NEWYORK ENGINEERS

October 06, 2023

COMBINED DRAFT REPORT

ASHRAE Level-II Energy Audit Study

University College of the Cayman Islands,

Grand Cayman Campus

168 Olympic Way, PO Box 702 Grand Cayman, Cayman Islands KY1-1107

NEWYORK ENGINEERS

Disclaimer

The goal of this energy study is to identify potential energy efficiency and carbon reduction opportunities, help prioritize specific measures for implementation. Most energy conservation measures have received preliminary analysis of feasibility that identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to establish a basis for further discussion and to help prioritize energy measures. NYE reviewed the energy conservation measures and estimates of energy savings were reviewed for technical accuracy. Actual, achieved energy savings depend on behavioral factors and other uncontrollable variables and, therefore, estimates of final energy savings are not guaranteed. NYE shall in no event be liable should the actual energy savings vary. NYE bases estimated installation costs on our experience at similar facilities, pricing from US & Cayman Island local contractors and vendors, and/or cost estimates from RS Means. We encourage the owner of the facility to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual measures and conditions. NYE does not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates. The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable Cayman Island Local Laws.

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Introduction

The UCCI Grand Cayman Campus is located on 168 Olympic Way in the Cayman Islands and consists of eleven blocks with a total area of 67,132 square meters. The campus, zoned as an educational facility, contains buildings constructed in the early 1920s and others in the early 1970s. New York Engineers performed an ASHRAE-II energy audit and made recommendations for energy efficiency solutions.

Dr. Robert Robertson, Principle In-charge of University College of Cayman Islands (UCCI), contracted New York Engineers (NYE) to perform an ASHRAE Level 2 Energy Audit and solar feasibility study at Grand Cayman Campus. The purpose of the energy audit is to identify energy savings opportunities. NYE built a calibrated energy model based on utility data, building drawings, and site access provided by UCCI. The model was developed with eQuest software, and Energy Conservation Measures (ECM) were applied to acquire the findings of this report.

Methodology

This audit follows ASHRAE Level II requirements. The audit includes a review of existing drawings, annual utility bills, and other data; one-week site visits to check equipment conditions and working performance; Mr. Vishwaraj Nimbalkar and Mr. Thomas Dugan conducted detailed site visits from July 10–15, 2023.

The energy analysis is performed using standard engineering calculation procedures and the building energy simulation program eQuest, an hour-by-hour energy usage modeling program evolved from DOE2, which was jointly developed by National Laboratories for the U.S. Department of Energy. While eQuest is generally accepted as one of the most accurate building energy simulation programs, the estimated energy usage should not be interpreted as an absolute prediction.

The actual energy usage may differ from the prediction due to variables beyond the energy analyst's control. These may include changes in occupancy, schedules, final equipment selection, installation, operation, weather variations from typical year data used, and other unforeseen circumstances.

A baseline building energy performance model was first developed based on the existing building conditions. Energy conservation measures (ECMs) were identified and analyzed by modifying the baseline building to reflect the impact of each ECM on the building's energy performance. An interactive model was created to simulate the net effect of all ECMs.

The cost-effectiveness of each ECM was evaluated using a simple payback analysis, which yields the time required to recover the cost of implementing the ECM by its annual energy cost savings. The ECM cost estimates are either obtained from RSMeans data or provided by the US & Cayman Island local equipment vendors.

Energy Audit Team

The New York Engineers (NYE) team conveys their gratitude and thanks to the management of UCCI, Grand Cayman Campus, 168 Olympic Way, PO Box 702 Grand Cayman, and Cayman Islands KY1-1107 for giving us an opportunity to study their building & campus for the Energy Audit, which was conducted on July 10-14, 2023.

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Executive Summary

The NYE team conducted a comprehensive survey of all buildings at UCCI's Grand Campus. They examined the major energy-consuming elements in each of the eleven buildings, which included HVAC systems, lighting systems, and various miscellaneous loads. The cooling of conditioned spaces is achieved through HVAC systems such as condensing units, split DX (direct expansion) systems, and air handling units. The lighting system in the buildings has already been upgraded with energy-efficient LED technology. The buildings primarily house office equipment, classroom equipment, kitchen equipment, gym equipment, and some café equipment, all contributing to plug loads.

The study of Energy Conservation Measures (ECMs) includes the replacement of outdated HVAC equipment with new, energy-efficient models and the addition of variable frequency drive (VFD) controls to reduce energy consumption. Since LED fixtures have already replaced the lighting, further energy savings can be achieved by adding controls like occupancy sensors and daylighting sensors to prevent unnecessary power consumption. It is recommended to install a centralized Building Management System (BMS) since there is currently no overall control system for university equipment, and BMS systems are highly effective in reducing overall energy consumption. Additionally, the study examined on-site energy generation services in the form of solar PV installations on building roofs and parking lots.

Below, is a table detailing electricity savings after the implementation of Energy Conservation Measures (ECMs), categorized by each building. The table includes associated cost savings, measure cost and simple payback years.

Table 1: Executive Summary Table

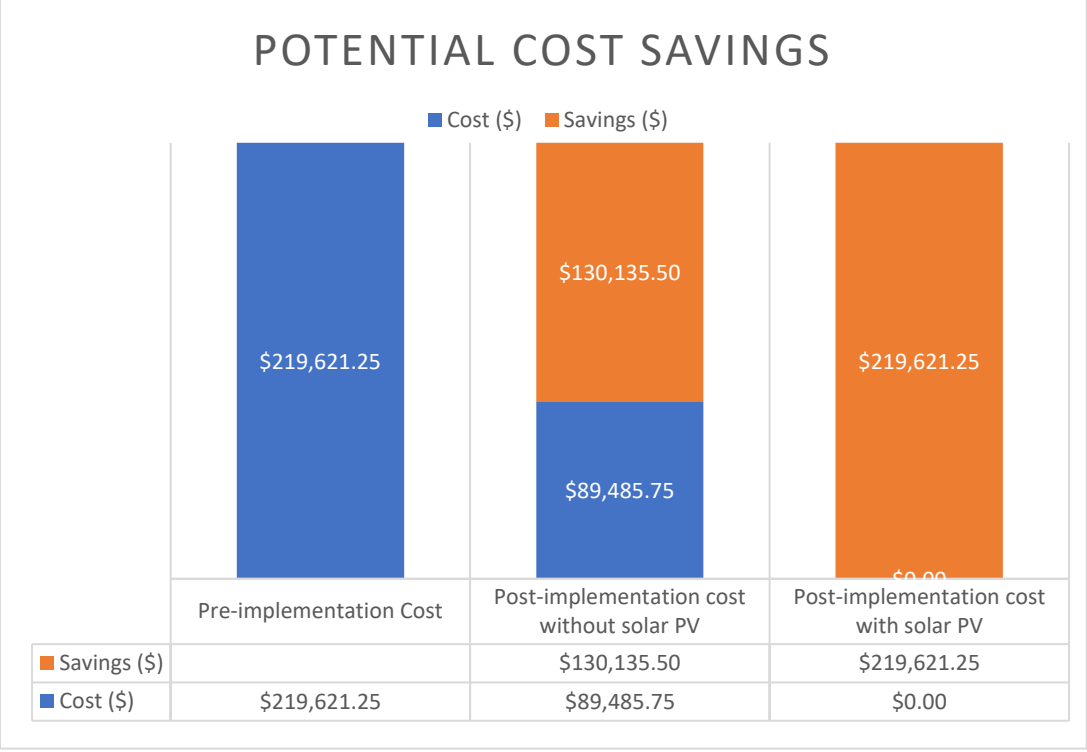
Building name	Electricity Savings (kWh)	Electric Cost Savings ($)	Measure Cost ($)	Simple Payback (years)
F - The Sir Vassel Johnson Hall	205,799	$51,450	$395,062	8
D - The Hon. James Bodden Block	83,950	$20,988	$87,433	4
A - The Hon. Benson Ebanks Block (Administration Building)	169,048	$42,262	$197,197	5
B - The Layman E. Scott Block	67,044	$16,761	$78,208	5
C - The Hon. Sybil McLaughlin Block	186,089	$46,523	$217,076	5
E - The Sam Basdeo Library	132,564	$33,141	$198,790	6
I - The UCCI School of Nursing	35,232	$8,808	$52,833	6
G - The School of Hospitality Studies Kitchen	9,829	$2,457	$13,617	6
H - The Dr. Wm. Hrudey Observatory	2,038	$510	$2,824	6
J - The Dual Enrolment Tutorial Room	17,418	$4,354	$24,131	6
K- Workshop Mechanical Room	5,692	$1,423	$7,885	6
Total	**914,704**	**$228,676**	**$1,275,056**	**6**

This audit report's objectives are to identify potential opportunities for energy efficiency, assist in prioritizing particular steps for implementation, and inform the UCCI of any financial incentives they could be eligible for in order to execute the advised measures. Most measures have only received a preliminary study of feasibility for this audit report, which specifies estimated ranges of savings and expenses.

This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. The following sections describe the evaluated measures.

Several energy conservation measures were studied, including those for the building's HVAC heating, ventilation, air-conditioning, building management system, and lighting. We found some potential options of the energy conservation measures (ECMs) to reduce the total energy consumption by 3,121 MMBtu and annual greenhouse gas emissions by about 777 ton CO2e.

The breakdown of existing utility costs and projected annual savings following implementation of all measures are shown in graphs 1. Together these measures represent an opportunity to reduce UCCI annual energy usage by about 103% overall i.e. achieve net zero energy campus.



Graph 1: All Building's Cost Savings

A detailed description of UCCI existing energy usage can be found in Section Building Energy Use and Costs. Estimates of total cost, energy savings, and financial incentives, which may be available for each ECM, are summarized below

in Table 2 and 3. A brief description of each measure category can be found below. A detailed description of each ECM can be found in Section Energy Conservation Measures.

Refer to table 2 for a cumulative ECM summary for energy values of each measure and table 3 for a cumulative cost values and simple payback calculations.

ECM Summary Table - Combined

The cumulative energy and cost savings for each studied measure is shown in following two tables. These energy and cost savings represent the modelled measures across the whole campus. The buildings for where each measure is recommended is shown in table 2.

Table 2: Cumulative Energy Conservation Measure Summary

Measure Number	Measure Description	Annual Energy Savings						
		Annual Energy Use (kWh)	Total Energy Use (MMBtu)	Ton CO2 emission	Saving ton Co2 Emission	Electricity Savings (kWh)	Total Energy Savings (MMBtu)	Energy Savings to Total Baseline use (%)
	Baseline Consumption	878,485	2,997	747	-			
ECM 1	Lighting Control	845,420	2,885	719	28	33,065	113	4%
ECM 2	Window Upgrade	857,089	2,924	729	18	21,396	73	2%
ECM-3A	BMS – Night Setback (NSB)	762,554	2,602	648	99	115,931	396	13%
ECM-3B	BMS – Fan Schedule	751,359	2,564	639	108	127,126	434	14%
ECM-3C	BMS – Optimal ON-OFF	857,088	2,924	729	18	21,397	73	2%
ECM-3D	BMS – Demand Control Ventilation (DCV)	718,095	2,450	610	136	27,114	93	3%
ECM-4	Upgrade AHU's Control (Sir Vassel Johnson Hall)	187,906	641	160	587	11,287	39	1%
ECM-5	Variable frequency Drive (VFD) Installation on Indoor units	507,759	1,732	432	315	38,257	131	4%
ECM-6	Weatherization	757,947	2,586	644	102	120,538	411	14%
ECM-7	Vending Machine Controls (Sir Vassel Johnson Hall)	197,550	674	168	579	1,643	6	0.2%
ECM-8	Replacement of Condensing Unit (The Hon. Sybil McLaughlin building.)	373,661	1,275	318	429	2,738	9	0.3%
ECM-9	Solar PV (381.3 kW)	484,323	1,653	412	335	394,162	1,345	45%
Total					**2,755**	**914,704**	**3,121**	**104%**

Table 3: Cumulative Energy Conservation Measure Results with Payback

Annual Energy Savings						Payback Analysis		
Measure Number	Measure Description	Electricity Savings (kWh)	Total Energy Savings (MMBtu)	Electric Cost Savings ($)	Total Energy Cost Savings ($)	Measure Cost ($)	Saving ton Co2 Emission	Simple Payback (years)
ECM 1	Lighting Control	33,065	113	$8,266	$8,266	$14,048	28	2
ECM 2	Window Upgrade	21,396	73	$5,349	$5,349	$52,419	18	10
ECM-3A	BMS - Night Setback Control (NSB)	115,931	396	$28,983	$28,983	$118,139	99	4
ECM-3B	BMS - Fan Control	127,126	434	$31,782	$31,782	$76,161	108	2
ECM-3C	BMS - Optimal On- Off	21,397	73	$5,349	$5,349	$21,295	18	4
ECM-3D	BMS - Demand Control Ventilation (DCV)	27,114	93	$6,779	$6,779	$9,192	23	1
ECM-4	Upgrade AHU's Control (Sir Vassel Johnson Hall)	11,287	39	$2,822	$2,822	$8,025	10	3
ECM-5	Variable frequency Drive (VFD) Installation on Indoor units	38,257	131	$9,564	$9,564	$11,049	33	1
ECM-6	Weatherization	120,538	411	$30,135	$30,135	$139,201	102	5
ECM-7	Vending Machine Controls (Sir Vassel Johnson Hall)	1,643	6	$411	$411	$769	1	2
ECM-8	Replacement of Condensing Unit (The Hon. Sybil McLaughlin building.)	2,738	9	$685	$685	$2,375	2	3
ECM-9	Solar PV (381.3 kW)	394,162	1,345	$98,541	$98,541	$816,435	335	8
Total		**914,704**	**3,121**	**228,676**	**228,676**	**$1,275,056**	**777**	**6**

Note:

- ECM 1, 2, 3A, 3B, 3C, 6 and ECM 9 measures applicable for all buildings.
- ECM 3D applicable only for the Sir Vassel Johnson Hall, Hon. Benson Ebanks building, Layman E.Scott Building, The Hon. Sybil McLaughlin building, The Sam Basdeo Library, The UCCI School of Nursing Building.
- ECM 4 applicable only for the Sir Vassel Johnson Hall.
- ECM 5 is only applicable only for Hon. Benson Ebanks building, Layman E.Scott Building, Hon. Sybil McLaughlin building, Sam Basdeo Library, UCCI School of Nursing Building.
- ECM 6 is applicable only for the Sir Vassel Johnson Hall.
- ECM 7 is applicable only for the Hon. Sybil McLaughlin building.

ENERGY EFFICIENT PRACTICES

A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs.

Potential opportunities identified at UCCI include:

- Reduce Air Leakage
- Close Doors and Windows
- Ensure Lighting Controls Are Operating Properly
- Reduce Motor Short Cycling
- Perform Routine Motor Maintenance
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Ensure Economizers are Functioning Properly
- Check for and Seal Duct Leakage
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Replace Computer Monitors
- Water Conservation

For details on these energy efficient practices, please refer to Section Energy Efficient Best Practices.

ON-SITE GENERATION MEASURES

NYE evaluated the potential for installing on-site generation for UCCI campus. Based on the configuration of the site and its loads there appears to be a low potential for cost-effective installation of any solar PV or combined heat and power self-generation measures. For details on our evaluation and on-site generation potential, please refer to Section On-Site Generation.

ECM SUMMARY AND INCREASE IN BUILDING VALUE

As a result of our study, a package of utility cost savings was bundled together based on our findings. The measures include upgrades for the building envelope, lighting system, and HVAC. Implementation cost, simple payback, and energy savings have all been calculated.

> The package includes lighting control, window upgradation, building management system on night setback (NSB), fan schedule, optimal on-off, demand control ventilation (DCV), replacement of AHUs, variable frequency drives (VFDs) on indoor units, vending machine control, replacement of the condensing unit, and solar PV installation.

Upon completion of installation, the building's value will immediately increase due to a higher net operating income. The net operating income increase has been calculated via energy savings and penalty avoidance. Annual energy savings with penalties avoided are the change in net operating income. Given a capitalization rate of 5% from Marcus & Millichap's Institutional Property Advisors (IPA), the following equation was used to calculate the net operating income increase per recommended package.

$$Capitalization\ Rate = \frac{\Delta\ Net\ Operating\ Income}{\Delta\ Value\ of\ Property}$$

Table 4: Increase in building value Building

	Measure Cost	Saving ton CO2 Emission	Annual Energy Savings	Net Property value Increase
Johnson Hall	$395,062	175	$51,450	$1,028,995
Bodden building	$87,433	71	$20,988	$419,750
Admin+ Layman+ Sybil	$492,481	359	$105,560	$2,111,197
Library+ Nursing	$251,623	143	$41,949	$838,980
Kitchen+ Observatory+ Tutorial+ Workshop	$48,457	30	$8,744	$174,885
Total	**$1,275,056**	**777**	**$228,676**	**$4,573,520**

EMISSIONS OUTLOOK

Cayman Island sustainability development goals report determined that some progress has been made towards the 2030 target. According to the Cayman Islands' 2021 Census Report, Cayman has achieved almost universal access to electricity, i.e. 97 per cent of Caymanian households have access to electricity. Energy policy aims to reduce greenhouse case emissions from 12.3 tCO2e per person in 2014 to 4.8 tCO2e by 2030.

In February 2017, the Cabinet approved the Cayman Islands' NEP 2017–2037. The NEP, first drafted in 2013, and reviewed in 2016, set a target of generating 70 per cent of electricity from renewable sources by 2037. When the target was set in 2015, more than 99 per cent of energy in the Cayman Islands was generated from oil products. At that time, renewable energy accounted for 0.2 per cent of electricity generation. In the seven years since the target was set, little progress has been made. By February 2023, renewable energy contributed 3 percent of Grand Cayman's total energy production. Significant effort will be needed to increase the use of renewable energy over the next 15 years and to achieve the target of 70 percent.

Facility Information and Existing Conditions

GENERAL SITE INFORMATION

Table 5: General Site information

BUILDING DETAILS	
Client Name	Dr. Christopher Williams
Property Superintendent	Cleveland Julien
Building Name(s)	1. The Sam Basdeo Library. 2. The Sir Vassel Johnson Hall. 3. The Layman E.Scott Building. 4. The Hon. James Bodden building. 5. The Hon. Benson Ebanks building. 6. The Dual Enrolment tutorial room. 7. Dr. WM Hrudey Observatory Block. 8. Facilities / Maintenance Workshop. 9. The Hon. Sybil McLaughlin building. 10. The UCCI School of Nursing Building. 11. School of Hospitality Studies Kitchen.
Total SF	67,132 ft^2
Number of Buildings	11

ENVELOPE DESCRIPTION

The envelope or building exterior exchanges energy with the outside air and absorbs energy from the sun, affecting the energy required by the building's HVAC system for indoor comfort. The details of the envelope parameter for the existing building are as follows:

- Exterior Wall: The exterior wall of the project has a U-value, which is the inverse of the R-value and is calculated as 0.580 Btu/h-ft2-°F.
- Exterior Roof: The exterior roof of the project has minimal insulation to resist the heat flow from the sun's rays. The U-value, which is the inverse of the R-value, is calculated as 0.034 Btu/h-ft2-°F.
- Exterior Window Glass: The exterior window glass consists of double-pane clear glass. The U-value is calculated as 1.47 Btu/h-ft2-°F, the shading coefficient is calculated as 0.60 and visible light transmittance is 0.80.

Table 6: Operational Schedule

BUILDING NAME	WEEKDAY/WEEKEND	OPERATING SCHEDULE
The Sir Vassel Johnson Hall. The Hon. James Bodden building. The Layman E.Scott Building.	Weekday	9:00 AM to 5:00 PM
The Hon. Benson Ebanks building. The Dual Enrolment tutorial room. Dr. WM Hrudey Observatory Block. Facilities / Maintenance Workshop. The Hon. Sybil McLaughlin building. The UCCI School of Nursing Building. School of Hospitality Studies Kitchen.	Weekend	Closed
The Sam Basdeo Library	All week working	Monday-Thursday: 9AM-9PM Friday: 9AM-4PM Saturday-Sunday:9AM-5PM

Building Energy Use and Costs

UCCI and CUC conducted a detailed study of the three electrical services/meters, one (24505-302934) of which is classified as Large Commercial other two (24505-317270 & 24505-342700) classified as General Commercial. At the outset of the review, the metered data for all three services was looked at to determine whether there could be immediate benefits through either the aggregation of the three services into a single metered service or the splitting of the Large Commercial electrical service into multiple services such that each new service was lowered to General Commercial rates. In each case, there were no immediate savings due to the specific consumption characteristics of the electrical services and the charge component differences for the General Commercial (consumption-only rates) and Large Commercial (demand and consumption rates) rate classes.

New York Engineers (NYE) recommends UCCI to consider implementing a campus wide sub-metering of each individual building to study energy usage and daily consumption patterns. An annual review of these sub-meters would be beneficial in identifying additional energy savings strategies and energy wastage outside normal business operations. The submetering could be in the form of utility grade meters of data loggers install at the main power disconnect of each building.

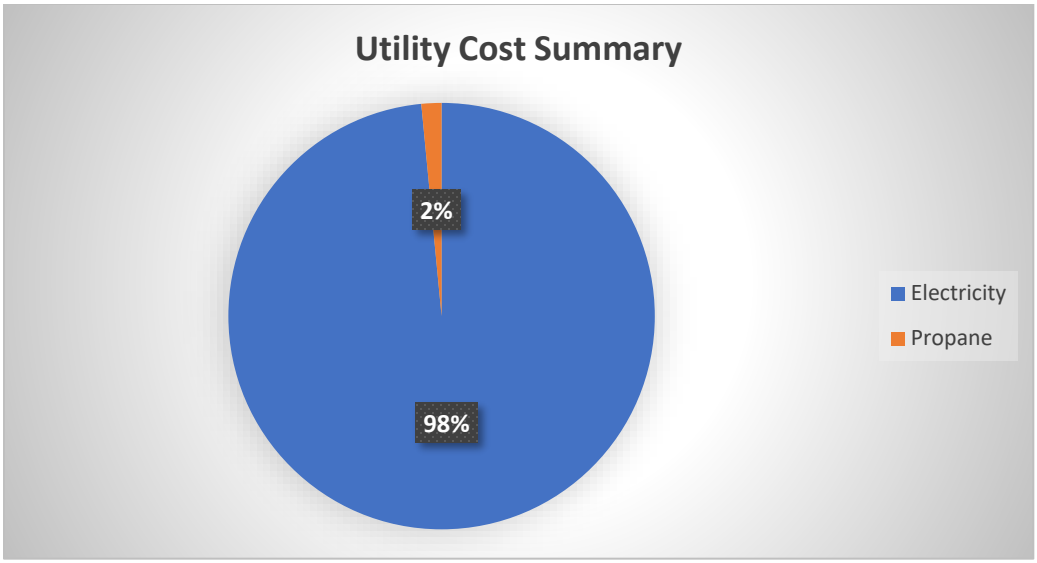
Combined annual utility data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are several factors that could cause the energy use to vary from the “typical” energy usage profile for facilities with similar characteristics.

TOTAL COST OF ENERGY

Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Table 7: Utility Summary

Fuel	Usage	Cost ($)
Electricity (kWh)	849,420	$212,355
Propane (Gallon)	574	$ 3,329
Total ($)		**$215,684**



Graph 2: Utility Cost Summary

An energy balance identifies and quantifies energy use in your various building systems. This can highlight areas with the most potential for improvement. This energy balance was developed using calculated energy use for each of the end uses noted in the figure.

The energy auditor collects information regarding equipment operating hours, capacity, efficiency, and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated energy use is then compared to the historical energy use, and the initial inputs are revised as necessary to balance the calculated energy use to the historical energy use.

UTILITY USAGE

Utility usage for UCCI includes electricity measured in kilowatt-hours. The electric per unit cost utilized was 0.25 US dollars per kWh.

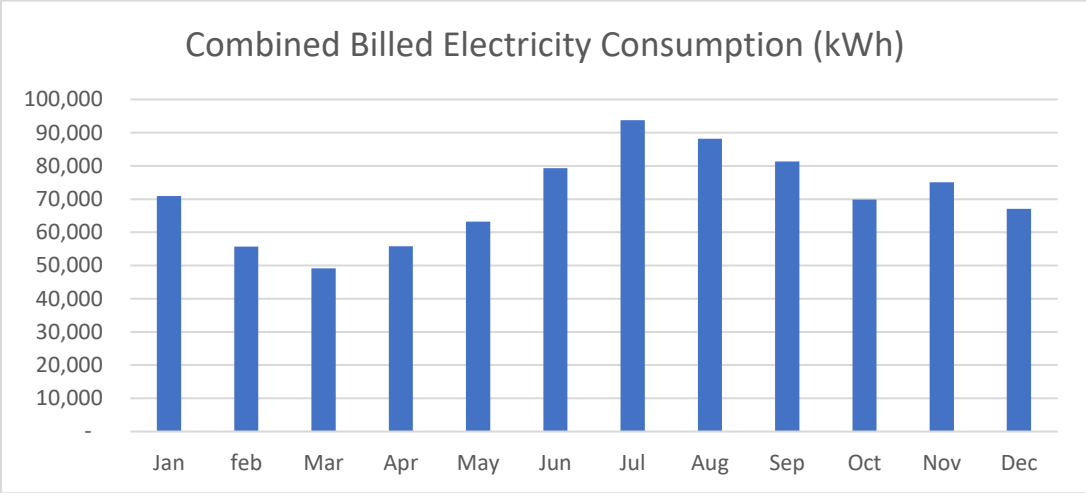
Electricity is used for the following applications in the base building:

- Base building
  - Interior Lighting
  - Plug Loads
  - HVAC system
  - Lab equipment's

UTILITY BILLING

- Electricity

- Supplied by: Caribbean Utilities Company, Ltd. (CUC)
- Billed to UCCI
- Number of Meters: 03 (24505-302934, 24505-317270 & 24505-342700)
- The average electric cost over the past 12 months was $0.25/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

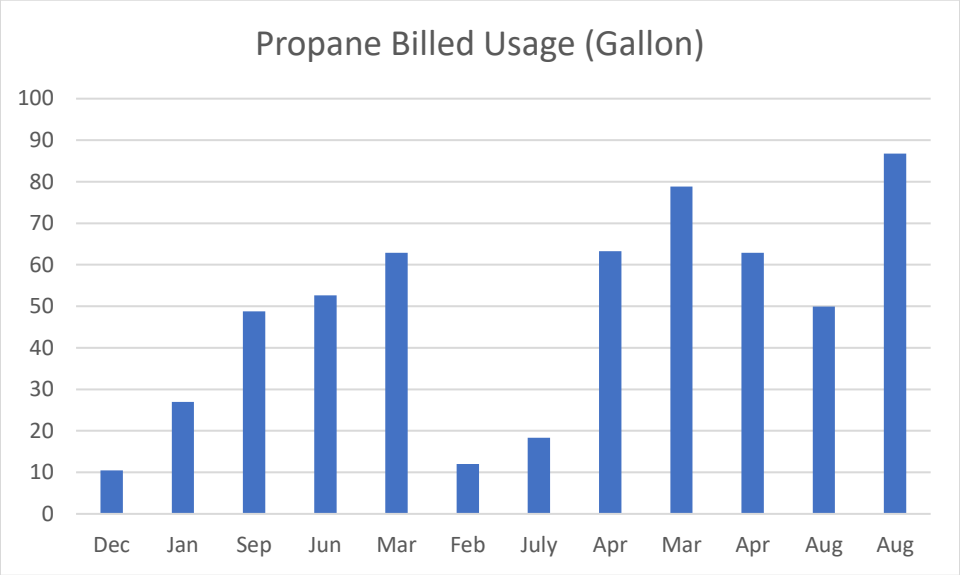


Graph 3: Combined Electricity Consumption Chart

Table 8: Annual Electric Usage (kWh)

Month	Electric Usage KWh	Total Electric Cost ($)
January	70,880	$17,720
February	55,720	$13,930
March	49,140	$12,285
April	55,780	$13,945
May	63,220	$15,805
June	79,320	$19,830
July	93,720	$23,430
August	88,220	$22,055
September	81,320	$20,330
October	69,900	$17,475
November	75,100	$18,775
December	67,100	$16,775
Total	**849,420**	**$212,355**

- Propane
  - Supplied by: Home Gas Ltd,
  - Billed to UCCI (School Canteen, Lab, Hospitality Kitchen)
  - The average propane cost over the past months was $5.8/Unit, which is the blended rate that includes, distribution, and other charges. This report uses this blended rate to estimate energy cost savings.



Graph 4: Propane Billed Usage (2022)

Table 9: Annual Propane Usage (Gallon)

Usage Description Area	Date	Propane Usage (Gallon)	Total Cost
UCCI School Canteen	12/5/2022	10.5	61
168 Olympic way George town	1/4/2023	27	157
UCCI School Canteen 168 Olympic way George town	9/12/2022	48.8	283
UCCI School Canteen 168 Olympic way George town	6/20/2022	52.6	305
UCCI School Canteen 168 Olympic way George town	3/7/2022	62.9	365
UCCI School Canteen 168 Olympic way George town	2/27/2023	12	70
UCCI School Canteen 168 Olympic way George town	7/11/2022	18.3	106
UCCI School Canteen 168 Olympic way George town	4/19/2022	63.3	367
UCCI School Canteen 168 Olympic way George town	3/28/2022	78.8	457
UCCI School Canteen 168 Olympic way George town	3/7/2022	62.9	365
UCCI-Hospitality Kitchen 168 Olympic way Hospitality kitchen Tank	8/31/2022	49.9	289
UCCI-Lab-168 Olympic way	8/31/2022	86.8	503
Total		**574**	**3,328**

On-Site Generation Measures

On-site generation measure options include renewable (e.g., solar, wind) on-site technologies that generate power to meet all or a portion of the electric energy needs of a facility. Also referred to as distributed generation, these systems contribute to Greenhouse Gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases, resulting in the electric system reliability through improved transmission and distribution system utilization.

Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before making a decision to implement, a feasibility study should be conducted that would take a detailed look at existing energy profiles, siting, interconnection, and the costs associated with the generation project including interconnection costs, departing load charges, and any additional special facilities charges.

Photovoltaic

Sunlight can be converted into electricity using photovoltaics (PV) modules. Modules are racked together into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is interconnected to the facility's electrical distribution system. The amount of unobstructed area available determines how large of a solar array can be installed. The size of the array combined with the orientation, tilt, and shading elements determines the energy produced. A preliminary screening, based on the facility's electric demand, size, location, and unshaded free area, shows that the facility has a high potential for installing a PV array.

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the potential for PV at the site. In order to be cost-effective, a solar PV array needs certain minimum criteria, such as flat or south-facing rooftop or other unshaded space on which to place the PV panels. In our opinion, the facility might not meet these minimum criteria for cost-effective PV installation.

Design 4 (Trees) (copy) UCCI, University College Of The Cayman Islands, Olympic Way, George Town, Cayman Islands

Report

Project Name	UCCI
Project Address	University College Of The Cayman Islands, Olympic Way, George Town, Cayman Islands
Prepared By	Anuj Srivastava anuj.s@ny-engineers.com

System Metrics

Design	Design 4 (Trees) (copy)
Module DC Nameplate	651.8 kW
Inverter AC Nameplate	604.8 kW Load Ratio: 1.08
Annual Production	777.3 MWh
Performance Ratio	58.4%
kWh/kWp	1,192.4
Weather Dataset	TMY, 0.04° Grid (19.29,-81.38), NREL (psm3)
Simulator Version	15005d4bf4-bb691dc6d3-53d616690c-8f0cc661d2

Project Location

Detailed Layout

Figure 1: Solar Panels Placement

We used HelioScope tool for solar feasibility study, a solar simulation tool from the Folsom Labs, to conduct an analysis of the site. Based on our simulation, a relatively small rooftop PV array might be feasible. We estimate that the available roof and parking space might support up to a 651.8 kW solar array. Such an array might produce up 777,300 kWh per year, which could save the college up to $163,233 per year in electric purchases. Based on average costs for commercial solar installation and current CUC prices. The available roof space needs to be properly accessed by a qualified solar installer to determine feasibility. A structural analysis of the roof may be necessary as well. Roof conditions might make available roof space smaller than we assumed, or too costly to develop, which might make a solar array not economically viable for the site.

PARKING LOT AND ROOFTOP SOLAR PV CAPACITY HELIOSCOPE REPORT

The HelioScope Solar feasibility study has been conducted meticulously, affirming that the UCCI (University College of the Cayman Islands) Grand Cayman campus is indeed a suitable location for the installation of solar photovoltaic (PV) systems. The study reveals that the campus has the potential to generate a substantial solar power capacity, specifically measuring 651.80 kW, with an estimated annual production output of 777,300 kWh. Furthermore, the solar installation encompasses a total area of 33,787.04 square feet, encompassing both parking facilities and the roofs of various buildings. For detailed information on the solar power distribution, Please refer to table 11.

Table 10: Breakdown of Parking Lot & Rooftop Solar PV

Sr. No.	Building Name	Capacity in KW
1	F - The Sir Vassel Johnson Hall	150.00
2	D - The Hon. James Bodden Block	17.30
3	A - The Hon. Benson Ebanks Block (Administration Building)	150.00
4	B - The Layman E. Scott Block	
5	C - The Hon. Sybil McLaughlin Block	
6	E - The Sam Basdeo Library	50.00
7	I - The UCCI School of Nursing	
8	G - The School of Hospitality Studies Kitchen	14.00
9	H - The Dr. WM. Hrudey Observatory	
10	J - The Dual Enrolment Tutorial Room	
11	K- Workshop Mechanical Room	
12	Canopy Solar	15.00
13	Parking Lot	255.50
Total Solar Plant Capacity		**651.80**

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