REQUEST FOR PROPOSALS

Isle au Haut Solar + Storage Islanding Minigrid

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Administered By:

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isle au haut electric power company
Founded 1969

U.S. DEPARTMENT OF ENERGY | OFFICE OF ELECTRICITY

Sandia National Laboratories

NOTICE

This Request For Proposal ("RFP") to provide a comprehensive, integrated new renewable energy generation plant incorporating; solar photovoltaics, battery energy storage, and new diesel generation, was prepared by Bryan Carroll for the Isle au Haut Electric Power Company (POCO) with the cooperation of Sandia National Labs (SNL) and the Department of Electricity's Office of Electricity. POCO, nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by any of the agencies listed above. The views and opinions of the author expressed herein do not necessarily state or reflect those of any agency thereof. POCO, or any stakeholder or representative of the POCO, providing assistance or expertise, shall not be responsible in any way in connection with erroneous information or data provided to it by any third party, or for the effects of any such erroneous information or data whether or not contained or referred to in this document. POCO reserves the right to not proceed with the initiative as well as the right not to discuss the initiative further with any respondent without reason.

TABLE OF CONTENTS

PREFACE

Isle au Haut Electric Power Company, founded in 1969 by Patrick Tully, Stanley Dodge, Jr., Harold Turner, Jack MacDonald and William Barter, and today consisting of 121 members at the time of this proposal, have prepared this document to invite qualified solar engineering, procurement, and construction (EPC) companies, wishing to submit qualifications and proposals to design, develop, finance, build, and maintain a turnkey community-scale, islanding solar+storage minigrid plant. This integrated renewable energy supply system RFP represents a landmark opportunity for organizations, both regionally and nationally, who have demonstrated a track record of success in the delivery of resilient energy projects, and who have the skills and resources available to power a unique and remote island community. In the face of a rapidly changing climate and fluctuating energy costs, our ratepayers, working families, school children, and full and part-time residents that call Isle au Haut home, deserve predictable and reliable power at a fair cost.

ACKNOWLEDGEMENTS

The author would like to acknowledge the continued efforts of the volunteer Board of Directors, current Board President Jim Wilson and Board Vice President Nick Filler, and employees, both past and present, of the Isle au Haut Electric Company, for their continued support and dedication to deliver the most reliable electrical service at fair rates. Also, a huge debt is owed to the ingenuity, engineering, line construction and maintenance of past managers and Chief Engineers, particularly Pat Tully (Founder), Parker Waite, and Bill Stevens. Thank you all for your stewardship. Isle au Haut Electric Power Company would also like to acknowledge the efforts and support of Russ Weed (CleanTech Strategies), Dan Borneo (Sandia National Labs) and Dr. Imre Gyuk (DOE Office of Electricity) for their leadership, technical assistance and support throughout the administration of this RFP.

1.0 Executive Summary

Electricity for the Town of Isle au Haut is supplied by Versant Power, at the current standard offer rate ($0.0687/kWh; plus additional transmission and delivery charges), via a 6.5 mile, single phase submarine cable. Installed in 1983, this #2 AWG, 15kV, 7-strand, single conductor URD cable, was purchased from Hendrix Cable (Milford, NH), and painstakingly laid on the seafloor in 6 sections. Due to an informed product selection and methods and location of installation, the cable has performed fault-free for 38 years. At the time of installation, the cable was financed by the co-op members through an $1800 compulsory fee. The cable cost $90,000 to install, leaving the balance of the budgeted $110,000 to be saved for eventual cable replacement in an expected 10 years. Today, 38 years after the installation, the cable is wholly owned by the not-for-profit rural electric cooperative (d/b/a Isle au Haut Electric Power Company) and its 121 members.

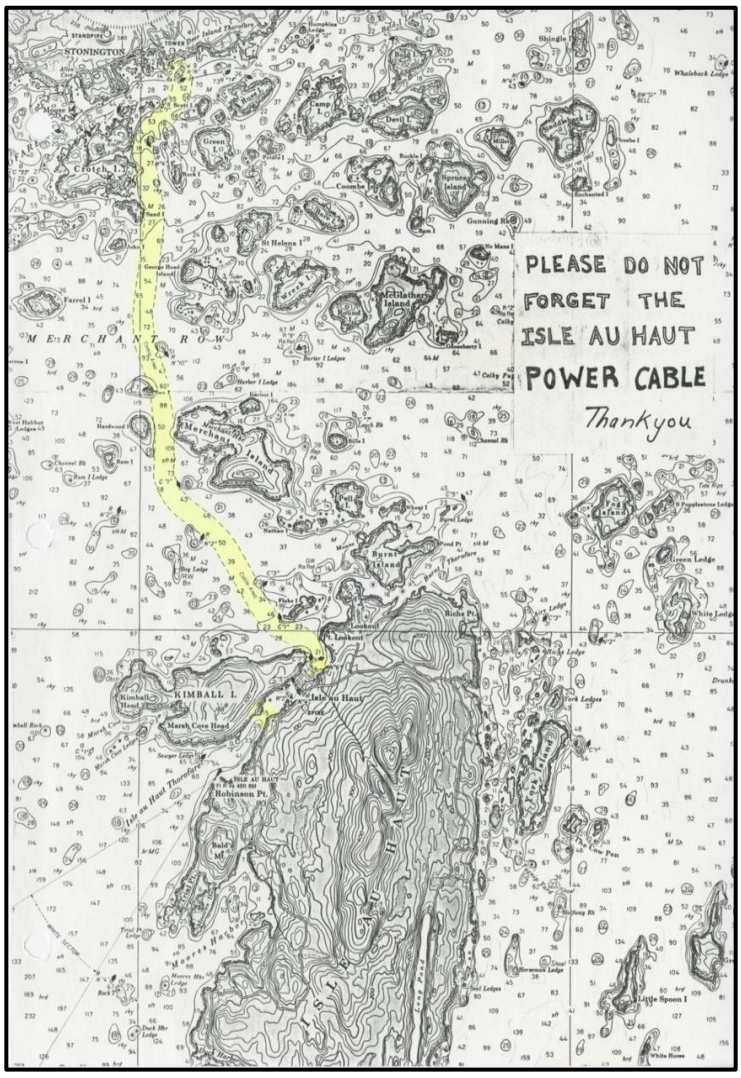

Figure 1. Nautical chart with markings of new power cable line in 1983. This chart was distributed to local boaters and fisherman to avoid entanglement, and also submitted to U.S. Army Corp of Engineers and Environmental Protection Agency for permission for the project.

Prior to the installation of the cable and interconnection to the local Bangor-Hydro macrogrid at the intersection of Colwell's Lane and Bayview Ave. in Stonington, where a 7.2kV spur and transformer were placed by Stonington and Deer Isle Electric Company, island energy was supplied and managed by the Isle au Haut Electric Power Company, incorporated in 1969, with demand being met by several diesel gensets at a subscriber rate of $0.32 kWh. Today, a single diesel genset meets the load of the island only during mainland service interruptions, but it is expected that if the cable were to fail, self-generation on island would raise the subscriber rate to ~$0.65/kWh (based on current cost of diesel and operational costs) up from current rate of $0.32/kWh.

Management of the co-op has to be based on the assumption that failure of the cable is likely imminent, an assumption confirmed by the manufacturer of the cable. With the issuing of this RFP, for the design of a new community (grid-scale) solar energy and energy storage plant, as well as all related rights to generation output, energy, capacity, environmental attributes, and ancillaries, stemming from standalone solar-powered generation or solar plus

TECHNOLOGY	Base Proposal: New Solar Photovoltaic (inclusive of 200 kW procured but not installed0) Base Proposal: New DC- or AC-Coupled Battery Energy Storage System ("BESS") with MPPT and generator controls Base Proposal: New EPA Tier 4 diesel generator, or equivalent, (<65db), with generator optimization software and associated auto switchgear and a microgrid software control unit with remote monitoring
SOLAR ARRAY SIZE	Minimum: 200 kW_{DC} Maximum: TBD, but site limited
BESS SIZE AND DURATION*	Minimum: 500 kWh_{AC}, or 12 hours of average load (see Table), whichever is greater in the winter even on the best days we will need 18 hours, storage is costly but so is diesel. Maximum: To be proposed by respondent
CONSTRUCTION SCHEDULE	Proposed construction milestones with dates
COMMERCIAL OPERATION DATE	To be proposed by respondent with submittal of construction schedule
CONTRACT	Base Proposal: PPA for entire energy generation Base Proposal Option: PPA with step-in purchase rights, or ownership flip Base proposal options as above with heat pump thermal storage use at half normal $/kWh
PRODUCTS	Base Proposal Solar: Premium solar modules (mono or multi) Base Proposal Racking: Driven pile, ground screw, or ballast. Base Proposal BESS: lithium ion, supercapacitor or other battery at an equivalent technology readiness level, that is modular and able to accommodate increased storage due to increased heat pump demand Base Proposal Generators: new 100kW_{AC} generator with Tier 4 emissions; back-up of existing 250 kW_{AC} generator Microgrid controller that maximizes use of excess solar for heat pumps and other possible storage
PPA TERM	Base Proposal Solar production: 20 years Base Proposal BESS: 20 years with options to oversize and/or augment with power and energy capacities guarantee
GENERATION SHAPE	Base Proposal Solar: As-Generated Base Proposal Solar: Fixed Shape Base Proposal BESS: Extend the as-generated solar into morning and evening peak hours Base Proposal BESS: smooth the as-generated solar into more expected solar blocks during daylight hours, or, Base Proposal BESS: create a dispatchable solar resource
PERFORMANCE GUARANTEE	To be proposed by respondent (see PPA term)
PRODUCT AND WORKMANSHIP WARRANTIES	To be proposed by respondent, but minimum workmanship warranties of 5-year, and product warranties, and extended warranties, with minimum of 15 years BESS: 10 years
PRICE	Base Solar + BESS Proposal: Fixed rate ($/MWh) with or without an annual escalator

Table 1. Bid criteria stipulated by POCO.

storage generation project. Upon cable failure, or disconnection, POCO's generation, transmission and distribution system will be a wholly-owned and restricted transmission system, with no interconnection to ISO-New England ("ISO-NE"), which oversees the operation of Maine's bulk electric power system creating a true islanded grid.

POCO will accept proposals from any independent power producer, solar+storage developer, electric power marketer, or any consortium bid group consisting of a qualified technology vendor and electrical contractor, that has solar and storage facilities available, existing and in operation, and operates within the ISO-NE transmission system?? ("Respondents","Bidders"). POCO requires proposals for Third- Party Power Purchase Agreements ("PPA","Agreements"), and PPAs with ownership transfer models, as an option to the Base Proposal. POCO is soliciting only proposals meeting the criteria listed above in Table 1.

POCO is looking specifically at the risks associated with a PPA business model, and will further evaluate bidder proposals in part on how such risks are identified, allocated, and mitigated under the PPA.

For Reference:

***Historical reports of hourly interval load data provided upon request for the period 2018-2020 or longer if required for sizing or other reasons.**

****Detailed site dimensions, restrictions, and covenants to be provided by POCO upon request with facsimiles of those documents provided in this RFP.**

2.0 Background

The project will be located on the island of Isle au Haut, Maine, at a predetermined site, on POCO-owned land, at a place called Coombs Mountain (44.080274, -68.613192). The land is on a south-facing slope; it is mostly exposed ledge and fractured glacial rocks covered by a very thin layer of organic duff. There are no wetlands or vernal pools and no habitations within about 850 feet of the site. Further, and as a benefit to interconnection, the site is adjacent to the existing transmission line of the island electrical distribution system with poles already installed on site adjacent to the expected point of interconnection.

Though the population on the island increases in the summer months, the number of POCO customers connected to the system remains stable throughout the year, with 140 grid-connected and serviced watt-hour meters. With the increase in population during the summer months, POCO is considered to be a summer-peaking utility, with 50 percent of its sales occurring during the June – October period. Over the past 3 years, annual energy purchases have been steady, with a standard deviation of 2763 (to the nearest kWh), and with two peaks throughout the day. A mini-peak (33 kWh) occurs around 10 am daily, and a larger peak occurs around (38 kWh) 10 pm.

The project seeks to increase the efficiency of POCO's power generation and provide a demonstration for a renewable microgrid system that could be replicated on other islands and in other small, remote communities. A number of thermal storage heat pumps are being installed with the expectation that they will be able to use otherwise curtailed solar power. At 16¢/kWh, heat pump users (half-rate) will reduce their heating costs by approximately 50% according to commonly available heat pump heating data. The other 50% becomes POCO revenue. POCO will charge half our normal rate for use off this excess. For example, with 10 heat pumps installed, the benefit will be the equivalent of ~30% of the value of the

energy produced by the solar array. Microgrid software that is able to maximize this benefit to the community and the heat pump program will be needed to facilitate this.

It is expected that the project awarded to the winning bidder will replace the outdated, analog switchgear, allowing any generators to seamlessly mate with the BESS and run at maximum efficiency. To help facilitate this, a 40'x20' frost-protected concrete slab is already installed and will be the base for any proposed insulated intermodal containers, containing a minimum of 500 kWh_{AC} of storage. Additionally, the slab was designed and poured to accommodate another intermodal container to house inverters, control equipment, transformers or associated switchgear of a proposed solar + storage solution including a new generator.

2.1 Generation, Transmission, and Distribution Facilities

As a utility that is geographically isolated from the mainland grid, POCO must rely on the supply of energy from Versant Power, a regulated electric transmission and distribution utility serving 159,000 customer accounts in northern and eastern Maine. Versant Power, like its predecessor Emera Maine, is an energy supplier, providing reliable service to the Deer Isle Peninsula and Isle au Haut via the Brooksville Substation in Sedgwick, ME (44 kV primary/12.5 kV secondary/7.5 MVA nameplate capacity). Though Isle au Haut is part of Knox County, Maine, POCO is part of the Versant Bangor-Hydro District, as we are geographically adjacent to Hancock County, Maine. From the southern tip of Stonington, Versant meters energy supplied to Isle au Haut at the current standard offer rate.

Current generation on island, during cable disconnection, is accomplished through standby diesel generation, co-located where the cable comes ashore and adjacent to our substation. A single Olympian D200 standby generator rated at 250 kW_{AC} supplies and meets all loads on island. This generator, not located at the solar site, is expected to be included in any proposal as a redundant energy source, but will continue to utilize a Versant approved manual switch operated only by POCO personnel in the event of low solar, low storage, and no power supply from cable conditions. Exclusive of this inventory of equipment, proposals must include a new generator, solar, battery energy storage with seamless integration into existing transmission and distribution.

2.2 Electricity Usage, Rates, and Costs

Due to the nature of construction, installation, repair, replacement, and improvement of diesel generation, transmission, and distribution facilities on island, POCO determined a subsea cable to be the most cost-effective solution in 1983, offsetting the burden of kWh rates up to $0.65/kWh, based on cost of diesel and operating costs. Today, with the subsea cable in operation, the island annually consumes about 280,000 kWh (Table 2) of electricity, with 50% of its energy supply and demand occurring between June and October (detailed bill history upon request), and a 30 minute peak load of roughly 75 kW.

YEAR	ENERGY PURCHASE	STANDARD OFFER SUPPLY
	kWh	$/kWh
2018	281640	0.0732
2019	286800	0.0837
2020	282507	0.0688

Table 2. Isle au Haut Electric Power Company annual historical purchases (2018-2020).

Month	Energy Purchase
	kWh
JANUARY	2188
FEBRUARY	1899
MARCH	1850
APRIL	1874
MAY	1957
JUNE	2499
JULY	3462
AUGUST	3476
SEPTEMBER	2765
OCTOBER	2736
NOVEMBER	2427
DECEMBER	2283

Table 3. Isle au Haut Electric Power Company annual historical monthly purchase average (2018-2020).

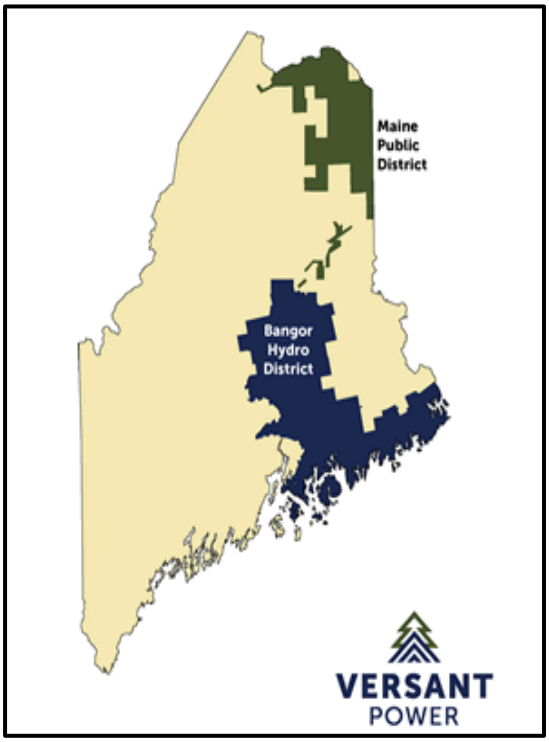

Fig 2. Versant Power supply districts

Due to the nature of maintaining a rural grid, with a low meter density, inclusive of the transmission and distribution infrastructure, operating costs average around $110,000/year, which helps determine both the fixed meter fees and user fees (see below). The current rate structure, for members of the cooperative, is based on the following conditions:

Fixed meter fee	**$25.00/meter/month**
Fixed user fee	**$0.32/kWh**
Unit cost of electricity	**$0.46/kWh**

The Maine Public Utilities Commission (MPUC) approved a Partial Stipulation dated September 16, 2020, and signed by the Isle Au Haut Electric Power Company and the Office of the Public Advocate (OPA). The stipulation resulted in an increase of $9.00 in the monthly fixed meter charge paid by each of the Cooperative's customers. Prior to this recent meter rate increase approval by MPUC, POCO had not raised, or adjusted any fees, in 15 years.

POCO, like all customers in the Bangor Hydro District, have a choice of who supplies the electricity that Versant Power delivers to our meter. On an annual basis, POCO evaluates the offers by regional power marketers, but regularly opts out of a competitive electricity provider bid, instead opting for Standard Offer service, a default service put out to bid by the Maine Public Utilities Commission. Over the past 3 years, the standard offer has had a high of $0.0836 and a low of $0.0687. For 2021, rates are expected to dip more.

3.0 Solar Proposal

In 2015, POCO held several community meetings to explore the options for Isle au Haut's energy future. Alternatives such as a new cable, diesel only self-generation, wind generation, solar, micro-turbines, fuel cells and even tidal power were discussed. A comparison of the most technically and economically feasible alternatives was conducted. The project has been the subject of an on-going community-wide discussion for nearly six years and has garnered very strong community support. In 2016 after a discussion of the alternatives, the member-owners voted unanimously to proceed with a solar option; it confirmed that decision at its annual meetings in 2017, 2018, 2019, and 2020. Two special Isle au Haut Town meetings were called to vote on the sale of

Town land to the company for construction of the solar array; one of these votes was unanimous; the other had 80% in favor (the 20% opposed were against the sale of the land but not opposed to the solar project).

3.1 Solar Site

The proposed integrated energy system will be installed and operated on the Coombs Mountain (Figure 5) site previously described. It is anticipated that a new 7.2kV feeder line will be installed from the site and will run approximately 4,900' to the termination point of the undersea cable located adjacent to the Isle au Haut school and near the existing back-up generator house and substation. Based on this assumption, POCO has already moved the primary line on adjacent poles, installed additional neutral brackets, and the necessary poles to bring primary power to the solar site. There is currently no transformer at the solar site, but the cost of installing any new step up transformer can be excluded from any bid as POCO will assume the cost of purchase and installation prior to system going online.

Access to the solar array will be provided by an existing dirt road on the parcel, which will lead to an equipment pad and an accessible road extension. The access road extension runs along the east side of the site and reaches the northernmost point of the array field in order to provide access to each row of the array field. A locked vehicle gate will be used to control site access proceeding construction. At this time, all necessary land preparation has been completed in order to allow for an accelerated design and installation of a ground-mounted solar array.

The ground-mounted photovoltaic system proposed will support the modules at an expected fixed tilt of at least 40 degrees in order for POCO to recognize a greater solar fraction in the winter months supporting an innovative heat pump program (Appendix A). For example, an according to our models, a fixed tilt of 45 degrees will provide approximately 11% more power around the winter solstice when energy supplies are the tightest. At this tilt angle it will diminish power around the time of the summer solstice when there is considerable excess, almost no air conditioning and no other ready market.

POCO has proactively purchased (896) Canadian Solar KuMax CS3U 340P (Appendix B) modules and it is required that these modules, plus any additional modules necessary, be of similar efficiency and open circuit voltage (OCV). The modules on hand are to be purchased and incorporated into the design, at a discounted rate of $170/module. Although all ground-mounted solar proposals will be reviewed, due to site limitations, mainly the ability to perform an expensive and logistically challenging geotechnical study, it is suggested that a drill and grout approach be included in the total cost of the project scope.

The proposed containerized BESS solution should be able to protect BESS from historical high and low outdoor temperatures on site and provide fire protection and noise mitigation at a minimum. Adjacent to, or sited on the slab, should be a new ancillary standby generator rated to no less than 100 kW_{AC}. Battery management system, temperature management system, and gas protection systems with venting should all be integrated and native to the containerized solution inclusive of fire protection if battery chemistry requires. All PV DC source circuits can be chased from the solar site to the pad, at which point the DC power will be converted to usable AC power for the grid or stored as potential grid energy in the BESS. It is expected that all equipment will be bonded to a perimeter grounding grid before commissioning

Fig. 3 Coomb's Mountain solar site August, 2020. Concrete pad in SE corner is approximately 40'x20.'

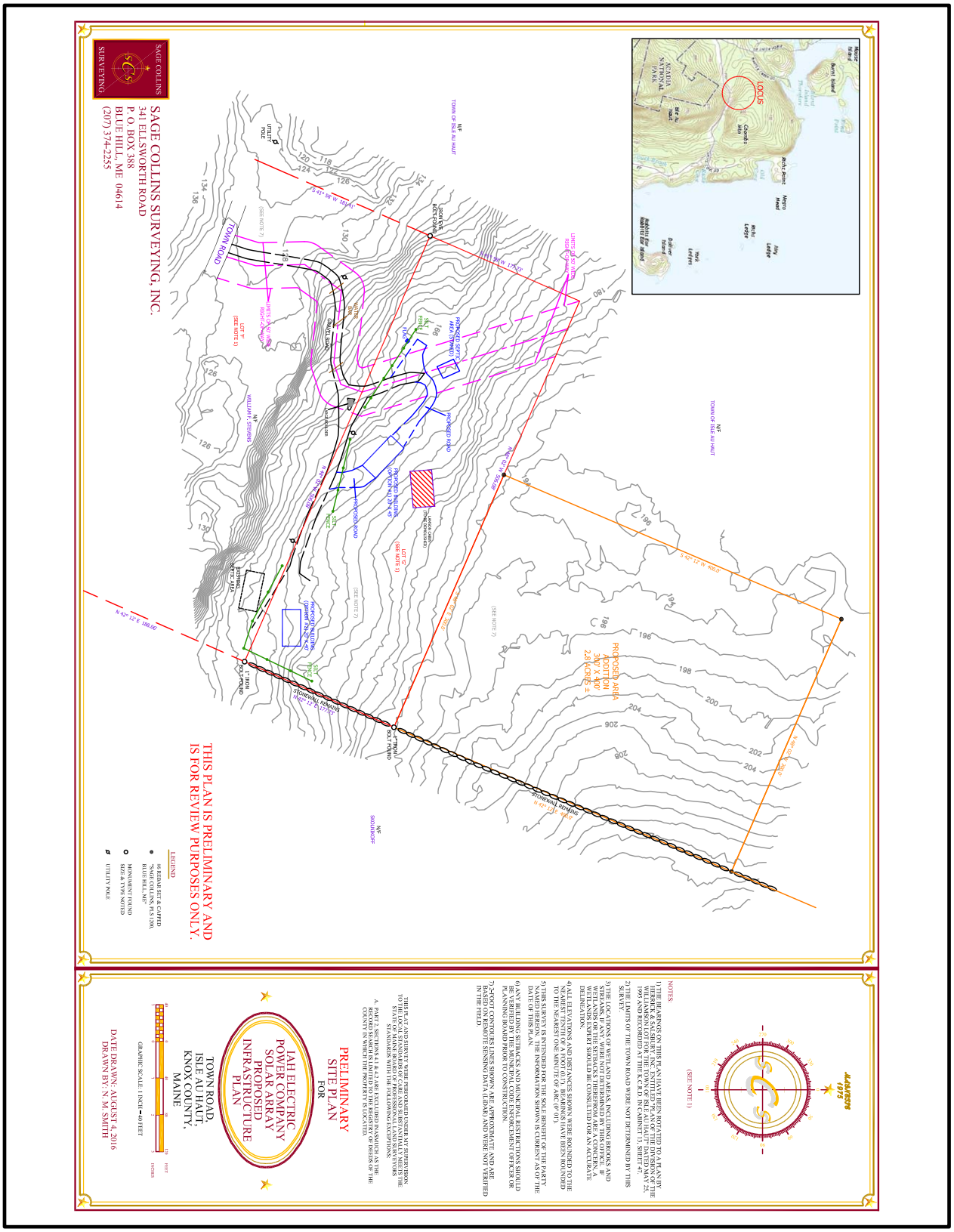

Fig. 4. Site survey depicting right of ways and property boundaries.

Fig. 5. Cable landing and POCO substation. 44.07654,-68.631170

4.0 Technical Requirements and Reference Materials

Respondents' proposals for installation and equipment shall be fully code compliant, complying with all applicable building, mechanical, fire, seismic, structural and electrical codes. Only products that are listed, tested, identified, or labeled by UL, ETL, or another Nationally or Internationally Recognized Testing Laboratory shall be used as components in the project. Non-listed products are only permitted for use as project components when a comparable useable listed component does not exist. Non-listed products proposed for use as components must be identified as such in all submittals.

The contractor shall use project components that are made of materials or finishes that are to last a minimum of 20 years with highly corrosion-resistant metal for salt air condition ratings.

The publications and technical codes listed below, including those intended for the safety of battery energy storage systems, are for reference only and form a part of this document and are hereby incorporated:

- NFPA 70, National Electrical Code (NEC) 2020, sets the foundation for electrical safety.
- UL 1703 Flat – Plate PV Modules and Panels
- UL 1741 – Standard for Static Inverters and Charge Controllers for Use in Photovoltaic Power Systems
- UL 9540 Standard for Safety of Energy Storage Systems and Equipment
- UL 9540A Standard for Safety of Energy Storage Systems and Equipment testing
- FM Approved – Fire Protection Tests for Solar Component Products
- NFPA 855 – Fire Protection Standard For The Installation Of Stationary Energy Storage Systems, 2020
- IEC 62446 Grid Connected Photovoltaic Systems- Minimum Requirements for System Documentation, Commissioning Tests, and Inspections

Other technical codes that shall apply include:

- ASME PTC 50 (solar PV performance)
- ANSI Z21.83 (solar PV performance and safety)
- NFPA 853 (solar PV systems near buildings)
- IEEE 1547 (interconnections)

5.0 Roles and Responsibilities

The respondent is required to provide:

- Design concepts, including at least one installed and operational, similarly-scaled solar+storage project as reference
- Construction documents and engineering calculations that are signed and sealed by a licensed architect or engineer in State of Maine
- Submittals for materials and products
- Construction materials, equipment and labor
- Design and construction supervision / contract management
- Quality control plan (QCP)

- Safety plan
- Inspections and tests (per QCP)
- Manuals (design calculations, operation/maintenance, shop drawing, etc.)
- Commissioning of project
- Training of POCO operating staff for operation and maintenance
- Operation and Maintenance for first year and optional service plan after the first year
- Web-based monitoring system for 20 years
- Seek approval of interconnection with utility Versant including requirements for grid circuit studies and ancillary equipment

POCO will:

- Review for approval design submittals and QCP, seeking outside engineering, or third-party, expertise as necessary
- Witness inspections and test witnesses to verify attainment of performance requirements

6.0 Utility Interconnection Agreement

The successful respondent shall coordinate with POCO to ensure that the project satisfies all utility criteria for interconnection of the project to the electric distribution system. This includes coordinating all negotiations, meeting with POCO, design reviews, and participating in any needed interaction between the two parties.

The respondent shall manage interconnection and startup of project in coordination with the site and POCO. The contractor shall at its own expense pay any interconnection, processing, and other fees and expenses as may be required by POCO for interconnection and operation of the project.

Unlike most projects in Maine, the successful respondent will not be responsible for preparing required submissions for obtaining Net Energy Billing (NEB) and interconnection agreements from the utility and Maine Public Utilities Commission, including exclusion from Distributed Generation Procurement Process. Due to the increasing cost of interconnection of renewable energy systems in Maine, an islanding solar+storage project, with the ability to island automatically prohibiting export of excess energy is the POCO preference. Versant will need to approve of automatic switchgear to verify the design and intent.

7.0 Quality Assurance/Quality Control

For each performance and installation requirement, the QCP shall identify the item/system to be tested, exact test(s) to be performed, measured parameters, inspection/testing organization, and the stage of construction development when tests are to be performed. Each inspection/test shall be included in the overall construction schedule. The contractor is not relieved from required performance tests should these not be included in the plan.

The QCP is intended to document those inspections and tests necessary to assure POCO, or its representatives, that product delivery, quality and performance are as required. It also serves as an inspection coordination tool between the contractor and POCO or its representatives. An example of these inspections/tests is the final test/inspection for overall performance compliance of the system.

Results from tests and inspections shall be submitted within 24 hours of performing the tests and inspections.

At a minimum, the QCP should conform to the technical requirements in Section 4.0. Also, please refer to "IEC 62446 Grid Connected Photovoltaic Systems - Minimum Requirements for System Documentation, Commissioning Tests, and Inspections (2009)" as a guide for submittal.

Submissions. A draft QCP shall be prepared and submitted as part of a complete proposal. The QCP may be rejected as incomplete and returned for resubmission if there is any performance, condition or operating test that is not covered therein.

Updating. Post-award, or, during bid negotiations, the bidder shall update QCP if any changes are necessary due to changes in project scope/scale and schedule constraints; subject to POCO approval. POCO shall be notified immediately of any schedule and/or procedural changes.

7.1 Performance Testing and Verification

Tests will be conducted at the final commissioning/acceptance testing, and one year after the acceptance date at no additional cost, and as such should be included as part of the proposal. A testing program will be proposed, approved and submitted with final acceptance documents. Performance tests at commissioning will include I-V curve traces for all PV strings, meg-ohm testing, and string voltage testing for each individual string at a combiner point. Further, storage dispatch testing must be proposed and performed in order for full project acceptance.

7.2 Project Acceptance

For project acceptance, measured PV performance at maximum power point (MPPT) must be at least 90% of rated performance, which will be adjusted for concurrently measured cell temperature and plane of array (POA) irradiance. This can be accomplished using a current industry standard I-V curve tracer with capability to compare measured PV string I-V curves with nameplate performance of PV string compensated for concurrent cell temperature and POA irradiance measurements.

If performance is less than 90% at the one-year performance tests (measured using the same method as for project acceptance), contractor shall promptly correct any malfunction or issues as necessary to return project to 90% measured performance or better. The contractor shall supply POCO with detailed documentation of malfunction or errors and all corrective actions taken.

With respect to the BESS, common tests and measurements which will be performed upon commissioning, and upon POCO approval will constitute project acceptance:

- Startup / Shutdown / E-Stop
- Equipment failure
- Abnormal Grid Events
- Power Rating
- Energy Rating
- Round trip efficiency
- Short- / long- term test
- Frequency regulation

All tests will be easily repeatable and results returned to POCO at the end of year one, with the same set of conditions attached to BESS performance.

8.0 Solar Array

PV modules shall be a commercial, premium mono- or poly-crystalline module, with a minimum efficiency of 18%, and shall be UL listed, and shall be properly installed according to manufacturer's instructions, NEC, and as specified herein.

The PV array shall be oriented, and the inter-row spacing accommodating, to allow for shade free conditions from 9 a.m. until 3 p.m. (solar time), on the Winter Solstice for the project latitude. All bids must include documentation of the impact from any obstruction on the seasonal or annual performance of the solar photovoltaic array, and provide a shade analysis as part of the submittal.

The solar electric system shall produce the minimum annual AC energy output. If the system is proposed to produce more than the minimum required energy output to reduce the cost per delivered kWh, then the system shall produce the "proposed" energy. The output received will be adjusted if the actual yearly solar insolation received is less than that indicated by a PVSyst model. A normalizing calculation will be made to correct the output, so a contractor is not penalized for an extremely cloudy year.

8.1 Solar Modules and DC Scope

System wiring shall be installed in accordance with the provisions of the NEC.

All modules installed in a series string shall be installed in the same plane/orientation. Trackers, if rated to historic wind loads on site, will be considered for this project if value added exceeds increased cost of procurement, installation and maintenance. The same conditions apply to bi-facial modules.

PV modules shall have a 25-year limited warranty stating that modules will generate no less than 80% of rated output under STC after that time period. PV modules that do not satisfy this warranty condition shall be replaced.

Module installation design shall allow for the best ventilation possible of panels to avoid adverse performance impact (eg. ground mount, fixed-tilt).

Warranty. Provide a module manufacturer's warranty as a minimum: No module will generate less than 90% of its specified minimum power when purchased. PV modules shall have a 25-year limited warranty guaranteeing a minimum performance of at least 80% of the original power for at least twenty-five (25) years. Measurement made under actual installation and temperature will be normalized to standard test conditions using the temperature and coefficients published in the module specifications. DC voltage drop from DC string combiners to the inverters, shall be no more than 3%, with proof provided in both the wire schedule and relevant conduit table.

8.2 Inverters and Controls

Each single phase inverter and associated controls shall be properly installed according to manufacturer's instructions. Any proposed inverter(s) shall be commercial inverters, listed to UL 1741 and IEEE 1547, and can carry additional certifications from EU testing labs such as Fraunhofer and TÜV

.

The inverter shall have at a minimum the following features:

- UL/ETL listed
- Nominal rated DC-to-AC conversion efficiency of **96%** or higher
- Shall have operational indicators of performance and have built-in data acquisition and capable of remote monitoring to report error and fault codes
- Shall be capable of parallel operation with the existing AC power on island, or on mainland. For example, each inverter, when in operation, shall automatically synchronize its output waveform within 1 second upon restoration of utility power.

Warning labels shall be posted on the control panels and junction boxes indicating that the circuits are energized by an alternate power source independent of utility-provided power.

Operating instructions shall be posted on or near the system, and on file with facilities operation and maintenance documents.

Provide detailed lock out /tag out instructions for all equipment.

Power provided shall be compatible with onsite electric distribution systems, which is single phase 2.4kV. Inverters should be installed in most optimum locations with appropriate environmental protections and access. If inverters are mounted outside, for any reason other than being sited within a container, they shall be shaded from direct sun from 10 a.m. to 6 p.m. in the months of June to August

Warranty supplied in the proposal should be a minimum **10-year manufacturers'** warranty.

8.3 Control Panel to Solar Electric Array Wire Runs

Areas where wiring passes through ceilings, walls or other areas of any new or existing buildings accommodating inverters, charge controllers, storage and ancillary equipment, shall be properly restored, booted, sealed and returned to their original condition.

All wiring between ground-mounted array and the point of interconnection shall meet all applicable codes. It is expected that if any site conditions allow for trenching, that all conduits will be buried to a minimum depth of 18" below grade, and appropriately marked 12" above conduit. But, if conditions on ground do not permit burial, alternative methods will be allowed.

In the absence of perimeter fencing, all field electrical devices shall have the capability to be locked and PV strings exceeding 1000V protected by conduit, wire/cable trays, or PV Scrim.

8.4 Monitoring

The PV systems installed shall provide for monitoring by POCO and for 3rd party asset manager or Operations and Maintenance provider. The public site is intended for education and outreach regarding renewable energy production and information on avoided greenhouse gas production. The public site shall be maintained for ten years. the POCO site for ?? years.

Monitor both sites by an IP addressable device and displayed graphically in a user-friendly manner the following parameters:

- AC energy current and recent history
- AC amps …
- Solar irradiance ...
- Show status of all equipment …
- status of heat pumps and/or disposition of excess power - use / curtailment

Data shall be available both in real time and in archived in 15-minute averages (minimum). All monitoring hardware and monitoring equipment shall be provided by the contractor.

System performance shall allow display during different monitoring periods from one hour to one year.

Provide networking equipment, engineering, programming, wiring, and software to allow remote connection by POCO to the local area network.

Meters utilized for the project shall be UL listed and should be revenue-grade in nature.

Meters shall be installed in the main distribution panel (MDP) when possible. Meters shall not be mounted to the transformer housing without prior approval when there is no other reasonable place to mount it.

9.0 Project Closeout

The following steps shall be taken to assure the project is in a condition to receive inspections and tests prior to commissioning:

Finalize record drawings and manuals, indicating all “as-built” conditions.
Record Drawings. The contractor shall maintain on site the working record drawings of all changes/deviations from the original design. Notations on record drawings shall be made in erasable red pencil or other color to correspond to different changes or categories of work. Marked-up drawings shall always be maintained at the contractor’s on-site construction office, available for POCO to review. Record drawings shall note related change order designations on impacted work. When shop drawings indicate significant variations over design drawings, shop drawings may be incorporated as part of record drawings. Review of record drawings may be required before monthly payments can be processed.

9.1 As-Built Drawings and Specifications

The Contractor shall provide "as-built drawings" and documents based upon actual site installation. Should POCO determine that variations exist between finished construction and the as-built drawings, the contractor shall correct drawings to the satisfaction of POCO.

The contractor shall submit six (4) hard copies and two (2) USB storage devices containing the “as-built” drawings and specifications as CAD and PDF files, including equipment elevations, all specification sheets and operation manuals associated with construction and operation.

9.2 Warranties and Guarantees

Submit specific warranties and guarantees, final certifications and similar documents to POCO upon substantial completion and prior to final payment. Include copies with operations and maintenance

manual. All warranties, performance guarantees, and close-out documents shall be signed by a principal of the contractor's firm and sealed.

9.3 Maintenance and Operators Manual

Provide detailed operation and maintenance manuals for the PV panels and inverters, DC ESS and AC inverters if any, and generators including diagram of system components, description of normal operation; description of operational indicators and normal status of each, table of modes of operation, safety considerations, preventative maintenance requirements, troubleshooting and corrective actions; sources of spare parts and cut-sheets for all components.

The contractor shall prepare six (6) hardcopies and two (2) flash drives containing the detailed Maintenance and Operators Manuals. Additionally, contractor shall provide a recommended list of spare parts, and at a minimum a set of combiner box fuses for each array shall be provided along with the required spare panels noted in Section 8.

9.4 Demonstration and Training

Provide POCO approved training for designated personnel in the operation of the entire photovoltaic energy system, including operation and maintenance of inverter(s), transfer switches, panel board, disconnects and other features as requested by POCO. Instruct the designated POCO personnel in removal and installation of panels, including wiring and all connections. Provide POCO with written instructions and procedures for shut-down and start-up activities for all components of the system.

10.0 Operations and Maintenance Service

The winning bidder shall include an offer to provide comprehensive, proactive, Operations and Maintenance (O&M) beyond the previously stated workmanship warranty. Work shall include all manufacturer recommended maintenance as well as a 12-month performance commissioning test as outlined in QCP. POCO shall be invited to witness all performance commissioning's. A maintenance log shall be maintained to note dates, equipment and issues being resolved.

11.0 Submission Instructions

Each Respondent should complete and submit an Expression of Interest ("EOI") form by February 12, 2021 in order for the Respondent to directly receive any subsequent information related to the RFP distributed prior to the proposal due date. The Notice of Intent to Respond form and all other RFP documents will be posted on the Isle au Haut Solar + Storage Islanding Minigrid project website, but an example is provided in Appendix C.

Respondents need to provide electronic copies of their EOI to the bid evaluation team no later than 2:00 p.m. Eastern, Friday, February 12, 2021. Electronic copies can be sent to the following email address: manager@iahpower.org.

Proposals are considered complete upon the submission of Respondent's indicative pricing and clear delineation as to the products being offered to POCO. This solicitation and related processes imply no obligation on the part of POCO to accept any proposal. All expenses incurred by the bidder in the development of their proposal are the sole responsibility of the bidder. When responding, please provide information relating to:

- the availability of, and Bidder's access to, the equipment and components proposed
- procurement lead times if available
- list of the manufacturers of the storage system and major individual balance of plant equipment
- description and equipment specifications of the proposed Project, including storage modules, power converter, meters, communications equipment and protocols, disconnect devices, point of interconnection voltage, and any other related facilities necessary to interconnect the proposed project

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12.0 RFP SCHEDULE

This RFP is a selective tendering process and is being issued to support both the requirements of POCO to provide customers with safe, reliable electricity in a most cost-efficient manner, as well as the initial phase of renewable energy transition for the island. The schedule and deadlines set out below apply to this RFP. POCO reserves the right to revise this schedule at any time and at its sole discretion. The proposed schedule and timetable are as follows:

NO.	ACTIVITY	DATE
1	POCO ISSUE OF REQUEST FOR PROPOSAL (RFP)	02/17/2021
2	EXPRESSION OF INTEREST (EOI) SUBMITTAL BY BIDDERS	03/01/2021
3	RFP QUERIES AND CLARIFICATION BY BIDDERS	03/31/2021
4	POCO RESPONSE TO RFP QUERIES	04/09/2021
5	COMPLETE PROPOSAL SUBMISSION BY BIDDERS	04/23/2021
6	POCO CLARIFICATION AND QUESTIONS TO BIDDERS	05/07/2021
7	POCO EVALUATION OF PROPOSALS COMPLETE	05/28/2021
8	POCO NOTIFICATION TO SELECTED BIDDER(S)	06/11/2021
9	LETTER OF INTENT SIGNED SIGNIFYING AWARD OF PROJECT	07/02/2021
10	COMPLETE NEGOTIATIONS OF PROJECT FINANCING AND SCHEDULE WITH SELECTED BIDDER(S)	08/31/2021
11	SIGNING OF DEFINITIVE AGREEMENTS	09/10/2021
12	ISSUE OF FULL NOTICE TO PROCEED	09/30/2021

Respondents are encouraged to attend a scheduled site visit prior to submittal, if schedule and COVID-19 protocols allow. Respondents will be notified by email of a schedule of potential site visit dates.

13.0 Company Qualifications, Licenses, & Experience

When responding to this RFP, please include a separate cover letter with company qualifications, and representative projects, including those in which a single scope of work may have been provided. Having qualifications in multiple disciplines is extremely helpful when comparing bidders. For the proposed BESS the bidder shall describe; **1)** the length of time since the same type of proposed system technology was first commercially deployed in uses similar to ours, **2)** the number of configurations delivered by the bidder similar to the proposed configuration which are presently in service, and **3)** the bidder's experience with the useful life in service and the reliability of the proposed BESS technology. Please do not provide a list of contracted or awarded projects. Following these requirements ensures that this solar + storage project is aligned with POCO departmental objectives, and if possible, disciplines and qualifications to be highlighted:

- Finance
- Facilities
- Engineering
- Utilities
- Legal
- Procurement
- Risk Management

Please submit three hard copies, and one digital copy of qualifications ("RFQ"). All copies shall be clearly labeled with RFQ title, date, and firm name. Submit with final bid proposal on Friday, April 16, 2021 to:

Bryan Carroll, PO Box 65, Isle au Haut, Maine 04645 and manager@iahpower.org respectively.

14.0 Financial

In setting financial goals, it is important for the bidder to establish clear valuations and standard metrics to allow POCO to make accurate comparisons. This alleviates confusion that might come with a proposal which only discusses total installed watts, and/or price-per-watt while another proposal shows total energy production and price-per-kWh. For example, Bidders should respond with the following conditions in mind allowing for economic optimization and easy review by POCO:

- DC system cost
- BESS (useable kWh) cost
- Value of stored PV (kWh)
- Excess solar captured by thermal storage
- Generator Fuel Consumption
- Purchased energy from Versant

Fuel Consumption (gallon)	**Purchased Energy Cost**	**DC System Cost**	**BESS Useable Cost**	**Value of stored PV**	**Excess stored (thermal) kWh**
	$	$	$	$	

With the proposed PPA as the baseline for proposals by bidders the successful bidder will be the owner and operator of the power system and the seller of power, with POCO as the buyer (off-taker). POCO and the successful bidder will agree, when entering into the PPA, what the power and energy capacities, uptime, operations and maintenance, lifetime, and other requirements of the power system (system Requirements) will be.

Bidders' proposals to POCO will further be evaluated in part based on:

- affordability of the proposed PPA to POCO's member-owners/end-users;
- performance (including reliability and resilience) of the power system proposed by the bidder, including the photovoltaic, energy storage, and generators as subsystems, as well as the performance of the power system as a whole; and
- emissions and waste to the environment expected from the proposed power system.

As referenced in section 1, bidders shall also include POCO having the option to purchase the power system after:

- successful bidder builds the power system plant to meet or exceed the System Requirements;
- owns and operates the power system under the agreed PPA for specified time periods, including through commissioning and a trial period as well as specified operation periods thereafter (e.g. one, two, and five years); and
- transfers ownership of the power system to POCO under terms and conditions agreed by POCO and the successful bidder, including at POCO's election the successful bidder continuing to provide operations and maintenance services for the power system.

In addition to the evaluation criteria stated above, bidders' proposals to POCO will be evaluated in part based on the terms and conditions (T&C) proposed for transfer and continued operations and maintenance of the power system.

15.0 Evaluation Criteria

POCO, and the bid evaluation team, will review submitted qualifications and may request a meeting, and or site visit in order to proceed with bid selection. Bidders will be evaluated based on technical understanding of the project scope, and evaluation of the proposed solar generation equipment, solar energy storage technology, installation criteria, and financing. Most importantly, it should be the sole intent of the bidder to provide a bespoke integrated energy solution, designed specifically to meet the unique energy needs of the island; dated generation, transmission and distribution infrastructure, low meter density, predictable seasonal peaking in energy demand and reliance on fossil fuels during times of cable disconnection, either reactively or proactively.

All bids will be scrutinized to assure that prices are highly competitive, reflect the benefits of Federal Investment Tax Credit and accelerated depreciation, and are consistent with market conditions and cost per watt for comparable solar + storage projects identified by POCO and bid evaluation team. POCO's decision will be based on the evaluation of several factors including, but not limited to the following:

Qualifications & Experience (25%)

1. Strength of qualifications and experience of bidder and key project team personnel
2. Strength of project references, customer satisfaction, completion of projects equivalent to those included in this RFP, and success in maintaining project budgets and schedules
3. Financial stability and proof of funding for these projects with proven track record

Technical Proposal (25%)

1. Preliminary system design is appropriate for POCO needs, accounts for site conditions, and is optimized to take advantage of the conditions required by POCO, including innovative storage heat pump programs. Maximizes the value of the project to the community including in ways that may not be captured as revenue by POCO, e.g., private benefits of heat pump use.
2. Projected energy production is realistic and appropriate for the facility based on proposed system design and site conditions
3. PV module, inverter, racking, and monitoring (revenue grade) components are high quality, available, and have strong track record and warranty coverage
4. Energy storage system is high quality, available, and has strong track record and warranty coverage
5. Generator is high quality, available, and has strong track record and warranty coverage
6. Proposal clearly delineates the extent to which the project addresses fossil fuel use/replacement and other environmental matters that are likely to be relevant to the community (eg. emissions reduction calculation)

Project Costs (30%)

1. Operations and maintenance cost for first 10 years of system life, plus 10 additional years
2. Financial analysis of total system costs and benefits over 10 years
3. Extent to which proposal addresses the risk of unexpected increases in operations and maintenance costs

Proposal Attributes (20%)

1. Proposal is complete and addresses all stated RFP requirements and preferences, and demonstrates experience working with commercial, utility, and community scale integrated solar+storage projects. Ability of the bidder to provide evidence of a high level of continued support, throughout award, term negotiation, and plant operation will also be evaluated as a valuable attribute.

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Appendix A

History of Heat Pump Program.

In June of 2019, IaHEPC was awarded a $66,360 grant from Efficiency Maine (EM) through the Load Management Innovation Pilot program to install heat pumps with thermal storage in island homes and buildings. IaHEPC submitted the proposal jointly with Introspective Systems (IS). The original scope of the project called for up to 20 heat pumps with thermal storage in island homes and buildings and artificial intelligence software to tell the heat pumps when to run in order to take advantage of excess power produced by the solar array. The EM grant would provide incentives to homeowners who installed these systems. The large heating system in the Town Hall would serve as a demonstration site for a full heating season before homeowners would commit to installing their own systems.

2020 Updates

In the summer of 2020, Efficiency Maine informed us that they were not able to keep delaying the project indefinitely. They needed us to either set a "sunset date" for the project or find a way to ensure that the heat pump installations would be finished this year. In response, we shifted the priorities so that the installations did not rely on private homeowners seeing the effectiveness of the town hall heat pumps and the microgrid before investing in these systems. We identified several municipal buildings and affordable rental homes that would be a good fit for these systems and Efficiency Maine agreed to fully fund these sites.

Efficiency Maine agreed to keep the funding for this project on two conditions: 1) receiving assurances that the project would be constructed by fall of 2021, and 2) confirming that IS would be able to collect sufficient data before the end of 2021 to measure the performance of these systems.

NEW

CanadianSolar

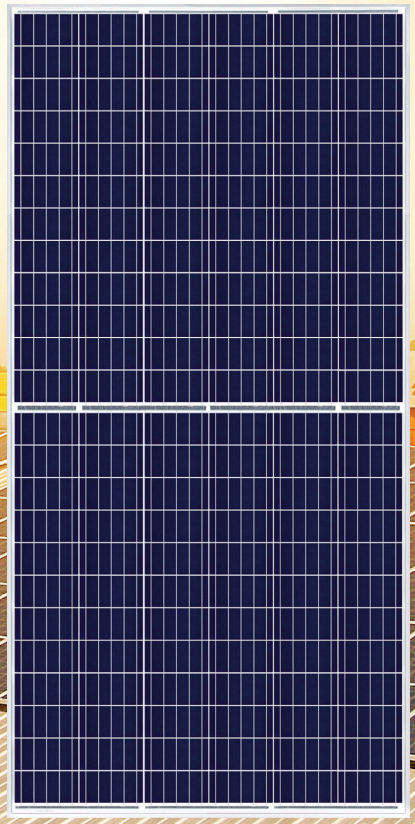
KuMax (1000 V / 1500 V)

HIGH EFFICIENCY POLY^{GEN3} MODULE CS3U-335|340|345|350P

With Canadian Solar's industry leading black silicon cell technology and the innovative LIC (Low Internal Current) module technology, we are now able to offer our global customers high power poly modules up to 350 W.

The KuMax poly modules with a dimension of 2000 × 992 mm, close to our 72 cell MaxPower modules, have the following unique features:

- **Higher** power classes for equivalent module sizes
- **High** module efficiency up to 17.64 %
- **LOW** hot spot temperature risk
- **LOW** temperature coefficient (Pmax): -0.39 % / °C
- **LOW** NMOT (Nominal Module Operating Temperature): 43 ± 2 °C



More power output thanks to low NMOT: 43 ± 2 °C

Low power loss in cell connection

Safer: lower hot spot temperature

***

Heavy snow load up to 5400 Pa, wind load up to 2400 Pa

1500 V

Low BoS cost with 1500 V_{DC} system voltage

25 years linear power output warranty

10 years product warranty on materials and workmanship

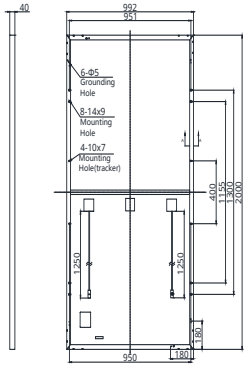
PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730: 2005 & 2016: VDE / CE / UL 1703: CSA

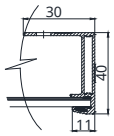
* Please contact your local Canadian Solar sales representative for the specific product certificates applicable in your market.

ENGINEERING DRAWING (mm)

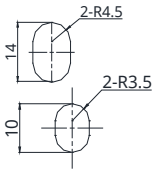
Rear View



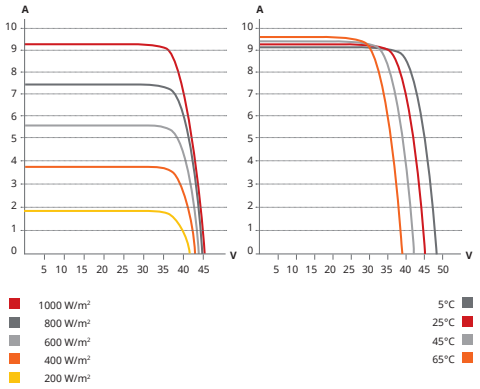
Frame Cross Section A-A



Mounting Hole



CS3U-325P / I-V CURVES



ELECTRICAL DATA | STC*

CS3U	335P	340P	345P	350P
Nominal Max. Power (Pmax)	335 W	340 W	345 W	350 W
Opt. Operating Voltage (Vmp)	38.2 V	38.4 V	38.6 V	38.8 V
Opt. Operating Current (Imp)	8.77 A	8.86 A	8.94 A	9.03 A
Open Circuit Voltage (Voc)	45.7 V	45.9 V	46.1 V	46.3 V
Short Circuit Current (Isc)	9.28 A	9.36 A	9.44 A	9.52 A
Module Efficiency	16.89%	17.14%	17.39%	17.64%
Operating Temperature	-40°C ~ +85°C			
Max. System Voltage	1000 V (IEC / UL) or 1500 V (IEC / UL)			
Module Fire Performance	TYPE 1 (UL 1703) or CLASS C (IEC 61730)			
Max. Series Fuse Rating	30 A			
Application Classification	Class A			
Power Tolerance	0 ~ + 5 W			

* Under Standard Test Conditions (STC) of irradiance of 1000 W/m2, spectrum AM 1.5 and cell temperature of 25°C.

MECHANICAL DATA

Specification	Data
Cell Type	Poly-crystalline, 156.75 × 78.38 mm
Cell Arrangement	144 [2 × (12 × 6)]
Dimensions	2000 ×992 ×40 mm (78.7 ×39.1 ×1.57 in)
Weight	22.6 kg (49.8 lbs)
Front Cover	3.2 mm tempered glass
Frame	Anodized aluminium alloy, crossbar enhanced
J-Box	IP68, 3 diodes
Cable	4.0 mm² & 12 AWG
Cable Length	1670 mm (65.7 in)
Connector	T4 (IEC / UL)
Per Pallet	27 pieces
Per Container (40' HQ)	594 pieces

ELECTRICAL DATA | NMOT*

CS3U	335P	340P	345P	350P
Nominal Max. Power (Pmax)	247 W	250 W	254 W	258 W
Opt. Operating Voltage (Vmp)	4.8 V	35.0 V	35.2 V	35.4 V
Opt. Operating Current (Imp)	7.10 A	7.15 A	7.22 A	7.29 A
Open Circuit Voltage (Voc)	42.5 V	42.7 V	42.9 V	43.1 V
Short Circuit Current (Isc)	7.49 A	7.55 A	7.62 A	7.69 A

*Under Nominal Module Operating Temperature (NMOT), irradiance of 800 W/m2, spectrum AM 1.5, ambient temperature 20°C, wind speed 1 m/s.

TEMPERATURE CHARACTERISTICS

Specification	Data
Temperature Coefficient (Pmax)	-0.39 % / °C
Temperature Coefficient (Voc)	-0.31 % / °C
Temperature Coefficient (Isc)	0.05 % / °C
Nominal Module Operating Temperature	43±2 °C

PARTNER SECTION

The aforesaid datasheet only provides the general information on Canadian Solar products and, due to the on-going innovation and improvement, please always contact your local Canadian Solar sales representative for the updated information on specifications, key features and certification requirements of Canadian Solar products in your region.

Please be kindly advised that PV modules should be handled and installed by qualified people who have professional skills and please carefully read the safety and installation instructions before using our PV modules.

CANADIAN SOLAR (USA) INC. September 2017 | All rights reserved | PV Module Product Datasheet V5.552_E2_NA
3000 Oak Road, Suite 400, Walnut Creek, CA 94597, USA | www.canadiansolar.com/na | sales.us@canadiansolar.com

Appendix C

Expression of Interest (EOI) Cover Letter

Date: [Date]

Name: [Name of Respondent][d/b/a]
Address: [Street Address]

Attention: Isle au Haut Electric Power Company
c/o Bryan Carroll
PO Box 65
Isle au Haut, Maine 04645

Cc: CleanTech Strategies
c/o Russ Weed, President

Subject: Expression of Interest

NOTE: Amendments and additions will be posted to the Isle au Haut Islanding Minigrid RFP website. It is the Respondent's sole responsibility to check for amendments and additional information.

The enclosed is submitted in response to the above-referenced Expression of Interest as outlined in Section 13 and will be submitted by March 1, 2021 to manager@iahpower.org.

We have carefully read and examined the Expression of Interest qualifications and have conducted such other investigations as were prudent and reasonable in preparing the Response, including providing at least 3 reference projects with contacts.

Yours truly,

_____
Signature

_____
Date

Legal Name:
Title:
Telephone:
Email:
Date: