CEA
Clean Energy Associates

Investment Confidence

RACKING QUALITY ASSURANCE PROGRAM

TARGET PROBLEM:

Depending on the project structure and installation circumstances, racking products require vast customization in design and production. With over 50 different technical processes, each product goes through a tailored combination of several processes according to specific design needs. Due to high level of customization, rarely are racking manufacturing processes standardized among industry suppliers, creating loop-holes for systematic defect and inferior quality products.

Additionally, outsourcing is a common practice among racking manufacturers. Data collected from CEA's past projects show that in-house and outsourced production have varied combination of defects resulting from different product type, BOM, and production process. Suppliers' own in-house quality control is insufficient in minimizing defect risk when a significant portion of their production are outsourced to sub-vendors' factories.

CEA'S SOLUTION:

The CEA's Quality Assurance Program (CQAP) reduces risk and ensures downstream project stakeholders maximize the energy output of their system. The CQAP provides quality assurance services for all key racking products including tracker:

- Design evaluation and technical due diligence
- Supplier bank-ability assessment
- Factory audits
- Supplier selection and evaluation
- Online production monitoring
- Pre-shipment inspection
- Loading and logistics management

Expertise covers:

- Fixed tilt racking
- Single axis tracker
- Rooftop
- Carport
- Greenhouse
- Floating racking
- Manual tracker

POOR RACKING QUALITY MAY:

- Cause installation and operation failure of the solar plant
- Lead to module defects, such as micro cracks, potentially resulting in the overall system output loss
- Shorten lifetime of the solar plant to within 1 year in worse case
- Increase O&M and downtime cost of the solar plant due to escalated damages

"More than 8 GW of racking quality assurance experience at 15 top tier suppliers for global clients' PV projects in 8 countries"

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PROGRAM FEATURES

CEA's customized QA services for various racking products is designed to cover the entire production lifetime that can be applied to any technical processes to minimize defect risk.




Pre-Production

- **Factory's certification (ISO, OHSAS, etc) assessment**
- **Product's certification (UL, CE, etc) assessment**
- **Drawing / installation manual / technical document review**

Production Monitoring

- **Dimension measurement**
- **Production process risk evaluation**
- **Gono-go test**
- **Raw material physical / chemical properties test**
- **Production process monitoring**
- **Equipment/mould maintenance and calibration monitoring**

Pre-Shipment

- **Random sampling**
- **QC Optimized criteria**
- **Visual inspection**
- **Dimension measurement**
- **Corrosion resistance test**
- **Safety test**
- **Defect root analysis and corrective recommendation**

Container Loading

- **Proper packing**
- **Proper loading**
- **Container and seal information**
- **Correct product**

PROJECT REFERENCES

LOCATION: UAE
VOLUME: 1177 MW
PRODUCT: Fixed Tilt Racking
SERVICE: Document Audit/Pre-shipment inspection

CEA Value Added:
CEA conducted racking QA work for the largest single-site solar project in the world, the fixed tilt racking with an innovative raw material S550GD with ZM coating. The manufacturer site was located in Switzerland. CEA conducted document audit/pre-shipment inspection with weekly basis, and consistently ensured a good quality delivery in three quarters.

LOCATION: Spain
VOLUME: 138MW
PRODUCT: Single Axis Tracker
SERVICE: Document audit and in-line monitoring

CEA Value Added:
During documentation audit and production monitoring, CEA recommended the supplier design a set of jigs for internal QA to maintain the test precision after evaluating the test procedure and methodology which improved the test system as well as the overall production quality.

LOCATION: Australia
VOLUME: 255MW
PRODUCT: Single Axis Tracker
SERVICE: Pre-shipment and in-line monitoring

CEA Value Added:
Motor curing time requirements for production lines did not comply with the QAP, and dynamometer test parameters were improper. Unqualified curing time can affect functionality and shorten the motor lifetime. CEA requested the supplier to review the QAP/SOP and the actual test requirement on the production.

"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

Why Clean Energy Associates: EXPERIENCE AND RELIABILITY MATTERS

Clean Energy Associates (CEA), a solar and storage technical advisory firm, provides quality assurance and independent engineering solutions worldwide. We serve financial institutions, project developers, EPCs, IPPs, and power plant owners. From our base in China, CEA's quality control engineers travel worldwide to conduct 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 project 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 and storage industries through our expertise in PV modules, racking, inverters 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.

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