



MILLER BROS.



**Kearsarge Energy, Miller Brothers and VHB's
Joint Response to the Town of Bristol and
Town of Barrington's Invitation for RFQ/RFP
Bid #850 Public-Private Partnership for On-
Site Solar Projects**

Table of Contents

Contents

SECTION 1. Transmittal Letter	4
SECTION 2. Respondent Information	9
I. Kearsarge Company Profile	9
I (a). Miller Bros. Company Profile	10
I (b). VHB Company Profile	11
II. Project Team	12
i. Team Leader and Point of Contact	12
ii. Key Personnel	12
iii. Resumes	13
III. Commitment to Safety	19
IV. Capital Finance Capability	22
i. Description of Financing Structure	22
SECTION 3. Relevant Solar Project Experience	24
i. Project Team Solar Projects	24
ii. Project Team’s Total Capacity of Operational Solar PV Installations	25
iii. Project Team’s Total Capacity in the Northeast	25
iv. Project Team Experience with Capped Landfills	26
v. Kearsarge Energy Solar PV Installations with Municipalities	27
SECTION 4. Kearsarge Energy References	28
SECTION 5. Proposed Solar PV System	28
I. System Summary	28
II. System Components	28
III. Warranties	29
IV. Design	29
V. Permitting and Approvals	29
I. Interconnection	30
I. Decommissioning & Removal of System	31
II. Schedule and Project Management	32
SECTION 6. Educational Opportunities	39
SECTION 7. Appendices	40
Appendix 1. Preliminary Site Layout	40
Appendix 2. Letters of Support	42

Appendix 3. VHB Resumes	46
Appendix 4. Kearsarge Energy Limited Partnership Equity Funding Letter	48
Appendix 5. Kearsarge Energy Solar PV Portfolio	49
Appendix 6. References & Required Bid Forms	61
Appendix 7. Equipment Specification Sheets	67

SECTION 1. Transmittal Letter

Wednesday, November 30, 2016

Town Clerk's Office
Town Hall
10 Court Street
Bristol, RI 02809

Re: Response to Invitation for RFQ/RFP Bid #850 Public-Private Partnership for On-Site Solar Projects

To Whom It May Concern:

On behalf of Kearsarge Energy Limited Partnership ("Kearsarge"), Miller Brothers, Inc. ("Miller Bros.") and Vanasse Hangen Brustlin Inc. ("VHB"), we are pleased to present the Town of Bristol and the Town of Barrington ("Towns") with the enclosed proposal for a **4.75 MW DC** ballasted Solar PV facility at the Town of Bristol Capped Landfill off of Minturn Farm Road. Please see Appendix 1. Preliminary Site Layout for a preliminary layout and enclosed Price Proposal for further details on the benefits to the Towns.

We believe that our team's extensive and industry leading experience and expertise in developing solar projects, in particular solar on capped landfills, provides the Towns the most viable and attractive solution for completing this project on time and within budget. We have an unparalleled track record of successfully developing solar PV projects with municipalities and other public and non-profit entities across the Northeast. Our combined companies' resources and assets allow for economies of scale and efficiency. Additionally, with our own strong balance sheet, we do not need nor desire to "sell projects" to outside investors. We own all of our developed projects for the duration of their useful life. Our principal has a home in Bristol and this would be an important local asset. Kearsarge has established a strong presence in the Rhode Island solar market winning and now constructing **8.7 MW of solar PV across green-fields and capped landfills as part of a public bid with the South Kingstown Solar Consortium and the University of Rhode Island.**

Thank you for your consideration and we value the opportunity to work with the Towns on strengthening your clean energy commitments.

TEAM EXPERIENCE & QUALIFICATIONS SUMMARY *PROVEN INDUSTRY LEADERS*

KEARSARGE ENERGY: DEVELOPER, FINANCING PROVIDER, & LONG-TERM OWNER

- Kearsarge Energy, is a Watertown, Massachusetts based and owned, full-service renewable energy project developer, financier, and owner/operator. Kearsarge is one of the Top 5 solar developers in Massachusetts in terms of installed capacity, having developed and financed more than **60 MWs and \$200 million of solar PV projects**, with almost \$90 million over the past two years in New England.
- Kearsarge Energy will provide all of its own funding for this project and has established lending relationships with local and regional banks for project financing. Kearsarge will be the long-term owner and operator of the project.
- Kearsarge Energy has a portfolio of over 20 MWs of operational solar PV facilities under ownership in New England. We are experienced in landfills including 1.7 MW DC array on the Town of Concord's capped landfill, 14.7 MWs on Superfund Sites and 6 MWs on another landfill with an additional 20 MWs under construction currently.

MILLER BROS. CONSTRUCTION: ENGINEERING, PROCUREMENT & CONSTRUCTION PARTNER

- Miller Bros., founded in 1937 and incorporated in 1989, has **completed over 140 MWs of solar PV and currently has over 300 MWs under management.**
- Miller Bros has over 30 years of experience of Design/Build and Project Management experience working for federal, municipal and corporate clients with over \$200 million in bonding capacity.
- **Miller Bros. has extensive experience contracting with Government entities for solar, energy storage and electric utility services.** Projects include:
 - Recently completed an 18 MW solar PV array at the United States Army base at Fort Detrick, Maryland
 - **Currently constructing over 7 MWs of solar PV on capped landfills in the Northeast.**
 - Design and installation of new underground electric utilities and lighting systems for the Armed Forces Reserve Training Center at the Willow Grove Naval Base.
 - Installation of new underground electric utilities for the NAVFAC Foundry and Propeller Center in the Philadelphia Navy Yard.

VHB: PERMITTING, CIVIL & ENVIRONMENTAL PARTNER

- VHB, founded in 1979, has served the energy industry for more than 25 years with comprehensive, integrated services ranging from federal, state and local permitting to land survey – and from site plan development to legal testimony.
- VHB established a Providence, RI office in 1985 and has been an active partner in improving the quality of life for Rhode Island residents ever since with more than 60 professionals offering the entire range of VHB's integrated transportation, land development and environmental services. VHB has also worked closely with the Towns of Bristol and Barrington on planning, Hazard Mitigation Plans, zoning and other work and is very familiar with key personnel and the local permitting process. In addition, key members of VHB's leadership team live in Bristol, RI and are dedicated members of the local community.
- Provided design, permitting, wetlands survey and landscaping on over 12 MWs of solar PV facilities in Rhode Island.
- VHB has provided engineering, permitting and other services on over 12 MWs of solar PV on capped landfills in New England.

Highlighted are some key factors that differentiate Kearsarge from its competitors:

- **Kearsarge will be the long term owner and operator of the Minturn Landfill Solar PV project.** We do not anticipate selling the project after commercial operation. Unlike many other developers, we are committed to our projects for the long term and have built a business model on developing, installing, owning and operating a portfolio of projects, while using as many local partners and materials as possible.
- **Kearsarge's completed projects have consistently out-performed.** We use top tier components and as owners, we build projects that will be showcases of renewable energy. Our projects currently are forecasted to generate over 45 million kWh per year and an estimated 1.1 billion kWh over their lifetime, saving our off-take partners millions of dollars annually, and generating enough energy to power 3,000 homes per year.
- **Kearsarge provides all of its own funding and does not need to sell its solar projects nor work with an intermediary to secure financing.** Kearsarge is financially very strong and our investment committee has already approved all equity funding for the proposed Minturn Farm

Landfill Project. Kearsarge has a direct established lending relationship for debt financing with regional banks such as Boston Private Bank, Eastern Bank and Cambridge Savings Bank.

- **Kearsarge has built and financed over 60 MWs of solar PV arrays, establishing it as one of the top solar developers in New England, with an additional 15 MWs under development in Rhode Island.**
- Kearsarge is a privately held, financially strong, local company with streamlined decision making and a superior reputation for **delivering on its proposals and in successful partnerships with public and private entities**. Every project that we have started as been completed on time and on budget.
- Kearsarge is experienced in the design and permitting of Solar PV, having obtained all permits for our portfolio with a **grassroots approach, having worked closely with local, state and federal permitting authorities and local stakeholders for ground-mount, rooftop, canopy, landfill, brownfield and Superfund sites in a variety of communities**.
- Kearsarge has executed over 20 Ground Leases and Power Purchase Agreements with New England municipalities, schools and other public entities over the past five years, including Bellingham, Franklin, Canton, Norwell, and Grafton, among others. Part of Kearsarge's success in executing and delivering on Solar Agreements is our flexibility, ability to creatively solve problems and being a trusted partner that Municipalities can rely upon.
- Finally, Kearsarge and its partners bring a high sense of integrity and transparency to every project, ensuring that each project is completed in an ethical and fair manner. We have outstanding references from every solar project we have completed.

As evidence of the strength of our relationships and our ability to work with municipalities and other public entities to secure Power Purchase Agreements (PPA's) and Ground Leases, please find below highlighted select projects that we completed over the past couple of years with municipal partners. In addition, please see Appendix 2. Letters of Support for Letters of Support from three of our partners, the Town of Grafton Water District, the Concord Municipal Light Plant, and Mount St. Mary's Abbey in Franklin, MA.

Project: Kearsarge Concord Landfill

Location: Town of Concord, MA

Size: 1.7 MW DC

Type: PPA & Lease

Public Off-taker: Town of Concord

Interconnection Utility: Concord Municipal Light Plant

Completion Date: May, 2014

Major Equipment: ET Solar Modules, Solectria Inverters, RBI Racking

Description: Kearsarge managed the design, permitting, and financing of the ballasted, ground-mounted system. Forging another strong public-private partnership with the Town of Concord and the Concord Municipal Light Department, and many local stakeholders, Kearsarge worked to maximize the output and design of the project while balancing a complex set of permitting constraints and delicate site conditions.



Project: Grafton Water District

Location: Town of Grafton, MA

Size: 1.7 MW DC

Type: PPA & Lease

Public Off-taker: Town of Grafton and the Grafton Water District

Interconnection Utility: National Grid

Completion Date: October, 2012

Major Equipment: Hanwha Modules, Solectria Inverters, RBI Racking



Description: The solar farm is situated on approximately 10 acres of land surrounding one of the water district's pump stations and is interconnected to existing electrical infrastructure that serves pump station equipment on site.

The project has been recognized by the Massachusetts Department of Environmental Protection as a leading example of how solar arrays can be seamlessly integrated with existing water infrastructure facilities as it was first project permitted within the 400' Zone I

radius of a groundwater well. Kearsarge successfully worked with Massachusetts Department of Fish & Game and the Natural Heritage & Endangered Species Program as the site includes Wood Turtle Habitat and nesting grounds, as well as the Town of Grafton Planning Board and Conservation Commission.

A Land Lease was executed with the Grafton Water District on additional land that is sub-leased from the Town and a Power Purchase Agreement was executed with the District, further establishing Kearsarge as a leader in the public solar energy sector in Massachusetts.

Project: Kearsarge Barre II – Britton Road

Location: Town of Barre, MA



Size: 1.9 MW

Type: Virtual Net Metering

Public Off-takers: Town of Grafton and Pathfinder Regional Vocational Technical High School

Interconnection Utility: National Grid

Major Equipment: JinkoSolar Modules, Solectria Inverters, RBI Racking

Completion Date: April, 2014

Description: The project is located on a privately-owned underutilized former agricultural parcel that is adjacent to several active agricultural fields in central Massachusetts. Kearsarge managed all local permitting, working with the Town of Barre Conservation Commission and Planning Board, managed design and construction contractors, managed the National Grid interconnection process, arranged tax equity and debt financing with multiple national financial institutions, and is the project's long term owner.

All net metering credits generated by the project are sold to public off-takers. Kearsarge successfully negotiated and executed 20 year virtual net metering PPAs with the Town of Grafton and Pathfinder Regional Vocational Technical High School. The project has performed above projections since it achieved Commercial Operations, providing substantial energy cost savings to the Town of Grafton and the Pathfinder School.

Thank you for the opportunity to work with the Towns on this exciting project. We look forward to building a successful partnership for the development of the Landfill.

Sincerely,

A handwritten signature in black ink, appearing to read "Andrew Bernstein". The signature is fluid and cursive.

Andrew Bernstein, on behalf of the Project Team
Managing Partner
Kearsarge Energy Limited Partnership

SECTION 2. Respondent Information

I. Kearsarge Company Profile



- i. Founded 2009; 7 years continuous business
- ii. Ownership status: Privately Held
- iii. Location of Company Office: 480 Pleasant Street, Suite B110, Watertown, MA 02472
- iv. Number of employees: 5 full-time (locally)
- v. Location from which employees will be assigned: Watertown, MA
- vi. Point of Contact: Andrew Bernstein, 480 Pleasant Street, Suite B110, Watertown, MA 02472; 617-393-4222
- vii. Lawsuits and Disputes: Kearsarge Energy has never been involved in a lawsuit or dispute regarding a contract nor is subject to any pending investigation

Kearsarge, based in Watertown, Massachusetts, is a leading renewable energy project developer and financier with a focus on the fast-growing solar energy market. Since its founding in 2009, Kearsarge has taken principal roles in the development, financing, construction, and management of a portfolio of commercial and utility-scale solar photovoltaic (“PV”) projects in the Northeastern U.S, Georgia, North Carolina, and with its partner, Kairos Energy Capital, in Hawaii. In Massachusetts, Kearsarge has developed and financed over 60 MW DC of projects in Investor-Owned Utility Territories with net metered credit purchase agreement off-takers, with municipal light departments and wholesale off-takers. With this track record, Kearsarge is one of the top solar developers in terms of MWs installed in the Northeast. We deploy our own capital and own and operate all of our Solar Projects.

Over the past seven years, Kearsarge Energy has built a superior reputation for delivering on its promises, constructing top-notch solar PV facilities and completing every project on time and within budget. In an industry with large, multi-national publicly traded corporations, Kearsarge has set itself apart by being a local partner that others can rely upon for providing best in industry turnkey solar solutions. Kearsarge and its project partners offer a comprehensive solar solution that includes all stages of permitting, the entire construction process, managing the incentives and financing details and administration, and all operations and maintenance services. As a privately-held, local firm, Kearsarge is able to streamline decision making and company Principals are available to Town officials at all times throughout the development and operational stages of this project. In addition, key decision makers are located within an hour’s drive and important legal or financial decisions do not have to be sent up a corporate ladder for approval, thus ensuring a quick turn-around and efficient procedures.

Kearsarge’s qualifications for this bid include:

- **Extensive experience developing and owning solar PV arrays on capped landfills and Superfund sites**
 - Kearsarge built and operates the 1.7 MW DC array at the Town of Concord, MA capped landfill
 - Kearsarge currently developing a portfolio of over 23 MW’s of solar PV on capped landfills, brownfields and Superfund sites in Massachusetts and Rhode Island, including over 8 MW at the Town of South Kingstown and University Rhode Island landfills

- **Financial capability**
 - Kearsarge has financed and built over 60 MW and \$180 million in solar PV projects over the past several years in New England
 - Kearsarge has a very strong balance sheet and deploys all of its own capital to fund project development
 - Kearsarge owns and operates its projects and does not need to sell to outside investors
- **Track record of developing solar PV arrays with municipalities and public entities**
 - Kearsarge has executed over 20 Net Metered Power Purchase Agreements, Power Purchase Agreements and Leases with municipalities, school departments, universities, municipal light plants and other public entities over the past several years
 - Kearsarge has built in-house capabilities and legal, administrative and regulatory expertise to assist municipalities and public entities with the intricacies of solar leases and power purchase agreements

I (a). Miller Bros. Company Profile



- i. Founded in 1937; Incorporated in 1989
- ii. Ownership status: Privately Held
- iii. Corporate Office: 301 Alan Wood Road, Conshohocken, PA 19428
- iv. Bonding Capacity: \$200+ million

Miller Bros. is experienced in all aspects of the construction industry including engineering, design and construction of large scale utility, transit, heavy and highway, renewable energy, commercial and industrial projects, as well as a full line of preventative maintenance services. Our commitment to excellence and focus on safety are the foundations that our company is built upon. With a family history and depth of experience in the utility construction and maintenance business, Miller Bros. has created long-lasting customer relationships based on high quality, safe and productive services exceeding the customers' expectations.

Miller Bros. has extensive experience working with local, state and federal government clients on utility, transit, infrastructure and solar PV projects. Miller Bros. was responsible for the high voltage installation, AC/DC Terminations and Final Commissioning for the 18 MW Fort Detrick, MD solar PV array with the United States Army. This project, a micro-grid compatible system, will provide approximately 10 percent of the bases' energy requirement and will make a significant contribution to the Base's goal of becoming NetZero by 2020. In addition to working with the United States Army, Miller Bros. has worked with:

- Chelmsford, MA public schools
- City of Northampton, MA
- Town of Stockbridge, MA
- Pennsylvania Department of Transportation
- South Eastern Transportation Authority
- Delaware River Port Authority
- Amtrak

- Maryland Port Authority
- Newark International Airport

Miller Bros. solar PV and utility experience, qualifications and services include:

- Self-Perform Site/Civil, Electrical, Mechanical, including:
 - Site Development Support
 - Transmission Interconnection
 - Engineering/Design
 - Construction
- Utility construction, including complete electrical construction and maintenance from Generation Point through Transmission and substations, with full utility line construction equipment – 300+pcs heavy equipment
- Aerial & Underground Transmission & Distribution Power Systems
- Substation Construction & Maintenance
- Smart Grid / Fiber Optic / SCADA Communications
- Directional Drilling Services – Boring, Vertical Drilling & Coring
- Utility Compliance – 27 years audited financials, corporate safety policy, insurance
- Over 140+ MW of solar PV completed to date
- O&M – 300+ MWs under management: Asset Management, Preventative & Reactive Maintenance
- Medium voltage interconnection/distribution

I (b). VHB Company Profile



Founded: 1979

Number of Employees: 1300+

Number of Employees in Local Office: 60+

Local Office: 1 Cedar Street #400, Providence RI 02903

For more than 25 years, VHB has provided the energy industry with comprehensive, integrated services ranging from federal, state, and local permitting to land survey—and from site plan development to legal testimony. Our team draws from a broad knowledge of the regulatory environment—as well as the latest energy policies and trends—to devise thoughtful, forward-thinking solutions for transmission, distribution, and siting projects. Moreover, with a long-standing office in Providence, and previous project work in both Bristol and Barrington, VHB professionals understand the unique characteristics, challenges, and opportunities associated with Rhode Island's energy market and can assist with determining the best strategies to move projects forward successfully.

Serving Solar Energy Clients

While working to maximize efficiency and reducing environmental impacts, VHB helps evaluate, design, and permit solar projects throughout the East Coast. We have supported a range of photovoltaic solar projects for municipal, residential, and commercial clients, as well as facilities up-to and including utility scale solar projects. Services we have provided include due diligence to identify optional site locations,

natural resource constraints, and interconnection issues; siting and layout to determine the potential energy yield and costs; and permitting and construction monitoring. By emphasizing the timely and cost-effective delivery of critical services, the VHB team has helped our clients move their solar projects forward to completion and operation.

Environmental and Cultural Resource Permitting

As regulations continue to evolve, VHB routinely helps clients evaluate environmental constraints and opportunities, and then determine the best strategies to successfully progress their projects. We offer strategic approaches to local and federal permitting, including proactive communication with the agencies and stakeholders involved. Additionally, with an in-house staff of more than 150 environmental and cultural resources professionals—including a strong local, RI-based team—we are prepared to quickly address any impacts to cultural/historic resources, threatened and endangered species, and more.

Site/Civil Engineering

VHB’s civil engineers provide comprehensive site planning and engineering design services to assist clients with a diverse mix of projects. Our work has included roadways, parking areas, walkways, stormwater management facilities, utility corridors, water features, pump stations, and other supporting site elements. Frequently, our engineers also take a leading role in securing necessary approvals and permits from regulatory agencies and utility providers, representing our clients and projects in public hearings and meetings.

II. Project Team

i. Team Leader and Point of Contact

Team Leader: ANDREW BERNSTEIN, Managing Partner, Kearsarge Energy.
 480 Pleasant Street, Suite B110, Watertown, MA 02472
abernstein@kearsargeenergy.com, 617-393-4222

ii. Key Personnel

Name	Title	Entity	Project Role	Location
Andrew Bernstein	Managing Partner	Kearsarge Energy	Team Leader	Watertown, MA
Everett Tatelbaum	Vice President	Kearsarge Energy	Financing, Project Management, Regulatory Compliance & Contracts	Watertown, MA
Adam Vosker	Director, Finance & Accounting	Kearsarge Energy	Financing, Accounting & Compliance	Watertown, MA
Henry Barrett	Associate	Kearsarge Energy	Project Development & Due Diligence	Watertown, MA
Harry B. Miller, III	President and CEO	Miller Bros.	Miller Bros. Team Leader	Conshohocken, PA
Douglas W. Stoneback	Vice President of Operations	Miller Bros.	Operations, Utility Construction, Electrical Maintenance & Emergency Services	Conshohocken, PA

Joe Marrone	Chief Estimator & Senior Project Manager	Miller Bros.	Project Manager, Site Development	Conshohocken, PA
Silas A. Bauer	Senior Project Manager	VHB	Project Manager, VHB Team Leader	Watertown, MA
Jonathan L. Feinstein	Senior Vice President	VHB	Regulatory Affairs	Providence, RI
Jonathan B. Stabach, PE, LEED AP	Project Manager	VHB	Project Management, site design, stormwater design, permitting	Providence, RI
Conor Nagle, PE, ENV SP	Project Manager	VHB	Civil engineering	Providence, RI
Susan Moberg, PWS, CFM	Principal	VHB	Project management, environmental licensing, permitting and compliance	Providence, RI

iii. Resumes

ANDREW BERNSTEIN

MANAGING PARTNER, KEARSARGE ENERGY LP

CONTACT: abernstein@kearsargeenergy.com, 617-393-4222

Mr. Bernstein manages overall development of Kearsarge Solar and is currently leading construction and development of 15 other MA SREC II projects ranging from 400 kW DC to 6 MW DC, and development stage projects throughout New England. Mr. Bernstein has 30 years of experience managing a broad range of organizations and divisions of large publicly traded corporations to early stage entrepreneurial enterprises with two successful exits and experience in project finance and investment banking. He is immersed in the local Massachusetts community and is on the board of several foundations and nonprofit entities including volunteer teaching in local public schools as well as guest lecturing in business at colleges and business schools.

- 30 years of experience managing a broad range of organizations and divisions of large publicly traded corporations to early stage entrepreneurial enterprises with two successful exits and experience in project finance and investment banking.
- CEO & President of Cymfony Inc., for 9 years, a market intelligence and media analysis company which was purchased by TNS Media in 2007 and then WPP.
- Selected Energy Consulting for National Firms focused on renewable and clean energy assets.
- Managing Partner of HotHouse Venture Partners, an early stage venture capital and consulting organization including several projects on renewable development.
- COO and Executive Vice President of Articulate Systems, a software company specializing in voice and data applications acquired by Lernout & Hauspie in 1999.
- Started the international division of a \$600 million apparel and footwear company, The Stride Rite Corporation in 20 countries over five years.
- Kidder, Peabody & Co. equity research and project finance investment banking.
- A.B. Brown University and an MBA from Harvard University
- Currently serves on or leads several for-profit and non-profit boards including the Brookline Community Foundation and the Board of Overseers at the Brigham and Women's Hospital.
- While at Cymfony, DoD awarded him Top Secret Clearance

EVERETT W. TATELBAUM

VICE PRESIDENT, KEARSARGE ENERGY LP

CONTACT: *etatelbaum@kearsargeenergy.com, 617-393-4222*

Mr. Tatelbaum played key roles in the development, financing, due diligence, legal affairs, regulatory compliance, and asset management of all 13 operating Massachusetts Kearsarge Solar Projects and is currently involved in the development, financing, and construction of 10 MA SREC II projects ranging from 400 kW DC to 6 MW DC, and development stage projects in Vermont, Connecticut, Rhode Island, New Hampshire and New York.

- Leads strategic planning and development at Kearsarge, including overseeing project finance, due diligence, and regulatory affairs. In this role he has worked to permit, finance, construct and operate a portfolio of more than 40 MW and over \$120 million of solar PV projects in Massachusetts and Hawaii.
- Previously worked in Research at BCK Law, P.C. with a focus on energy efficiency and renewable energy policy, regulatory affairs, local permitting, and project development and contributed to BCK's successful effort to secure Massachusetts' Department of Public Utilities approval for a major client's \$87 million three-year Energy Efficiency Plan.
- Worked in Sustainable Energy and Eco-culture across Ireland, France, Italy, Hungary & Greece
- Selected to Americorps Fellowship as Literacy Teacher for under privileged kids in Inner City and extended to teaching Math for High School Students.
- BA, Wesleyan University

ADAM VOSKER, CPA

DIRECTOR, FINANCE & ACCOUNTING, KEARSARGE ENERGY LP

CONTACT: *avosker@kearsargeenergy.com, 617-393-4222*

Mr. Vosker's role is oversight over accounting and financial operations. His focus on project level financial management includes recognition and forecasts of PPA and SREC revenues, cash management, and all expenditures to accurately gauge project financial position. In addition, he handles all internal and external reporting requirements.

- Leads Kearsarge Energy's Finance & Accounting team, including financial modelling, project finance and accounting and strategic management.
- Over 10 years of accounting, financial and auditing experience large regional and multinational companies for government, non-profit and private sector clients
- Director of Accounting at Black Box Network Services, a \$1b, publicly traded multinational communications solutions provider, where he oversaw accounting and financial report for government clients, including GAAP, SOX and Federal Acquisition Regulation compliance.
- Led auditing and tax filings for non-profit, manufacturing, and professional services firms clients at Alexander Aronson Finning CPAs, a large regional CPA firm based in Westborough, MA.
- Managed financial reporting, annual and monthly budgeting and annual audits for CCA USA, Inc.
- Certification: Certified Public Accountant
- BA, University of Massachusetts, Amherst, MA
- Master of Science in Accounting, Sawyer School of Management, Boston, MA

HENRY BARRETT

ASSOCIATE, KEARSARGE ENERGY LP

CONTACT: hbarrett@kearsargeenergy.com, 617-393-4222

Mr. Barrett focuses on business development, due diligence and asset management for Kearsarge's portfolio of solar PV projects. He is currently focused on the development of new Massachusetts SREC II projects, with projects ranging from 400 kW DC to 6 MW DC, as well as managing existing solar production

- Previously worked at start-ups in Massachusetts with a focus on market analysis for the residential solar market and business development and regulatory affairs for a small-scale hydro firm.
- Researched and helped determine sustainability initiatives for a range of corporate and nonprofit organizations.
- Worked as Legislative Aide in the Massachusetts State House, focusing on statewide energy policy, including permitting and siting wind facilities, changes to the net metering program and energy efficiency programs.
- Received his BA from Colorado College and MA in Energy Policy and Business from the Fletcher School at Tufts University.

HARRY B. MILLER III

President and Chief Executive Officer

Professional Experience:

Harry B. Miller III is the President and Chief Executive Officer of Miller Brothers. Harry's classical training is as an Electrical Engineer and he is member of the International Brotherhood of Electrical Workers (IBEW) contributes significantly to his expertise in the field of electrical construction. Harry has over 30 years in the electrical construction industry. He is responsible for overall business strategy, corporate development, planning, project engineering, electrical design and general business processes at Miller Brothers. Harry Miller's electrical, operational and financial experience maximizes client value.

Licenses and Certifications:

- Qualified Penn Dot business partner
- Qualified NJDOT Business partner
- Qualified Septa business partner
- Electrical Engineer
- Licensed in PA, NJ, DE, MA

Professional Qualifications:

- Electrical Design
- Structural Design
- Member International Brotherhood of Electrical Workers (IBEW)
- Federal, State and Local Compliance
- Construction Consulting
- Budget Management
- Client Management
- Technical Plan Review
- Working Knowledge of IBC, NEC codes

Formal Education

- B.S. Electrical Engineering, Temple University, Philadelphia, Pennsylvania
- IMSA Level Certified

Select Project Management Experience:

Pennsylvania Department of Transportation – Interstate 476 Reconstruction & I.T.S.

Miller Bros was awarded the contract for installation of intelligent transportation systems on Interstate 476 in Montgomery County, Pennsylvania in 2009. The project covered an area of 8 miles and had an approximate duration of 3 years. Total contract value for this work was \$9.2 Million. This project was completed ahead of schedule with no safety incidents. Currently, Miller Bros is involved with numerous I.T.S. projects for the State of Pennsylvania throughout the eastern part of the state.

Toys R US Eastern US Distribution Center – Constellation Energy

Miller Bros. received a contract to complete the electrical construction, installation and commissioning of a 5.4 MW roof-top amorphous silicon photovoltaic (PV) solar panels solar array under contract to Constellation Energy. Constellation Energy is the project owner, developer and EPC. The solar array completely covered the 1,200,000 square foot roof of the Toy "R" US Eastern United States Distribution Center. The array consisted of a series of 10 PV cells in a power section. The approximate contract value was \$5.5 Million.

Harwood Valmont – (PPL) Pennsylvania Power & Light Corporation

Miller Bros was awarded the contract for transmission line construction and extension for a proposed substation near Valmont, Pennsylvania. The project also encompassed reconductoring of existing poles lines. The contract value for this project was approximately \$2 Million. Construction completed in early 2010. Miller Bros continues to work with (PPL) Pennsylvania Power & Light on many transmission, reconductoring, distribution and substation projects.

DOUGLAS W. STONEBACK

Vice President of Operations

Professional Experience:

Douglas Stoneback has been in the electrical construction industry for over 37 years. His early career was spent working and managing projects in the field as a Job Foreman and later as a Superintendent. For the last 11 years, Douglas has served as Vice President of Corporate Operations and has been responsible for the overall operations of the Utility Construction, Electrical Maintenance and Emergency Service departments. Some of his responsibilities include scheduling, labor, resource tracking, quality control and procurement. Doug works directly with the area's largest utilities including Exelon Corp, Pepco Holdings and PPL Electric.

Licenses and Certifications:

- NECA Safety Certification
- OSHA 10 Hour Course / Certification
- Electrician Local Union 126 (IBEW) 35 Years

Professional Qualifications:

- Electrical Design Build Engineering
- Project Management
- Labor Management
- Materials Procurement
- Budget Management
- Working Knowledge of IBC, NEC codes

Formal Education

- Electrical Construction, Montgomery County Technical School, Graduate
- PA 4 Year Electrical Apprenticeship Program (1972-1976)

JOSEPH MARRONE

Chief Estimator and Senior Project Manager

Professional Experience:

Joseph Marrone serves as a Senior Project Manager and a Chief Estimator for Miller Brothers. Joe has extreme passion for utility construction and over 10 years of experience in the utility, industrial, commercial, mechanical and solar industry. Joe's extensive experience in estimating, project management, labor management and material procurement allow him to deliver quality projects, on time and under budget. Wearing multiple hats allows Joe to bring a project from concept, through coordination, design, planning and construction, to successful completion.

Licenses and Certifications:

- Electrical Association of Philadelphia
- NECA Safety Certification
- OSHA Certification
- PV – Solar Energy International Institute
- Solar PV Calculations – EEC
- O&M of PV Systems – NECA

Professional Qualifications:

- Utility Design Build Engineering
- Project, Labor, Budget and Materials Management
- Working Knowledge of IBC, NEC codes

Formal Education

- B.S. Business Management, Temple University, Philadelphia, Pennsylvania
- Six Sigma Black Belt, Villanova University, Villanova, Pennsylvania

Project Management Experience

Army Reserve Center, Willow Grove, Pennsylvania

Miller Bros. was contracted in 2010 to aid in design and complete the installation of new underground electric utilities and lighting systems for the Armed Forces Reserve Training Center at the Willow Grove Naval Base. Joe worked directly with the Base's military personnel to validate and value engineer the electrical utility design for the new complex. Joe's experience working on secure bases allowed him to move through the construction phases without interruption to the existing operations on base.

Toys R' Us, Flanders, New Jersey

Miller Bros. was contracted by Constellation Energy in 2011 to complete construction of what was at the time the largest PV rooftop in the Country, a 5MW solar array. Miller Bros completed installation and final commissioning in December, 2011. With Joe's oversight and management, the project was completed on time and without any safety incidents.

NAVFAC MIDLANT, Philadelphia, Pennsylvania

Miller Bros. was contracted in 2012 to install new underground electric utilities for the NAVFAC Foundry and Propeller Center in the Philadelphia Navy Yard. Joe had daily interaction with the foundry personnel throughout the construction of this project. Daily challenges included very secure entrance and searches as well as tight operating spaces. Despite these challenges, Joe delivered the complex ductbank system ahead of schedule.

Hebron Solar, Hebron, Maryland

Miller Bros. was contracted by Marina Energy, LLC to complete development, design, procurement, construction and commissioning of this 18MW single axis tracker array. Joe managed all aspects of the project from development, through design and to final commissioning. The project was completed on a 120 acre field. The \$40 million dollar project was completed without any safety incidents on time and on budget.

Imclone Systems, Branchburg, New Jersey

Miller Bros. was contracted to complete the installation and commissioning of this 10MW ground mount array. Joe managed the construction of this project through a winter that saw a snowfall of over 36" in one month. Joe's experience and ability to manage a schedule with other trades while compressing manpower allowed this project to be successfully delivered on time.

6MW Natural Gas Peaker Plant, Philadelphia, Pennsylvania

Miller Bros. is contracted to complete the design, installation and commissioning of this 6MW NG peaker plant located in the Philadelphia Navy Yard. The plant will supply demand response for the local utility as well as peak shaving for local businesses on the Philadelphia Navy Yard's Micro Grid. Joe has passed through the contracting and modeling of this plant, and currently working with several engineers to finalize design. Construction is anticipated to start in Q3, 2016.

Additional Solar Projects

Brickyard Solar – 2MW

Holland Solar – 3.5MW

Newark Airport Solar – 1MW

Mountain Creek Solar – 7MW

MPA Baltimore Solar – 1MW

Arthur Ashe Solar – 400kw

Frenchtown 1 Solar – 2MW

Frenchtown 2 Solar – 3 MW

Flemington Solar – 8MW

Ben Moore Paints Solar – 2MW

Please see Appendix 3. VHB Resumes for resumes of key VHB personnel.

III. Commitment to Safety

It is the policy of Miller Bros. to operate in a safe and responsible manner that respects the environment and the health of our employees, our customers, and the communities in which we operate. Further, it is our goal to maintain a safety culture among our employees which fosters the understanding that the ultimate responsibility is to work safely and not to compromise environmental, health, or safety values for profit or production.

Miller Bros. Commitment:

- Maintain a work environment that is intolerant of recognized safety hazards and will ensure the protection of our employees and all others who come in contact with our operations.
- Maintain a work environment that enables and encourages all stakeholders to take corrective action if they observe a condition they believe to be unsafe.
- Hold accountable employees at all levels to manage and maintain safe work practices within their respective areas of responsibility.
- Achieve safety excellence through continuous improvement by enhancing the skill sets of our employees and developing an environment that encourages employee participation and ownership in our safety program.
- Comply with all federal, state, and / or local regulations and client rules which govern safety at the jobsite and work locations.

Commitment to Working Safely

Everyone has the responsibility for working safely on each site. Each person has the right and responsibility to stop work if he/she disagrees with or does not understand the work instructions, or feels that the assigned task is unsafe. In addition, each person who stops work has the responsibility to ask questions and to work with Miller Bros Supervision and the Safety Department to develop a work plan to restore flow and to

proceed with the work in a safe manner.

Miller Bros. has developed and adopted a Corporate Safety Program that is committed to the safe completion of all projects. In that regard, through training seminars, our employees are fully aware of the dangers associated with our industry and the precautions necessary to avert such dangers. Our commitment to safety will take priority over all other concerns. This commitment extends to all subcontractors working on our projects, the vendors delivering materials, and the engineering firms and clients with whom we work. The standards by which we manage our projects exceed those mandated by OSHA in most circumstances and meet the standards in all others. Our program includes implementation of safety measures, as well as the enforcement of OSHA standards. Our supervisors are authorized to enforce the safety standards enacted by OSHA and to ensure the overall safety of the project and the employees. All subcontractors are expected to cooperate and comply with our efforts to achieve a safe worksite for all involved.

It will be a company goal to develop, implement, and enforce a loss prevention program that is recognized in the construction industry as second to none. We are committed to providing a safe work environment by making safety training available beyond the "minimum required", recognizing employee achievement and a constant review of both positive and negative results as both written and implemented in the field.

Safety Program Goals

Miller Bros. goal for all projects is to achieve a zero recordable injury and illness objective, resulting in accident experience rates of zero. Our objectives are to ensure that employees are well informed in the hazards particular to the scope of work; that all employees are comfortable, confident, and knowledgeable before engaging in any task; that employees are encouraged and take ownership of participating in the safety process; and that any time a situation presents itself without a clear plan of action work will be stopped until a resolution is reached.

Stop Work Authority

All employees on site have the authority and responsibility to stop work for conditions that pose imminent hazard or danger. Imminent hazards are those hazards or situations, if allowed to persist, are likely to cause an accident that will result in death, serious injury, significant property damage, or environmental impairment. Miller Bros. considers no activity to be so urgent or important that its standards for environmental protection, safety, or health may be compromised. Employees have the right and responsibility not to perform tasks or activities they feel pose undue risk to themselves, co-workers, or the environment. Stop-work actions take precedence over all other priorities and procedures. All imminent hazard situations should be resolved on the spot, if possible. The Supervisor, SHSO, and Project Manager should be involved as needed to resolve the issue. Work will not re-commence until all parties are satisfied with the resolution.

Hazard Controls and Safe Work Practices

Miller Bros. practices safe work practices and control measures used to reduce or eliminate potential hazards. All Miller Bros. employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. Work area hazards should be corrected upon discovery with an appropriate control method. Miller Bros. follows the NIOSH Hierarchy of Controls to select a preferred method to reduce or eliminate exposure to the work area hazard. The Hierarchy of controls describes that the control methods in order of preference are: elimination or substitution, engineering controls, warnings, training, and personal protective equipment. If a work area hazard is not corrected immediately, the discoverer must report the hazard to their direct supervisor or the site superintendent. All accidents, injuries and illnesses will be reported to a supervisor or the site superintendent immediately.

Health and Safety Plans

Health and Safety Plans are prepared for projects contain the planned controls based on an assessment of the expected hazards to be encountered during performance of the project. It is expected that all employees and subcontractors comply with the provisions of this plan. Should new hazards be presented, they must be assessed and appropriate controls be selected following the NIOSH Hierarchy of Controls.

Safety Meetings

Before the start of work on each shift, all Miller Bros. employees will attend a documented Tailgate Safety Meeting. Topics for the Tailgate Safety Meetings will be selected based on observations of behaviors or conditions from the previous week, or in response to upcoming activities. All Miller Bros. employees and subcontractors working on the site are expected and required to attend the Tailgate Safety Meeting. Each week, an All-hands Site Safety Meeting will be held with all personnel on site to review and discuss past observations of behaviors and conditions, upcoming site activities, special hazards, areas to avoid, or lessons learned.

Site Compliance Inspections

In order to ensure compliance with regulatory agencies and Miller Bros. internal procedures and expectations, field inspections will be performed of all our projects. On all job sites Health and Safety Representatives or the Supervisor in charge will perform regular and frequent inspections of the condition of the work site. The SHSO or their designee will conduct a documented inspection each day. Any findings generated from that inspection will be recorded on the inspection form and included into the corrective action tracking log. Any deficiencies found during any inspection are to be corrected immediately. Corrective actions which cannot be completed immediately will be logged onto a tracking table for follow-up with the responsible personnel. Only items which require transfer/purchase of additional materials and/or equipment, or require follow-up meetings or training will not be corrected immediately. Miller Bros. will participate in site compliance inspections as requested.

Safety Interventions

Miller Bros. empowers its employees to intervene whenever they see unsafe behavior or unsafe conditions. Unsafe conditions are corrected immediately, and any condition requiring the purchase of new tools and equipment will require a temporary task stand-down until the correct equipment is available. Unsafe behaviors may be corrected through coaching or retraining. As needed, the observer can involve the Supervisor or local management to resolve the issue.

IV. Capital Finance Capability

i. Description of Financing Structure

Kearsarge's proposal for the Project will be structured according to our proven project finance Model:

- **100% of project equity funding has been pre-approved by the Kearsarge Investment Committee** for this Project based on the project specifics detailed in this proposal and is available and reserved in our bank account. Please see Appendix 4. Kearsarge Energy Limited Partnership Equity Funding Letter for a letter from Kearsarge Energy Limited Partnership confirming allocation of this capital.
- Kearsarge will form a Special Purpose Entity ("SPE"), which will be the long-term owner of the Project and all appurtenant equipment, entitlements and will execute all project agreements.
- The SPE will be owned by Kearsarge and will take out a commercial loan from one of our senior commercial lending banks **where we have over \$50 million preapproved for solar projects.** Kearsarge has completed over 20 projects with commercial banks for both tax equity and debt. **We do not use third parties to arrange financing as all of our relationships are direct—which further differentiates Kearsarge from many other competitors.**
- Kearsarge will oversee all Operations & Maintenance work and Kearsarge will directly manage all lease payments, as well as all general and administrative requirements.

In addition, on every project Kearsarge has several types of cash reserves to further enhance the financial stability of the individual project over the long term:

1. **Working Capital Reserves for Regular Project Operations at Project Level.** These funds are calculated per project and are based on normal quarterly operating expense for each project.
2. **Restricted Cash Debt Reserves as required by Commercial Lender at Project Level.** These funds are tied to two to three quarters of debt service payments for each project.
3. **Decommissioning Reserves at Project Level as required by certain municipalities.** These funds are either escrowed cash accounts, Letters of Credit, or other forms of sureties.
4. **Restricted Cash Reserve at Kearsarge Energy LP Parent Level.** These funds cover tax equity investor requirements.

Kearsarge is a financially strong partner and by the end of 2016 will have total assets of approximately \$100 million. Additionally, we are held to the highest standards of creditworthiness and financial discretion in order to meet the requirements of our banks and are fully audited each year.

Highlights of Kearsarge's financial experience and capabilities include:

- **As of October, 2016, Kearsarge has financed over 60 MW and \$180 million of solar projects.**
- Currently financing a 75 MW and \$220 million portfolio of renewable energy projects across New



England and in select markets around the U.S.

- A strong balance sheet and relationships with four Massachusetts banks with currently over **\$50 million in pre-approved loan capacity** for Solar Projects.
- Completed over **\$60 million of debt financing** with local banks for Massachusetts solar projects alone.

Every solar energy project presents a unique set of challenges and complexities. Due to the experience, achievements and knowledge base of its principals, Kearsarge is well-positioned to execute on municipal solar energy projects. Andrew Bernstein has over 30 years in finance and project finance experience and one of Kearsarge's unique advantages is our ability to flexibly and creatively finance projects. We have been at the forefront of creatively and effectively structuring solar PV projects over the last five years, including two of the largest projects in Massachusetts.

Kearsarge's strong balance sheet and top tier financial qualifications allow us to support numerous projects currently operational and under development. Kearsarge has worked on projects of varying size and complexity and we are very confident in our approach and financing structure, as it has been approved by our national partners – some of the largest financial institutions in the country.

Minimize Risk. For its portfolio of solar projects Kearsarge has utilized several different financing platforms. We have multiple sources for tax equity, commercial debt, government subsidized debt, and hybrid non-profit/foundation debt vehicles. Currently, **we finance all of our projects with our own capital**, bring in senior debt and if needed augment with third party tax equity. We plan to do the same for this Project, which provides Kearsarge with a readily available and reliable "one-stop" source of capital. In addition, we have a unique structure that allows for our construction partners to invest in projects themselves, thus giving them added "skin in the game."

Partner with Local Banks. As part of our commitment to the communities in which we operate and our goal of creating sustainable and mutually beneficial relationships for every project, we will work with our regional banking partners for this Project. To date, Kearsarge has completed seven projects with over \$30 million of funding from regional banks, including Cambridge Savings Bank, Eastern Bank, and Boston Private Bank. By partnering with local banks, we ensure that the money stays locally and can be used to help build stronger and more resilient communities. Unlike large, national solar companies we understand the value and power of local relationships.

In summary, Kearsarge and its partners have a proven track record of delivering projects that consistently surpass the highest standards of economic, environmental and technical quality. Our team takes great care to be realistic about system size, construction schedules, interconnection timing with the local utility, and financing. We provide an effective and straightforward solar solution that incorporates top tier engineering and guaranteed savings into a turnkey package. Upon request we can provide any additional materials necessary to demonstrate our financing capability.



SECTION 3. Relevant Solar Project Experience

i. Project Team Solar Projects

Please see table below for a list of Kearsarge Energy's Solar Projects.

Number	Size (kW DC)	Location	Type	Year of Completion
1	315	Town of Sunderland, MA	Ground-Mount	2016
2	990	Town of Westborough, MA	Ground-Mount	2016
3	762	Town of Rehoboth, MA	Ground-Mount	2016
4	645	Town of Athol, MA	Ground-Mount	2016
5	3,200	Town of Granby, MA	Ground-Mount	Scheduled 2016
6	581	Town of Norwell, MA	Canopy	Scheduled 2016
7	5,564	Town of Concord, MA	Ground-Mount	Scheduled 2016
8	854	Town of Duxbury, MA	Rooftop	Scheduled 2016
9	4,124	Town of Bellingham, MA	Ballasted Capped Landfill	Scheduled 2016
10	1,300	Town of Shirley, MA	Ground-Mount	Scheduled 2016
11	1,300	Town of Ayer, MA	Ground-Mount	Scheduled 2017
12	6,000	Town of Montague, MA	Ballasted Capped Landfill & Ground-Mount	Scheduled 2017
13	8,700	Town of South Kingstown, RI	Ballasted Capped Landfill & Ground-Mount	Scheduled 2017
14	2,770	Town of Gill, MA	Ground-Mount	Scheduled 2017
15	1,100	Egremont, MA	Ground-Mount	Scheduled 2017
16	2,800	Egremont, MA	Ground-Mount	Scheduled 2017
17	2,600	Great Barrington, MA	Ground-Mount	Scheduled 2017
18	4,925	Town of Southwick, MA	Ground-Mount	2015
19	6,000	Town of Chester, MA	Ground-Mount	2014



20	860	City of Chicopee, MA	Ground-Mount	2014
21	2,400	Town of Barre, MA	Ground-Mount	2014
22	1,723	Town of Concord, MA	Ballasted Capped Landfill	2014
23	1,900	Town of Barre, MA	Ground-Mount	2014
24	2,500	Town of Hubbardston, MA	Ground-Mount	2013
25	1,720	Town of Grafton, MA	Ground-Mount	2013
26	370	Town of Canton, MA	Rooftop	2013
27	417	Town of Canton, MA	Rooftop	2013
28	4,800	Town of Franklin, MA	Ground-Mount	2013
29	3,600	Town of Franklin, MA	Ground-Mount	2013
30	5,740	Town of Salisbury, MA	Ground-Mount	2012
TOTAL	80,560			

Please see Appendix 5. Kearsarge Energy Solar PV Portfolio for Kearsarge Energy Solar PV Portfolio.

ii. Project Team's Total Capacity of Operational Solar PV Installations

Kearsarge Energy	37,500
Miller Bros.	200,000
Total	237,500

iii. Project Team's Total Capacity in the Northeast

Project Type	kW DC
Capped Landfills	9,400
Roof-mounted	9,087
Carport	587



Ground-mounted	110,513
Other	0
Total	129,587

iv. Project Team Experience with Capped Landfills

The Project Team's combined experience of developing solar PV arrays on capped landfills in will enable us to move quickly through the extensive permitting process with RIDEM and local permitting authorities. VHB is one of the leading environmental and engineering firms in the Northeast and has extensive experience working with local, state and Federal regulatory bodies for permitting solar PV projects on capped landfills. VHB has provided ballasted racking design, environmental assessments, local and state permitting and overall management of more than 13 MWs of solar PV on public and private capped landfills in the Northeast, including a 6 MW solar array on a private landfill in Massachusetts, the largest such project to date.

In addition, Miller Bros. is currently acting as the EPC on two ballasted solar arrays on the Town of Northampton (3.2 MW DC) and the Town of Stockbridge's (1 MW DC) municipal capped landfill projects. They are operating under tight timeframes and complex sites to complete these projects before the end of the year.

Kearsarge has specifically worked with the Massachusetts DEP on solar PV arrays on multiple landfill and brownfields, including the 1.7 MW Town of Concord capped landfill (operational), the 5.5 MW DC WR Grace Superfund site located in the Town of Concord (currently under construction), the 4.1 MW DC Town of Bellingham capped landfill (currently under construction) and the 6 MW DC Town of Montague capped landfill (currently in permitting). Kearsarge has also worked with the MA DEP on the 1.7 MW DC Grafton Water District Project. This was the first solar PV system installed at an active wellhead site and was the first to be permitted within 400' Zone 1 radius of a groundwater well. This project has since been recognized by the DEP as a leading example of how solar can be integrated seamlessly with existing water infrastructure facilities.

In addition, Kearsarge is currently working with the local EPA office, RIDEM and South Kingstown officials on the Post-Closure Use Alteration process for the 8.7 MW DC capped landfill project in South Kingstown and URI.

As a result of this experience and the strong relationships Kearsarge maintains with State and Local Regulatory bodies, Kearsarge is able to efficiently move projects through permitting. Previous projects have required approvals for sites on landfill caps; an active wellhead site; officially-listed brownfields; sites with multiple endangered species, including turtles, tiger moths, and orchids; wetlands; residential neighborhoods; scenic roads; utility pole easements; Federal Aviation Administration approval for work adjacent to operating airfields; and a range of other site-specific conditions.



v. Kearsarge Energy Solar PV Installations with Municipalities

Number	Project	Size (kW DC)	Type
1	Bellingham Landfill	4,100	Chapter 25A / 30B
3	Sunderland Elementary School	315	Chapter 30B
4	Westborough Wastewater Treatment Plant	990	Chapter 25A / 30B
5	Town of Concord former Federal Superfund Site	5,560	Municipal Light Department
6	Montague Landfill & Industrial Park	6,000	Chapter 30B
7	Duxbury Elementary, Middle & High Schools	850	30B Design/Build Energy Management Services Agreement
8	Town of Concord Municipal Buildings & Parking Lots	5,000	Municipal Light Department
9	Southwick	4,925	Chapter 25A
12	Barre MA	2,400	Chapter 25A
13	Concord MA	1,723	Municipal Light Department
14	Barre MA	1,900	Chapter 25A
15	Hubbardston MA	2,500	Chapter 25A
16	Grafton MA	1,720	30B Design/Build Energy Management Services Agreement
17	Canton MA	370	Chapter 25A
18	Canton MA	417	Chapter 25A
19	Franklin MA	4,800	Chapter 25A
20	Franklin MA	3,600	Chapter 25A
21	Salisbury, MA	5,740	Chapter 25A

In addition, Kearsarge Energy is working on seven late development-stage projects with Massachusetts municipalities and public entities that were awarded through public competitive bids over the past year:



	Project Name	Size (kW DC)	Municipal Partner	Type of Contract	Length of Contract	Municipal Role
1	Bellingham Landfill	4,100	Town of Bellingham, MA	Lease	20 years	Site Host
2	Sunderland Elementary School	315	Town of Sunderland, MA	PPA & Lease	20 years	Site Host and Off-taker
3	Westborough Wastewater Treatment Plant	990	Town of Westborough, MA	PPA & Lease	20 years	Site Host and Off-taker
4	Town of Concord former Federal Superfund Site	5,564	Concord Municipal Light Plant, MA	PPA & Lease	20 years	Site Host and Off-taker
5	Montague Landfill & Industrial Park	6,000	Town of Montague, MA	Lease	20 Years	Site Host
6	Duxbury Elementary, Middle & High Schools	850	Town of Duxbury, MA	Lease & Energy Management Services	20 Years	Site Host and Off-taker
7	Town of Concord Municipal Buildings & Parking Lots	5,000	Concord Municipal Light Plant	PPA & Lease	20 Years	Site Host & Off-Taker
	Total	22,819				

SECTION 4. Kearsarge Energy References

Please see Appendix 6. References & Required Bid Forms for references.

SECTION 5. Proposed Solar PV System

I. System Summary

Project	Size (kW DC/ AC)	Year 1 Production (kWh)
Minturn Farm Road Landfill	4,750 kW DC / 3,800	5,700,000

II. System Components

Project	Equipment	Description
Minturn Farm Road Landfill	Modules	Manufacturer: Trina Model Number: Tallmax Plus Wattage: 335 Quantity: 14,179



	Inverters	Manufacturer: Power Electronics Model Number: Quantity:
	Racking	GameChange Solar fixed tilt ballasted
	Data Acquisition Software	ALSO Energy <ul style="list-style-type: none"> • Monitoring system to include revenue grade meters & CTs for each switchboard • Weather station • (2) Pyranometers • Temperature sensor • Data loggers • Power supplies • Cellular communications • (2) NEMA 3R enclosures

III. Warranties

EPC Installation	5 Years
PV Modules	25 Years
Inverters	10 Years
Racking	20 Years

IV. Design

Design. The initial layout, design and configuration is based on the site visit, an initial solar feasibility study and taking into account documents and information provided in the RFP. Final design and size will be formalized based on additional site visits, site discovery, comprehensive evaluation of the capped landfill and suitability for solar, detailed topography, wetlands surveys, interconnection with National Grid and permitting with RIDEM. The proposed layout is designed to maximize the available land and thus generate the greatest economic benefit to the Towns.

The Project Team will utilize a fixed-tilt ballasted ground-mount racking system for the capped landfill in order to protect the integrity of the cap. We have restricted the racking to only the areas with slopes of less than 10 degrees, as this is industry practice and will protect against blocks sliding and damaging the cap.

Please see Appendix 1. Preliminary Site Layout for an initial site layout and drawing and Appendix 7. Equipment Specification Sheets for Equipment Specification Sheets.

V. Permitting and Approvals



Per the RFP, The Project Team is responsible for obtaining and paying for all costs for all permits associated with these projects. Kearsarge and its project partners have over a decade of experience permitting solar PV projects with local Planning Boards, Conservation Commissions, and state and federal authorities, including RIDEM and equivalent authorities in Massachusetts and other states in the Northeast. In addition, Kearsarge is working closely with RIDEM and the U.S. EPA on permitting solar projects at the South Kingstown and University of Rhode Island Superfund Sites.

I. Interconnection

The Project Team understands that the interconnection process can be the longest lead time in any solar project and we work extremely hard to ensure this process remains on track, all design decisions are highly value-engineered, and that all payments are made in a timely manner. Kearsarge has been working closely with National Grid to optimize the design and cost effectiveness of the interconnection to the solar arrays Kearsarge is currently developing in South Kingstown. Due to this knowledge and experience, Kearsarge is very familiar with the key personnel within National Grid to expedite the interconnection review and approval process.

Since Kearsarge funds all project development with its own Balance Sheet we have the financial flexibility and can respond to the utility on an immediate basis. This allows for a more efficient process, a greater degree of certainty for the Towns, and gives us an advantage over other solar developers that must receive approval from national funding partners for these types of expenses.

As with all of our past projects, we will take a comprehensive, inclusive approach to interconnection with National Grid. We have strong working relationships with key personnel within the National Grid Distributed Generation team and we will begin immediately from Day 1 to update the existing Feasibility Study done by National Grid for this property and to submit for new Feasibility and Impact Studies to determine what type of upgrades, if any, are necessary and pre-emptively identify any roadblocks or hurdles that may arise so as to maintain our strict schedule and have the project generating energy as quickly as possible.

The Project Team has interconnected projects with **National Grid, Eversource, and three different municipal light department territories** across Massachusetts. We have built some of the largest projects in Eversource and National Grid territories and our references would support our professionalism and thoroughness with the utilities. **Project interconnections range in size from 317 kW DC (300 kW AC) to 6 MW DC (4.8 MW AC)** and include rooftop behind-the-meter and stand-alone Federal Energy Regulatory Commission-Qualified Facilities (FERC QF) wholesale power generation facilities. This includes simple new meter and transformer upgrades all the way through significant substation upgrades, single phase re-stringing to three-phase, as well as 13.8 kV and 23 kV distribution line interconnections.

In National Grid territory, Kearsarge has previously interconnected 7 projects totaling 22.7 MWs, and has 7 projects and more than 19 MWs in development. We are confident in our ability to work through any design, technical, and cost issues in a timely and effective manner on any National Grid project. This experience includes complex interconnections on multiple projects. They include:

- **Mount Saint Abbey's Phase 1 and Phase 2 in Franklin, MA:**
 - Kearsarge Energy initially applied for a single point of interconnection for a project hosted by Mount Saint Mary's Abbey and received initial feedback from National Grid that the feeder was limited and the project would have to be constrained by the size of



- the existing infrastructure.
 - Through extensive collaboration and work with National Grid and their consultants, we were able to identify an additional feeder and Abbey land on an adjacent parcel and thereby create two separate and distinct developments with different timelines. We worked with National Grid to tie into a 13.8 kV feeder to the south of one property and a 23 kV feeder to the north and east of another adjacent property, allowing for successful interconnection.
 - We worked with National Grid and the Town of Franklin to ensure smooth local permitting process for municipal easements for new poles and wetlands crossings for pole upgrades.
 - We were able to maximize the solar development potential for our host partner, Mount Saint Mary's Abbey, to maximize energy cost savings to our NMPPA off-taker, the Town of Franklin, by delivering two projects instead of one. All stakeholders were extremely pleased by the end results.
- **Kearsarge Barre I, Kearsarge Barre II, and KS Solar Six:**
 - Simultaneously, Kearsarge Energy was developing three separate projects in the Town of Hubbardston and the Town of Barre. Each project was to be interconnected to the same substation, which required significant upgrades.
 - Connecting three projects on different timelines into one substation presented additional technical challenges and required creative solutions.
 - The Kearsarge Project Team proactively worked with National Grid in order to find synergies between the projects and to develop a cost-sharing plan in order for the projects to be financially viable.
 - After working with National Grid on this complex process over eighteen months and three separate projects, we were able to reach a mutually beneficial solution that allowed for all the projects to connect to the same substation at a cost that was within budget and met our schedule.
 - All three projects were constructed on time and have been generating above projections, delivering significant energy cost savings to NMPPA partners including UMass Lowell, the City of Leominster, the Town of Grafton, and the Pathfinder Regional Vocational Technical High School.

I. Decommissioning & Removal of System

As Kearsarge owns and operates all of its projects, we take great care in establishing a detailed decommissioning plan for each site. Therefore, as specified in the RFP, Kearsarge is pleased to work with the Town to provide security to the Town for the removal of the System at the end of the Term and welcomes the opportunity to collaborate with and receive feedback from the Town and local stakeholders for the decommissioning plan and process. As Kearsarge has done with many municipal counterparties, planning boards, and private landowners, we will provide a form of surety in an amount equal to the estimated cost of removing the system as prepared by a qualified construction professional. Such security shall be made available to the Town per any permit requirements upon abandonment of the System.

Kearsarge Energy uses independent, highly qualified 3rd parties to assess decommissioning costs and develop a mutually-agreed upon plan for decommissioning the solar PV array.



II. Schedule and Project Management

Cost Controls

Cost control is a constant focus for the Miller Brothers. It begins with the estimating process and continues with project execution and closeout. Throughout this process, our Project Managers utilize a variety of tools to focus on controlling and managing cost. Our belief is that efficiencies are found and errors are avoided through regular detailed analysis of productions, man-hour, material, equipment, and subcontractor costs in addition to assessing risk. Each procedure makes good business sense and we follow them because they provide for tight project management control and cost effective results on all projects. Cost control begins during the project planning stage in our estimating process with a clear definition of the project scope and performance activities, specific task analysis, time, crew size and composition and equipment. Miller Brothers estimating methodology uses build-up, bottoms-up approach to cost estimating, identifying and reviewing specific activities and then incorporating each into a cost estimate.

Our system allows us to efficiently execute our preferred estimating methods by enabling the separation and segregation of pricing for each work activity, as well as summarizing or "rolling up" categories for total estimate cost calculations. The granularity that comes with this approach helps ensure that once operations begin, there are no significant cost swings. Miller Brothers identifies major subcontractor activities early on in the bid process and develops comprehensive scopes of work as the basis for soliciting subcontractor quotes. We solicit multiple quotes for materials, subcontracts and equipment rentals with the support of our Procurement Manager. We require firm written quotes indicating prices, quantities, availability and delivery constraints as well as terms and conditions. The Project Management Team reviews the cost proposal. We also evaluate value engineering opportunities and alternatives that offer cost savings and incorporate them into the proposal as deemed appropriate.

Cost Tracking

Our Superintendent and Foreman review actual productions daily at the end of the shift to make real-time adjustments preceding continued operations to ensure the project meets budgeted productions. Weekly operations meetings provide our project staff an opportunity to review the resource utilization and rental reports, in addition to commitments and purchasing. Productivity and cost per unit of production are tracked against budget for both self-performed and subcontracted tasks.

Balancing resources is an essential element of our approach to effectively control costs, both direct and indirect on our projects and as a company. It is also a major influence on all of our areas of operation (continuity of personnel, process/procedure familiarity and client knowledge). Accurate manpower projections, timely acquisition of materials and services and proper scheduling/ deployment of equipment and subcontractors are critical to successful performance and effective cost control.

Schedules

Miller Brothers has established standard planning and scheduling methodologies and procedures that we utilize during the estimating process, upon award (during job start up), and throughout the project's duration. We use several industry standard systems and tools in the planning process. In addition, our project delivery team extensively uses internal manuals, procedures, forms and checklists. Miller Brothers offers a thoroughly coordinated approach to integrate planning, design development, permitting, procurement, construction, inspections and commissioning. Our plans are driven by the major milestones and critical paths shown in our project schedule. We sequence activities in parallel to fast-track the project schedule in order to meet the required completion date. This process is the same for all design/build projects. The on-time execution of this project is reliant on full client involvement, including early, rapid and continuous participation for design reviews and approvals as well as efficient permitting from local authorities. The final



stages of the project require careful and diligent coordination of multiple calendars in order to obtain required inspections and utility interconnection.

Quality Management System

Miller Brothers defines "quality" as meeting standards, requirements and expectations of both internal and external customers. The QMS provides the structure to achieve the quality management goals necessary to obtain world-class standards of performance and quality in all areas of operations. The purpose of the QMS is to ensure the quality of products and services provided to customers. The QMS is a framework that provides structures for organizational level and project-specific quality planning, implementation and performance assessment. The QMS consists of the following components:

Miller Bros. Corporate Position on Quality:

- Quality Assurance Program Plan (QAPP) - Defines the elements of the QMS and the roles and responsibilities of the corporate and quality control organizations. Provides details for implementation of each element of the QMS. The QAPP is the basis for program-focused and project-focused Quality Control Project Plans (QCPs).
- Quality Control Project Plans (QCPs) - Detailed QA/QC documents designed for specific programs or individual projects. Requirements are tailored to particular contracts, customer expectations, specific scopes of services and site conditions.
- Quality Control Manual (QCM) - Document specifying who shall apply what procedures and when to a specific product, process and/ or service.
- Standard Operating Practices (SOP's) - Company-adopted QA procedures and repetitive process operations referenced by the QAPP and contained in the quality control manual.

Quality Assurance

Quality assurance involves our system of activities and procedures that ensures that a process, product or service meets the needs and expectations of the customer. QA is an integral part of the QMS. The organizational and project-specific quality elements of the QMS are used to define QA practices.

- Quality elements at the organizational level regulate activities that support common or standardized functions such as employee qualifications and training, document control, billing, cost reporting and material procurement.
- Quality elements at the project level address the definition and implementation of customer requirements to produce the desired type and quality of product service.

Some specific examples of project-level quality elements in the QMS are:

- Project planning for all projects, regardless of size: planning based on contract requirements, the use of customer communications, work plans and project instructions.
- Preparation and implementation of construction QC Plans with procedures that specify how to carry out activities and define inspection to ensure equality.
- QCP's that document the data collection planning process, describe specific procedures for data collection.
- Quality assessments and audits used as follow-up.
- Document and design reviews by qualified technical personnel and senior reviewers to reduce errors and ensure consistency.
- Technical assessments for the technical adequacy of items, activities and documents.
- Quality implementation of work processes (i.e. follow only planned, reviewed and approved procedures.)



- Generation of QC records stating quality results achieved or providing evidence of activities performed.

The quality program is applicable to all Miller Brothers projects. The quality elements and procedures are applied to specific activities being performed to the appropriate degree based on the importance of each activity in achieving technical and quality objectives. This is a graded approach to quality designed to achieve the following:

- Uncompromised adherence to project safety and safe work practices.
- Conformance and compliance with contract requirements.
- Use of necessary and documented methods to obtain reported data.
- Reported data are valid and of known quality.
- Reported observations, analyses are accurate and within known limits.
- Designed facilities will meet design objectives and function satisfactorily.
- Controls in place to perform work safely with protection of project personnel in compliance with applicable federal and state health and safety rules.
- Maintenance of appropriate project records.

Quality Control Project Plans

Contracts or large programs sometimes require quality elements that are more specific than Miller Brothers QAPP. To address these elements, program-specific QCP's will be prepared and implemented. The requirements documented in a QCP take precedence over the QAPP for the program. The QCP's will be tailored to meet the specific needs of the program to which they apply.

Construction Quality Control Plan

The Construction Quality Control Plan (CQCP) is developed to ensure the following:

- To achieve a quality product on time and in compliance with the terms of the contract.
- To establish and utilize a construction quality program of the scope and character necessary to achieve the quality of construction outlined in the contract.
- To produce and maintain acceptable records of its quality control activities.

The CQCP defines the QMS for a construction project as dictated by customer requirements. The QMS consists of the plans, procedures and organization necessary to construct the facility in accordance with the contract and design specifications. The CQCP covers all construction operations, both on-site and off-site as well as work performed by subcontractors, fabricators, suppliers and purchasing agents.

The CQCP is used to verify that the construction activities are performed in a timely manner, reliable, meet their intended purpose and are of the specified quality. The CQCP includes the processes used to verify construction quality in the work processes, materials of construction and construction services. Components of a CQCP include:

QC organization, including lines of authority and communication

- Qualifications of QC personnel
- Definable feature of work (DFW)
- Procedures for scheduling and managing submittals
- Surveillance
- Inspection
- Acceptance of testing procedures



- Testing methods
- Documentation procedures

Implementation of the CQCP is the responsibility of all personnel providing services for construction. The Construction Quality Systems Manager (CQSM) verifies the implementation of a CQCP.

Three-Phase Quality Control Process

Each phase of the control process presents the programmatic requirements for ensuring that the work is completed in a coordinated and efficient manner with the highest level of integrity and quality.

The Preparatory Phase is executed prior to initiating a DFW. The CQSM will conduct a preparatory phase meeting to ensure that all necessary pre-construction activities have been completed including:

- Permit requirements and approvals
- Notifications
- Submittal Approvals
- Materials Management
- Specifications and drawings review

The preparatory Phase also establishes equipment and manpower requirements and defines personnel roles and responsibilities. Safety and health requirements are also identified and discussed during the Preparatory Phase of quality control. The Internal Phase of the quality control process ensures that the requirements and methods identified during the Preparatory Phase are implemented appropriately. This phase establishes the minimum quality requirements, workmanship and methods for execution of the DFW or task. It is implemented during the DFW inception prior to significant work completion. The Follow-Up Phase of the quality control process is completed during the DFW execution to ensure that the minimum quality requirements established during the Initial Phase are being met. This phase covers all work completed from the end of the initial Phase through the completion of the DFW. The Follow-Up Phase includes all required testing and inspections.

Meetings and Inspections

QC meetings and inspections will be conducted and documented to ensure that the QC process is working. This phased system of quality control will be implemented for each DFW as previously defined or as defined by the CQCO or CQSM. All inspections will be documented and attached to the Daily Quality Control Report (DQCR).

Craft Worker Statement

Miller Brothers employs full-time craft workers from all trades. Our workforce of trained and experienced line workers, electricians, laborers, equipment operators, mechanical workers and iron workers means that we can successfully handle any task related to the project in-house. Our workforce is dedicated to delivering the highest quality product for our valued clients and customers.

Field Logbooks and Daily Record Keeping

The CQSM will maintain a daily field CQC logbook of construction activities. The intent of the CQC logbook is to consolidate field notations for all construction quality control related project activities and will be the core document used to generate the DQCR's. The logbook will be used as the primary source to document quality control information and CQC research.



Construction Daily Quality Control Reports

Miller Brothers will maintain daily records and submit daily reports on all construction quality control activities. The reports will be factual records containing all construction related numerical data (i.e. test results) and quality control logs. The construction DCQR will contain the daily record of inspections for all work accomplished subsequent to the previous day's work. The DCQR will consolidate and summarize all reports and logs for the day and copies of these documents will be attached to the DCQR.

Deficiency Management

This section describes the procedures for controlling items that are noncompliant with the specified design requirements. A tracking system (i.e. electronic spreadsheet) will be implemented to identify such nonconforming items and monitor them through resolution by corrective action. Deficiencies may be identified during all of the three-phases of the quality control process. Defects and deficiencies identified will be documented in the DCQR. Once identified, defects and deficiencies will be added to the tracking system and will be monitored closely until the appropriate corrective action (re-work, repair, replacement or acceptance) is completed. The client will be informed of all identified deficiencies, the prescribed corrective action(s) and the status of the corrective action through completion. Once the corrective action(s) for an identified item has been completed, the item will be closed-out by removing it from the active corrective action request log and finalizing the nonconformance report. Stop work authority can be used whenever continued work will either compromise the quality of the project or jeopardize the health and safety of the workers. All stop work actions must be documented including identification of the person(s) involved, persons notified of the action, tasks being performed and the deficient act or material that justifies the stop work action. Work related to the deficiency will not be allowed to continue until the appropriately prescribed actions have been implemented and documented.

Field Work Variances

All variances from the contract specifications or drawings will be documented. This report will identify the variance, proposed change, technical justification, cost and schedule impact (to be determined by the PM as applicable). All field work variance reports must be reviewed, approved and signed by the client prior to implementation.

Punch List

Punch-lists are a tool for identifying remaining items to be addressed and are associated with a DFW or a specific work tasks. A project construction punch list will be generated by the QCSM for each major portion of work. These punch lists will identify all outstanding items to be completed prior to approval and release of final payment. Construction punch lists will identify the item to be addressed, the date of notice, the individual identifying the problem, the person responsible for addressing the item, the method by which the item is addressed and the date the item is addressed and accepted by.

Testing

All tests and inspections will be performed in accordance with the procedures contained within the project contract documents. The QCSM will be responsible for the tracking, verification and documentation of all contract documents, as well as all test and inspection activities and data. The contractor will perform specified or required tests to verify that control measures are adequate to provide a product that conforms to contract requirements.

Project Closeout Procedures

Project Closeout Procedures are established to identify the requirements for the final project acceptance and ensure that Miller Brothers and its subcontractors and vendors have satisfactorily met all obligations as defined in the contract documents and all changes or modifications as identified in the project documentation.



Final Inspection

Once all items on the punch list are addressed to the client's satisfaction, a final inspection will be conducted. The final inspection will ensure that all outstanding items, including noted deficiencies and punch list items have been corrected and/ or addressed.

Pre-Operation and Sequence Verification

POSV, as appropriate, will be completed prior to system start up. All operating systems will be "tagged-out" until the POSV is completed under witness by the CQSM and the client. All system components will be tested for proper placement and/or operation prior to start-up. Upon completion of the POSV, the responsible technician or engineer and the CQSM will prepare and sign a POSV checklist (system specific) that identifies each tested component and the date and time of POSV. Additionally, the technician or engineer and the CQSM will initial each component as having witnessed their proper operation.

System Start-Up

Upon completion of the POSV process, the system will be approved for start-up. Final system adjustments will be made during the start-up process to ensure that all components are functioning within the specified range(s) of operation.

Communication during Construction

To efficiently execute construction work, an effective communications network must be established to resolve nonconference issues that may arise. Open lines of communication are essential to maintain strong working relationships and provide a quality-constructed facility. To facilitate communication, a set of forms is used to document many of the projects activities. Forms currently available and useful to a project are presented in appropriate SOPs. Additional communication forms and documentation are developed as deemed necessary on a project-specific basis.

Construction Reports

The following construction reports or others as identified in a project specification are issued to communicate progress of the project to the customer:

- Analytical data reports
- Daily quality controls reports
- Quality control summary reports
- Records arising from the disposal of potentially hazardous construction waste

Quality Assurance & Acceptance Testing

Miller Brothers will conduct a full System Quality Control Audit upon completion of system assembly. This QC Audit will include a full site visit and inspection upon completion of the project by our designated Engineering team auditor.

Working with the Towns of Bristol & Barrington

The Project Teams understands that the ultimate customers in this project are the Towns of Bristol and Barrington, and as such, we plan to work closely with the Towns and relevant personnel to coordinate on-site activities, taking special consideration of the on-going transfer station activities. Our goal is for Miller Bros.' construction work to have the least amount of impact as possible on the Town's activities and operations. Our project teams have a proven track record of partnering with all stakeholders involved in our projects to ensure that all parties' needs are considered and planned around.



We propose to have a kick-off meeting with the Towns during the pre-construction phase (before Miller Bros. mobilizes to the site), so that we can understand how we might interface with various Town operations during the course of construction. Once we understand all of the needs and meet the main points of contact for the Town, we will communicate with them as frequently as required to ensure we are coordinating appropriately and meeting their needs.

SECTION 6. Educational Opportunities

Part of Kearsarge's mission is to help build a more sustainable world and we take seriously our goal of educating and demonstrating the importance of renewable energy in every community where we operate. As such, we developed educational programs for both our Canton Schools projects and as part of our KS Solar Six Hubbardston, MA installation.

For the Canton, MA rooftop projects, located at the public middle school and high school, in collaboration with the project's installer, we provided curriculum supplements to teachers throughout the district as well as the opportunity to monitor construction and ongoing project performance through online software modules.

As part of our KS Solar Six - Hubbardston project we coordinated the opportunity for students from the University of Massachusetts Lowell, buyer of all net metered credits from the project, to visit the site and collect data as part of science, engineering, and public policy coursework.

Kearsarge is also currently working with the Sunderland MA Elementary School and the Duxbury MA Public Schools on educational components for elementary, middle and high school students as part of our ground-mount and rooftop solar PV arrays at each school.

If the Towns are interested, Kearsarge would be pleased to work with local schools and the community to develop similar offerings and opportunities, which can include field trips to the site, educational curriculum, presentations, and a live web link the Towns can use to track solar production and to help showcase the benefits of the project.



SECTION 7. Appendices

Appendix 1. Preliminary Site Layout





MILLER BROS.

4.75mWDC

**6 Minturn Farm Road
Bristol, RI 02809**

1 ARRAY PLAN



SYSTEM SPECIFICATIONS	
SYSTEM SIZE AC	3.8mWAC
SYSTEM SIZE DC	4.75mWDC
DC/AC RATIO	1.25
MODULE MODEL	335w
MODULE RATING	1000V
MODULES PER STRING	18
TOTAL MODULE QTY	14,179
INVERTER	
RACKING	Ballasted, Ground Mount
MODULES PER ROW	
TRACKING ANGLE	20
ROW SPACING	16
GCR	Approx. 40%
AZIMUTH	180

REV. NO	DESCRIPTION	DATE

SHEET TITLE:
PRELIMINARY LAYOUT

PROJ. MGR.	PROJ. ENGR.	DATE:
DRAWN BY: JM	CHECKED BY:	11.26.16
DRAWING NO.		SCALE: AS SHOWN

PV-100

Appendix 2. Letters of Support

GWD

COMMISSIONERS
Robert Frederico
Michael Corda
Kenneth Grew

GRAFTON WATER DISTRICT
Sewing Your Water Needs

44 Millbury Street
Grafton, MA 01519

(508) 839-2302 - Fax: (508) 839-2367
E-Mail: GRAFTON20@AOL.COM

MANAGER
Matthew E. Pearson

TREASURER
Joseph Meichelbeck

March 16, 2015

RE: Letter in Support of Kearsarge Energy

To Whom It May Concern;

Please accept this letter of support for Kearsarge Energy's proposed solar PV project. As the General Manager of the Grafton Water District, I worked very closely with Kearsarge's team during the development of a 1.7 MW DC solar PV array on Town of Grafton land that is leased by the Grafton Water District, and I can vouch for their professionalism, responsiveness and being a trust worthy partner throughout the project's development. Kearsarge worked very closely with me on the PPA and the land lease with the Town and supported me after the project was built when I had issues with net metering and the Schedule Zs with the utility. I even invited them to our annual vendor appreciation lunch!

The Grafton Water District had been working on a plan for a solar array for many years, as we viewed it as an attractive option to reduce our electricity bills. After issuing an RFP, we selected a local construction firm and an out-of-state financing party and owner for the project. Unfortunately, this did not work out as they could not deliver on their offer (not uncommon in the Solar industry) and backed out of the project. Fortunately, Kearsarge Energy stepped in with its own financing, took over the project and was able to get it back on track without any significant delays. In addition to the financing obstacles we faced, there were also numerous permitting and regulatory issues that Kearsarge had to work through, including;

- Site plan and design approval in a NHESP priority habitat for Wood Turtles;
- Town of Grafton Conservation Commission concerns;
- Challenging site layout; and most importantly,
- Obtaining DEP approval for the first Solar PV Project in the Commonwealth within the Zone I 400-foot protective radius of a Drinking Water Well in accordance with Guideline BRP 2011-1

From first-hand experience, I can say that Kearsarge Energy kept the communication channels open at all times and handled all of these issues with honesty and transparency, expediency, and respect for all parties involved. They presented to the Town on numerous issues and gained respect throughout the community. Throughout the process Kearsarge demonstrated their knowledge and experience in dealing with sensitive issues and working with local and state regulators and authorities.

The Kearsarge Team also showed great professionalism in helping the Water District understand and solve challenges with the implementation of the National Grid Virtual Net Metering Schedule Z process as



noted above. Overall, it was a pleasure working with them. We continue to reap the benefits of the solar array in the form of greatly reduced electricity rates, reduced greenhouse gas emissions, and general goodwill in our community for doing the right thing.

Given my experience with Kearsarge and their ability to execute, I recommend them for this or any other solar PV project. I would be happy to answer any questions or discuss any aspect of my experience with Kearsarge if you wish to contact me.

Sincerely



Matthew Pearson

General Manager, Grafton Water District





Concord Municipal Light Plant

1175 Elm Street • P.O. Box 1029
 Concord, Massachusetts 01742-1029
 978-318-3101 • FAX 978-318-3105 • www.concordma.gov
 David G. Wood, Director

April 6, 2015

RE: Letter of Reference for Kearsarge Energy

To Whom It May Concern:

I am writing to attest to Kearsarge Energy's experience and professionalism in developing, owning and operating the 1.7 MW DC ballasted ground-mounted solar PV array at our capped Landfill in Concord, Massachusetts. As the Director of the Concord Light Department in the Town of Concord, I can highlight my experience working with Kearsarge Energy on the Project.

Like many municipalities in Massachusetts, our town has several properties, including a closed and capped landfill, which was previously unused and unproductive. Over a period that lasted several years we began the process of getting feedback from town officials and local stakeholders on the possibility of developing some of these parcels with the idea that solar might be a good use and an ideal way to generate clean, renewable energy for the town. As a community, we are concerned with our carbon footprint and are constantly looking for ways to reduce our energy bills, especially in these times of volatile energy prices. Through a very thorough and open stakeholder engagement process, we decided to issue an RFP for a solar project on our capped landfill. Kearsarge was part of the team that was awarded the RFP.

As a municipality, we were concerned about potential environmental, health and safety issues. We also wanted to make sure the integrity of the landfill was not compromised and ensure that we protected as much open space as possible. Kearsarge and their construction partners were proactive in giving us regular updates, allaying any concerns we had and working collaboratively with all relevant stakeholders to ensure all their concerns were heard and incorporated into the final project. Kearsarge secured all local and state permits and successfully worked with us on negotiating the interconnection and power purchase agreements. The solar PV array was completed in May, 2014 and as the long-term owner-operator, Kearsarge has been responsive to any issues that have arisen since the project's completion.

The solar industry is growing and continues to mature here in Massachusetts, and fortunately municipalities have the option of working with a number of highly qualified firms. Given the opportunity, I would work with Kearsarge again in the future.

Sincerely,

David Wood
 Director
 Concord Municipal Light Plant





CISTERCIAN NUNS
MOUNT SAINT MARY'S ABBEY

December 31, 2015

To Whom It May Concern:

On behalf of Mount Saint Mary's Abbey, in Franklin, Massachusetts, I write to offer my support for Kearsarge Energy and to highlight our positive experience working with their team to develop 8.4 MW of ground-mounted solar across two arrays on the Abbey's property.

Operating and maintaining an Abbey is difficult work. To improve our long-term financial position, we evaluated our existing assets with the goal of leveraging them to generate additional revenue for the Abbey. In addition to our Trappistine Candy business, we have a considerable amount of agricultural and undeveloped land. We were aware of the growing solar industry in Massachusetts and working with the Kearsarge team we realized that hosting a solar farm would be an ideal way of generating stable long-term revenues for the Abbey through annual land lease payments. We were impressed with Kearsarge's track record, references and overall proposal, and selected them as a partner to develop and build our 3.6 MW DC and 4.8 MW DC ground-mounted arrays.

Kearsarge Energy was an ideal partner because they took a holistic and comprehensive approach to the siting and construction of the array, as we were worried about the impacts on wildlife and the land. They were very considerate of our wishes and incorporated our feedback into the final design of the array. We appreciated their willingness to work together as a team throughout the construction of the project. During contract negotiations the Kearsarge team was extremely responsive and open with us and we felt that they were a trusted negotiating partner. When we had concerns about cutting trees, they were immediately responsive to our needs and worked to a solution that benefitted all stakeholders.

Kearsarge also managed all aspects of a highly complex interconnection process with National Grid and worked successfully to establish a long-term partnership with the Town of Franklin for the sale of the energy generated by the Projects and Tax Agreements on land that was now taxable. Overall, Kearsarge organized a landmark public-private partnership, significant energy cost savings and property taxes to the Town of Franklin, as well as stable lease revenues to the Abbey.

It was a pleasure working with Kearsarge and I highly recommend working with them if you have the opportunity.

Sincerely,

Mother Maureen McCabe
Abbess and President
Mount Saint Mary's Abbey
300 Arnold Street
Wrentham, MA 02093

300 Arnold St., Wrentham, MA 02093-4799, Phone: 508-528-1282 Fax: 508-528-5360



Appendix 3. VHB Resumes



Silas A. Bauer

Senior Project Manager



Education

MA, Urban and Environmental
Policy and Planning with a
focus in Energy Policy, Tufts
University, 2009

BA, Anthropology, Connecticut
College, 1998

Silas recently joined VHB as a Senior Energy Siting Project Manager. He is an experienced energy project manager and energy policy analyst with a background in both private and public sector work. His experience includes managing the technical process of electric interconnection for a Massachusetts solar developer, analyzing California's natural gas infrastructure and prices, cost-benefit analyses of California's ratepayer investments in emerging energy technologies, and analyzing New England renewable energy policies and REC market prices.

18 years of professional experience

BlueWave Capital, LLC, Boston, MA

Prior to joining VHB, Silas was Director of Interconnection – Project Management Team overseeing BlueWave's relationship with the electric utilities for our portfolio of 40+ Massachusetts solar projects. He managed the interconnection process from the initial application through to the final authorization to interconnect, reviewed the technical details of the utilities' interconnection design, and ensured coordination between the utilities' construction and the construction process. He also tracked and managed all payments to the utilities and filed and tracked all of the company's net metering and solar renewable energy credit applications.

California Energy Commission, Electricity Supply Analysis Division, Natural Gas Unit, Sacramento, CA

Prior to joining VHB, Silas was Energy Commission Specialist for the California Energy Commission where he tracked all North American natural gas pipeline infrastructure changes and pipeline safety issues, and analyzed the effects of natural gas capacity constraints on supply and prices.

California Energy Commission, Energy Research & Development Division, Sacramento, CA

Prior to joining VHB, Silas was Energy Commission Specialist for the California Energy Commission where he conducted economic analyses to assess the benefits of the Energy Commission's RD&D investments in promising energy efficiency and clean energy technologies, and tracked the benefits to California's electric ratepayers. He reported benefits through report tables and written reports and served as Lead Editor for the Electric Program Investment Charge (EPIC) triennial investment plan.

Sustainable Energy Advantage, LLC, Framingham, MA

Prior to joining VHB, Silas was Policy Analyst, coordinating writing and publishing of SEA's Eyes & Ears Policy Digest through research and analysis of New England renewable energy policies. He conducted various research and quantitative analysis tasks for the SEA Renewable Energy Market Outlook (REMO), a New England REC price forecast model. He also worked on individual consulting projects as a renewable energy policy and market analyst.

Silas A. Bauer

Harvard Law School, The Berkman Center, Cambridge, MA

Prior to joining VHB, while Silas was a Research Assistant, he was a member of the Industrial Cooperation Project, for which he authored project reports and updates on wind, solar and tidal energy technology markets and patenting activity. He documented instances of open innovation in alternative energy technology development.

Educational Administration Experience

From 1998 – 2007, Silas served in Educational Administration

- Associate Director of College Counseling, Buckingham Browne and Nichols School
- Assistant Director of Admissions, Babson College
- Assistant to the Director of Human Resources, The Media Lab, MIT
- Assistant Director of Admissions, Connecticut College

Jonathan L. Feinstein

Senior Vice President



Education

MCP, Community Planning and Area Development, University of Rhode Island, 1978

BS, Natural Resources Development, University of Rhode Island, 1976

Registrations/ Certifications

U.S. Fish and Wildlife Service
HEP Analysis

Affiliations/ Memberships

Society of Wetland Scientists,
Member

National Association of
Industrial and Office Properties,
Environmental Expert,
Wetlands

Environmental Business
Council of New England,
Chairman

Jonathan is Senior Vice President of Environmental Practice at VHB. As a regulatory affairs specialist, he has extensive experience in the environmental analysis and the social analysis of the impacts of major transportation infrastructure and land development projects. Jonathan has specific knowledge of the National Environmental Policy Act and state environmental policies and procedures, as well as a working knowledge of state and federal regulations and requirements for environmental documents. Mr. Feinstein is a Bristol resident and is very familiar with Town officials and the community.

39 years of professional experience

Energy Transmission Studies

Jon has directed studies for major gas line and electric transmission companies involving the location of systems and assessing and designing mitigation of the impacts of their placement. Projects included a feasibility study of a 40-mile 345 kV transmission line in Rhode Island for the Narragansett Electric Company as well as a 115 kV facility in southern Rhode Island. Gas transmission projects include new pipelines in Chaplin, CT, and Seekonk and Medford, MA. He has acted as an expert witness for Narragansett Electric on numerous occasions as part of the Rhode Island Energy Facility Safety Board (EFSB) hearing process. This has included environmental testimony for wetlands and overall environmental impacts. Jon has also been involved with gas transmission projects in Virginia associated with construction practices and mitigation.

Environmental Policy

Jon regularly participates in both seminars as a speaker and at conferences associated with the development of environmental policy on a state and Federal level. His focus has been in the area of environmental streamlining, environmental quality, and strategic advancement of environmental impact assessment methods and techniques. In addition, he is a recurring staff member at Duke University Nicholas School of the Environment. His teaching roll includes developing the conduct of training for professionals associated with the implementation of the National Environmental Policy Act (NEPA). He is also involved with the development of regulatory matters for the agricultural industry focusing on the approval of new genetic engineering (GE) of crops.

Woonsocket Industrial Highway/Route 99 Draft and Final SEIS, Woonsocket, RI

Jon successfully directed the Draft Supplemental EIS and a Final SEIS for the Woonsocket Industrial Highway/Route 99 project within a 12-month schedule and participated in a joint public hearing with the U.S. Army Corps of Engineers to facilitate the NEPA process and federal permitting requirements.

Quonset Point Vision Plan, North Kingstown, RI

For the RI Economic Development Corporation, Jon worked on the preparation of a strategic vision to guide redevelopment of the 3,000-acre former Navy property at Quonset Point to bring together water, air, rail, and road transportation networks.

Jonathan L. Feinstein

T.F. Green Airport Improvements Program EIS and Permitting, Warwick, RI

Jon served as the Principal-in-Charge when VHB was selected to restart the EIS process for this project, which included three major development projects - extension of the 7,000 foot-runway up to 9,500 feet; runway-end safety area improvements; and the construction of a 50,000-square-foot cargo building. The project resulted in residential relocations in one of the most densely populated states in the nation, many residential sound insulation projects, relocation or tunneling of U.S. Route 1 and other major roadways, substantial wetland water resource and endangered species impacts, and tribal lands. The project included revisiting forecasts and other planning issues. VHB has assisted the FAA in initiating a unique and intensive community outreach program and has proposed an innovative approach to developing an innovative mitigation approach that will integrate community, airport and environmental needs and considerations at the outset of the project.

Aroostook County Transportation Improvement Project DEIS/EIS, Aroostook County, ME

Over the past few years, considerable planning work has been completed in Aroostook County with emphasis on the viability of providing improved access from Houlton, located in the southernmost part of the study area, to Fort Kent, approximately one hundred-fifty miles north. These studies highlighted the need for improved local roadway access and the potential benefits that improved access would contribute to the regional economy. Jon led the VHB Team in the preparation of the DEIS in accordance with National Environmental Policy Act (NEPA) requirements and the Maine Sensible Transportation Act (STPA). The VHB Team is providing a macro screening of up to 20 corridors, identifying seven most feasible corridors, and developing a refined analysis of these seven corridors and a No-Build 2025 option in the DEIS.

Southern Nevada Supplemental Airport Environmental Impact Statement, Clark County, NV

Jon was the Principal-in-Charge of the EIS for the first new major commercial service airport to be developed in the U.S. in a decade. In coordination with the FAA and BLM, VHB conducted a comprehensive analysis of over 6,000 acres for the new airport location near Las Vegas, which was complicated by proximity to the Mojave Desert Preserve. Proposed improvements included over 20 miles of major roadway enhancements, innovative noise modeling and mitigation, major soil removal activity, and flood storage planning for a fast-growing region. The potentially significant natural and cultural resource impacts on the site were included in VHB's evaluation, which was conducted on a streamlined, 4.5-year schedule. This project is currently on hold due to the state of the aviation industry and economy.

Philadelphia International Airport EIS/Permitting, Philadelphia, PA

Jon served as Principal-in-Charge for the EIS preparation for the proposed \$5 billion airport reconstruction, including new runways and new terminals to be constructed on the existing airport site. Designated for streamlining as a Priority Project under Executive Order 13274, this project is under close Federal Aviation Administration (FAA) and Congressional scrutiny. On a concurrent EIS and permitting schedule of 42 months, potential project impacts include 20 acres of river fill, noise in completely new residential areas, changes to drinking water and air quality, and effects to a national wildlife refuge.

Jonathan B. Stabach, PE, LEED AP

Project Manager



Jon is a Project Manager in VHB's Providence, Rhode Island office. His design experience includes low impact development and sustainable design, site planning and layout, earthwork analysis, stormwater management design, and pump station design. Jon has extensive experience providing design and permitting for solar array sites in Massachusetts and Rhode Island.

23 years of professional experience

Education

BS, Civil Engineering, University of Connecticut, 1993

Registrations/ Certifications

Professional Engineer (Land Development) RI, 2003

LEED Accredited Professional, 2004

National Charrette Institute Charrette System™ Certificate, 2007

Affiliations/ Memberships

American Society of Civil Engineers

Urban Land Institute (ULI), New England Chapter, Associate Sustaining

RES America, Hope Farm 10MW Solar Array, Cranston, RI

Jon served as Project Manager for design and permitting of a 10 MW ground-based solar array for RES America on a 59.4 acre site in Cranston, Rhode Island. The project is a former nursery operation and was designed to minimize earthwork activity, preserve natural buffer areas and avoid impacts to wetlands. The project received approval from the City of Cranston Planning Board.

Canton Landfill, Canton, MA

Jon served as Project Manager for the design and permitting of this 5.8 MW project on a closed and capped landfill, completed in 2012. The project received a post-closure use permit from the MA DEP. VHB also filed for and obtained authorizations for the project from the Zoning Board of Appeals, Planning Board, and Conservation Commission. Issues successfully addressed included aesthetics, erosion and sedimentation control, and stormwater management.

Pine Street Landfill Solar Array, Canton, MA

Jon was the Project Manager for the civil engineering design and permitting for the Pine Street Landfill Solar Array in Canton, Massachusetts. The project included 24,000 solar panels on 12.5 acres of the capped landfill with a Nampling Rate of 5.6 MW. The project received approval from the Town of Canton Conservation Commission, Planning Board, and the Massachusetts Department of Environmental Protection.

Ravenbrook Landfill Solar Array, Carver, MA

Jon was the Project Manager for the civil engineering design and permitting for the Ravenbrook Landfill Solar Array in Carver, Massachusetts. The project included 20,600 solar panels on 15 acres of the capped landfill with a Nampling Rate of 6.0 MW. The project received approval from the Town of Carver Planning Board and the Massachusetts Department of Environmental Protection.

Solar Array Design and Permitting, Berkley, MA

Jon was the Project Manager for the civil engineering design and permitting for a 3.6-MW solar array in Berkley, Massachusetts. The project included 12,200 solar panels on 20 acres of former agricultural fields. The project received approval from the Town of Berkley Conservation Commission and Planning Board.

Jonathan B. Stabach, PE, LEED AP

Roger Williams University, Campus Improvements, Bristol, RI

Jon has served as Project Manager for site layout, grading, stormwater, and utility design and permitting for multiple new buildings and sports facilities as well as design coordination and permitting for various campus facility projects as part of a master plan for Roger Williams University. Projects have included a new 370-bed dormitory with six adjacent tennis courts with lighting, a basketball court, and sand volleyball court; a 50,000-square-foot academic building with rain gardens, the new admissions building with pervious paver parking area; relocation of a campus bus shelter; pedestrian and vehicular improvements of the Law School entrance; and site design for a new sailing center. Each project design included low impact development (LID) techniques for stormwater management. The projects, which were designed to meet LEED criteria, included an extensive investigation, assessment and design of improvements for the campus water system. The residence hall project included the design of a pump station with 100,000-gallon-per-day capacity for all buildings on the northern end of the campus.

T.F. Green Airport, Land Use Services, Warwick, RI

Jon assessed existing land use patterns, prepared a summary of the relevant land use plans and regulations, and reviewed the existing conditions land use compatibility for the T.F. Green Airport Improvement Program Environmental Impact Assessment (EIS). The project included a 1,500-foot extension of the primary runway, safety improvements, and cargo facility improvements. Jon was also responsible for determining the feasibility of implementing stormwater quality systems required the proposed airport improvement program to comply with regulatory requirements.

Brown University, Engineering and Transportation Projects, Providence, RI

As Project Manager Jon was responsible for the civil engineering design and permitting for various campus building renovation and facility improvements projects at Brown University, including Faunce House Renovation, Metcalf Building Renovation, Central Walk, 315 Thayer Street, Metcalf/Miller Residence Hall Renovations, Hunter Lab Renovations, 200 Dyer Street Renovations, and 295 Dyer Street Renovations. The projects called for a variety of tasks including assessment of groundwater intrusion, drainage system reconstruction, design of new utility services, and permitting with Narragansett Bay Commission, Providence Water Supply Board, and City of Providence Department of Public Works.

Rhode Island College, On-Call Assignments, Providence, RI

Jon has served as Project Manager for multiple on-call assignments at Rhode Island College including the design and permitting for the reconfiguration and renovation of parking lot B and D, a parking garage study, reconfiguration of the loading area for the Nazarian Center for the Performing Arts, and pedestrian crossings on College Road. Parking Lot B is a primary commuter lot for Rhode Island College with approximately 750 parking spaces. Parking Lot D is the faculty parking area with approximately 200 parking spaces and includes accommodations for electric car charging stations. These assignment include revising the parking layout to improve circulation and parking efficiency, grading revisions to alleviate ponding, pavement renovation studies, and stormwater design to address drainage problems, improve collection, and enhance water quality.

Conor Nagle, PE, ENV SP

Project Manager



Conor is a Project Manager with VHB's Land Development Department where he is responsible for civil engineering design and permitting for a wide range of energy and land development projects, as well as construction coordination. His expertise includes large projects involving site grading, stormwater management system design, and utility infrastructure design.

19 years of professional experience

Education

BS, Civil/Environmental Engineering, University College Cork, 1996

Registrations/ Certifications

Professional Engineer (Civil) MA, 2005

Professional Engineer RI, 2010

Envision™ Sustainability Professional, 2013

Certified Soil Evaluator MA

Title V System Inspector MA

OSHA 10-Hour Construction Safety and Health Certificate

Affiliations/ Memberships

American Society of Civil Engineers, ASCE/ BSCES, 2006

International Council of Shopping Centers (ICSC)

NAIOP Commercial Real Estate Development Association

2-MW Solar Energy Facility, Norton, MA

Working with a solar energy developer, Conor led the design and permitting efforts for a 2-MW solar energy facility located in a former farmer's field in West Brookfield. Although the site/civil engineering aspects of this project were relatively straightforward, permitting was quite complex as the site included bordering vegetated wetlands and vernal pools and significant setback and screening requirements. Conor and his team completed conceptual and detailed design as well as state and local permitting, including a Notice of Intent with the Local Conservation and the Massachusetts Department of Environmental Protection and a Special Permit with the Planning Board.

Solar Energy Facilities, Norton, MA

Working with a solar energy developer, Conor led the design and permitting efforts for two solar energy facilities located on undeveloped property on the Wheaton College campus. Permitting was quite complex as the site included bordering vegetated wetlands and vernal pools, and significant setback and screening requirements. Conor and his team completed conceptual and detailed design as well as state and local permitting, including a Notice of Intent with the Local Conservation and the Massachusetts Department of Environmental Protection, and a Special Permit with the Planning Board.

3-MW Solar Energy Facility, West Brookfield, MA

Working with a solar energy developer, Conor led the design and permitting efforts for a 3-MW solar energy facility located in a former agricultural field in West Brookfield. Although site civil engineering aspects of this project were relatively straightforward, permitting was quite complex as the site included bordering vegetated wetlands, a rare species habitat, and a riverfront area. Conor's team completed detailed design for permitting and construction, as well as state and local permitting, including a Stormwater Management Permit with the West Brookfield Stormwater Authority.

Fuel Facility Design and Construction, Connecticut, Massachusetts, Rhode Island, and New York

Conor provided program and project management for a fuel facility development client. His team designed, permitted, and oversaw construction, including underground storage tank inspection, of over 20 fuel facilities in the northeast United States. He coordinated the design team of engineers and worked closely with client and team consultants on site design components that included utilities, underground storage tanks, drainage, grading, and site

Conor Nagle, PE, ENV SP

layout. He prepared permitting submissions to the town and state, coordinated with private and public utility companies, and provided construction inspection and administration.

Herb Chambers Automobile Dealership, Burlington, MA

Conor provided site planning, design, local permitting, and construction oversight for an automobile dealership. He coordinated with the design team of engineers and worked with client and team consultants on site design components including utilities, drainage, grading, and site layout. Conor was also responsible for preparation of permitting submissions to the town including Planning Board and Conservation Commission, coordination with private and public utility companies, and construction inspection and administration.

Oracle Office Campus, Burlington, MA

Conor provided site planning, design, local permitting and construction oversight for Phase 2 of the Oracle Corporate's new \$100 million high tech corporate campus expansion. His responsibilities included coordinating the design team of engineers and working closely with client and team consultants on site design components including utilities, drainage, grading, and site layout. Conor was responsible for preparation of permitting submissions to the Town, coordination with private and public utility companies, and construction inspection and administration. The development of the Phase 2 campus included the addition of a 149,000-square-foot office building, 108,000 square feet of additional retail space connected to the existing mall, and a 35,000-square-foot stand-alone retail store. The development of Phase 2 & 3 campus included the addition of 275,000 square feet of office space, a 750-space parking garage and associated site layout, and design of the 24-acre campus.

Susan Moberg, PWS, CFM

Principal



Susan leads VHB's Environmental Sciences Group in Rhode Island. She specializes in project management, environmental licensing and permitting, and compliance monitoring for complex energy and infrastructure projects. She has provided environmental permitting for several solar sites.

24 years of professional experience

Education

BS, Soil and Water Science,
University of Rhode Island, 1993

Registrations/ Certifications

Professional Wetland Scientist
(Wetland Science), 2003

Professional Soil Scientist (Soil
Science), 1997

Licensed Soil Evaluator (Soil
Science) RI, 2000

Certified Floodplain Manager,
2013

RI Invasive Manager (IM)
(Coastal Buffer Zone
Management) RI, 2009

Affiliations/ Memberships

Society of Wetland Scientists

Society of Soil Scientists of
Southern New England

Association of State Floodplain
Managers, 2013

Solar Due Diligence Assessments, Simsbury and Litchfield CT; Johnston, RI

Susan provided environmental and zoning due diligence including preparation of a permitting matrix, site constraints, and mapping of seven parcels for a confidential client's potential solar sites.

Solar Array Project, Foster, RI

Susan is VHB's Project Manager for a confidential client's 2.8 MW solar array project in Foster, Rhode Island. Services included wetland delineation and permitting, site layout, grading and drainage design, local permitting and landscape architecture services.

National Grid, Aquidneck Island Reliability Project, Rhode Island

Susan is VHB's Project Manager for the National Grid Aquidneck Island Reliability Project (AIRP). The purpose of the project is to improve electric reliability on Aquidneck Island, which routinely experiences brown-outs and black-outs in the summer time. The project involves the reconstruction of four miles of 69 kV transmission line and upgrading the voltage to 115 kV, construction of a new substation in Newport, reconstruction of a substation in Middletown, modifications to a substation in Portsmouth, improvement of approximately 30 miles of distribution line, and retirement of five substations in Middletown and Newport. VHB is providing environmental, engineering and aviation permitting support. VHB prepared and filed the Environmental Report with the RI Energy Facility Siting Board in December 2015, and prepared federal, state and local environmental permits for filing in the spring of 2016.

National Grid, Chase Hill Substation, Hopkinton, RI

Susan managed VHB's survey, design and permitting contract with National Grid for the proposed substation in Hopkinton, Rhode Island. National Grid owned a site that was preferred for the development. Because the site was surrounded by residential abutters, the project quickly became a source of contention abutters and subsequently, the Town Council. As directed by the Public Utility Commission in response to an Appeal filed by National Grid, National Grid and VHB conducted an analysis of more than 20 sites within Hopkinton and Westerly to assess suitability for a new substation. Several of these sites were analyzed in detail and tasks included wetland delineation, surveying, review of environmental assessments and conceptual design layout. Following the identification of a new preferred site in 2012, National Grid requested VHB to perform wetland delineation, land survey, environmental licensing & permitting, and traffic permitting for the new site. Permits were issued in 2014 and construction commenced in 2015. VHB is providing environmental compliance monitoring during construction.

Susan Moberg, PWS, CFM

National Grid, Rhode Island Reliability Project, Rhode Island

Susan managed VHB's licensing, permitting, and engineering contract with National Grid on the Rhode Island Reliability Project, which is a 24-mile transmission line improvement project. The project spans six Rhode Island municipalities and involves reconstruction of existing facilities within the right-of-way, which includes an existing 345 kV line and two 115 kV transmission lines, and construction of a new 345 kV transmission line. Improvements to West Farnum Substation, Hartford Avenue, Drumrock and Kent County Substation were also planned. Susan oversaw the preparation of the Energy Facility Siting Board (EFSB) Environmental Report, state and federal wetland permit applications, various plans and graphics to support local planning and zoning applications, state and local traffic permit applications, and local stormwater/erosion control applications. She provided expert testimony regarding the project impacts during the EFSB evidentiary hearings, and was cross-examined by counsel from the RI Attorney General's office and project interveners. Construction was completed in 2013.

Alstom Power\GE, Temporary Logistics Hub, Providence, RI

Susan provided due diligence, design and permitting services for a temporary logistics hub facility at the Port of Providence that is being used for partial assembly of the Block Island Wind Farm Turbines.

Narragansett Bay Commission, Abbot Valley Run and Blackstone Valley Interceptors, Cumberland and Lincoln, RI

For the Narragansett Bay Commission VHB performed surveying, engineering, and environmental services for the planned maintenance of the Abbot Valley Run and Blackstone Valley Interceptors. Susan supervised the environmental tasks, which included wetland delineation and permitting. She worked with VHB engineers to develop plans for the improvement of the easements that had been neglected for many years and are significantly overgrown. She also worked with the Commission to develop a strategy regarding the permitting. The maintenance work was classified by activity type such that much of the maintenance would be carried out in accordance with the exempt activities listed in the Rhode Island Department of Environmental Management (RIDEM) Wetland Regulations. Permits applications were developed for proposed improvements to a series of stream crossings where the Commission wished to have permanent access routes in place.

Appendix 4. Kearsarge Energy Limited Partnership Equity Funding Letter



480 Pleasant Street, Suite B110
Watertown, MA 02472

T: (617) 393-4222 F: (617) 934-2082
www.kearsargeenergy.com

Tuesday, November 22, 2016

Town Clerk's Office
Town Hall
10 Court Street
Bristol, RI 02809

To Whom It May Concern:

Please accept this letter as notice and confirmation to the Towns of Bristol and Barrington that the Kearsarge Energy Investment Committee, on November 21, 2016, approved the allocation of all required equity funding for the proposed Solar PV installation located off of Minturn Farm Road, Bristol, RI as outlined in the enclosed proposal.

On behalf of the Kearsarge Investment Committee we look forward to the opportunity to work with the Towns of Bristol and Barrington on this exciting development.

Please do not hesitate to contact me with any questions.

Sincerely,

A handwritten signature in black ink that reads "Andrew J. Bernstein".

Andrew J. Bernstein

Managing Partner, Kearsarge Energy Limited Partnership & Head of Investment Committee



Appendix 5. Kearsarge Energy Solar PV Portfolio

KEARSARGE ENERGY – SELECT PROJECT PORTFOLIO



4.9 MW: Kearsarge Southwick (Southwick, MA)

Kearsarge completed development and arranged all financing, and is the owner and operator of this 4.9 MW DC project, one of the largest SREC II projects in Massachusetts. The project is located on former agricultural land in western Massachusetts adjacent to current tobacco and corn fields. It required complex interconnection design, working with Western Massachusetts Electric Company (now Eversource) to account for system upgrades planned for construction following completion of Kearsarge's project. All net metering credits generated by the Project are sold to the Town of West Springfield creating a landmark public-private partnership that will save West Springfield millions of dollars over the life of the project while the Town of Southwick will earn significant local tax revenues. Construction began in October 2014 and Commercial Operations commenced March 2015.



6.0 MW: Kearsarge Chester (Chester, MA)

Located on former agricultural land in western Massachusetts, development of this 6 MW DC ground-mounted installation included extensive collaboration with the local municipal light department, Western Massachusetts Electric Company, and the Chester community. Kearsarge arranged all financing for this landmark Project and is the long-term owner and operator of the installation. Construction began in the first quarter of 2014 and Commercial Operation began June 2014.



870 kW: Kearsarge Chicopee (Chicopee, MA)

After conducting a detailed assessment of various renewable energy alternatives and potential siting options, Kearsarge worked with a \$30 billion publicly-traded healthcare products company's local and national energy management and operations teams to develop an 870 kW DC ground-mounted system. The project is located in Chicopee, Massachusetts adjacent to a major medical supplies manufacturing plant. Kearsarge coordinated project design, interconnection, and net metering policy with the local Municipal Light Department. The project's host will achieve significant energy cost savings while supporting its industry-leading corporate renewable energy goals. Commercial Operation began June 2014.



2.4 MW: Kearsarge Barre I - Stetson Road (Barre, MA)

Located on a former ski hill in central Massachusetts, this 2.4 MW DC ground-mounted project represents a creative and sustainable land reuse development strategy and an important public-private partnership. The project has revitalized a vacant parcel and sells all energy it generates to a local municipality through the Massachusetts net metering program. Kearsarge developed the project in conjunction with a partner, arranged financing with multiple national financial institutions, and is the long term owner and operator of the project. Construction began in the fourth quarter of 2013 and Commercial Operation began May 2014.



1.7 MW: Kearsarge Concord (Concord, MA)

The Town of Concord, Massachusetts and its municipal light department set bold renewable energy goals for their community and in support of these goals initiated development of the Town's closed and capped municipal landfill. Kearsarge managed the design, permitting, and financing of the project, a ballasted, ground-mounted 1.7 MW DC system. Forging another strong public-private partnership with the Town of Concord, the Light Department, and many local stakeholders, Kearsarge worked to maximize the output and design of the project while observing a complex set of permitting constraints and site conditions. The Light Department has secured a long-term fixed price energy supply, the Town has tapped the potential of an otherwise unusable parcel securing tax and lease revenue, and the entire community profits from the environmental and economic benefits brought about by avoided emissions, transmission and distribution loss savings, and peak demand reductions. Commercial Operations began May 2014.



1.9 MW: Kearsarge Barre II - Britton Road (Barre, MA)

With support from a partner, Kearsarge developed a 1.9 MW DC ground-mounted project in Barre, Massachusetts. The project is located on an underutilized and isolated former agricultural parcel that is adjacent to several active agricultural fields in central Massachusetts. Energy generated by the project is sold to a local municipality and a regional high school. Kearsarge arranged financing with multiple national financial institutions, and is the project's long term owner and operator. Construction began in the fourth quarter of 2013 and Commercial Operation began April of 2014.



2.5 MW: KS Solar Six - Hubbardston Solar (Hubbardston, MA)

Kearsarge partnered with an experienced local developer to finance, construct, own and operate a 2.5 MW DC green field ground-mounted solar farm in central Massachusetts. The project is located on privately-owned former agricultural land and has contracted with the University of Massachusetts Lowell to sell all net metering credits generated by the facility. Commercial Operation began December 2013.



3.6 MW: Mount Saint Mary's Solar Farm Project 1 (Franklin, MA)

Through a strong and innovative partnership with Mount Saint Mary's Abbey, Kearsarge developed two separate ground-mounted projects, the first totaling 3.6 MW DC. Net Metering Credits from the project are sold through a long-term purchase agreement to the Town of Franklin creating a highly beneficial public-private partnership between the landowner, Kearsarge, its financing partners, and the host town. Kearsarge managed a complex interconnection process with National Grid for these landmark projects. Commercial Operations at Franklin Project 1 began in November of 2013.



4.8 MW: Mount Saint Mary's Solar Farm Project 2 (Franklin, MA)

Kearsarge's second project in Franklin, MA, is a 4.8 MW DC ground-mounted system. Net Metering Credits are sold through long-term purchase agreements to the Town of Franklin. Commercial Operation began December 2013.



1.7 MW: Grafton Water District (Grafton, MA)

Kearsarge partnered with the Town of Grafton, MA and its Water District to develop this 1.7 MW DC solar farm. The solar farm is situated on approximately 10 acres of land surrounding one of the water district's pump stations and is interconnected to existing electrical infrastructure that serves pump station equipment on site. All energy generated by the system will be purchased by the Water District and host municipality via long-term Net Metered Power Purchase Agreements. The project has been recognized and supported by the Massachusetts Department of Environmental Protection as a leading example of how solar arrays can be seamlessly integrated with existing water infrastructure facilities as it will be the first project permitted within 400' of a groundwater well. Kearsarge developed the project, securing site control, structuring contracts, managing the permitting process, and arranging all financing. Commercial Operations began October 2013.



787 kW: Canton Public Schools (Canton, MA)

Kearsarge worked with a major national energy efficiency and solutions provider to develop, design, interconnect, and finance a major rooftop solar PV installation for a suburban public school district approximately 20 miles south of Boston. Located at the high school and middle school this 787 kW DC rooftop project will save the school district thousands of dollars annually. Commercial Operations began August 2013.



5.7 MW: True North Solar (Salisbury, MA)

Located 30 miles north of Boston, MA, True North, a 5.7 MW DC ground-mounted project, was one of the earliest large scale SREC I projects in Massachusetts. All energy generated by the system is being purchased by local municipalities and school districts. When construction was completed in August of 2012 this became the largest solar project in the Commonwealth of Massachusetts and one of the largest in the Northeastern U.S. Kearsarge partnered with the site owner on the later stages of development in order to secure financing for the project and assist in completing development. The site's landowner managed development and permitting of the project and Kearsarge performed key due diligence steps, deal structuring, worked with multiple sources of funding, and explored several financing approaches before partnering with an international firm to complete the project.



140 kW: Hanalani Schools (Mililani, HI)

This 140 kW DC private school project involved resolution of complex site real estate issues, as well as non-profit energy user questions and very tight scheduling to achieve project completion in time to qualify for key project incentives. Project completed December 2011. Kearsarge provided financing and long-term project ownership.



150 kW: Napili Kai Resort (Lahaina, HI)

Completed in November 2011, this 150 kW DC beachfront resort project involved difficult design, utility interconnection and land use issues in order to ensure a solid project for the energy user and a safe investment for the capital providers. Kearsarge provided financing and long-term project ownership.

Appendix 6. References & Required Bid Forms

TOWN OF BRISTOL and TOWN OF BARRINGTON, RI
INVITATION FOR RFQ/RFP
BID #850
PUBLIC-PRIVATE PARTNERSHIP FOR ON-SITE SOLAR PROJECTS

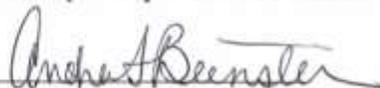
Attachment A
Town of Barrington

BID FORM

NAME AND ADDRESS OF BIDDING FIRM:

Kearsarge Energy
480 Pleasant Street, Suite B110
Watertown, MA 02472

I herein agree to abide by all requirements as detailed in the "Invitation for Bid #850".

Signature: 

Printed Name & Title: Andrew Bernstein, Managing Partner

Date: 11/23/2016



TOWN OF BRISTOL and TOWN OF BARRINGTON, RI

INVITATION FOR RFQ/RFP
BID #850
PUBLIC-PRIVATE PARTNERSHIP FOR ON-SITE SOLAR PROJECTS

Attachment A
Town of Bristol

BID FORM

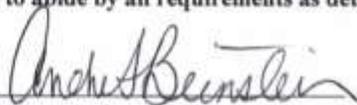
NAME AND ADDRESS OF BIDDING FIRM:

Kearsarge Energy

480 Pleasant Street, Suite B110

Watertown, MA 02472

I herein agree to abide by all requirements as detailed in the "Invitation for Bid #850".

Signature: 

Printed Name & Title: Andrew Bernstein, Managing Partner

Date: 11/23/2016



TOWN OF BRISTOL and TOWN OF BARRINGTON, RI

INVITATION FOR RFQ/RFP
 BID #850
 PUBLIC-PRIVATE PARTNERSHIP FOR ON-SITE SOLAR PROJECTS

ATTACHMENT C

**BIDDER'S STATEMENT
 REGARDING INSURANCE COVERAGE**

BIDDER HEREBY CERTIFIES that the Bidder has reviewed and understands the insurance coverage requirements specified in the Invitation for Bid No. 850, Public – Private Partnership for On-Site Solar Projects. Should the Bidder be awarded the contract for the work, Bidder further certifies that the Bidder can meet the specified requirements for insurance and agrees to provide the Town with a certificate of insurance which names the Town of Bristol and the Town of Barrington as an Additional Insured for the work specified.

Insurance Required:

- Workman's Compensation in compliance with statutory limits
- Comprehensive General Liability Insurance of at least \$1,000,000.

Kearsarge Energy

Name of Bidder (Person, Firm, or Corporation)

Andrew Bernstein
 Signature of Bidder's Authorized Representative

Andrew Bernstein, Managing Partner

Name & Title of Authorized Representative

11/23/2016

Date of Signing

TOWN OF BRISTOL and TOWN OF BARRINGTON, RI

INVITATION FOR RFQ/RFP
 BID #850
 PUBLIC-PRIVATE PARTNERSHIP FOR ON-SITE SOLAR PROJECTS

ATTACHMENT B
Non-COLLUSION AFFIDAVIT
To Be Completed, Notarized, and Submitted With Bid

State of Rhode Island
 County of Bristol

" Kearsarge Energy, Bidder, being first duly sworn, deposes and says that he or she is Owner of the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the Bidder or any other Bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other Bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and further, that the Bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid."

11/23/2016
 Date

Kearsarge Energy
 Bidder name
 (Person, Firm, Corp.)

480 Pleasant Street, Suite B110
 Address

Watertown, MA 02472
 City, State, Zip

Watertown, MA Kearsarge Office
 (Signed at)

Andrew Bernstein
 Authorized Representative

Andrew Bernstein
 Representative's Name

Managing Partner
 Representative's Title

TOWN OF BRISTOL and TOWN OF BARRINGTON, RI

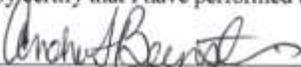
INVITATION FOR RFQ/RFP
 BID #850
 PUBLIC-PRIVATE PARTNERSHIP FOR ON-SITE SOLAR PROJECTS

ATTACHMENT D

BIDDER STATEMENT OF RELEVANT EXPERIENCE

List three (3) references for which your firm provided service within the last five years.

I hereby certify that I have performed the work listed below.



 Signature of Bidder

DESCRIPTION	DATES	CONTRACT AMOUNT	CUSTOMER CONTACT	CUSTOMER TELEPHONE
Ground lease with Town for 4 MW DC pile-driven and ballasted capped landfill solar facility on town-owned land	Start: December, 2016 End: December, 2016	\$11.3 million	Denis Fraine, Town Administrator, Town of Bellingham, MA	508-657-2801
Ground lease and PPA with the Grafton Water District for a 1.7 MW DC pile-driven ground-mount	Start: February 2013 End: September 2013	\$5.2 million	Matt Pearson, General Manager, Grafton Water District, Grafton, MA	508-839-2302
Ground lease with the Abbey for a combined 8.4 MW DC pile-driven ground mount	Start: March 2013 End: November 2013	\$27.3 million	Sr. Alice Chau, Business Manager, Mount St. Mary's Abbey, Wrentham, MA	508-528-1282

Appendix 7. Equipment Specification Sheets

Mono
Multi
Solutions



THE TALLMAX^M plus⁺

MODULE

72 CELL
MONOCRYSTALLINE MODULE

330-355W
POWER OUTPUT RANGE

18.3%
MAXIMUM EFFICIENCY

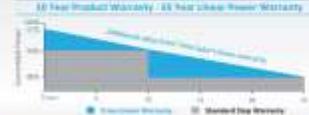
0~+5W
POSITIVE POWER TOLERANCE

As a leading global manufacturer of next generation photovoltaic products, we believe close cooperation with our partners is critical to success. With local presence around the globe, Trina is able to provide exceptional service to each customer in each market and supplement our innovative, reliable products with the backing of Trina as a strong, bankable partner. We are committed to building strategic, mutually beneficial collaboration with installers, developers, distributors and other partners as the backbone of our shared success in driving Smart Energy Together.

Trina Solar Limited
www.trinasolar.com

LINEAR PERFORMANCE WARRANTY

25 Year Product Warranty - 25 Year Linear Power Warranty



TrinaSolar

Smart Energy Together



Maximize limited space with top-end efficiency

- Up to 183 W/m² power density
- Low thermal coefficients for greater energy production at high operating temperatures



Highly reliable due to stringent quality control

- Over 30 in-house tests (UV, TC, HF, and many more)
- In-house testing goes well beyond certification requirements
- 100% EL double inspection



Certified to withstand challenging environmental conditions

- 2400 Pa wind load
- 5400 Pa snow load
- 35 mm hail stones at 97 km/h

Comprehensive products and system certificates

- IEC 61215/ IEC 61730/ UL 1703/ IEC 61701/IEC 62716
- ISO 9001: Quality Management System
- ISO 14001: Environmental Management System
- ISO 14064: Greenhouse Gases Emissions Verification
- OHSAS 18001: Occupation Health and Safety Management System





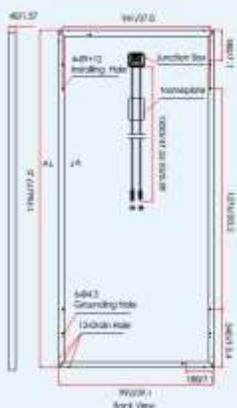




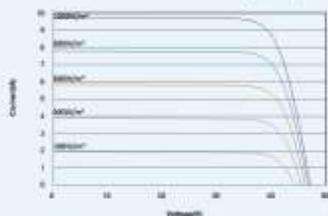


THE TALLMAX^{plus} MODULE

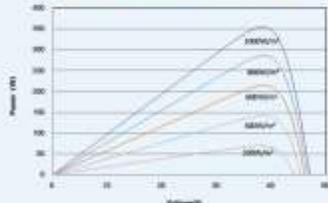
TSM-DD14A(II)

DIMENSIONS OF PV MODULE
Unit: mm/inches

I-V CURVES OF PV MODULE(355W)



P-V CURVES OF PV MODULE(355W)



ELECTRICAL DATA (STC)

Peak Power Watts P_{max} [Wp]*	330	335	340	345	350	355
Power Output Tolerance P_{max} [W]	0~+5					
Maximum Power Voltage V_{mp} [V]	37.8	37.9	38.2	38.4	38.5	38.7
Maximum Power Current I_{mp} [A]	8.73	8.84	8.90	9.00	9.09	9.17
Open Circuit Voltage V_{oc} [V]	46.2	46.3	46.5	46.7	46.9	47.0
Short Circuit Current I_{sc} [A]	9.27	9.36	9.45	9.50	9.60	9.69
Module Efficiency η [%]	17.0	17.3	17.5	17.8	18.0	18.3

STC: Irradiance 1000 W/m^2 , Cell Temperature 25°C, Air Mass AM1.5.
*Test tolerance: $\pm 3\%$.

ELECTRICAL DATA (NOCT)

Maximum Power P_{max} [Wp]	246	250	253	257	261	264
Maximum Power Voltage V_{mp} [V]	34.9	35.1	35.2	35.5	35.6	35.8
Maximum Power Current I_{mp} [A]	7.04	7.12	7.19	7.25	7.33	7.40
Open Circuit Voltage V_{oc} [V]	43.0	43.1	43.2	43.4	43.5	43.7
Short Circuit Current I_{sc} [A]	7.49	7.56	7.63	7.67	7.75	7.82

NOCT: Irradiance of 800 W/m^2 , Ambient Temperature 20°C, Wind Speed 1 m/s.

MECHANICAL DATA

Solar Cells	Monocrystalline 156 × 156 mm (6 inches)
Cell Orientation	72 cells (6 × 12)
Module Dimensions	1956 × 992 × 40 mm (77.0 × 39.1 × 1.57 inches)
Weight	36.0 kg (57.3 lb)
Glass	4.0 mm (0.15 inches), High Transmission, AR Coated Tempered Glass
Backsheet	White
Frame	Silver Anodized Aluminium Alloy
J-Box	IP 67 or IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm ² (0.006 inches ²), 1200 mm (47.2 inches)
Connector	MC4 Compatible or Amphenol H4/UTX
Fire type	Type 1 or Type 2

TEMPERATURE RATINGS

Nominal Operating Cell Temperature (NOCT)	44°C (± 2°C)
Temperature Coefficient of P_{max}	-0.39%/°C
Temperature Coefficient of V_{oc}	-0.29%/°C
Temperature Coefficient of I_{sc}	0.05%/°C

MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1000V DC (IEC) 1000V DC (UL)
Max Series Fuse Rating	15A

WARRANTY

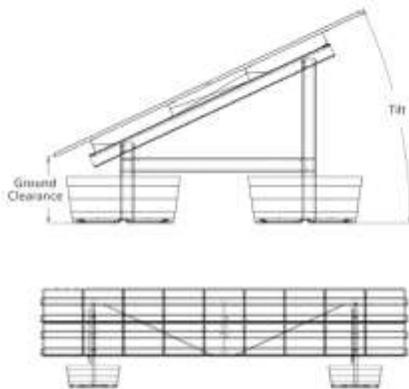
- 10 year Product Workmanship Warranty
 - 25 year Linear Power Warranty
- (Please refer to product warranty for details)

PACKAGING CONFIGURATION

- Modules per box: 26 pieces
- Modules per 40' container: 572 pieces

Pour-In-Place™ BALLASTED GROUND SYSTEM

Technical Data Sheet



Patent pending protected system with self-leveling technology: 68% faster install than precast

Substantial labor savings by eliminating moving and shimming heavy, precast blocks

Articulating purlin connections to navigate up to 15% terrain slopes

Supports all poly, glass and thin film modules

Integrated grounding and wire management

Available in both 1 and 2up in portrait panels

Landfill solar racking leader



12.9 MW - NJ - GC Pour-In-Place™ System - Largest Superfund Landfill Solar System in USA

Pour-In-Place™ BALLASTED GROUND SYSTEM

Tel: 212 388 5160
 info@gamechangesolar.com
 gamechangesolar.com

Technical Data Sheet



Pour-in-Place™ Ballasted Ground System:
 faster install, steeper slopes



Pour-in-Place™ thin film panel clamps
 mount using rivets, T bolts or socket bolts



Slots combine with rail support self-leveling
 technology enables up to 7" vertical adjustability



Available with galvanized purlins with
 large wire management tray



Large hoop-shaped brackets slide to enable over
 7" of vertical adjustment or facilitate install on
 ground sloping in all directions

© GameChange Solar, LLC, 2014

Features

Pour-in-Place™ Ballasted Ground System: less concrete, faster install, steeper slopes

Substantial adjustability allows for slopes up to 15%

Self-leveling technology enables up to 7" total vertical adjustability including use of slots

No gravel beds or other expensive ground preparations required for leveling as needed for precast - save up to \$.05/watt

Up to 4 ft. high ground clearance to allow for snow and vegetation

5 to 35° tilt with multiple inter-row spacing options

Full layout and engineering analysis for every project

51% overall lower cost than competitors

Integrated grounding and wire management

Test & Certification

- Wind tunnel tested by industry leader CPP & rated for 150 mph wind speed
- Independent assessment by Black & Veatch
- Rated up to 90 psf snow load
- ETL / UL 2703 tested
- Meets IBC and ASME standards for structural loading
- Warranty 20 years

Calculations

- 100% code compliant designs for any locality
- Structural PE stamped drawings and calculations
- Individual system structural calculations
- Individual system design calculations based on regional load values
- Design loads according to IBC 2006 or 2009

Material

- Rail support structure components: G90+ galvanized steel
- Panel mounting rails: G90+ galvanized steel (aluminum also available)
- Recycled HMWPE forms
- 3/8" magnacoat bolts and serrated flange nuts
- Panel mounting hardware: top mount - panel mounting clips: stainless steel FTL / UL 467 teathed clips 1/4" - 20 x 1.5" to 2.5" T bolts, 1/4" - 20 serrated flange nuts: stainless steel bottom mount: 1/4" - 20 x 3/4" T bolts, 1/4" - 20 serrated flange nuts, star washers: stainless steel

Grounding

- Integrated grounding with star washers or teathed module clamps included - both approved under ETL / UL 2703
- Grounding must be done by electrician at row ends

HEC-US_{V1500}

UTILITY SCALE SOLAR INVERTER



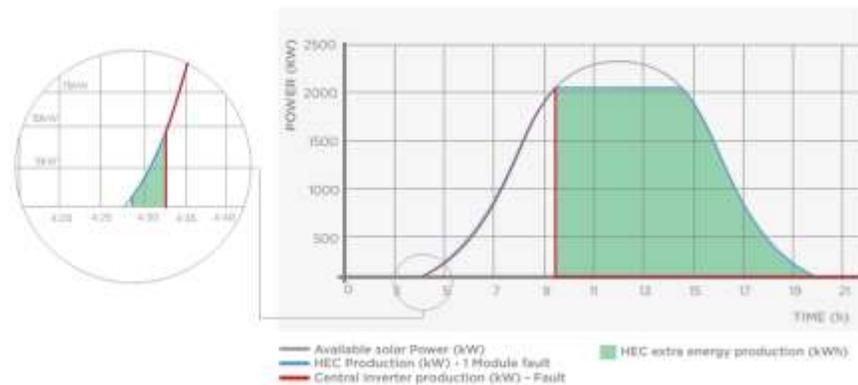
POWER ELECTRONICS / SOLAR INVERTER



AUTOMATIC REDUNDANT POWER MODULE SYSTEM (ARPMS)

The HEC-US V1500 topology combines the advantages of a central inverter with the availability of string inverters. HEC-US V1500 is a modular central inverter based on an Automatic Redundant Power Module (350kVA to 500kVA per stage).

If there is a fault in one power module, it is taken off-line and its output power is distributed evenly among the remaining functioning modules. All power modules work in parallel controlled by a dual redundant main control. As the main governor of the system it is responsible for the MPPT tracking, synchronization sequence and overall protection. The automatic redundant capability based on our industrial systems is able to shift the main control in the event of a fault, restoring the backup control and restarting the station to guarantee high availability. (patent pending)



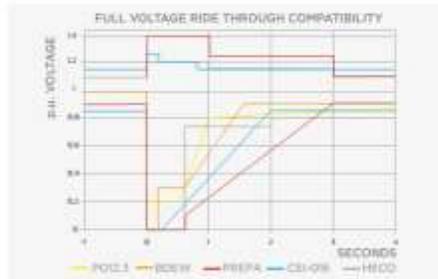
A modular inverter is more efficient than a standard central inverter. During low radiation conditions, a modular architecture uses the correct number of power modules to provide power, while a central inverter must consume power internally to support the entire system. With lower losses, a modular inverter can provide power earlier in the morning and stop later at the end of the day. As a result, throughout the entire service life of the PV plant, the HEC-US V1500 inverter generates higher yields than a standard central inverter with a higher reliability than string inverters.





DYNAMIC GRID SUPPORT

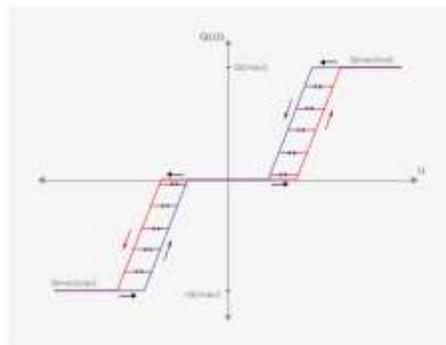
HEC-US V1500 firmware includes the latest utility interactive features (LVRT, OVRT, FRS, FRT, Anti-islanding, active and reactive power curtailment...), and is compatible with all the specific requirements of the utilities.



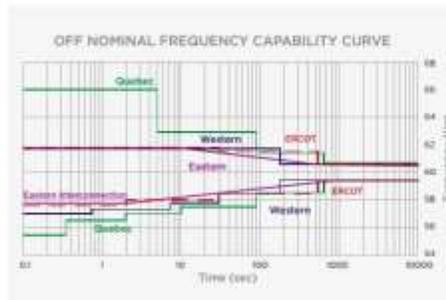
▲ **LVRT or ZVRT (Low Voltage Ride Through).** Inverters can withstand any voltage dip or profile required by the local utility. The inverter can immediately feed the fault with full reactive power, as long as the protection limits are not exceeded.



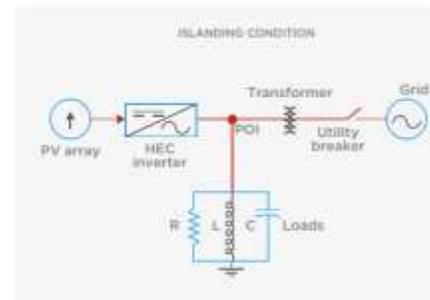
▲ **FRS (Frequency Regulation System).** Frequency droop algorithm curtails the active power along a preset characteristic curve supporting grid stabilization.



▲ **Q(V) curve:** It is a dynamic voltage control function which provides reactive power in order to maintain the voltage as close as possible to its nominal value.



▲ **FRT (Frequency Ride Through):** Freesun solar inverters have flexible frequency protection settings, and can be easily adjusted to comply with future requirements.



▲ **Anti-islanding:** This protection combines passive and active methods that eliminates nuisance tripping and reduces grid distortion according to IEC 62116 and IEEE1547.

HEC-US^{V1500}

TECHNICAL CHARACTERISTICS

		690VAC - MPPT Window 976V-1250V					
		FRAME 3	FRAME 4	FRAME 5	FRAME 6	FRAME 7	
NUMBER OF MODULES		3	4	5	6	7	
REFERENCE		FS1275CU15	FS1700CU15	FS2125CU15	FS2550CU15	FS3000CU15	
OUTPUT	AC Output Power(kVA/kW) @50°C ⁽¹⁾	1275	1700	2125	2550	3000	
	AC Output Power(kVA/kW) @25°C ⁽¹⁾	1530	2040	2550	3060	3500	
	AC Output Power(kW) @50°C; PF=0.9	1150	1530	1930	2250	2700	
	Max. AC Output Current (A) @25°C	1285	1710	2140	2570	3000	
	Operating Grid Voltage (VAC)	690V ±10%					
	Operating Grid Frequency (Hz)	60Hz					
INPUT	Current Harmonic Distortion (THDI)	< 3% per IEEE519					
	Power Factor (cosine phi) ⁽²⁾	0.0 leading - 0.0 lagging / Reactive Power injection at night					
	Power Curtailment (kVA)	0..100% / 0.1% Steps					
	MPPT @full power (VDC) ⁽³⁾	976V - 1250V					
	Maximum DC voltage	1500V					
	Minimum Start voltage	1100V - User configurable					
	Max. DC continuous current (A)	1600	2140	2675	3210	3745	
	Max. DC short circuit current (A)	2320	3100	3880	4650	5450	
	EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (%)	98.5%	98.7%	98.7%	98.7%	98.7%
		CEC (%)	98.0%	98.5%	98.5%	98.5%	98.5%
Max. Standby Consumption (Prnight)		< approx. 50W/per module					
Control Power Supply		120V / 208VAC-6kVA power supply available for external equipment (optional)					
CABINET	Dimensions [WxDxH] [inches]	118.6"x37.2"x86.5"	147.6"x37.2"x86.5"	175.7"x37.2"x86.5"	203.8"x37.2"x86.5"	231.9"x37.2"x86.5"	
	Dimensions [WxDxH] [mm]	3038x945x2198	3751x945x2198	4464x945x2198	5177x945x2198	5890x945x2198	
	Weight (kg)	2635	3290	3945	4600	5255	
	Weight (lbs)	5809	7253	8697	10141	11585	
ENVIRONMENT	Air Flow	Bottom intake. Exhaust top rear vent.					
	Type of ventilation	Forced air cooling					
	Degree of protection	NEMA 3R					
	Permissible Ambient Temperature	-31°F to +140°F, -35°C ⁽⁴⁾ to +60°C / Active Power derating >50°C/122°F					
	Relative Humidity	0% to 100% non condensing					
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)					
CONTROL INTERFACE	Noise level ⁽⁴⁾	< 79 dBA					
	Interface	Graphic Display (Inside cabinet) / Optional Freesun App					
	Communication protocol	Modbus TCP					
	Power Plant Controller	Optional					
PROTECTIONS	Keyed ON/OFF switch	Standard					
	Digital I/O	User configurable					
	Analog I/O	User configurable					
	Ground Fault Protection	Floating PV array; Isolation Monitoring per MPP; NEC2014 Grounded PV Array; GFDI protection Optional PV Array transfer kit; GFDI and Isolation monitoring device					
CERTIFICATIONS	Humidity control	Active Heating					
	General AC Protection & Disconn.	Circuit Breaker					
	General DC Protection & Disconn.	External Disconnecting Unit, Cabinet					
	Module AC Protection & Disconn.	AC contactor & fuses					
	Module DC Protection	DC fuses					
CERTIFICATIONS	Overvoltage Protection	AC and DC protection (type 2)					
	Safety	UL 1741; CSA 22.2 No.1071-01					
	Utility interconnect	IEEE 1547 with Utility Interactive Control functions					

NOTES: (1) Values at 100-Vac nom and cos φ=1. Consult Power Electronics for derating curves.
 (2) Consult P-Q charts available: $G(kVA)/P(kW) = (S(kVA))^2 / P(kW)^2$
 (3) Heating kit option required below -20°C.
 (4) Sound pressure level at a distance of 1m from the rear part.

POWER ELECTRONICS / SOLAR INVERTER

HEC-US V1500

TECHNICAL CHARACTERISTICS

		645VAC - MPPT Window 913V-1250V				
		FRAME 3	FRAME 4	FRAME 5	FRAME 6	FRAME 7
NUMBER OF MODULES		3	4	5	6	7
REFERENCE		FS1200CU15	FS1800CU15	FS2000CU15	FS2400CU15	FS2800CU15
OUTPUT	AC Output Power(kVA/kW) @50°C ^[1]	1300	1600	2000	2400	2900
	AC Output Power(kVA/kW) @25°C ^[1]	1430	1790	2390	2860	3345
	AC Output Power(kW) @50°C; PF=0.9	1080	1440	1800	2160	2520
	Max. AC Output Current (A) @25°C	1285	1710	2140	2570	3000
	Operating Grid Voltage (VAC)	645V ±10%				
	Operating Grid Frequency (Hz)	60Hz				
	Current Harmonic Distortion (THD)	< 3% per IEEE519				
	Power Factor (cosine phi) ^[2]	0.0 leading - 0.0 lagging / Reactive Power injection at night				
	Power Curtailment (kVA)	0..100% / 0.1% Steps				
	MPPT @full power (VDC) ^[3]	913V - 1250V				
INPUT	Maximum DC voltage	1500V				
	Minimum Start Voltage	1075V - User configurable				
	Max. DC continuous current (A)	1600	2140	2675	3210	3745
	Max. DC short circuit current (A)	2320	3100	3880	4650	5450
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (%)	98.4%	98.5%	98.6%	98.6%	98.6%
	CEC (%)	98.0%	98.0%	98.5%	98.5%	98.5%
	Max. Standby Consumption (Pnight)	< approx. 50W/per module				
CABINET	Control Power Supply	120V / 208VAC-6kVA power supply available for external equipment (optional)				
	Dimensions [WxDxH] [inches]	118.1"×37.2"×86.5"	147.6"×37.2"×86.5"	175.7"×37.2"×86.5"	203.8"×37.2"×86.5"	231.9"×37.2"×86.5"
	Dimensions [WxDxH] [mm]	3038×945×2198	3751×945×2198	4464×945×2198	5177×945×2198	5890×945×2198
	Weight (kg)	2655	3290	3945	4600	5255
	Weight (lbs)	5809	7253	8697	10141	11585
	Air Flow	Bottom intake, Exhaust top rear vent.				
	Type of ventilation	Forced air cooling				
ENVIRONMENT	Degree of protection	NEMA 3R				
	Permissible Ambient Temperature	-31°F to +140°F, -35°C ^[4] to +60°C / Active Power derating >50°C/122°F				
	Relative Humidity	0% to 100% non condensing				
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)				
	Noise level ^[4]	< 79 dBA				
CONTROL INTERFACE	Interface	Graphic Display (inside cabinet) / Optional Freesun App display				
	Communication protocol	Modbus TCP				
	Power Plant Controller	Optional				
	Keyed ON/OFF switch	Standard				
	Digital I/O	User configurable				
PROTECTIONS	Analog I/O	User configurable				
	Ground Fault Protection	Floating PV array, Isolation Monitoring per MPP NEC2014 Grounded PV Array, GFDI protection Optional PV Array transfer kit, GFDI and Isolation monitoring device				
	Humidity control	Active Heating				
	General AC Protection & Disconn.	Circuit Breaker				
	General DC Protection & Disconn.	External Disconnecting Unit Cabinet				
	Module AC Protection & Disconn.	AC contactor & fuses				
	Module DC Protection	DC fuses				
CERTIFICATIONS	Overvoltage Protection	AC and DC protection (type 2)				
	Safety	UL 1741, CSA 22.2 No.1071-01				
	Utility interconnect	IEEE 1547 with Utility Interactive Control functions				

NOTES: [1] Values at 100°Vac nom and cos φ=1. Consult Power Electronics for derating curves.
 [2] Consult P-Q charts available: Q(kVA)=+(-)S(kVA)²/P(kW)²
 [3] Heating kit option required below -20°C.
 [4] Sound pressure level at a distance of 1m from the rear part.



HEC-US^{v1500}

TECHNICAL CHARACTERISTICS

		600VAC - MPPT Window 849V-1250V				
		FRAME 3	FRAME 4	FRAME 5	FRAME 6	FRAME 7
NUMBER OF MODULES		3	4	5	6	7
REFERENCE		FS100CU15	FS1475CU15	FS1850CU15	FS2225CU15	FS2800CU15
OUTPUT	AC Output Power(kVA/kW) @50°C ⁽¹⁾	1100	1475	1850	2225	2600
	AC Output Power(kVA/kW) @25°C ⁽¹⁾	1335	1780	2225	2660	3110
	AC Output Power(kW) @50°C; PF=0.9	990	1325	1665	2000	2340
	Max. AC Output Current (A) @25°C	1285	1710	2140	2570	3000
	Operating Grid Voltage (VAC)	600V ±30%				
	Operating Grid Frequency (Hz)	60Hz				
	Current Harmonic Distortion (THDI)	< 3% per IEEE519				
	Power Factor (cosine phi) ⁽²⁾	0.0 leading ... 0.0 lagging / Reactive Power injection at night				
	Power Curtailment (kVA)	0...100% / 0.1% Steps				
	MPPt @full power (VDC) ⁽³⁾	849V - 1250V				
INPUT	Maximum DC voltage	1500V				
	Minimum Start voltage	1050V - User configurable				
	Max. DC continuous current (A)	1600	2140	2675	3210	3745
EFFICIENCY & AUX. SUPPLY	Max. DC short circuit current (A)	2320	3100	3880	4650	5450
	Efficiency (Max) (%)	98.4%	98.5%	98.6%	98.6%	98.6%
	CEC (%)	98.0%	98.0%	98.5%	98.5%	98.5%
	Max. Standby Consumption (Prnight)	< approx. 50W/per module				
CABINET	Control Power Supply	120V / 208VAC-6kVA power supply available for external equipment (optional)				
	Dimensions [WxDxH] [inches]	18.6"x37.2"x86.5"	14.76"x37.2"x86.5"	17.7"x37.2"x86.5"	20.38"x37.2"x86.5"	23.19"x37.2"x86.5"
	Dimensions [WxDxH] [mm]	3038x945x2198	3751x945x2198	4464x945x2198	5177x945x2198	5890x945x2198
	Weight (kg)	2635	3290	3945	4600	5255
	Weight (lbs)	5809	7253	8697	10141	11585
	Air Flow	Bottom intake. Exhaust top rear vent.				
	Type of ventilation	Forced air cooling				
	Degree of protection	NEMA 3R				
	Permissible Ambient Temperature	-31°F to +140°F, -35°C ⁽⁴⁾ to +60°C / Active Power derating >50°C/122°F				
	Relative Humidity	0% to 100% non condensing				
ENVIRONMENT	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)				
	Noise level ⁽⁴⁾	< 79 dBA				
	Interface	Graphic Display (inside cabinet) / Optional Freesun App				
	Communication protocol	Modbus TCP				
CONTROL INTERFACE	Power Plant Controller	Optional				
	Keyed ON/OFF switch	Standard				
	Digital I/O	User configurable				
	Analog I/O	User configurable				
PROTECTIONS	Ground Fault Protection	Floating PV array: Isolation Monitoring per MPP. NEC2014 Grounded PV Array: GFDI protection Optional PV Array transfer kit: GFDI and Isolation monitoring device				
	Humidity control	Active Heating				
	General AC Protection & Disconn.	Circuit Breaker				
	General DC Protection & Disconn.	External Disconnecting Unit, Cabinet				
	Module AC Protection & Disconn.	AC contactor & fuses				
	Module DC Protection	DC fuses				
CERTIFICATIONS	Overvoltage Protection	AC and DC protection (type 2)				
	Safety	UL 1741; CSA 22.2 No.1071-01				
	Utility interconnect	IEEE 1547 with Utility Interactive Control functions				

NOTES: (1) Values at 100-Vac nom and cos φ=1. Consult Power Electronics for derating curves.
 (2) Consult P-Q charts available: $Q(kVA)/P(kW) = (S(kVA))^2 - P(kW)^2$
 (3) Heating kit option required below -20°C.
 (4) Sound pressure level at a distance of 1m from the rear part.

POWER ELECTRONICS / SOLAR INVERTER

HEC-US V1500

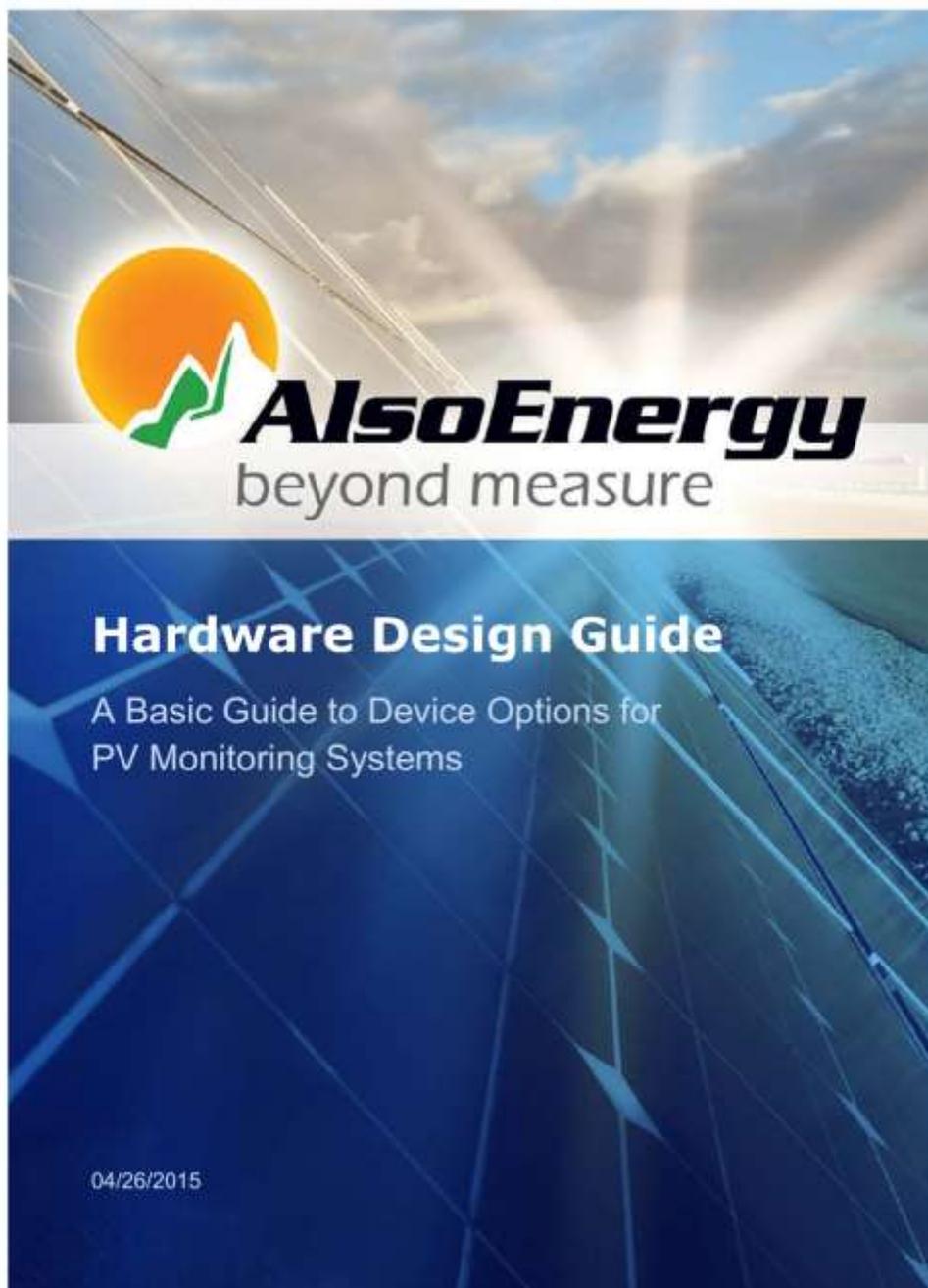
TECHNICAL CHARACTERISTICS

		565VAC - MPPT Window 800V-1250V				
		FRAME 3	FRAME 4	FRAME 5	FRAME 6	FRAME 7
NUMBER OF MODULES		3	4	5	6	7
REFERENCE		FS1050CU15	FS1400CU15	FS1750CU15	FS2100CU15	FS2450CU15
OUTPUT	AC Output Power(kVA/kW) @50°C [2]	1050	1400	1750	2100	2450
	AC Output Power(kVA/kW) @25°C [2]	1250	1675	2090	2510	2930
	AC Output Power(kW) @50°C; PF=0.9	945	1260	1575	1890	2205
	Max. AC Output Current (A) @25°C	1285	1710	2140	2570	3000
	Operating Grid Voltage (VAC)	565V ±10%				
	Operating Grid Frequency (Hz)	60Hz				
	Current Harmonic Distortion (THD)	< 3% per IEEE519				
	Power Factor (cosine phi) [4]	0.0 leading - 0.0 lagging / Reactive Power injection at night				
	Power Curtailment (kVA)	0..100% / 0.1% Steps				
	MPPT @full power (VDC) [3]	800V - 1250V				
INPUT	Maximum DC voltage	1500V				
	Minimum Start Voltage	1050V - User configurable				
	Max. DC continuous current (A)	1600	2140	2675	3210	3745
	Max. DC short circuit current (A)	2320	3100	3880	4650	5450
EFFICIENCY & AUX. SUPPLY	Efficiency (Max) (%)	98.2%	98.4%	98.5%	98.5%	98.5%
	CEC (%)	98.0%	98.0%	98.0%	98.5%	98.5%
	Max. Standby Consumption (Pnight)	< approx. 50W/per module				
CABINET	Control Power Supply	120V / 208VAC-6kVA power supply available for external equipment (optional)				
	Dimensions [WxDxH] [inches]	118.1"×37.2"×86.5"	147.6"×37.2"×86.5"	175.7"×37.2"×86.5"	203.8"×37.2"×86.5"	231.9"×37.2"×86.5"
	Dimensions [WxDxH] [mm]	3038×945×2198	3751×945×2198	4464×945×2198	5177×945×2198	5890×945×2198
	Weight (kg)	2655	3790	3945	4600	5255
	Weight (lbs)	5809	8253	8697	10141	11585
	Air Flow	Bottom intake, Exhaust top rear vent.				
	Type of ventilation	Forced air cooling				
ENVIRONMENT	Degree of protection	NEMA 3R				
	Permissible Ambient Temperature	-31°F to +140°F, -35°C [3] to +60°C / Active Power derating >50°C/122°F				
	Relative Humidity	0% to 100% non condensing				
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)				
	Noise level [4]	< 79 dBA				
CONTROL INTERFACE	Interface	Graphic Display (inside cabinet) / Optional Fraesun App				
	Communication protocol	Modbus TCP				
	Power Plant Controller	Optional				
	Keyed ON/OFF switch	Standard				
	Digital I/O	User configurable				
	Analog I/O	User configurable				
PROTECTIONS	Ground Fault Protection	Floating PV array; Isolation Monitoring per MPP NEC2014 Grounded PV Array; GFDI protection Optional PV Array transfer kit; GFDI and Isolation monitoring device				
	Humidity control	Active Heating				
	General AC Protection & Disconn.	Circuit Breaker				
	General DC Protection & Disconn.	External Disconnecting Unit Cabinet				
	Module AC Protection & Disconn.	AC contactor & fuses				
	Module DC Protection	DC fuses				
	Overvoltage Protection	AC and DC protection (type 2)				
CERTIFICATIONS	Safety	UL 1741, CSA 22.2 No.1071-01				
	Utility interconnect	IEEE 1547 with Utility Interactive Control functions				

NOTES: [1] Values at 100°Vac nom and cos φ=1. Consult Power Electronics for derating curves.
 [2] Consult P-Q charts available: Q(kVA)=P(kVA)²/P(kW)²
 [3] Heating kit option required below -20°C.
 [4] Sound pressure level at a distance of 1m from the rear part.



Hardware Design Guide

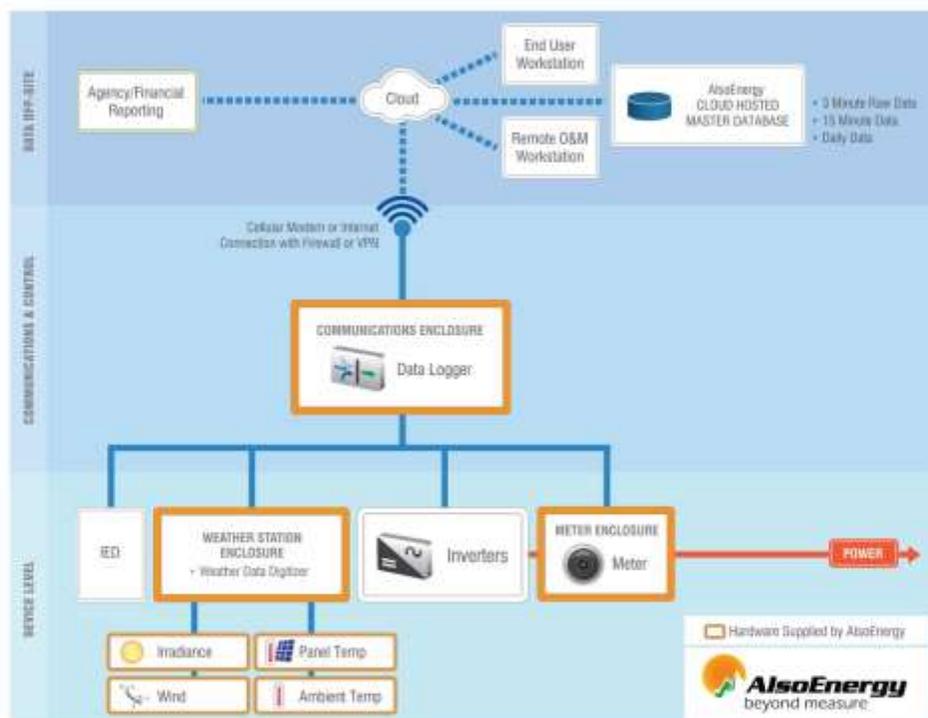


ALSO ENERGY INC · 3380 MITCHELL LN STE A · BOULDER, CO 80301 · WWW.ALSOENERGY.COM · 866-303-5668 · v2



Hardware Design Guide

AlsoEnergy provides a complete energy monitoring system and support for PV installations. Hardware is available as a turn-key system to minimize installation time. Our combination of features, functionality and competitive pricing makes AlsoEnergy the highest value monitoring solution.



Basic Monitoring System Diagram

Our equipment comes in prewired NEMA 4 enclosures designed for easy installation. However, we do offer on-site installation support services if desired. The enclosure contains a data logger and optionally a weather station and revenue grade meter. The following pages provide an overview of our hardware solutions, but are not a complete list of all the devices we provide or support. Please let us know if you have any special hardware requests and we will do our best to accommodate.

NEMA 4 Outdoor Enclosure

- Internal power supply
- Surge suppressors
- Room for two additional devices
- Dimensions:
15.75" tall, 15.75" wide, 8.25" deep
- Includes 3' Ethernet cable

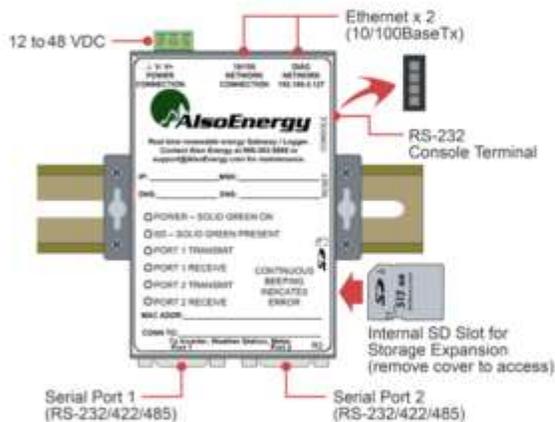


Data Logger

Our proprietary software is loaded on commercial hardware to produce our custom data logger. We gather raw data with our data loggers.

The Data Logger connects to inverters, meters and weather stations typically over MODBUS (other protocols are available).

In the event of network outages, data is stored on a removable SD card and uploaded when network functionality is restored. The SD card has the capability to store a years' worth of data. Inverter faults are directly detected and alerts can be optionally sent. Data is securely transmitted to the cloud hosted database.



Data Logger Features Include:

- Automatic real-time upload of data in customizable time intervals
- Automatic remote firmware updates
- Supports multiple inverters
- 2 modbus serial ports
- RoHS 100-240VAC
- UL, CSA, FCC, CE, TUV, CTick, VCCI Agency Approvals

Metering Solutions

Metering solutions are provided with current transformers to ensure system accuracy. Discrepancies between Production Meter and Inverter reported production is detected and alerts can be optionally sent. Other meters are available upon request.

FEATURES:

- ANSI C12.20 Class 0.2
- 24VAC/VDC excitation power (PLC/DDC compatible)
- Digital communication via RS-485 (MODBUS RTU)
- Two pulse outputs
- Rolling Window Demand calculations
- Two 0-10V analog outputs may be configured to represent any two instantaneous parameters
- Small, DIN mount enclosure
- Optically Isolated output signals




PRODUCT DESCRIPTION:

The WattsOn[®] universal power transducer utilizes cutting edge technology to implement a multi-functional power and energy transducer into a small, cost-effective package. WattsOn incorporates three meters into one to provide a unique solution for monitoring up to three single-phase loads, or one three-phase load. By using two of the inputs, it may be used with split-phase loads also.

WattsOn[™] provides comprehensive per phase (as well as cumulative) information, including Volts, Amps, Real Power, Reactive Power, Apparent Power, Watt-hours, VAR-hours, VA-hours, Power Factor and Frequency.

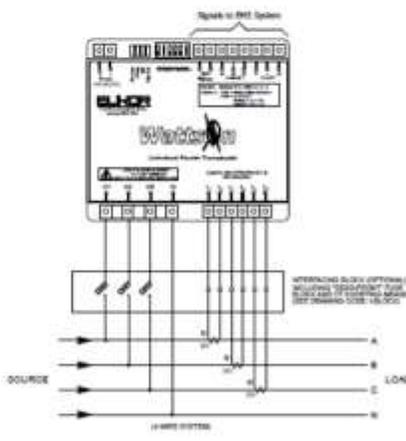
Power (Real and Reactive) is a signed measurement and the meter accumulates both import *and* export energies as well as capacitive *and* reactive energy *per phase*.

The unit accepts up to 600V (line-to-line) directly without the need for potential transformers. It accepts standard mV output CTs (333mV or 1000mV full scale output), as well as Elkor's line of "safe" mA split and solid core CTs. Optionally, the unit may be equipped with an internal interfacing module to accept any standard 5A CT.

The WattsOn[®] transducer features a high accuracy chipset and provides register updates up to two times per second. The true-RMS inputs may be used even with distorted waveforms such as those generated by variable frequency drives and SCR loads.

Information is available via the RS-485 (Modbus RTU) output port. In addition, two solid-state relay pulse outputs are available for Wh energy pulses as well as Qh pulses or direction of power flow indication. Optionally, the second pulse output may be substituted for two 0-10VDC outputs that may represent any instantaneous parameter that the meter measures. The analog outputs and their scaling may be field selected and adjusted via the RS-485 output port.

Metering Solutions

<p>SPECIFICATIONS:</p> <p>INPUTS</p> <p>Voltage 600 V or 600/347 V 480 V or 480/277 V 208 V or 208/120 V</p> <p>Single Phase, Split Phase, Three Phase 50 or 60 Hz</p> <p>Current</p> <ul style="list-style-type: none"> 333mV or 1000mV full scale output CTs. Either "Safe" mA output solid/split core CTs. 5A from standard CTs. <p>DEVICE SPECIFICATIONS</p> <p>Power Supply 15-24VAC or 20-30VDC, 100mA max.</p> <p>Accuracy Better than 0.2% of reading (at 25°C, pf=0.5) for most parameters.</p> <p>Environment Protected Installation: -40 to +60°C, 10 to 90% RH non-condensing</p> <p>Isolation All line inputs are isolated from the outputs. Hi-Pot testing: 2500VAC for one minute</p> <p>Enclosure 3.7" x 3.0" x 1.7" (94mm x 97 mm x 43 mm) W x L x H (note: height does not include DIN base).</p> <p>Weight mA/mV : 150g (5.5 oz) 5A : 200g (7 oz)</p> <p>Safety UL Recognized (Canada and US)</p>	<p>OUTPUTS</p> <p>Wh/Qh Solid state relay (24V, 150mA MAX), change of 100ms pulse on every pre-defined Wh value</p> <p>Qh output may be configured to represent direction of real power via Modbus.</p> <p>Analog Outputs (optional) Qh output may be substituted for two 0-10V analog outputs. Output parameters and span, and full scale may be field adjusted using Modbus communications.</p> <p>RS-485 Modbus RTU: up to 64 units may be connected to one 'chain'.</p> <p>MEASURED PARAMETERS (available via Modbus)</p> <p>Voltage [V] (A, B, C, Avg, AB, AC, BC, Avg) Current [A] (A, B, C, Avg) Active Power [W] (A, B, C, Total) — Bi-directional Apparent Power [VA] (A, B, C, Total) — Bi-directional Reactive Power [VAR] (A, B, C, Total) — Bi-directional Power Factor (A, B, C, System) — Bi-directional Frequency [Hz] Import/Export Energy [Wh] (A, B, C, Total) Inductive/Capacitive Energy [VARh] (A, B, C, Total) Apparent Energy [VAh] (A, B, C, Total) Total Demand Power [W]</p> <p>All parameters are available in integer and floating point format.</p>
<p>TYPICAL WIRING:</p>  <p>The diagram shows a three-phase meter with terminals for Line (L1, L2, L3), Neutral (N), and Ground (G). The power source is connected to the meter terminals. The load is connected between the lines and neutral. A transformer is shown connected to the meter terminals.</p>	<p>ORDERING INFORMATION:</p> <p>WattsOn- [11]-[12]-[13]-[14]</p> <p>Where:</p> <p>[11] Specifies Output Type: 1100 = 0-40V + 2 x Pulse 1200 = 0-10V + 1 x Pulse + 2 x Analog</p> <p>[12] Specifies CT Input Type:</p> <p>5A Input for 5A CTs MCTA Input for MCTA Split Core CTs (up to 300A) MCTB Input for MCTB Split Core CTs (up to 400A) MCTC Input for MCTC Split Core CTs (up to 200A) MCTD Input for MCTD Split Core CTs (up to 100A) MCTE Input for MCTE Split Core CTs (up to 100A) MCTF Input for MCTF Split Core CTs (up to 300A) 333M Input for 333mV output CTs 1000M Input for 1000mV output CTs</p> <p>*** Contact dealer for other input options</p> <p>[13] Specifies CT Full Scale Current (5A for 5A, 300A and 1000A options)</p> <p>[14] Specifies Meter Frequency (for greater accuracy), 1000 is assumed if not specified</p> <p>*** Note: By default, analog outputs are configured as 1) Total Real Power and 2) Average Current. The anticipated terminal voltage should be added to properly configure the output scaling. Analog output values and scaling may be changed later via Modbus.</p> <p>Example: WattsOn-120V-MCTC-500A-50Hz</p> <p>Specifies transformer with 0-10V analog outputs, and current, input calibrated for MCTC CTs, 500A maximum full scale, with a nominal frequency of 50Hz</p> <p>Example: WattsOn-120-0A</p> <p>Specifies transformer with two pulse outputs, calibrated for 5A input, and 60Hz nominal frequency.</p>

Weather Stations

Also Energy has developed high quality weather stations; custom-designed to accommodate the weather monitoring needs of any solar site. Our solutions range from a basic model consisting of a pyranometer, ambient temperature sensor and module temperature sensor, to a multi-input weather station.

	Basic	Standard
Ambient Temperature	Yes	Yes
Module Temperature	Yes	Yes
Wind Speed	No	Yes
Wind Direction	No	Yes
Pyranometer (Irradiance)	Yes	Yes

Our weather station solutions are highly cost competitive, and include five years of data storage and maintenance.

Weather Station Instruments



Anemometer : Wind Speed & Direction

- Rugged components stand up to hurricane-force winds
- Includes sealed stainless-steel bearings for long life.
- Digital filtering, with time constant is applied to wind direction measurements



Pyranometer: Solar Irradiance

- A thermopile pyranometer measures all of the energy between 280 and 2800 nm.



Temperature Sensors

- BAPI Outdoor & High Temperature sensors
- BAPI panel temperature sensors
- Quick-Response Sensor
- Well-Vented
- Watertight Enclosure

Upgrade Options

Kipp & Zonen Pyranometer: Solar Irradiance

- Includes Signal Conditioner
- 10m cable

Weather Station Remote Enclosure

- N4 Continuous Hinge 12X10X5 IN



*Kipp Zonen CMP-3
Pyranometer*

Weather Station Specifications

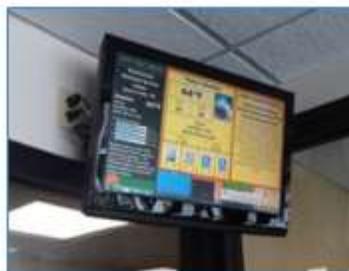
Ambient Temperature	-40° to 122°F, RTD Sensor 4.5°F Max Error at 77°F 6.3°F Max Error over -13° to 221°F
Module Temperature	-40° to 140°F, RTD Sensor 4.5°F Max Error at 77°F 6.3°F Max Error over -13° to 221°F
Wind Speed	3 to 175 mph, Greater of ±3 mph or ±5%
Wind Direction	0° to 360° , ±7°
Pyranometer	0 - 1,750 W/m ² (1.75 x full sun) ± 1% Cosine Response @ 45° zenith ± 5% Cosine Response @ 75° zenith ± 5% Absolute Accuracy ± 3% Uniformity, ± 1% Repeatability +1% per year long term stability
Protocol	Modbus RS-485 2 wire + ground
Operating temperature:	-20°C to 60°C
Relative humidity:	Up to 95% non-condensing
Enclosure Type:	NEMA 4

Lobby Displays and Kiosks

Lobby displays and kiosks enable you and your customers to publicly showcase your commitment to renewable energy, displaying real time data in an attractive, compelling and informative presentation.

Key Benefits:

- Display historical and real time PV System performance charts
- Customized display of interesting and educational information promoting clean energy
- Highlight and quantify the positive impact of your Solar PV System
- Custom home-page with corporate photo and marketing information
- Perfect for retail and corporate lobbies, educational facilities of all levels, and other high-traffic areas
- Embedded URL option available



AlsoEnergy provides two hardware display options:

- Wall mount 27" LCD Screen
- Free standing kiosk with 19" LCD touch screen