



CLEAN ENERGY ASSOCIATES

USA | China | India | Malaysia | Philippines | Vietnam | France | United Kingdom | Italy | Spain | Canada | Greece | Chile

Core Purpose

We believe that by helping our clients and stakeholders deploy solar and storage solutions worldwide, we are creating a better future.

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CLEAN ENERGY ASSOCIATES

Mitigate Risk and Optimize Your Solar Energy and Storage Investment



Solar and storage project developers, independent power producers, EPCs, investors and asset owners rely on Clean Energy Associates for technical advice, quality assurance and downstream engineering services for their solar and storage investments.



About Us

As technical advisors, we deliver supply chain, quality assurance and engineering services solutions which provide investment confidence to key stakeholders in solar and storage projects worldwide.

Clean Energy Associates (CEA) is a global technical advisory company that provides comprehensive engineering solutions for the solar and storage industries. We serve financial institutions, project developers, EPCs, IPPs and power plant owners. CEA is an American-owned engineering company with an executive leadership team with global industry experience. Working from our base in China, CEA's engineers travel worldwide to conduct quality assurance activities which include: upstream in-factory technical evaluations, including factory audits, production monitoring and pre-shipment product inspections. Our US-based product management and engineering (IE/OE) teams provide support throughout the product life cycle, from upstream supply chain management and supplier benchmarking, to downstream system design, construction, commissioning, performance assessment, re-power and optimization as well as warranty support. We serve the solar power and energy storage industries through our expertise in PV modules, racking, inverters, battery technologies and energy storage systems. Since 2008, CEA has reduced buyers' risks and improved returns on investments via quality assurance, technical and financial due diligence and engineering services covering more than 125 GW in over 65 countries.



Service: Module Quality Assurance
Year: 2019

Project Size: 160 MW
Location: USA

Mission

To help our clients and partners deploy quality solar and storage solutions worldwide

Vision

To become by 2025 the leading global solar PV and energy storage engineering services company that creates tangible impact with every client

Values

- We are family
- Have fun
- Unending curiosity
- Be humble
- Do the right thing
- Results matter
- Own it
- Perform above and beyond

 **> 65 Countries**
Projects Served

 **> 125 GW**
Projects Executed

 **> 350 Factories**
Visited Worldwide

 **8 GWh**
Quality Assurance

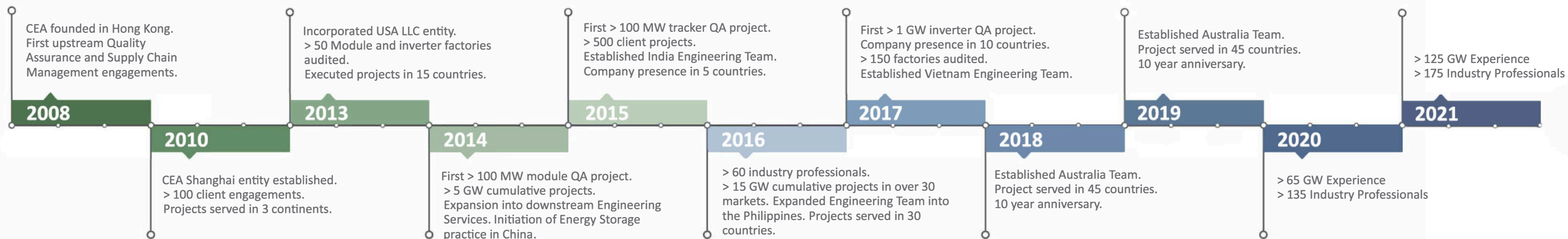
 **> \$96 Billion**
Project Value

 **13 Years**
Team Experience





Track Record



"Primrose Solar used CEA on several different pieces of work, including QA during construction and technical support in the investigation and resolution of post-construction issues. On every occasion, we were delighted with the quality of the work that CEA produced. Our experience is that CEA provides a robust and reliable service with work delivered to a high technical standard and delivered on time and on budget. The quality of the written reporting was high and CEA are also a pleasure to deal with as a team.

As an example, CEA supported us and our chosen EPC in the construction and refinancing of the 49 MW Evely project, which was built to such a high standard of technical construction and documentation that we were able to refinance with Deutsche Bank in just 6 weeks."

— Giles Clark, CEO, Primrose Solar

"CEA is very good at collecting the detailed, workshop floor product and manufacturing data that is required to protect from long-term risks and aggregating the information in time for management decision-making."

— Christian Miers, Product Manager, E.ON

"CEA has been our go-to 3rd party quality assurance firm since 2014. We have worked with them for three projects with a combined volume almost 500 MW of PV modules and their work has greatly reduced the equipment delivery and quality risk we face. CEA delivers professional, tailored services that meet our needs, despite sudden changes in manufacturers' schedules. We highly recommend CEA."

— Nate Franklin, President / CEO, Pacifico Energy



Upstream Quality Assurance



Supply Chain Management

Phase 1 Factory Audit

Prior to the beginning of production, CEA performs an on-site audit of each factory location identified in the program definition.

Phase 2 Incoming Quality Control

CEA's Incoming Quality Control inspection ensures that products are assembled only with components that have been verified by CEA to be in compliance with the specified bill of materials and the materials identified in listings and certifications.

- CEA monitors suppliers' incoming shipments of raw materials to ensure that the components match perfectly with client's specifications within the bill of materials (BOM)
- CEA ensures that the product listed in the supply agreement is the same product delivered to clients

By working at the manufacturer's factory, CEA's quality control team manages the production process by offering:

- 130+ in-house engineers who can be engaged with a short lead time
- 24/7 inline production monitoring support
- A guarantee that production methods follow international standards

Phase 3 Pre-Shipment Inspection

While guaranteeing the quality of product at the production facility is important, CEA can also ensure that the product will arrive at the destination in the same condition as when it departed by providing:

- Accurate calibration of module performance prior to packaging
- Oversight on the proper packaging specifications and ensuring containers are loaded properly

Project References

Module Quality Assurance

Project Size: 240 MW
Project Location: Telangana, India
Value Added: Developed and executed a comprehensive QA program that included 24/7 inline production monitoring, pre-shipment inspection and container loading inspection across 6 OEMs under a tight shipment schedule for a Top 5 Indian independent power producer.

Module Quality Assurance

Project Size: 200 MW+
Project Location: Atacama, Chile
Value Added: An international team of multiple nationalities was deployed for project execution over the course of 6 months at a Tier 2 Chinese supplier. Project scope included 24/7 inline production monitoring, pre-shipment inspection and third-party lab testing on behalf of a Spanish renewable energy company for its multi-phase PV plant in the Atacama Desert.

Racking QA

Project Size: 1.17GW
Project Location: Dubai, UAE
Value Added: Performed production monitoring and pre-shipment inspection on uniquely designed structure materials supplied to the world's biggest solar PV plant for a repeat customer.

Sourcing Strategies

- Industrial Analysis / Product Groups
- Sourcing Hubs and Platforms in Asia
- M&A Suppliers / Vendors
- SCM Concepts including Logistic Strategies
- Competitor Benchmarking
- China Sourcing Strategies
- Product Requirement Documentation

Tactical and Operational Procurement

- Supplier Search, Analysis and Audits (RFI / RFQ)
- Supplier Contracts and Validation
- Supplier Quality Management, QS
- TCO Models and Target Pricing
- Sample Test Management and Supervision
- Establishment of Procurement Processes and Best - In - Class Practices

Project Reference

Solar EPC and Developer

Project Size: 75 MW
Project Locations: North Carolina, Kentucky, Rhode Island, USA
Scope of Work: Supply Chain Management, Procurement, Logistics, including development of suppliers for modules, racking and inverters
Value Added: CEA supported the addition of 7 new vendors for the client thereby saving costs of major equipment and ensuring an on-time delivery of project milestones.

Supplier Management

- Supplier Integration Process
- Risk Management
- Design / Engineering "To Market"
- Optimization of Existing Supply Chains and Processes
- Logistics Oversight
- Insurance Claim Prosecution
- Lean Logistics Optimization
- Supplier Issue Resolution
- Price Certainty

Financial Due Diligence (FDD)

- Financial management
- Internal controls and compliance
- Financial stability
- Insurance coverage
- Warranty claims
- Cash flow
- Corporate governance
- Long term viability
- Profitability

"CEA has been a trusted partner for Blattner Energy since 2013. We work with CEA from initial vendor qualification through the manufacturing process. They have provided quality assurance services on 1 GW of racking and module manufacturing that has resulted in quality products delivered to our job sites. CEA gives us the visibility required to utilize the global supply chain."

— Aaron Pyfferoen, Manager of Procurement, Solar Blattner Energy



Engineering Services



Market Intelligence Special Services

> 13 GW of independent engineering projects On behalf of over 50 clients Across 6 countries

CEA's engineering services team provides quality control through optimizing system design, contract administration, construction monitoring and other tailored support that results in an optimized solution, maximizing profitability and minimizing risk.



Project Performance Optimization

CEA's service aims to maximize the performance and profitability of existing operational assets. Issues are identified through an in-depth analysis of historic data, onsite audits and review of each phase of the project's development. CEA identifies existing issues that can be quickly resolved to improve production immediately and reduce operating costs as well as provide recommendations for long-term improvements that will increase the project's value over the duration of its lifespan.

Supplier Benchmarking Program (SBP)

CEA has aggregated the results of our upstream quality assurance work from factory audits, inline production monitoring and pre-shipment inspections and has given a letter grade to each audit activity. Within the framework of user-driven sorting and selecting routines, the cloud-based SBP provides access to the collected data (in the form of charts and tables), enabling the subscriber to see manufacturers' scores for each activity as a function of location, workshop date and service. The database is augmented in real time as new audit scores are determined.

Strategic Market Intelligence Program (SMIP)

A curated quarterly deep-dive covering manufacturers' technology and product roadmaps, manufacturing capacities and expansion plans, product and technology overviews and outlooks. Monthly newsletters provide market highlights about companies, market dynamics and noteworthy news about technology and products. SMIP is available on a subscription basis.

Custom Projects

CEA's diverse team of engineers, finance and marketing experts is available for your custom project whether it be the development and validation of a go-to-market strategy, an assessment of new technology or product platform, or technical due diligence on a new business initiative or investment opportunity.

Project References

Independent Engineering

Project Size: 194 MW
Project Location: North Carolina, USA
Value Added: Independent engineering report review, historical performance review, O&M contract review, site visits and evaluation, and EPC warranty review.

Independent Engineering

Project Size: > 450 MW (4 projects)
Project Location: Canada, India
Value Added: Performed field evaluation of pile complications, replaced central and string inverters, conducted warranty claim assessment on accelerated degradation modules for a repeat customer as well as providing energy estimates and performance assessment.

Project References

Independent Engineering

Project Size: 56 MW
Project Location: Colchester, UK
Value Added: Helped the owner identify warranty based defective modules among 220,000 modules by EL Imaging at night over a 3-month period. After the complaint, the client will be able to replace all identified modules and recondition the solar assets as per their guaranteed warranty.

Independent Engineering

Project Size: 108 MW
Project Location: Idaho, US
Value Added: CEA completed full scope in-line production monitoring on behalf of the EPC over a course of more than three months across BYD Solar's own facilities and three OEMs in China. Onsite module issue tracking and resolution on behalf of the project developer.

Executive Leadership Team



Andy Klump CEO & Founder

- Executive with 20+ years in the high tech and renewable energy industries with 15 years of solar and storage supply chain work experience in Asia.
- Established CEA as the leading global solar and storage technical advisory firm with client engagements in over 55 countries, and a team with more than 135 industry professionals, including 85+ engineers in 12 countries. Served as the Vice President for Trina Solar's executive team from 2006-2008 and helped raise ~\$500M during and after the IPO on the NYSE.
- MBA, Harvard Business School; BA, Economics, Northwestern University.



Paul Wormser Vice President, Technology

- 40+ years of solar and storage industry experience with leadership roles for the world's largest solar companies, including Sharp, Konarka, Mobil Solar and Exxon Solar.
- Managed the supply chain for global projects as Senior Director of Marketing for Solar Materials at SunEdison and served as Vice President of Worldwide Applications at First Solar for new platform development.
- MBA, Northeastern University Graduate School of Business, BSME, Mechanical Engineering / Solar Energy, George Washington University.



Vinayak Gupta Vice President, Operations

- 25+ years scaling renewable and technology operations globally with 17 years semiconductor operations experience at Cypress, AMD and RMI.
- Skilled integrating manufacturing, supply chain, and operations through process transformation with senior executive positions at Zero Mass Water, SolarCity, and SunEdison.
- BSEE, MS Computer Engineering and MBA Santa Clara University.



Darryl Parker Vice President, Sales & Marketing

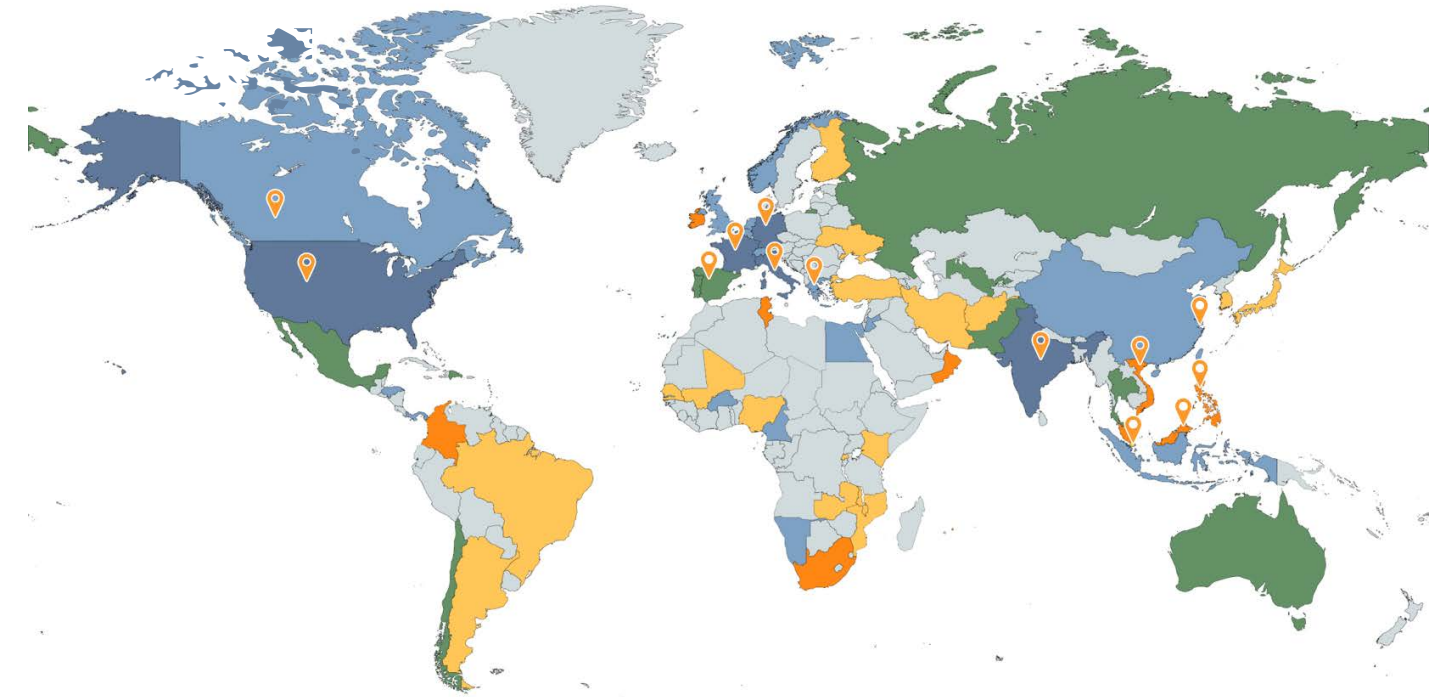
- 35+ years managing international sales teams with 13+ years in renewable energy and power electronics.
- Vice President of Sales and Marketing at Ampt and Satcon.
- Senior management, sales, support, and engineering roles at NCR Corp, Sun Microsystems, and IBM.
- MBA University of Phoenix; BS Electrical Engineering, Howard University.



Max Elghandour Vice President, Finance & Administration

- 35+ years of experience in managing the accounting departments of technology companies, directing financing issues related to growth, cash management, cost containment, strategic planning, and budgeting as well as mentoring business leaders in the US and China.
- Helped technology companies raise ~\$300M+ in funding and supported M&A transactions and pre-IPO due diligence.
- BA< Accounting, St. Francis College; CPA

Global Presence



 CEA team presence

CEA has executed client projects in more than 65 countries and performed factory audits and independent due diligence assignments at over 350 factories.

Team Background

Led by a leadership team with decades of solar and energy storage industry experience, our multicultural workforce is committed to providing fast, flexible and reliable customer service. Supported by over 130 engineers with a combined 1,000 years of industry experience throughout the PV and energy storage value chains, we help our clients and partners mitigate risk and ensure successful project execution.

USA | China | India | Malaysia | Philippines | Vietnam | France | United Kingdom | Italy | Spain | Canada | Greece | Chile