STOCKTON UNIVERSITY

2020 Initiatives Proposal Form

Thank you for your interest in submitting a proposal to the 2020 Initiatives process.

Please complete this form, save it to your hard drive, and then email a copy to: 2020@stockton.edu. Please copy your Dean/Director on the email. You will then be contacted by the appropriate 2020 Initiative Team representative/LEGS facilitators.

Proposals will be evaluated based on general criteria including the following:

- University-wide impact
- Clearly addressing one of the four LEGS themes from the 2020 strategic plan
- Specific budget details provided
- Realistic outcomes identified
- Assessment measures specified

Please consider the following questions as helpful prompts:

University-wide Objective(s)

- Does your proposal clearly address an issue relevant to your selected "primary strategic (LEGS) theme"?
- What specifically do you wish to accomplish with your project?
- How will Stockton, as a whole, benefit?

Expected Results

- How will you know if your project is a success?
- What are your anticipated outcomes and specific measurements for success?
- Does your proposal clearly indicate the person(s) or department(s) that will assume responsibility for the various work tasks?
- What is your project's "finish line"?

General Application Information	
Your Name	Michael Ferraro
Your Email	michael.ferraro@stockton.edu
Title of Project	Pomona/Duerer Monument Hybrid Lighting
Project Leader	Michael Ferraro
LEGS Initiative Team Coach	Tait Chirenje
Project Partner(s)	Facilities Planning and Construction
Duration / Time Frame of Project	

Proposal Category (choose one: one-time or ongoing)			
One-Time Event or Activity		**Ongoing Event or Activity**	
☐	(A) $5,000 or less	☐	(C) $5,000 or less
✔	(B) More than $5,000	☐	(D) More than $5,000

Strategic Theme (choose one)	
☐	**Learning**
☐	**Engagement**
☐	**Global Perspectives**
✔	**Sustainability**

Strategic Objectives: choose one primary (P) in main theme and up to three secondary (S) In any themes			
Learning			
-	Deliver high value-added learning experiences and promote scholarly activity (S1)	-	Reward scholarly applications (ER2)
-	Promote liberal arts ideal to develop lifelong learners (S2)	-	Establish additional revenue sources (RS1-L)
-	Strengthen internal processes to support learning (IP1-L)	-	Reduce expenses (RS2-L)
-	Develop faculty and staff skills to support learning (ER1-L)	-	Align resources to support strategic plan (RS3-L)
Engagement			
-	Establish Stockton as an integral part of the identity of students, faculty, staff, alumni, and community members (S3)	-	Foster an interactive environment among students, faculty, staff, and community (ER3)
-	Prepare students for active citizenship role (S4)	-	Increase opportunities for interactions between internal and external communities (ER4)
-	Create mutually reinforcing intellectual and co-curricular experiences (S5)	-	Establish additional revenue sources (RS1-E)
-	Strengthen internal processes to support engagement (IP1-E)	-	Reduce expenses (RS2-E)
-	Develop faculty and staff skills to support engagement (ER1-E)	-	Align resources to support the strategic plan (RS3-E)
Global Perspectives			
-	Develop a globally diverse Stockton community (S6)	-	Strengthen opportunities for global interaction among members of the Stockton community (ER5)
-	Enhance capacity to participate globally (S7)	-	Establish additional revenue sources (RS1-G)
-	Strengthen internal processes to support global education (IP1-G)	-	Reduce expenses (RS2-G)
-	Integrate global program efforts among multiple units of the university (IP2)	-	Align resources to support the strategic plan (RS3-G)
-	Develop faculty and staff skills to support global education (ER1-G)		
Sustainability			
S	Increase sustainable infrastructure (S8)	-	Develop and implement sustainability programs (IP5)
S	Enhance sustainability education and research (S9)	-	Develop faculty and staff skills to support sustainability (ER1-S)
S	Increase recognition as a model of sustainability (S10)	-	Reward sustainable practices (ER6)
-	Partner to promote global sustainability (S11)	-	Establish additional revenue sources (RS1-S)
-	Strengthen internal process to support sustainability (IP1-S)	P	Reduce expenses (RS2-S)
-	Prioritize sustainability in plan operations and residential life (IP3)	-	Align resources to support the strategic plan (RS3-S)
-	Promote sustainability across the curriculum (IP4)	-	Seek efficiencies through sustainable practices (RS4)

The tables below allow for summaries of about 350 words. Additional information can be included as an attachment.

Narrative Summary of Project

The Office of Facilities and Plant Operations is requesting $15,000 to cover the costs of installing a Smart Off-Grid Solar and Wind Hybrid Pole to supply power to the LED flood light fixtures to light the monument sign at this intersection of Pomona Road and Duerer Street. These are two heavily traveled County roads along the perimeter of the campus.

Earlier this year, the Office of Facilities and Plant Operations installed nineteen new signs at various locations around the Galloway Campus as part of the Signage and Wayfinding Project. This included four monument signs displaying the university's name and logo that were to be illuminated at night. Existing electrical service was available at three of the four, but not at the corner of Pomona Road and Duerer Street. The costs of drawing grid power to that location caused the office to take a second look, and consider solar and wind power, which have an initial saving of $30,000.

See attachment for additional information.

Assessment Plan: What are your anticipated outcomes and specific measurements for success?

The most obvious outcome is the provision of a sustainable alternative energy source for illuminating the Stockton University Monument Sign at the corner of Pomona and Duerer.

Other benefits include an initial installation savings of $30,000 vs grid connected electricity or contractor supplied solar panel array as well as improved aesthetic value by comparison. Annual Utility costs savings should provide 100% ROI within 15 years with, virtually, no-cost electricity afterwards.

The presence of the fixture in a prominent place also helps increase public awareness to the surrounding community of Stockton University as a technological leader in Sustainability and Alternative Energy.

Two professors, Chirenje and Jauregui, will download data from the poles for use in their Environmental Sustainability (SUST 2100) course. These data will be used to study alternative energy production and consumption with a focus on how they are influenced by a number of environmental factors.

Budget Summary

	Item	FY2019 July 1, 2018 – June 30, 2019	FY2020 July 1, 2019 – June 30, 2020	FY2021 July 1, 2020 – June 30, 2021	FY2022 July 1, 2021 – June 30, 2022	Notes/Comments (stipends, supplies, hospitality, etc.)
1.	Solar/Wind Hybrid Light Pole	$ 15,000.00				
2.	(includes shipping estimated at around $2000)					
3.						
4.						
5.						
6.						
7.						
	Total	$ 15,000.00	$ 0.00	$ 0.00	$ 0.00	

* Please note: a proposal can only receive 2020 funding for two fiscal years.

Funding Questions

Are you receiving any other University funding for this project?	Yes	
What department or academic school will your budget for this project reside in?	Facilities Planning and Construction	
Will you need funds for immediate use to begin your project?	◉ **Yes**	○ **No**
If so, how much?		
Date when funds will be needed		

Additional Support Questions

Will your project require support from Information Technology Services?	○ **Yes**	○ **No**
If so, please provide details		
Will your project require support from Plant/Facilities & Operations?	◉ **Yes**	○ **No**
If so, please provide details	Installation of pole, electrical lighting and wiring.	

Supervisor Approval/Support

Have you discussed your 2020 proposal with your supervisor, director, and/or dean and received their support?	Yes

* Please note: proposers who answer "no" to this question may be required to submit additional documentation in support of their 2020 application form.

CC: Dean/Director/Supervisor

Attachment: Narrative Summary of Pomona/Duerer Monument Hybrid Lighting Project

The Office of Facilities and Plant Operations is requesting $15,000 to cover the costs of installing a Smart Off-Grid Solar and Wind Hybrid Pole to supply power to the LED flood light fixtures to light the monument sign at this intersection of Pomona Road and Duerer Street. These are two heavily traveled County roads along the perimeter of the campus.

Earlier this year, the Office of Facilities and Plant Operations installed nineteen new signs at various locations around the Galloway Campus as part of the Signage and Wayfinding Project. This included four monument signs displaying the university's name and logo that were to be illuminated at night. Existing electrical service was available at three of the four, but not at the corner of Pomona Road and Duerer Street. The costs of drawing grid power to that location caused the office to take a second look, and consider solar and wind power, which have an initial saving of $30,000.

Facilities and Operations initially explored the option of having a new service line strung across Pomona Road to a new Atlantic City Electric pole to be installed on the Stockton side of the street. This would have required an easement by various State Agencies to allow ACE to install a pole in the public Right-of-Way zone. It was estimated to cost in excess of $30,000 in Application, Engineering, Permitting, Installation and Legal fees with a time frame from application to completion in excess of one year. The addition of a wooden electric pole with the associated transformer and wiring would also detract from the uninterrupted natural beauty of the site.

Facilities and Operations further explored an option to have a ground mount solar array installed by the signage contractor in the adjacent field to supply power for the lighting. While this design would do away with the need, and associated costs, for an easement, a quote for this design also came in at approximately $30,000. Ground mounted solar panel arrays would encompass a large footprint, require routine landscape maintenance and, similarly, detract from the appearance of the location.

Don Hudson reached out to me and asked that I confer with Patrick Hossay to come up with an alternative energy system that would increase Stockton's sustainable infrastructure while also reducing costs to the university, allowing an educational component and increasing recognition of the university as a model of Sustainability and Environmentalism. We discussed utilizing students to build various home-brew systems including a large wind turbine mounted on a 130-plus foot guyed truss tower and a ground mount solar array similar to that proposed by the signage contractor. Due to both aesthetic and code compliance concerns in this publicly accessible area, it was decided that we would pursue a pre-packaged system.

The smart hybrid technology pole will meet those objectives by putting the solar panels and wind turbine on display up in the air without overpowering the site or taking focus away from the monument sign. The black spun concrete will allow it to blend in with the natural surroundings while still maintaining the color and texture of the border of the monument sign. It also offers the capability to include brackets to mount a banner, if desired. A design with the "Green University" tagline would further increase recognition of Stockton as a cutting edge leader in alternative energy and sustainability.

Smart Off-Grid brings the Internet-of-Things to standalone solar and wind powered lighting systems. Through continuous real-time remote monitoring of energy production and consumption viewed alongside local weather forecasts used to predict potential future production capability, it allows tweaks

to the power output to be made to increase both the available capacity of the batteries over the short term as well as to extend their service life over the long term.

In conventional standalone systems, there is not a convenient way to keep an eye on the amount of energy produced or the reserve capacity available. Even in those systems that have included some monitoring capability, there is, generally, no way to make proactive adjustments to the use profile to maximize their efficiency. We have already run up against issues with our previous standalone hybrid wind/solar pole going dark on occasion. This was only discovered by accident while viewing the Quad Project webcams. Smart Off-Grid would lessen the frequency of such outages and provide us with immediate notification if any failure were to occur.

In comparison, that conventional standalone pole was purchased through the 2020 initiative for $7,000. It is constructed of powder coated extruded aluminum. At 18 feet tall, it is about 2/3 the height of the smart pole. It has only about 25% of the solar panel area and a less efficient wind turbine design. The manufacturer was unable to provide the monitoring capability. They were, also, unable to provide any documentation regarding parts, so we are unable to determine maintenance costs.

Increase sustainable infrastructure

Smart Off-Grid would be a unique addition to Stockton's impressive portfolio of sustainable infrastructure. While we have over two megawatts of solar photovoltaic production capacity, the only electricity storage capacity we have is in the Solar Workstation and the Hybrid Solar/Wind Light Pole purchased through previous 2020 initiatives. Energy storage is crucial to combating the "duck curve", the offset between times of midday peak production and evening peak consumption.

While this is only one pole, it would allow Students, Faculty and Facilities and Operations Staff the opportunity to test this Smart Off-Grid technology as a possible solution to the growing need to replace our 50 year old roadway and parking lot lighting that utilizes dated, inefficient technology and aging infrastructure that is well in excess of its 30-year projected service life.

Reduce Costs to the University

Anticipated Savings vs Grid Connected:

Stockton pays about $1,000 per year in electricity distribution and supply costs at current price levels on equal size monument sign lighting installations connected to grid power. In addition to the initial installation cost savings of $15,000, the energy transmission and commodity cost savings is anticipated to realize a 100% ROI within 15 years, even after factoring in scheduled maintenance.

Anticipated Maintenance/Support Costs:

$600-$900 battery replacement after 7-10 years. The OEM batteries come with 7 year manufacturer warranty. Because all components including batteries, turbines, solar panels and luminaires are manufacturer agnostic, Stockton would not be locked into a specific vendor for replacement parts.

$40 per year for cloud based data access that includes 24/7 monitoring, remote diagnostic testing and fault determination and proactive maintenance after initial 3 years.

Enhance sustainability education and research

Facilities and Operations will work with SUST and other programs to involve students, alongside Plant personnel, to study this technology. The data available through the Smart Off-Grid system would offer students real-time and historical production, consumption and carbon offset information. It would allow them to visualize the effects of weather on solar and wind energy production and battery storage

capacity. Tait Chirenje has expressed interest in this data for his SUST 2100 Environmental Sustainability course.

Facilities and Operations will make all monitoring data available to all interested students and faculty. We will look for ways to involve SUST in operational decisions about this technology going forward. We believe there will be opportunities for students and faculty to publish papers from the data provided by the Smart Off-Grid Hybrid Energy System. We will also work with students on generating publicity about this project, for example through showcases of student work.

Increase recognition as a model of sustainability

While Stockton utilizes a sizable amount of alternative energy solutions, they are concentrated in the core of the Main Campus, virtually hidden from public view to tens of thousands of daily passersby who don't venture down Vera King Farris Drive. Based on the most recent traffic counts available from the New Jersey Department of Transportation (2016/2017 data), the daily vehicular traffic at the corner of Pomona and Duerer is estimated at between 10,000 and 15,000 vehicles per day. This can be extrapolated to 15,000-30,000 passengers going through that intersection on any given day that would see the pole with it solar panels and spinning turbines and recognize Stockton as a leader in the field.

The Smart Off-Grid pole located at a major intersection along the Campus perimeter would stand as a beacon to Stockton's dedication to Environmentalism, Alternative Energy and Sustainability.

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Department of Engineering and Energy Management
Division of Facilities and Operations
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Phone: 609.652.4884
Fax: 609.626.5522

Attachments:

Image of Stockton University Monument Sign at corner of Duerer and Pomona

Images of Stockton University Smart Off-Grid pole rendering and similar pole design installation.

Images of similar installation used to light monument sign for City of Guelph, Ontario Canada

Sample Weather Forecast and Data Report available from Smart Off-Grid system

Sample Energy Production, Consumption and Carbon Offset Report

Additional Attachments:

Smart Off-Grid Energy System estimate

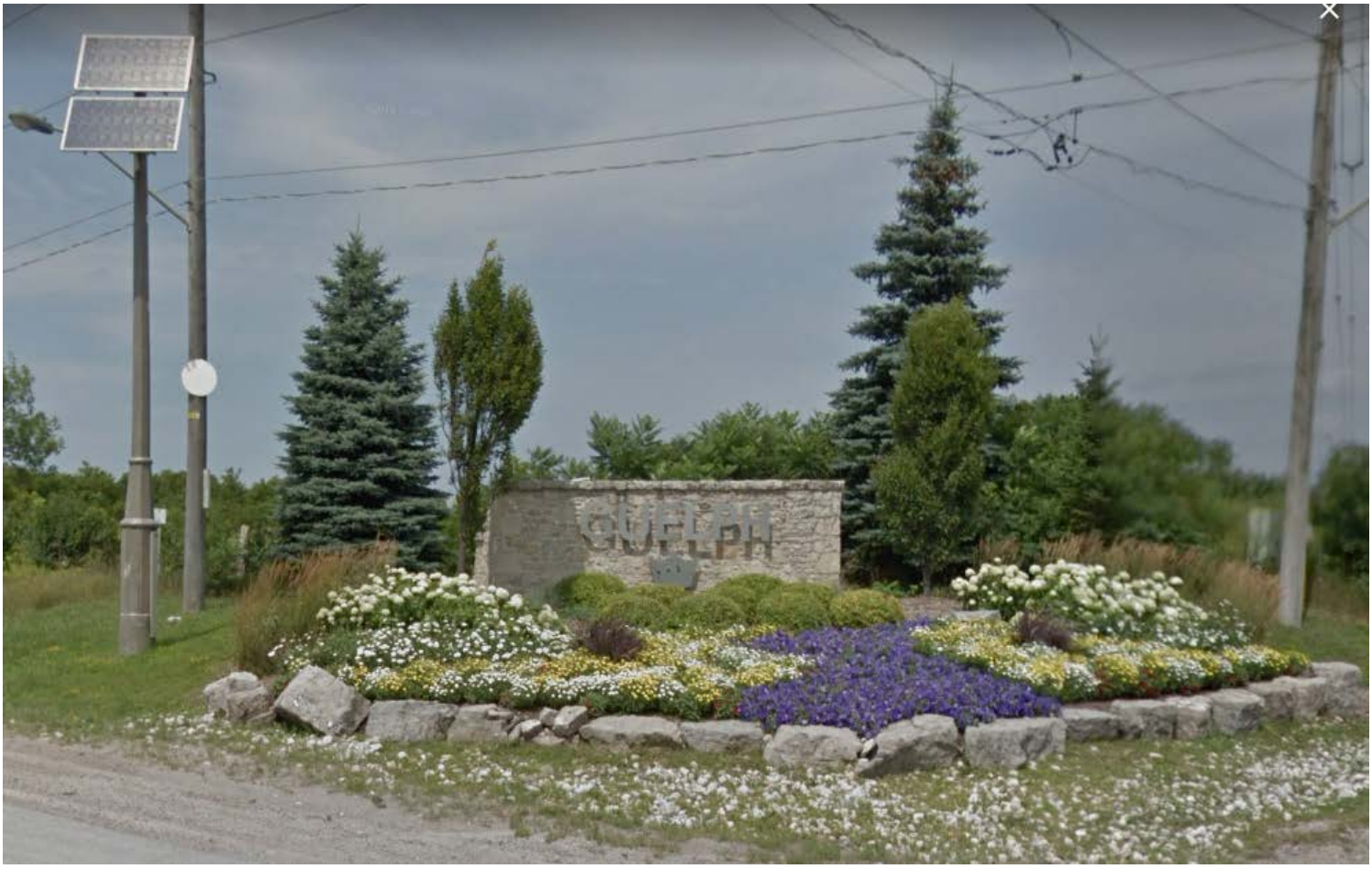
Stockton University Monument Sign

Pomona Road and Duerer Street

Rendering of Stockton Pole

Similar Pole - Earl Rowe Provincial Park, Ontario, Canada

Similar Installation – City of Guelph Ontario, Canada



(Stockton installation would include 4 staggered floodlights to eliminate the bright “hot spot”)

Sample Weather Forecast and Data Report

Monthly Report

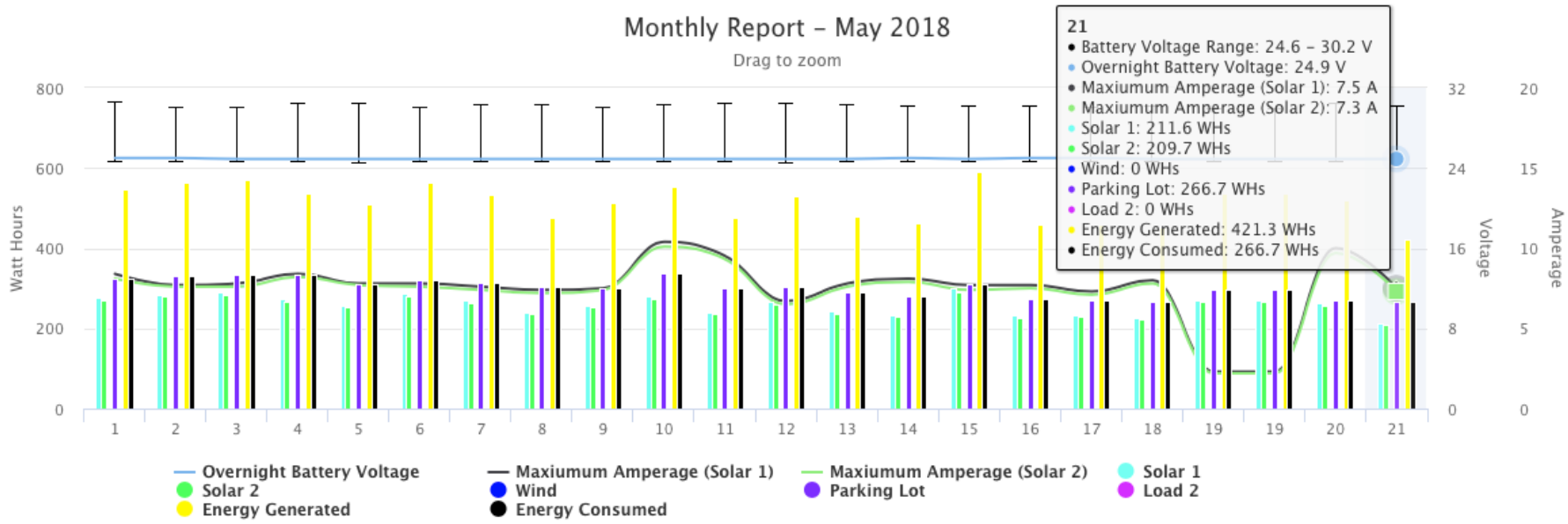


Chart Background Colour Legend

Almost reached Low Voltage Disconnect | Low Voltage Disconnect reached | Normal voltage

Weather Forecast

May 22nd
Rain in the morning.
Temperature 52.45 – 61.97 °F
Wind Speed 3.5 mph

May 23rd
Clear throughout the day.
Temperature 53.3 – 73.4 °F
Wind Speed 9.28 mph

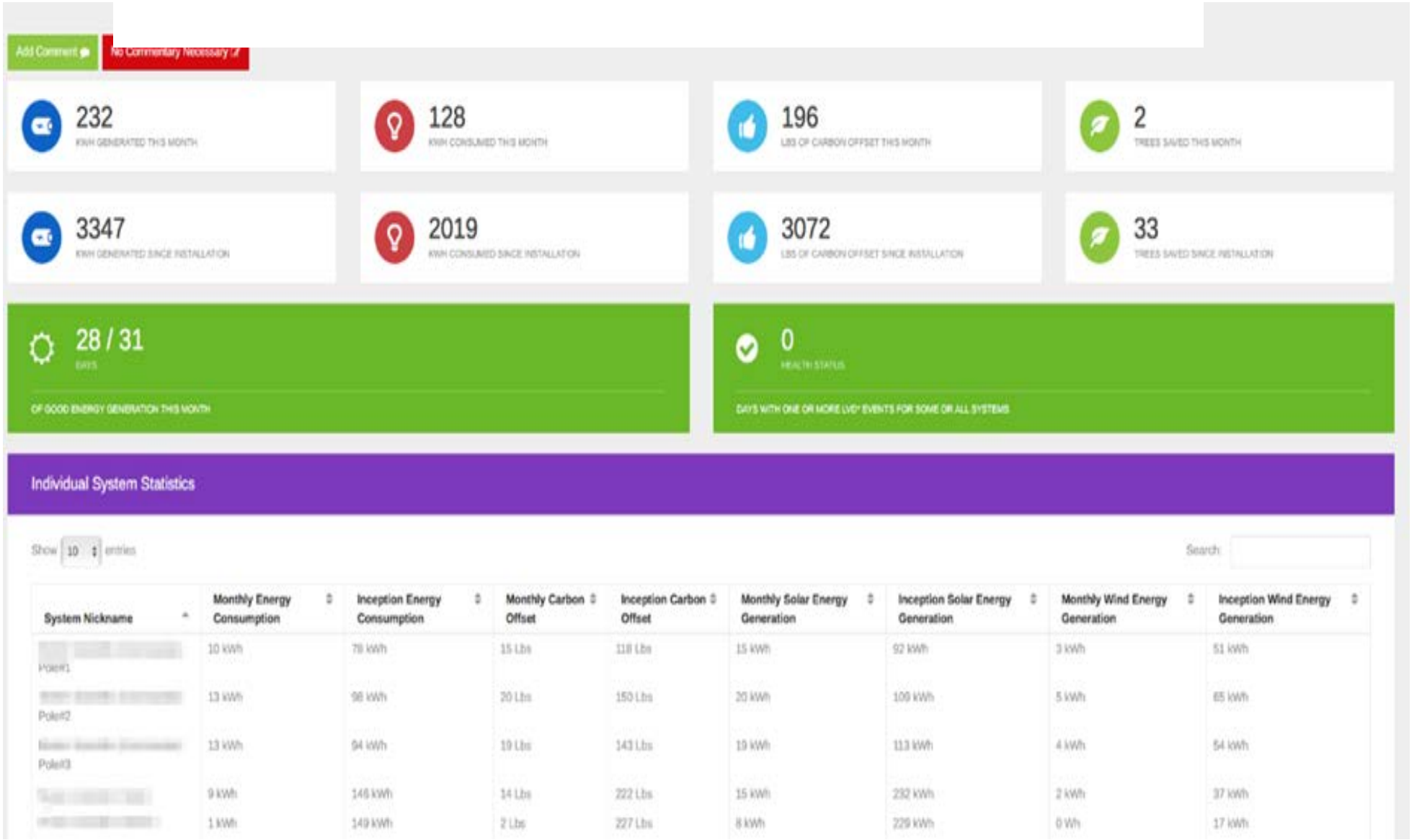
May 24th
Partly cloudy overnight.
Temperature 51.17 – 73.11 °F
Wind Speed 3.22 mph

May 25th
Partly cloudy until afternoon.
Temperature 56.66 – 77.2 °F
Wind Speed 10.72 mph

May 26th
Rain starting in the evening.
Temperature 60.45 – 74.65 °F
Wind Speed 6.38 mph

May 27th
Partly cloudy starting in the evening.
Temperature 54.25 – 68.42 °F
Wind Speed 8.8 mph

Sample Energy Production, Consumption and Carbon Offset Data Report



Illumient Proposal

Client: Stockton University
Contact: Michael Ferraro
Project Name: Sign Up-lighting
Quote# : 2018-1004
Presented by: Edward Paletsky
Quote valid for 60 days

ILLUMIENT
Smart Off-Grid Lighting

About Illumient

BEFORE THE SALE

- Site lighting and power analysis
- Configured to local conditions – never undersized
- Quality components
  - Extensive options
  - Decorative & industrial poles, color choices
  - Solar / Wind
  - Choice of luminaires, arms
  - Motion detection
  - Security cameras

INSTALLATION

- Drill and drop – no cabling/trenching cost
- No technical training required
- 14 Smart Meters on phone to validate install
- Built in communications for Smart Off-Grid
- Proven, tested to meet lighting standards

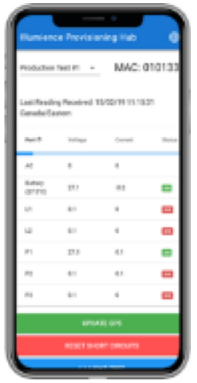
ONGOING

- Smart Off-Grid means 7x24x365 remote monitoring, control and servicing
- 80% reduction in maintenance costs
- Proactive maintenance, service calls eliminated
- Public website generated to promote green energy savings
- Partnership approach – Illumient is there after the sale too!

A technology to ***manage, control and maintain*** off-grid systems over the Internet

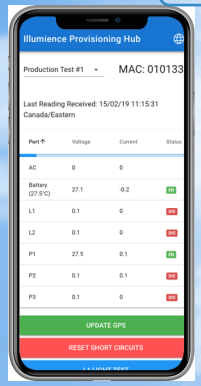
What is Smart Off-Grid?

A technology to ***manage, control and proactively service*** off-grid systems over the Internet



Why Does Smart Off-Grid Matter?

Smartphone App to Verify Installation



Brighter Lights w/ Configurable Profiles

Drill & Drop, Plug & Play Solutions

Remote Visibility & Control - Increases Reliability and Reduces Maintenance

SMART Controller Integrated Connectivity

Smaller Batteries Longer Life

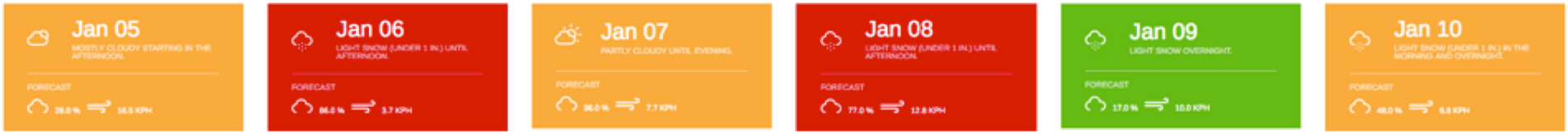
Most Cost Effective & Reliable System in the Market

Energy Analysis for Stockton University, NJ

The analysis performed is based on average weather over the last 30 years

Scenario	Solar Panels	Battery	Winter Energy (4 months)	Summer Energy (8 months)	Sample Light Wattage Profiles
A	1 x 300W with Daisy Turbine	1 x100ah	525 Watt hours	780 Watt hours	Winter: Max 35 Watts all night OR Custom Profile for customers needs Summer: Max 60 Watts all night
B	2 x 300W With Daisy Turbine	1 x 140ah	675 Watt hours	975 Watt hours	Winter: Max 45 Watts all night OR Custom Profile for customers needs Summer: Max 75 Watts all night
C	2 x 300W With Daisy turbine	2 x 100ah	675 Watt hours	1040 Watt hours	Winter: Max 45 Watts all night OR Custom Profile for customers needs Summer: Max 80 Watts all night
D	2 x 300W With Daisy Turbine	2 x 140ah	900 Watt hours	1365 Watt hours	Winter: Max 60 Watts night OR Custom Profile for customers needs Summer: Max 105 Watts all night

Includes Illumient Smart Off-Grid 6 Day Advanced Predictive Weather Forecasting



Illumient Dual Solar Off Grid System

Light ,Light Arm and cable from pole to up lighting Provided by Others

CBT-HDS-SCA-DS

Configuration:

- 26” Alexander Series Decorative spun concrete pole by StressCrete with internal power cabinet at base, the standard version is a direct burial type.
- Light , Light arm and Cable from pole to up lighting provided by others
- ***Clear Blue Technologies - Smart Off Grid Controller*** with cabling harness
- Includes 3 years of ***Illumience Smart Off-Grid cloud based monitoring and control***
- Includes 3 years of cellular communications for single pole projects, mesh/cellular or mesh/ethernet communications for multi-pole projects
- Dual 300 watt 60 cell solar panel and arm with mounting hardware
- Dual FFD 100ah AGM, thick plate, deep-cycle, lead acid batteries at 24vdc
- Dual 300 watt Daisy Wind Turbine
- AC to DC Inverter

Options:

- Motion sensing - integrated with controller add $ 300 ea
- Upgrade to Long Life Deep Cycle Batteries with the 7 year warranty

Pricing: **$ 10,590.78 each based on total of 1 unit**

This does NOT require a concrete base foundation

- Site soil analysis and civil engineering is responsibility of the customer.
- Shipping, Installation and Taxes are extra
- Payment terms 50% deposit, 50% prior to shipping O.A.C.
- Designed to AASHTO 90mph
- Should customer require ESA site inspection, this fee is not included by Clear Blue and is the responsibility of the customer and/or contractor.
- Customer understands that full title and ownership of each component of the system transfers to the customer when shipped (F.O.B shipping and/or C.I.F., as applicable)

Motion Sensing Option

Concrete Pole

ILLUMIENT

Dual Solar

Illumient Dual Solar Off Grid System

Light, Light Arm and cable from pole to up lighting Provided by Others

CBT-HDS-SCA-DS

Configuration:

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- Light, light arm and cable from pole to up lighting provided by others
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- Dual 300 watt 60 cell solar panel and arm with mounting hardware
- Dual DCLL 140ah AGM, thick plate, deep-cycle, lead acid batteries at 24vdc
- Dual 300 watt Daisy Wind Turbine
- AC to DC Inverter

Options:

- Motion sensing - integrated with controller add $ 300 ea

Pricing: **$ 10,989.01 each based on total of 1 units**

This does NOT require a concrete base foundation

- Site soil analysis and civil engineering is responsibility of the customer.
- Shipping, Installation and Taxes are extra
- Payment terms 50% deposit, 50% prior to shipping O.A.C.
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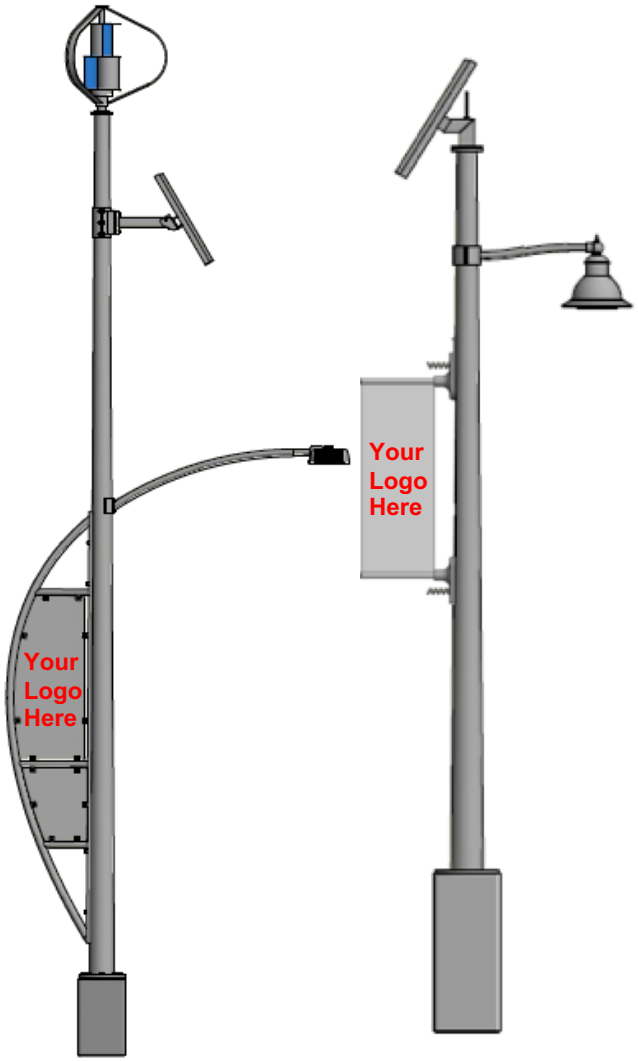
Motion Sensing Option

Concrete Pole

ILLUMIENT

Dual Solar

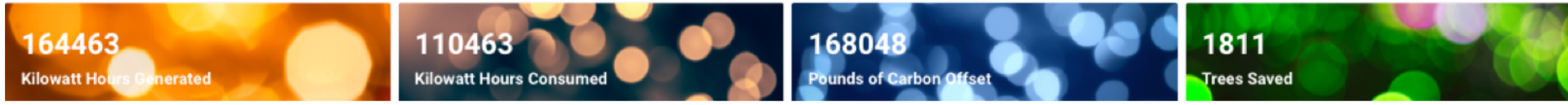


ILLUMIENT

Alternative Options

Illumience Cloud Features

Promote your sustainability!

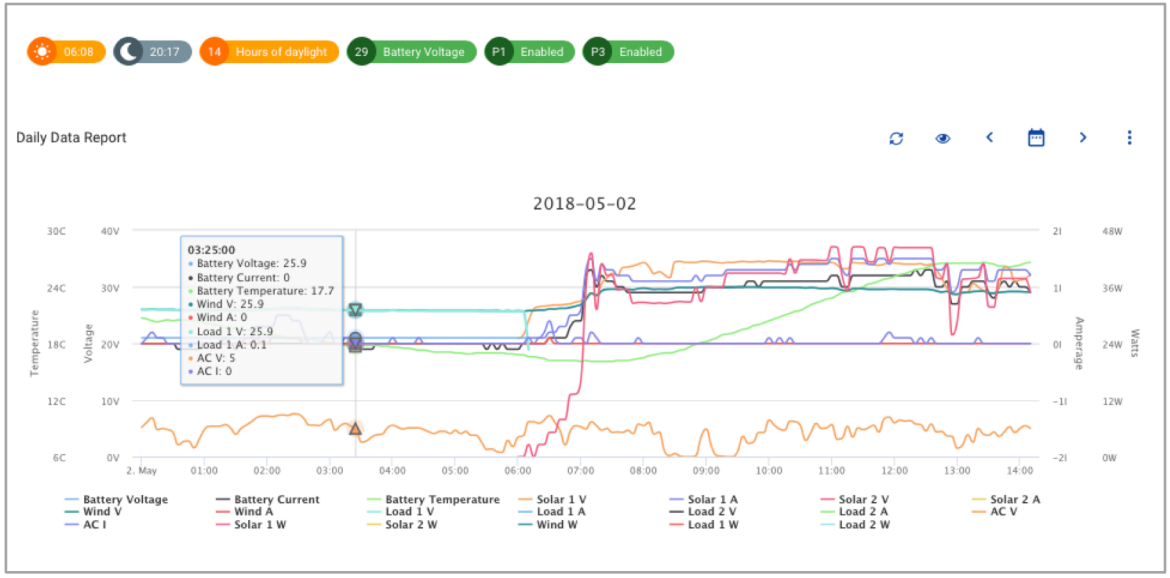


- **Validated install and provisioning via smartphone**
- **Proactive, automated maintenance**
- **7x24 system monitoring and status**
- **Hourly, daily and monthly online reports**
- **Set and change lighting and load profiles over the Internet**
- **Security camera integration**
- **Customizable alerts via email or SMS**
- **Easy to use web interface**
- **Predictive weather analysis**
- **Multi-language support**

Clear Blue Expert Service

- Based on Clear Blue's Illumience cloud-based software, it includes 7x24 monitoring, proactive maintenance, diagnostic testing and fault determination.
- Clear Blue supports your team with expert service from our own control center, where all of your systems are also monitored and managed.

Illumience Remote Management and Control



Specification:

- Smart Off-Grid remote management and monitoring service must be delivered by the supplier on an ongoing basis with remote technical trouble shooting and support
- Remote management and control is delivered via a Cloud-based service
- All communications between units and Cloud shall be fully encrypted
- System shall have ability to provide forward looking weather forecast for the site with indications of whether the system will run out of energy
- User configurable alarms for any system failures and also WARNING alarms should an anticipated outage be expected in the near future
- Installation remote commissioning test must be able to do a light test, solar panel test, battery test, short circuit tests, etc.
- Full ability to remotely control each individual system AND also all systems together as a group
- Ability to detect shading of the system during different times of the year and also be able to adjust individual systems based upon shading.
- Ability to adjust lights remotely to ensure system up time even during extra long ‘no sun’ and low sun periods, up to 5-10 days.

Entire system is fully remote controllable and adjustable via Clear Blue’s cloud-based Illumience software, including charging parameters, temperature compensation, remote solar panel troubleshooting and testing, emergency remote override, lighting profiles and more.

ILLUMIENT

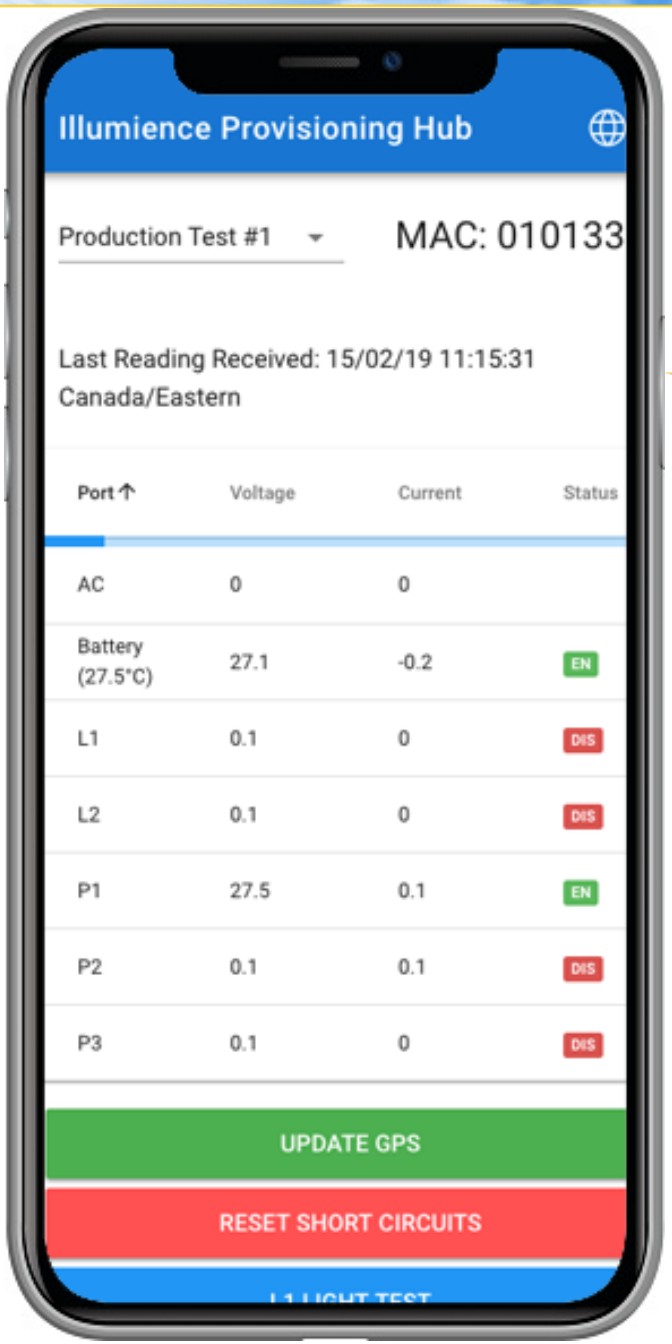
Off Grid Remote Management

Optional Internet of Things: Applications

- Security/CCTV cameras, other security devices
- Pedestrian traffic counters
- Smart traffic management, congestion relief
- Air quality/pollution and chemical monitoring
- Smart parking systems
- WiFi hotspots
- Feed for real time consumer apps (parking, traffic, safety, more)
- Sustainable energy/carbon credits
- Energy reduction and optimization

Motion Detection Option

- Lights turn off when no one is around, turn on when someone approaches
- Reduces battery draw when lights are not needed
- Motion sensors help with liability issues and safety
- Data captured provides valuable information on light usage, traffic patterns and more



Validated Installations

Smartphone app ensures proper install before your installer leaves the pole!

14 simultaneous meter readings

Where in the World is Clear Blue?

34 countries - 20 US states - 8 Canadian provinces

Numbers indicate # locations, not # systems at each site