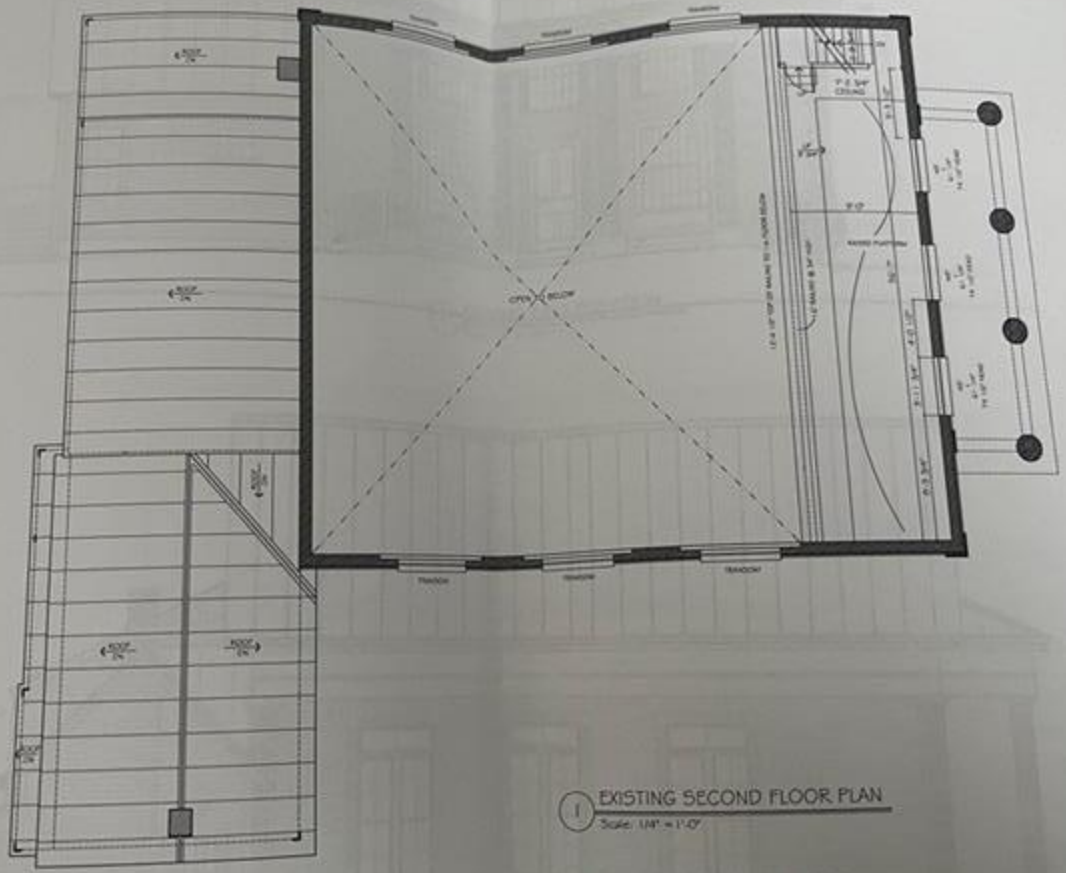


1 EXISTING FIRST FLOOR PLAN

Scale: 1/4" = 1'-0"

1st FLOOR = 2572 S.F.

PROJECT NORTH



1 EXISTING SECOND FLOOR PLAN
Scale: 1/4" = 1'-0"

2nd FLOOR = 342 S.F.

APPENDIX C: MECHANICAL EQUIPMENT INVENTORY

HEATING EQUIPMENT									
Equip. Location	**Area Served**	**Make**	**Model #**	**Year**	**Capacity**	**Rated Eff.**	**Dist.**	**Fuel**	**RUL**
Basement	Entire Building	Thermo Pride	OL33-200	1995, Assumed	250 MBU	85% AFUE	Ducted	Fuel Oil	Zero (0) Years

COOLING EQUIPMENT								
Equip. Location	**Area Served**	**Make**	**Model #**	**Year**	**Capacity (Tons)**	**Rated Eff.**	**Dist.**	**RUL**
None	-	-	-	-	-	-	-	-

DHW EQUIPMENT										
Equip. Location	**Area Served**	**Make**	**Model #**	**Year**	**Capacity**	**Rated Eff.**	**Direct or Indirect**	**Recirc. Pump HP**	**Fuel**	**RUL**
Kitchen	Kitchen	State Industries	GS640HBRS301	2011	40 Gal	0.62 EF	Direct	N/A	Propane	Two (2) years
Basement	Restrooms	A.O.Smith	ELJ15910	1988	15 Gal	0.90 EF	Direct	N/A	Electric	Zero (0) Years

APPLIANCES							
Type of Appliance	**Location**	**Make**	**Model #**	**Year**	**kWh/Year**	**Size (ft3)**	**RUL**
Range	Kitchen	Kenmore	No Label	No Label	660 kWh (Assumed, No label)	4.8	Ten (10) Years (assumed)
Refrigerator	Kitchen	Foster	No Label	No Label	2,500 kWh (assumed, no label)	72	Zero (0) Years

SITE LIGHTING									
Fixture Location	**Fixture Type**	**Lamp Type**	**Fixture Count**	**Lamp Count Per Fixture**	**Existing Lamp Wattage**	**Proposed Lamp Wattage**	**Control Type**	**Daily Run Hours**	**Type of Upgrade**
Entrance Hallway	Ceiling Mount	Incandescent	1	1	60	9	Switch	8	Lamp
Main Hall	Hanging Pendant	Incandescent	1	8	40	5.5	Switch	8	Lamp
Main Hall	Wall Mount	Incandescent	4	2	40	5.5	Switch	8	Lamp
Main Hall	Ceiling Mount	Incandescent	4	1	60	9	Swicth	8	Lamp
Storage Room	Hanging Ceiling Mount	Incandescent	2	1	40	5.5	Switch	8	Lamp
Restrooms	Ceiling Mount	Incandescent	4	1	60	9	Switch	8	Lamp

SITE LIGHTING									
Fixture Location	**Fixture Type**	**Lamp Type**	**Fixture Count**	**Lamp Count Per Fixture**	**Existing Lamp Wattage**	**Proposed Lamp Wattage**	**Control Type**	**Daily Run Hours**	**Type of Upgrade**
Kitchen	Linear Ceiling Mount	T-8 Fluorescent	2	2	32	15	Switch	8	Fixture
Kitchen	Linear Ceiling Mount	T-8 Fluorescent	1	1	32	15	Switch	8	Fixture
Exterior	Wall Mount	Incandescent	1	2	60	10	Switch	2	Lamp
Exterior	Ceiling Mount	Incandescent	1	2	60	10	Switch	2	Lamp
Basement	Ceiling Mount	LED	2	1	9	N/A	Switch	2	N/A

APPENDIX D: SOLAR PROPOSALS

Nova Group, GBC

Proposal for Customer

Prepared by:
naushad.amlani@novagroupgbc.com
naushad.amlani@novagroupgbc.com

For:
5233 Pomfret Rd, Pomfret

Quote #: 5271172
Valid until: Oct 11 2024

Solar Energy System Proposal

Dear ,

Thank you for the opportunity to present your Solar Energy System Proposal.

Best Regards,
naushad.amlani@novagroupgbc.com
Nova Group, GBC

Recommended System Option

109 %	$26,160	$27,391	$1,231
Consumption Offset	Lifetime Electricity Bill Savings	Net Cost of this solar system	Clean Energy Premium over system lifetime

Your Solution

Solaria PowerXT-370R-PD Series

14 Solaria PowerXT-370R-PD
370 Watt panels
with 25 Year Performance Warranty
Up to **20.5%** Module efficiency
5,848 kWh per year

SOLARIA

Battery

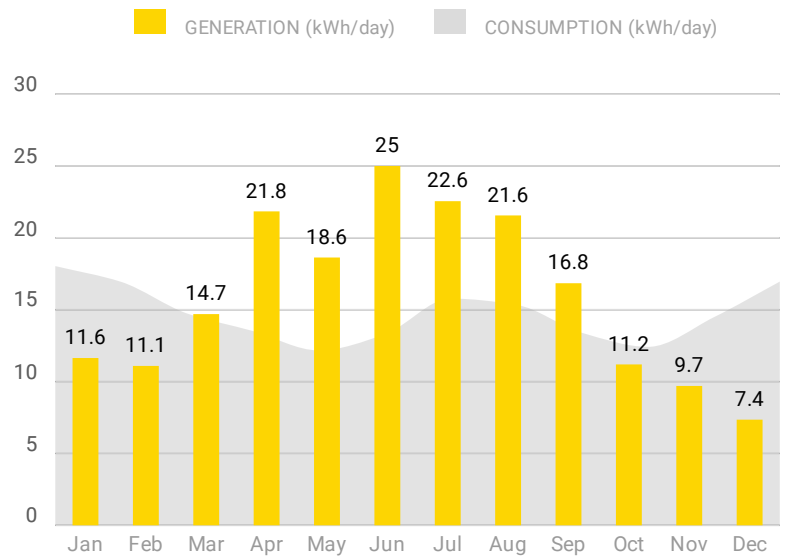
Growatt New Energy Technology Co., Ltd.
30.0 kWh Total Battery Storage
1 x ALP30.0L-E1

Warranties: 25 Year Panel Product Warranty, 25 Year Panel Performance Warranty, 10 Year Battery Product Warranty

System Performance

109%

Energy From Solar



System Performance Assumptions: System Total losses: 15.5%, Inverter losses: 2.5%, Optimizer losses: 0%, Shading losses: 0%, Performance Adjustment: 0%, Output Calculator: System Advisor Model 2020.02.29.r2. Panel Orientations: 14 panels with Azimuth 210 and Slope 20.

The solar system(s) quoted in this proposal are not intended to be portable.

Environmental Benefits

Solar has no emissions. It just silently generates pure, clean energy.

Each Year

109%

Of CO_2, SO_x & NO_x

160 kg

Avoided CO_2 per year

Over System Lifetime

2,940

Car miles avoided

30

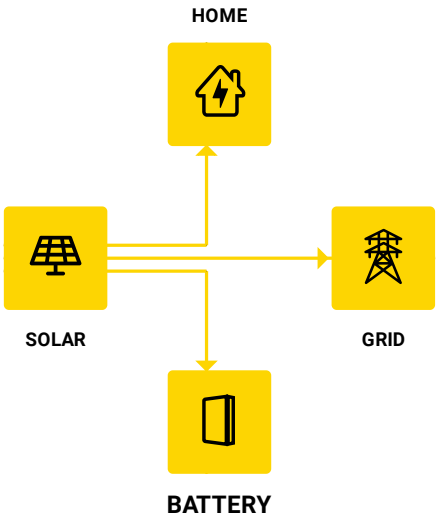
Trees planted

3

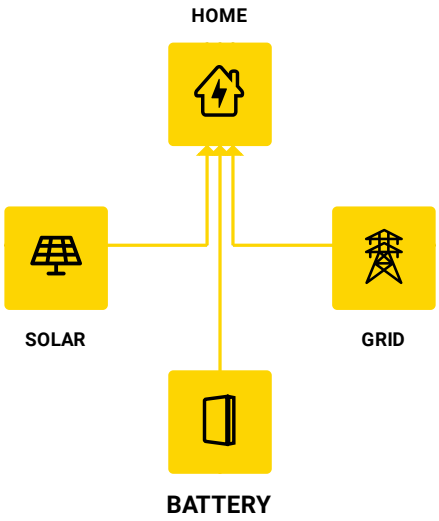
Long haul flights avoided

How your system works

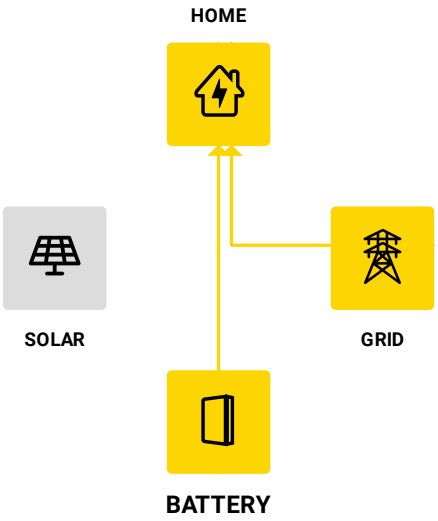
Generating Excess Solar



Partially Offset Usage

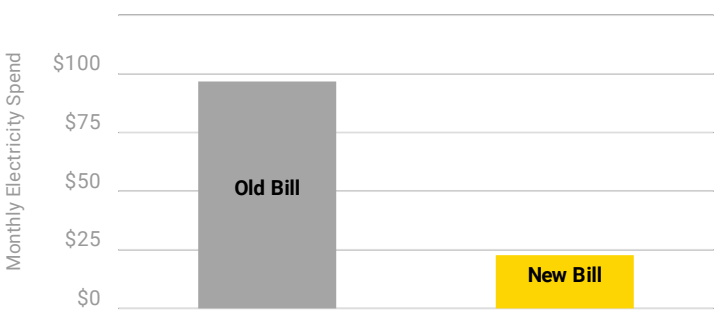


Night

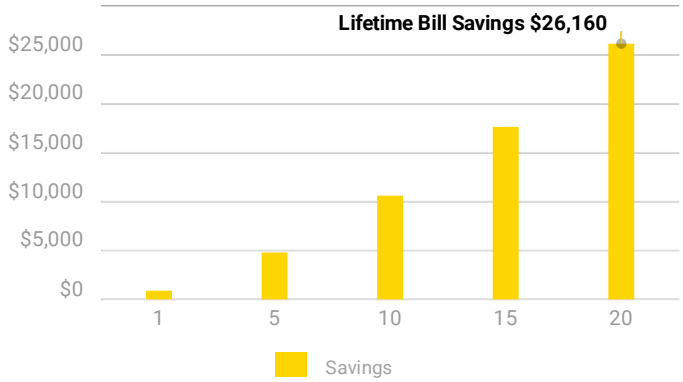


Electricity Bill Savings

First Year Monthly Bill Savings



Cumulative Bill Savings



Month	Solar Generation (kWh)	Electricity Consumption before solar (kWh)	Electricity Consumption after solar (kWh)	Utility Bill before solar ($)	Utility Bill after solar ($)	Cumulative Energy Credit ($)	Estimated Savings ($)
Jan	361	559	219	117	55	0	61
Feb	311	474	182	101	49	0	53
Mar	456	457	46	98	24	0	74
Apr	655	406	(232)	89	16	42	73
May	578	377	(176)	84	16	73	68
Jun	750	398	(327)	88	16	132	72
Jul	699	489	(183)	104	16	165	88
Aug	668	476	(164)	102	16	195	86
Sep	505	402	(95)	88	16	212	72
Oct	347	385	53	85	16	203	69
Nov	291	434	160	94	16	174	78
Dec	228	526	308	111	16	0	95

Rate not specified specified, using Residential Service based on location.

Your projected energy cost is calculated by considering a 4.0% increase in energy cost each year, due to trends in the raising cost of energy. This estimate is based on your selected preferences, current energy costs and the position and orientation of your roof to calculate the efficiency of the system. Projections are based on estimated usage of 5383 kWh per year, assuming Residential Service Electricity Tariff.

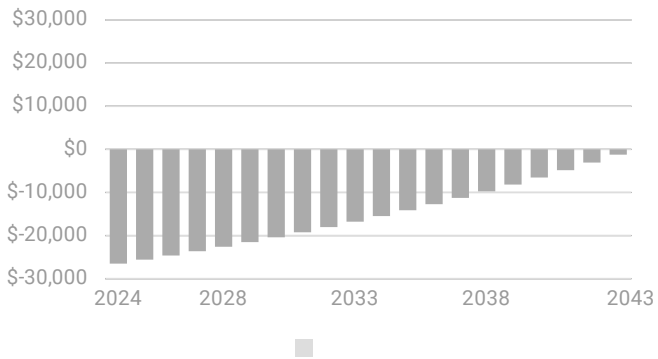
Your electricity tariff rates may change as a result of installing the system. You should contact your electricity retailer for further information.

Proposed Tariff Details - Green Mountain Power Rate 1	
Energy Charges	
Usage Charge *All Day*	$0.18 / kWh
Fixed Charges	
Fixed Charge	$16.00 / month

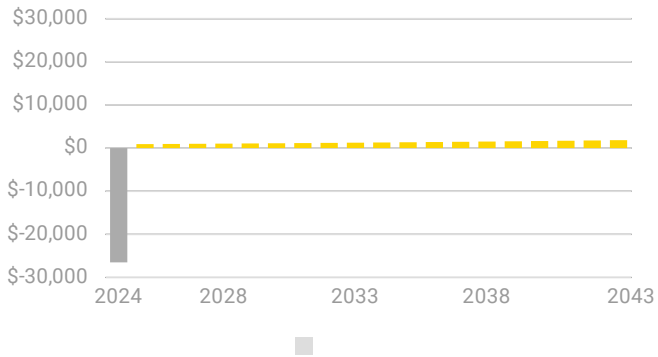
Net Financial Impact Cash

$26,160	-	$27,391	=	$1,231
Utility Bill Savings		Net System Cost		Clean Energy Premium

Cumulative Savings From Going Solar



Annual Savings From Going Solar



Estimates do not include replacement costs of equipment not covered by a warranty. Components may need replacement after their warranty period. Financial discount rate assumed: 6.75%

Quotation

Payment Option: Cash

14 x Solaria Corporation 370 Watt Panels (Solaria PowerXT-370R-PD) 1 x ALP30.0L-E1 (Growatt New Energy Technology Co., Ltd.)	
Total System Price	$39,130.00
Purchase Price	**$39,130.00**

Additional Incentives

Federal Investment Tax Credit (ITC) The Federal Solar Tax Credit or The Federal Investment Tax Credit (ITC) for constructions starting in 2023.	$11,739.00
Net System Cost	**$27,391.00**

Price excludes Retailer Smart Meter should you want us to install your Smart Meter it will be an additional cost.
This proposal is valid until Oct 11 2024.

Quote Acceptance

I have read & accept the terms and conditions.

Signature _____

Name _____ Date _____

SOLARIA®

Solaria PowerXT® | DC Panel

Solaria PowerXT®-370R-PD

Achieving 20.5% efficiency, Solaria PowerXT solar panels are one of the highest power panels in the residential and commercial solar market. Compared to conventional panels, Solaria PowerXT panels have fewer gaps between the solar cells; this leads to higher power and superior aesthetics. Solaria PowerXT Pure Black™ panels are manufactured with black backsheet and frames, enhancing a home or building's architectural beauty.

Developed in California, Solaria's patented cell cutting and panel assembly takes processed solar wafers and turns them into PowerXT solar panels. The process starts by creating a highly reliable PowerXT cell where busbars and ribbon interconnections are eliminated. Solaria then packages the cells into the PowerXT solar panel, reducing inactive space between the cells. This process leads to an exceptionally cost effective and efficient solar panel.

Higher Efficiency, Higher Power

Solaria PowerXT panels achieve up to 20.5% efficiency; conventional panels achieve 15% – 17% efficiency. Solaria PowerXT panels are one of the highest power panels available.

Lower System Costs

Solaria PowerXT panels produce more power per square meter area. This reduces installation costs due to fewer balance of system components.

Improved Shading Tolerance

Sub-strings are interconnected in parallel, within each of the four panel quadrants, which dramatically lowers the shading losses and boosts energy yield.

Improved Aesthetics

Compared to conventional panels, Solaria PowerXT panels have a more uniform appearance and superior aesthetics.

Durability and Reliability

Solder-less cell interconnections are highly reliable and designed to far exceed the industry leading 25 year warranty.

About Solaria

Established in 2000, The Solaria Corporation has created one of the industry's most respected IP portfolios, with over 350 issued and pending patents in PV solar cell and module technology. Headquartered in Oakland, California, Solaria has developed a technology platform that unlocks the potential of solar energy.

TOP PERFORMER 2018 DNV·GL PV MODULE RELIABILITY SCORECARD

TÜVRheinland® Precisely Right.

The Solaria Corporation 1700 Broadway, Oakland, CA 94612 P: (510) 270-2500 www.solaria.com

Rev 3D 12-2019

SOLARIA®

Solaria PowerXT®-370R-PD

Performance at STC (1000W/m², 25° C, AM 1.5)

Solaria PowerXT-		365R-PD	370R-PD
Max Power (P_{max})	[W]	365	370
Efficiency	[%]	20.2	20.5
Open Circuit Voltage (V_{oc})	[V]	48.0	48.3
Short Circuit Current (I_{sc})	[A]	9.58	9.60
Max Power Voltage (V_{mp})	[V]	39.9	40.2
Max Power Current (I_{mp})	[A]	9.16	9.20
Power Tolerance	[%]	-0/+3	-0/+3

Performance at NOCT (800W/m², 20°C Amb, Wind 1 m/s, AM 1.5)

Max Power (Pmax)	[W]	269	272
Open Circuit Voltage (V_{oc})	[V]	45.1	45.4
Short Circuit Current (I_{sc})	[A]	7.73	7.74
Max Power Voltage (V_{mp})	[V]	36.7	37.0
Max Power Current (I_{mp})	[A]	7.32	7.35

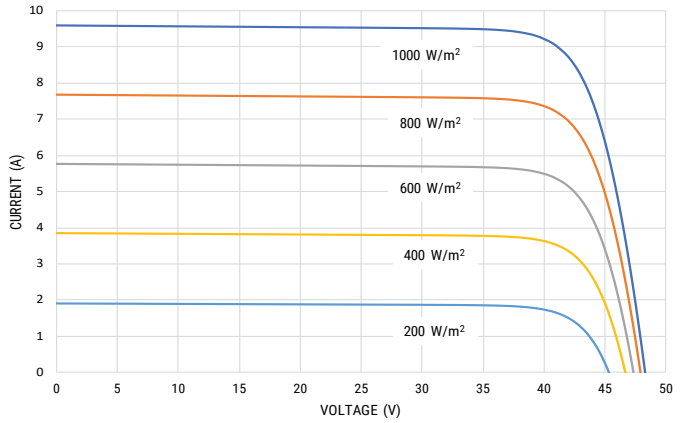
Temperature Characteristics

NOCT	[°C]	45 +/-2
Temp. Coeff. of P_{max}	[% / °C]	-0.39
Temp. Coeff. of V_{oc}	[% / °C]	-0.29
Temp. Coeff. of Isc	[% / °C]	0.04

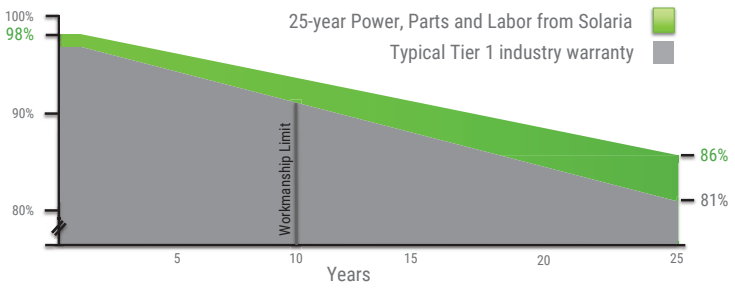
Design Parameters

Operating temperature	[°C]	-40 to +85
Max System Voltage	[V]	1000
Max Fuse Rating	[A]	15
Bypass Diodes	[#]	4

IV Curves vs. Irradiance (370W Panel)



Comprehensive 25-Year Warranty



Mechanical Characteristics

Cell Type	Monocrystalline Silicon
Dimensions (L x W x H)	63.8" x 43.9" x 1.57" 1621mm x 1116mm x 40mm
Weight	21 kg / 46 lbs
Glass Type / Thickness	AR Coated, Tempered / 3.2mm
Frame Type	Black Anodized Aluminum
Cable Type / Length	12 AWG PV Wire (UL) / 1000mm
Connector Type	MC4
Junction Box	IP67 / 4 diodes
Front Load	5400 Pa / 113 psf*
Rear Load	3600 Pa / 75 psf*

* Refer to Solaria Installation Manual for details

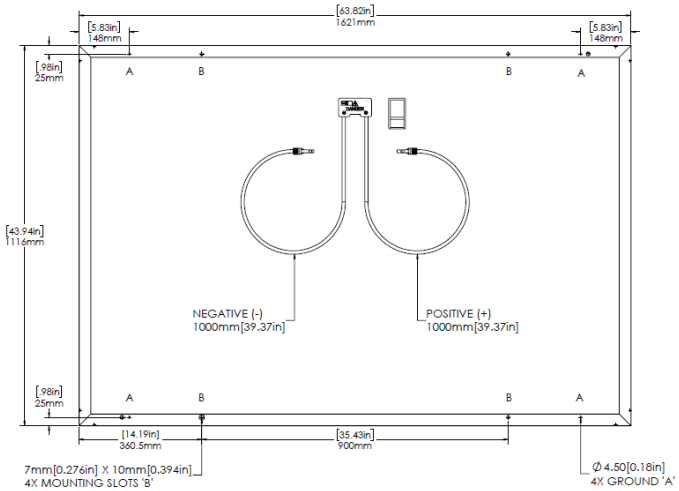
Certifications / Warranty

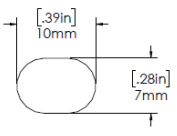
Certifications	UL 1703/IEC 61215/IEC 61730/CEC CAN/CSA-C22.2
Fire Type (UL 1703)	1
Warranty	25 years*

* Warranty details at www.solaria.com

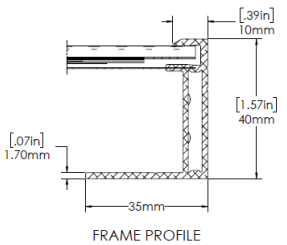
Packaging

Stacking Method	Horizontal / Palletized
Panels/ Pallet	25
Pallet Dims (L x W x H)	65.7" x 45.3" x 48.4" 1668mm x 1150mm x 1230 mm
Pallet Weight	590 kg / 1300 lbs
Pallets / 40-ft Container	28
Panels / 40-ft Container	700





MOUNTING SLOT 'B'



FRAME PROFILE

Nova Group, GBC

Proposal for Customer

Prepared by:
naushad.amlani@novagroupgbc.com
naushad.amlani@novagroupgbc.com

For:
5233 Pomfret Rd, Pomfret

Quote #: 5271172
Valid until: Oct 11 2024

Solar Energy System Proposal

Dear ,

Thank you for the opportunity to present your Solar Energy System Proposal.

Best Regards,
naushad.amlani@novagroupgbc.com
Nova Group, GBC

Recommended System Option

101 %	$61,173	$57,897	$3,276
Consumption Offset	Lifetime Electricity Bill Savings	Net Cost of this solar system	Estimated net savings over system lifetime

Your Solution

Solaria PowerXT-370R-PD Series

31 Solaria PowerXT-370R-PD
370 Watt panels
with 25 Year Performance Warranty
Up to **20.5%** Module efficiency
12,948 kWh per year

SOLARIA

Battery

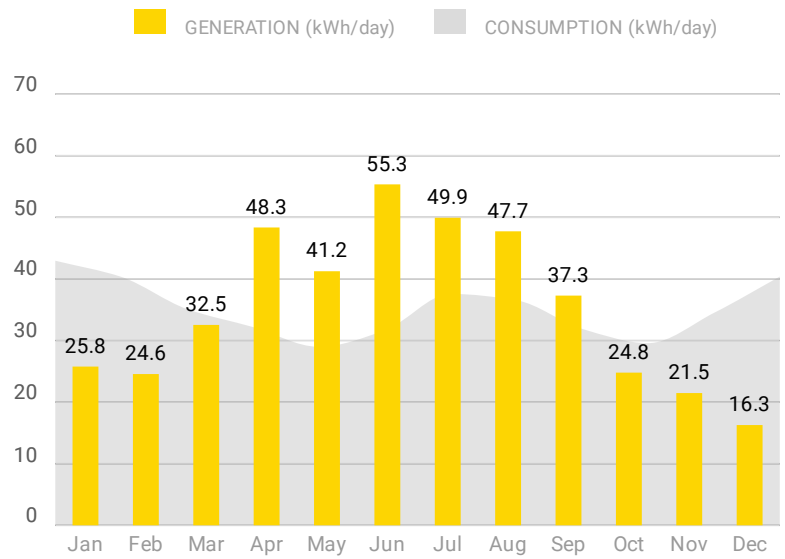
GivEnergy
69.0 kWh Total Battery Storage
1 x GIV-SME-30/69-ID

Warranties: 25 Year Panel Product Warranty, 25 Year Panel Performance Warranty, 10 Year Battery Product Warranty

System Performance

101%

Energy From Solar



System Performance Assumptions: System Total losses: 15.4%, Inverter losses: 2.5%, Optimizer losses: 0%, Shading losses: 0%, Performance Adjustment: 0%, Output Calculator: System Advisor Model 2020.02.29.r2. Panel Orientations: 31 panels with Azimuth 210 and Slope 20.

The solar system(s) quoted in this proposal are not intended to be portable.

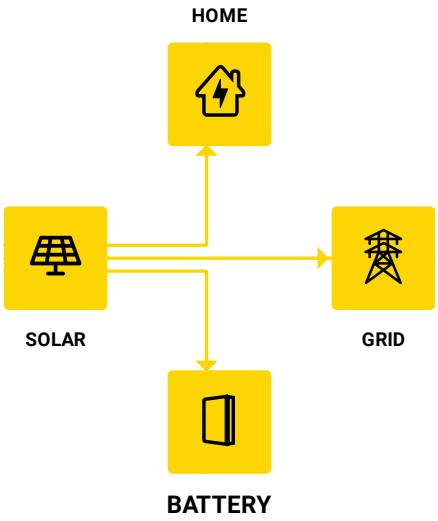
Environmental Benefits

Solar has no emissions. It just silently generates pure, clean energy.

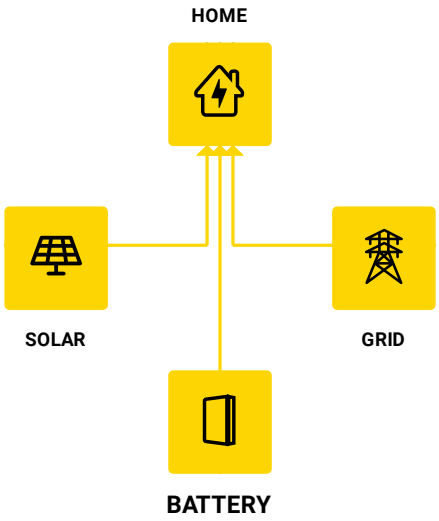
Each Year		Over System Lifetime		
101%	355 kg	6,508	67	8
Of CO_2, SO_x & NO_x	Avoided CO_2 per year	Car miles avoided	Trees planted	Long haul flights avoided

How your system works

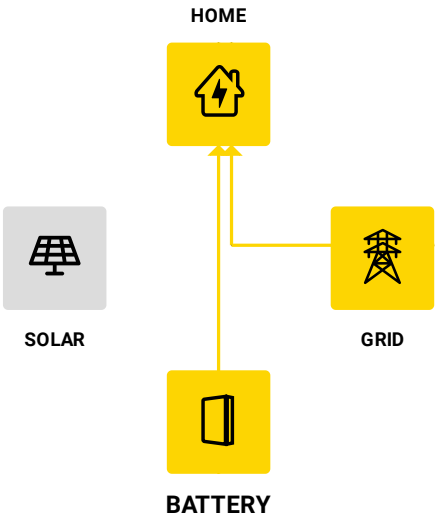
Generating Excess Solar



Partially Offset Usage

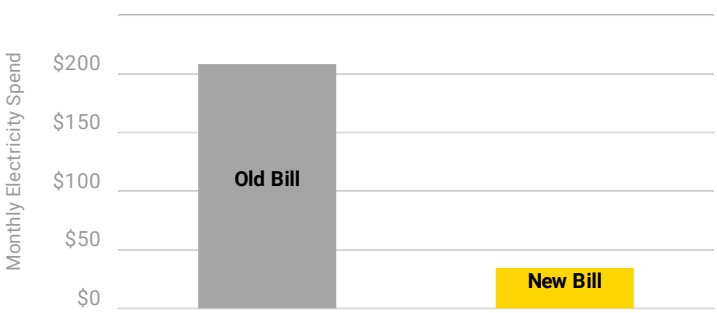


Night

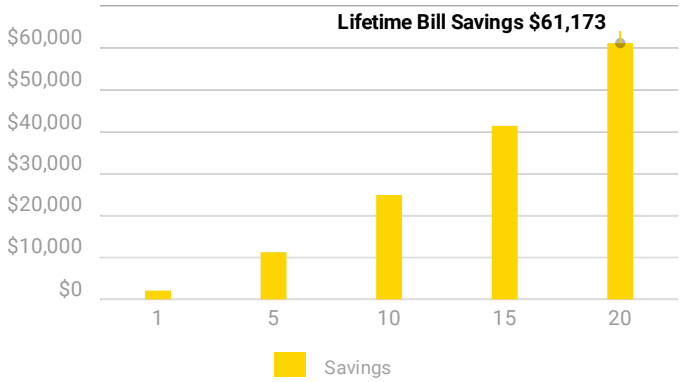


Electricity Bill Savings

First Year Monthly Bill Savings



Cumulative Bill Savings



Month	Solar Generation (kWh)	Electricity Consumption before solar (kWh)	Electricity Consumption after solar (kWh)	Utility Bill before solar ($)	Utility Bill after solar ($)	Cumulative Energy Credit ($)	Estimated Savings ($)
Jan	799	1,332	576	256	120	0	136
Feb	688	1,130	477	219	102	0	118
Mar	1,008	1,088	184	212	49	0	163
Apr	1,450	966	(445)	190	16	80	174
May	1,279	898	(325)	178	16	139	162
Jun	1,660	949	(648)	187	16	255	171
Jul	1,548	1,165	(319)	226	16	313	210
Aug	1,480	1,133	(279)	220	16	363	204
Sep	1,119	957	(148)	188	16	389	172
Oct	768	917	189	181	16	355	165
Nov	644	1,035	426	202	16	279	186
Dec	505	1,252	770	241	16	0	225

Rate not specified specified, using Residential Service based on location.

Your projected energy cost is calculated by considering a 4.0% increase in energy cost each year, due to trends in the raising cost of energy. This estimate is based on your selected preferences, current energy costs and the position and orientation of your roof to calculate the efficiency of the system. Projections are based on estimated usage of 12820 kWh per year, assuming Residential Service Electricity Tariff.

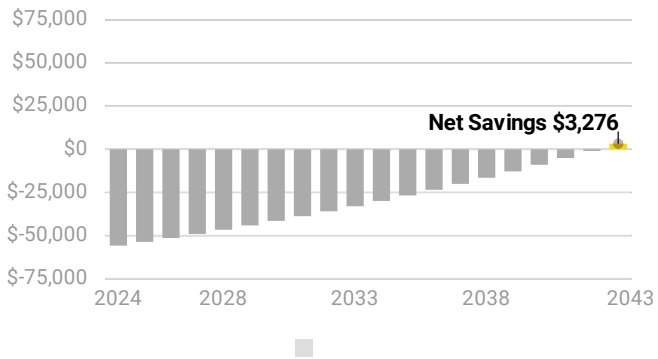
Your electricity tariff rates may change as a result of installing the system. You should contact your electricity retailer for further information.

Proposed Tariff Details - Green Mountain Power Rate 1	
Energy Charges	
Usage Charge *All Day*	$0.18 / kWh
Fixed Charges	
Fixed Charge	$16.00 / month

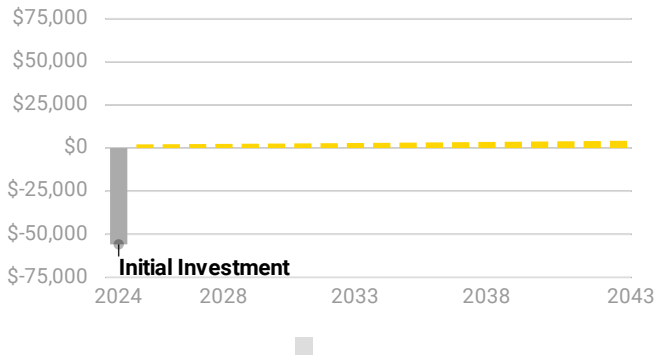
Net Financial Impact Cash

$61,173	-	$57,897	=	$3,276
Utility Bill Savings		Net System Cost		Estimated Net Savings

Cumulative Savings From Going Solar



Annual Savings From Going Solar



Estimates do not include replacement costs of equipment not covered by a warranty. Components may need replacement after their warranty period. Financial discount rate assumed: 6.75%

Quotation

Payment Option: Cash

31 x Solaria Corporation 370 Watt Panels (Solaria PowerXT-370R-PD) 1 x GIV-SME-30/69-ID (GivEnergy)	
Total System Price	$82,710.00
Purchase Price	**$82,710.00**

Additional Incentives

Federal Investment Tax Credit (ITC) The Federal Solar Tax Credit or The Federal Investment Tax Credit (ITC) for constructions starting in 2023.	$24,813.00
Net System Cost	**$57,897.00**

Price excludes Retailer Smart Meter should you want us to install your Smart Meter it will be an additional cost.
This proposal is valid until Oct 11 2024.

Quote Acceptance

I have read & accept the terms and conditions.

Signature _____

Name _____ Date _____

SOLARIA®

Solaria PowerXT® | DC Panel

Solaria PowerXT®-370R-PD

Achieving 20.5% efficiency, Solaria PowerXT solar panels are one of the highest power panels in the residential and commercial solar market. Compared to conventional panels, Solaria PowerXT panels have fewer gaps between the solar cells; this leads to higher power and superior aesthetics. Solaria PowerXT Pure Black™ panels are manufactured with black backsheet and frames, enhancing a home or building's architectural beauty.

Developed in California, Solaria's patented cell cutting and panel assembly takes processed solar wafers and turns them into PowerXT solar panels. The process starts by creating a highly reliable PowerXT cell where busbars and ribbon interconnections are eliminated. Solaria then packages the cells into the PowerXT solar panel, reducing inactive space between the cells. This process leads to an exceptionally cost effective and efficient solar panel.

Higher Efficiency, Higher Power

Solaria PowerXT panels achieve up to 20.5% efficiency; conventional panels achieve 15% – 17% efficiency. Solaria PowerXT panels are one of the highest power panels available.

Lower System Costs

Solaria PowerXT panels produce more power per square meter area. This reduces installation costs due to fewer balance of system components.

Improved Shading Tolerance

Sub-strings are interconnected in parallel, within each of the four panel quadrants, which dramatically lowers the shading losses and boosts energy yield.

Improved Aesthetics

Compared to conventional panels, Solaria PowerXT panels have a more uniform appearance and superior aesthetics.

Durability and Reliability

Solder-less cell interconnections are highly reliable and designed to far exceed the industry leading 25 year warranty.

About Solaria

Established in 2000, The Solaria Corporation has created one of the industry's most respected IP portfolios, with over 350 issued and pending patents in PV solar cell and module technology. Headquartered in Oakland, California, Solaria has developed a technology platform that unlocks the potential of solar energy.

TOP PERFORMER 2018 DNV·GL PV MODULE RELIABILITY SCORECARD

TÜVRheinland® Precisely Right.

The Solaria Corporation 1700 Broadway, Oakland, CA 94612 P: (510) 270-2500 www.solaria.com

Rev 3D 12-2019

SOLARIA®

Solaria PowerXT®-370R-PD

Performance at STC (1000W/m², 25° C, AM 1.5)

Solaria PowerXT-		365R-PD	370R-PD
Max Power (P_{max})	[W]	365	370
Efficiency	[%]	20.2	20.5
Open Circuit Voltage (V_{oc})	[V]	48.0	48.3
Short Circuit Current (I_{sc})	[A]	9.58	9.60
Max Power Voltage (V_{mp})	[V]	39.9	40.2
Max Power Current (I_{mp})	[A]	9.16	9.20
Power Tolerance	[%]	-0/+3	-0/+3

Performance at NOCT (800W/m², 20°C Amb, Wind 1 m/s, AM 1.5)

Max Power (Pmax)	[W]	269	272
Open Circuit Voltage (V_{oc})	[V]	45.1	45.4
Short Circuit Current (I_{sc})	[A]	7.73	7.74
Max Power Voltage (V_{mp})	[V]	36.7	37.0
Max Power Current (I_{mp})	[A]	7.32	7.35

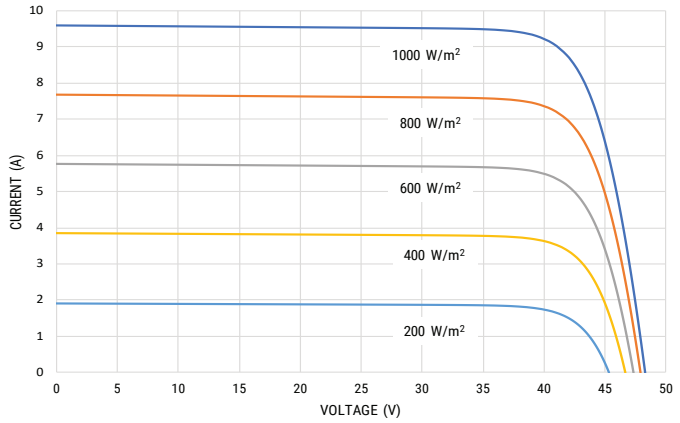
Temperature Characteristics

NOCT	[°C]	45 +/-2
Temp. Coeff. of P_{max}	[% / °C]	-0.39
Temp. Coeff. of V_{oc}	[% / °C]	-0.29
Temp. Coeff. of Isc	[% / °C]	0.04

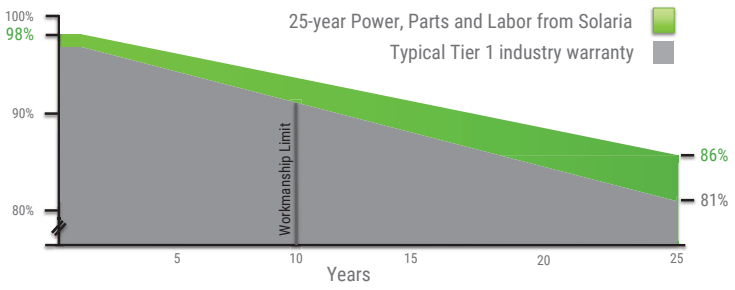
Design Parameters

Operating temperature	[°C]	-40 to +85
Max System Voltage	[V]	1000
Max Fuse Rating	[A]	15
Bypass Diodes	[#]	4

IV Curves vs. Irradiance (370W Panel)



Comprehensive 25-Year Warranty



Mechanical Characteristics

Cell Type	Monocrystalline Silicon
Dimensions (L x W x H)	63.8" x 43.9" x 1.57" 1621mm x 1116mm x 40mm
Weight	21 kg / 46 lbs
Glass Type / Thickness	AR Coated, Tempered / 3.2mm
Frame Type	Black Anodized Aluminum
Cable Type / Length	12 AWG PV Wire (UL) / 1000mm
Connector Type	MC4
Junction Box	IP67 / 4 diodes
Front Load	5400 Pa / 113 psf*
Rear Load	3600 Pa / 75 psf*

* Refer to Solaria Installation Manual for details

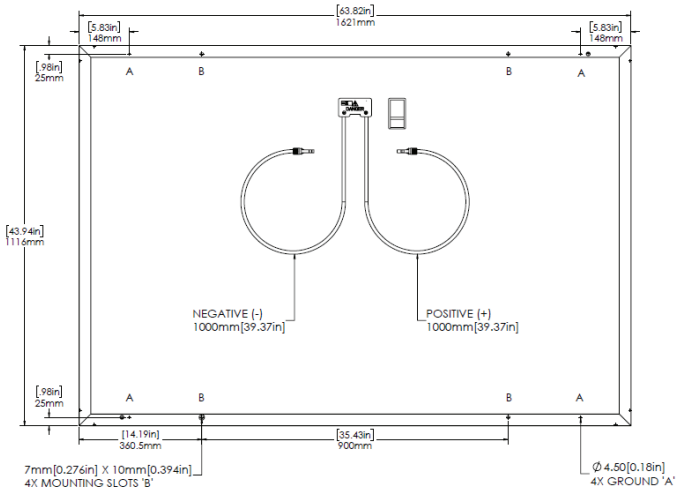
Certifications / Warranty

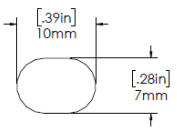
Certifications	UL 1703/IEC 61215/IEC 61730/CEC CAN/CSA-C22.2
Fire Type (UL 1703)	1
Warranty	25 years*

* Warranty details at www.solaria.com

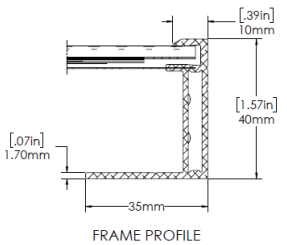
Packaging

Stacking Method	Horizontal / Palletized
Panels/ Pallet	25
Pallet Dims (L x W x H)	65.7" x 45.3" x 48.4" 1668mm x 1150mm x 1230 mm
Pallet Weight	590 kg / 1300 lbs
Pallets / 40-ft Container	28
Panels / 40-ft Container	700





MOUNTING SLOT 'B'



FRAME PROFILE

Nova Group

Glossary of Terms and Acronyms - Energy Assessment

Glossary of Terms and Acronyms - Energy Assessment

ECM – Energy Conservation Measures are projects recommended to reduce energy consumption. These can be No/Low cost items implemented as part of routine maintenance or Capital Cost items to be implemented as a capital improvement project.

Initial Investment – The estimated cost of implementing an ECM project. Estimates typically are based on R.S. Means Construction cost data and Industry Standards.

Annual Energy Savings – The reduction in energy consumption attributable to the implementation of a particular ECM. These savings values do not include the interactive effects of other ECMs.

Cost Savings – The expected reduction in utility or energy costs achieved through the corresponding reduction in energy consumption by implementation of an ECM.

Simple Payback Period – The number of years required for the cumulative value of energy or water cost savings less future non-fuel or non-water costs to equal the investment costs of the building energy or water system, without consideration of discount rates.

EUL – Expected Useful Life is the estimated lifespan of a typical piece of equipment based on industry accepted standards.

RUL – Remaining Useful Life is the EUL minus the effective age of the equipment and reflects the estimated number of operating years remaining for the item.

SIR – The savings-to-investment ratio is the ratio of the present value savings to the present value costs of an energy or water conservation measure. The numerator of the ratio is the present value of net savings in energy or water and non-fuel or non-water operation and maintenance costs attributable to the proposed energy or water conservation measure. The denominator of the ratio is the present value of the net increase in investment and replacement costs less salvage value attributable to the proposed energy or water conservation measure. It is recommended that energy-efficiency recommendations be based on a calculated SIR, with larger SIRs receiving a higher priority. A project typically is recommended only if the SIR is greater than or equal to 1.0, unless other factors outweigh the financial benefit.

Life Cycle Cost – The sum of the present values of (a) **I**nvestment costs, less salvage values at the end of the study period; (b) Non-fuel operation and maintenance costs: (c) Replacement costs less salvage costs of replaced building systems; and (d) Energy and/or water costs.

Life Cycle Savings – The sum of the estimated annual cost savings over the EUL of the recommended ECM, expressed in present value dollars.

Building Site Energy Use Intensity – The sum of the total site energy use in thousands of Btu per unit of gross building area. Site energy accounts for all energy consumed at the building location only not the energy consumed during generation and transmission of the energy to the site.

Building Source Energy Use Intensity – The sum of the total source energy use in thousands of Btu per unit of gross building area. Source energy is the energy consumed during generation and transmission in supplying the energy to your site.

Building Cost Intensity – This metric is the sum of all energy use costs in dollars per unit of gross building area.

Greenhouse Gas Emissions – Although there are numerous gases that are classified as contributors to the total for Greenhouse Emissions , the scope of this energy assessments focuses on carbon dioxide (CO_2). Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement).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