Hostelling International USA

Network-wide Solar Feasibility Study, Installation and Stakeholder Engagement - USA

SUMMARY

Project description: Study of feasibility for the installation and use of solar panels in 38 hostels

Project type: Sun, Education in sustainability

National association: Hostelling International USA

Project location: Pilot assessments have been completed for HI San Diego Point Loma and HI Santa Monica. Thirty-six other hostels within the network will be assessed for system feasibility; with the expectation that 5-10 projects will be determined feasible and pursued within a Power Purchase Agreement.

Estimation of number of reduced tonnes of CO_2: Altogether a portfolio of 10 projects would reduce 152.03 metric tons of CO2 and account for approximately 2.5% of all non-seasonal, associate hostel CO2 emissions from electricity and natural gas consumption of just over 6,000 metric tons.
Total funds request: £ 7,000

Total project cost: £44,179 (known)

Annual £ saves and ROI (return of investment): With the proposed number of properties within a PPA, we anticipate a developer offering us a 15-20% utility rate reduction. We will continue to track and monitor utility consumption and associated savings. Savings will be reinvested into future efficiency project investment whether through our sustainability reserve or other budgeting processes.

On average across the network, we currently pay $0.18/kWh (£0.12) and $0.88/therm (£0.58). At a 20% reduced rate, we would anticipate saving $7,140 (£4,712) combined annually on the 159,656 kWh and 7,910 therms calculated above.

Why this project should be funded ahead of others: Versus only one solar thermal or photovoltaic project, this program will determine the feasibility and subsequently deploy on-site solar technology at all feasible locations across the HI USA network. A rapid shift to renewable energy is essential in mitigating global climate change. On-site renewable energy generation is a key component of our commitment and should be of any organization, but the upfront investment of any one system is a challenge.

In addition, the small footprints of most hostel roofs provide little surface area for a system that can achieve significant greenhouse gas emission reductions. In the United States, Federal and State solar incentives are accessed through taxation, further making it harder for HI USA as a non-for-profit to offset the upfront cost of the projects.

Considering these factors, approaching on-site renewable technology one project at a time would prove monumentally difficult. Therefore, we will work with a solar contractor to assess all of our hostels at once and package feasible projects together into Power Purchase Agreements. Within these agreements, we will partner with a private developer, who will own and maintain the systems, while we pay them a discounted rate for all of the energy the systems generate.

Our green team of 40 diverse employees network-wide will determine how this immediate savings will be reinvested into other efforts within our sustainability program, such as energy efficiency upgrades or sustainability engagement and education. Custom-tailored education and engagement programing will be developed within the hostels and regions where systems are deployed. This programing will educate guests and the community on the local and global need for renewable energy and other climate change mitigation strategies. Through resources and examples, the programming will also call on guests and the community to act both while traveling and at home.

We are certain that a number of significant projects will be up for consideration this year. Our hope is you'll select ours for two reasons: the potential for multiple system deployment over a relatively short period of time and the commitment our organization will take to make this program an effective education and engagement tool for guests, employees and the community.

DETAILED PROJECT INFORMATION

Purpose/objectives of the project activity

Introduction

HI USA hostels inspire a genuine understanding of people, places and cultures for a more tolerant world. We envision hostellers becoming caring world citizens who are catalysts for international exchange and understanding and who are stewards of the Earth. We aim to empower our guests, employees, and communities to be the change agent that is needed to create the sustainability future that humanity depends upon.

The global tourism industry accounts for 5-15% of global greenhouse emissions according to the UN Environment Program. Therefore, we must proactively address the negative environmental impacts associated with carrying out our mission.

Our network-wide sustainability management system is being constructed to meet internationally-recognized certification by adopting a triple bottom line and continuous improvement approach. As part of this process, we will recognize, prioritize and consistently work to address our greatest impact areas (both positive and negative) while making an effort to incorporate all feasible environmentally and socially responsible best practices overtime.

Hostel energy consumption and employee business travel account for the vast majority of our direct operation's greenhouse gas emissions. We are currently developing means for capturing business travel data to accurately calculate our carbon footprint.

We have a firm grasp on our energy consumption at our associate hostels. The table below is a summary of utility data from our gateway (large volume) associate hostels. The table also uses the EPA[1]'s average carbon equivalency factors across the US to estimate carbon dioxide emissions in metric tons.

Large Volume Hostel	Square Footage	Beds	Avg Annual OVNs	Avg Annual Electricity (kWh)	Avg Annual Natural Gas (Therms)	Carbon Dioxide (metric tons equiv.)
HI Boston	64,351	458	112,700	1,259,155	78,314	1283.53
HI Chicago	100,000	574	93,600	2,485,604	46,257	1959.33
HI Los Angeles Santa Monica	31,000	260	80,100	311,243	12,520	281.01
HI New York	85,000	672	207,000	1,352,258	49,524	1195.09
HI San Diego Downtown	18,394	147	34,000	112,197	6,244	110.48
HI San Francisco City Center	25,000	160	46,300	122,267	15,463	166.30
HI San Francisco Downtown	28,000	345	94,900	98,733	18,655	167.00
HI San Francisco Fisherman's Wharf	17,080	172	50,600	98,733	30,530	229.96
HI Washington DC	28,000	250	74,300	397,920	23,213	397.48

The above hostels account for approximately 90% of all electricity consumed at HI USA associate hostels. Annual electricity and gas consumption at these properties results in 5,790 metric tons of carbon dioxide, which according to the EPA[1] is equivalent to:

- The annual emissions of 1,219 passenger vehicles.
- The emissions from 13,786,199 miles driven by one vehicle.
- The emissions from burning 651,533 gallons of gasoline.
- The emissions from 0.002 coal-fired power plants.
- The annual emissions of 528 average American homes.
- The carbon sequestered by 4,746 acres of US forest in one year.

A multi-prong approach to addressing hostel energy consumption is in effect:

- The purchase of Renewable Energy Credits: tradeable, non-tangible energy commodities that match one MWh of electricity consumed to one MWh of renewable electricity generated. To date, RECs have been purchased for the above properties, matching approximately 90% of our energy consumption with Green-e certified, 100% American Wind Energy.
- The long-term pursuit of direct renewable energy purchasing where locally available and fiscally feasible.
- The inclusion of baseline energy conservation measures into our mandatory hostel quality standards. These include completing an energy audit, installing LED bulbs, appropriate hostel weatherproofing and insulation, and purchasing Energy Star[2] rated appliances.
- The ongoing adoption of energy conservation best practices by hostels in pursuit of sustainability certification.

- The ongoing development of energy conservation education materials by our green team, focused on guests and employees and to be used as resources for all hostels within the network. Our green team is open to all employees and is currently comprised of 40 members with various roles across the network. These green champions help set the course of our sustainability effort by adopting pilot programs, developing resources, and executing and revising our sustainability policy and plan.

- The assessment of all hostels for on-site renewable energy technology and deployment of such technology wherever determined feasible.

This last component of our strategy is the focus of this grant application; the most effective way to accomplish this priority is for us to pursue a power purchase agreement.

[1]United States Environmental Protection Agency

[2]US originated program establishing an international standard for energy efficient consumer products.

A Power Purchase Agreement (PPA) is a financial arrangement, in which a third-party developer owns, operates and maintains the renewable energy system, and a host customer agrees to site the system on its roof or elsewhere on the property and purchases the system's output for a predetermined period. We wish to pursue this option for several reasons:

- In partnership, we can take advantage of federal and state incentives and rebates where alone we could not. As a non-for-profit, we are not subject to income taxes. Without a tax balance, we cannot reap these credits.

- Purchasing a system outright would require, in most cases, 7 years before we are able to reinvest any savings into enhancing our mission. With a power purchase agreement, we can immediately reinvest savings into our mission and other sustainability efforts after installation. The savings per unit of renewable energy produced will increase with more hostels included into the PPA.

- Pursuing system ownership would require raising tens, if not hundreds of thousands of dollars for each system, making bulk deployment of systems difficult and slower, if not impossible. A PPA will package multiple projects into one portfolio allowing us to pursue multiple system installation at once.

- With maintenance of the system handled by the developer in a PPA, we avoid the cost of ongoing maintenance and repair as well as the cost and time associated with training our maintenance staff. By outsourcing to trained professionals, their proper preventative and ongoing maintenance will ensure the system is operating at optimal efficiency, which is in both our and the developer's best interest.

Program Objectives

1. *To understand the feasibility of on-site renewable energy technology across the entire network of hostels before deploying any one system.*

We are exploring the feasibility of rooftop solar photovoltaic technology since it is common within power purchase agreements and government incentives are widely available. Solar thermal will be considered in California, where progressive incentives exist.

Feasibility will be determined by the following:

- Building Ownership, Leasing, or Concession
- Roof Surface Area Availability and Structural Integrity
- Feasible Size of System and Corresponding Energy Produced
- Sun and Shade Factors
- Incentive Availability
- Current Consumption and Cost of Energy
- Estimated Cost of System

The assessment will be completed by a highly-accredited renewable energy firm. The firm will also facilitate the evaluation of developers for a power purchase agreement. They will remotely assess 38 hostels within our network to determine initial feasibility. On-site evaluations of prime candidates will be conducted by the firm as necessary. The final assessment reports are vital in establishing an effective power purchase agreement, as they will provide the developers with all necessary information.

As part of their assessments, the renewable energy firm will:

- Evaluate the utility consumption of each hostel
- Size systems and run simulation software to determine system output and associated energy and greenhouse gas reductions
- Perform site visits to determine sizing data and physical feasibility as needed
- Provide estimated project costs
- Provide financial analysis for the developer to determine the utility rate savings for HI USA
- Provide estimated rebates and incentives available for the developer to evaluate
- Assist HI USA in evaluating PPA developer options

2. The deployment of on-site renewable energy technology to additionally function as an experiential education and engagement opportunity aimed at encouraging action among our guests and community. One of the actions encouraged will be contributing to our sustainability reserve.

The deployment of these systems will function to enhance our existing network-wide sustainability messaging. On-site solar technology will be used as a key feature in in-hostel and network-wide sustainability signage, posts, and reports. Successful deployment will demonstrate our deep, intrinsic commitment to sustainability by taking significant action aligned to our mission.

Hostels and regions where systems are deployed will design programs to showcase their system. These programs will educate and inspire guests, our employees, and the community regarding renewable energy and climate change mitigation. HI USA programming, at large, is rooted in experiential learning.

These programs will provide an opportunity for guests to witness first hand our organization's personal pursuit of sustainability and how it fits into a larger local and global journey. Whether a demonstration for guests, a community gathering, or an organized educational series for students (just to name a few); our programming will challenge participants to think critically and empower them to make sustainable choices during their travels and at home.

Providing other local examples, resources and impact opportunities will be included in all of these programs. Specifically for employees, resources for procuring and/or installing renewable energy at home will provide within a suite of sustainability take-home resources on the intranet.

As part of a greater resource development strategy, we will raise donations from guests at front desks across our network as an avenue for donating to our sustainability reserve. HI USA does not collect front desk donations as a standing process nor has publically established our sustainability reserve.

One donation option being considered is offsetting the carbon footprint of a guest's stay in the hostel. Calculated using the greenhouse gas protocol methodology and converted to dollars using the true social cost of carbon as developed by the EPA and other federal agencies, the current offset is approximately $0.50/overnight. Periodic matching by the organization will be considered for engagement programing such as World Environment Day.

Our sustainability reserve will support in-network projects to reduce our carbon footprint and/or enhance other sustainability efforts such as energy efficiency upgrades. For this project, funds raised could support our education and engagement efforts. Also tied to this project, funds may need to be raised to purchase a new roof for a hostel so that it can support an on-site renewable energy system. For example, approximately $500,000 would be needed to replace the roof at one of our gateways. These projects will be considered for inclusion in our Resource Development fundraising menu, as well, to garner as much alternative funding as possible.

Methodology (How):

Below is our proposed project timeline.

Phase 1	**FALL 2015**
Secure contractor and pilot assessments	
Tier properties for assessment based on anticipated feasibility	
Establish program goals and timeline	
Secure funding for assessment	
Baseline data analytics	
Phase 2	**WINTER 2015 - SPRING 2016**
Desk assessment of properties	
Initial PPA developer negotiations	
Internal project stakeholder meetings and approvals	
Phase 3	**SPRING 2016**
Site audits of properties as necessary	
Develop deployment timeline	
Phase 4	**SPRING 2016 - SUMMER 2016**
PPA developer negotiation	
First phase final site evaluations and system designs	
Legal and regulatory requirements	
Internal project stakeholder training and education	
Guest and community education/engagement launch	

Phase 5	SUMMER 2016 - FALL 2016
First phase site deployment	
Ongoing guest/community education and engagement	
Ongoing project stakeholder meetings	
Phase 6	**FALL 2016 - TBD**
First phase data monitoring and analytics	
First phase external communication	
Second and thereafter phase deployment (Roofs addressed)	

Once assessed, hostel projects will be prioritized according to immediate feasibility. Our first phase aims to include approximately 5-10 hostel projects. Hostel roofs requiring an upgrade prior to deployment will be included in our second and subsequent phases. For these subsequent phases, we expect installing the technology will be feasible during the roof replacement and will plan accordingly.

A multi-disciplinary team of employees from hostel development, operations, education, engagement, finance, resource development, and marketing will be needed to effectively execute this project. All stakeholders will meet early in the process to collaboratively develop and implement an action plan. Marketing, education and engagement efforts tied to each project will be much more impactful and effective with their stakeholders included from the beginning of the process.

Monitoring plan:

The monthly production of each renewable energy system will be tracked alongside each hostel's energy consumption. The renewable energy generated will be benchmarked against projected system production and cost savings as outlined in the initial proposals. Aggregated production and consumption data from across the network will be calculated, monitored and reported on a quarterly basis. This data will support and be used within our marketing, engagement, and education efforts.

Contribution of the project activity to sustainable development (Sustainable Development Matrix) (For example, you might include details of other environmental, social or economic initiatives which will complement this project):

As mentioned in detail above, the deployment of on-site renewable energy technology will function as an educational and engagement tool across our network of hostels. Efforts such as these are essential to demonstrating our commitment to environmental and social responsibility and thereby living our mission.

Such pursuits of on-site renewable technology are seen as best management practices that all organizations should follow who are committed to a sustainable future. This is indicated by its inclusion in many sustainability certifications, including Hostelling International's own HI Q&S. Our approach to this pursuit will ensure that we fully understand and reach the solar potential of our entire network and thereby meet and exceed a key criterion of sustainability certification.

Environmental impacts:

Small-scale renewable energy technology deployment is essential to climate change mitigation. This strategy is specifically important in the United States where the localized electrical grid is not effectively equipped to transport electricity generated from prime renewable energy locations such as solar in the southwest, to large energy consuming locations such as cities in the northeast. Therefore, it is essential that every viable location for renewable energy technology is exploited.

Renewable energy technology reduces our dependence on fossil fuels that produce greenhouse gases through their extraction, production, transport, and combustion. Global climate change is driven by the warming of the atmosphere, a direct result of the unprecedented human-caused release of greenhouse gases. Symptoms of global climate change, specifically sea level rise and shifting climatic patterns, will have a permanent, devastating impact on all life on Earth as coastal zones become inundated with water and habitats are drastically altered.

Additionally, the world's oceans, as a result of the high atmospheric concentration of carbon dioxide, are absorbing this prime greenhouse gas in a process called ocean carbon uptake. As a result of absorbing an estimated 30-40% of all carbon dioxide released each year (according to NOAA[3]), the oceans are becoming increasingly more acidic, directly threatening the survival of calcium carbonate shellfish, coral reefs, and dependent habitats and ecosystems.

Estimations of emission reductions (CO_2e tons):

Initial pilot reports were completed for HI San Diego Point Loma and HI Los Angeles Santa Monica to establish confidence within our solar contractor. Energy savings calculated within the reports were converted to carbon dioxide emission reductions below:

HI San Diego Point Loma

A hybrid system of 6 solar thermal panels and 49 solar photovoltaic panels. Water flows directly through the thermal panels.

6 thermal panels =

(378 therms of natural gas saved annually) x (0.005302 metric tons CO2/therm*) = 2.01 metric tons of CO2 reduced annually

49 solar photovoltaic panels =

(19,957 kWh produced per year) x (0.000689551 metric tons CO2/kWh*) = 13.76 metric tons of CO2 reduced annually

The 15.77 metric tons of offset CO2 accounts for 45.5% of the hostel's annual CO2 emissions from electricity and natural gas consumption of 34.63 metric tons.

HI Los Angeles Santa Monica

A solar thermal system consisting of 35 solar thermal collectors and a storage tank. A heat transfer liquid flows through the panels and around a separate tank heating water within the tank in the process.

35 thermal collectors =

(3,388 therms of natural gas saved annually) x (0.005302 metric tons CO2/therm) = 17.96 metric tons of CO2 reduced annually

The 17.96 metric tons of offset CO2 accounts for 6.4% of the hostel's annual CO2 emissions from electricity and natural gas consumption of 281.01.

CA Portfolio Estimation

Solar thermal will only be considered within California given existing state incentives. Projecting that we can find two more projects equivalent to that at HI San Diego Point Loma and another equivalent to HI Los Angeles Santa Monica, the estimated carbon dioxide emission reductions for CA projects are below:

Three projects x (15.77 metric tons of CO2 reduced) = 47.31 metric tons of CO2 reduced

Two projects x (17.96 metric tons of CO2 reduced) = 35.92 metric tons of CO2 reduced

Collectively, the 83.23 metric tons of CO2 accounts for approximately 7% of all associate CA hostels' annual CO2 emissions from electricity and natural gas consumption of just over 1,200 metric tons.

[3]US National Oceanic and Atmospheric Administration
*Calculations provided by the US Environmental Protection Agency, and account for the annual non-baseload CO2 output emission rate from 2010

Remaining Portfolio Estimation:

Varying sun hours per day across the country will affect the productivity of similarly sized systems from region to region, especially in contrast to sunny Southern California. Still, we used the solar photovoltaic system designed for HI San Diego Point Loma as a guide for the calculations below.

Five projects x (13.76 metric tons of CO2 reduced) = 68.8 metric tons of CO2 reduced

Altogether a portfolio of 10 projects would reduce 152.03 metric tons of CO2 and account for approximately 2.5% of all non-seasonal, associate hostel CO2 emissions from electricity and natural gas consumption of just over 6,000 metric tons. The electricity produced by the photovoltaic panels (159,656 kWh) would account for nearly 2.5% of overall electricity consumption at all associate hostels, while the natural gas saved by the solar thermal panels (7,910 therms) would account for nearly 3% of our total natural gas consumption.

- Saved Funds and ROI (return of investment) (How much do you anticipate saving on power bills after completion of the project? Please provide calculations. Please indicate what alternative use will be made of savings generated)

  With the proposed number of properties within a PPA, we anticipate a developer offering us a 15-20% utility rate reduction. We will continue to track and monitor utility consumption and associated savings. Savings will be reinvested into future efficiency project investment whether through our sustainability reserve or other budgeting processes.

On average across the network, we currently pay $0.18/kWh and $0.88/therm. At a 20% reduced rate, we would anticipate saving $7,140 combined annually on the 159,656 kWh and 7,910 therms calculated above.

Why should this hostel be funded ahead of others?

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