

True South Renewables
INC
The Renewable Energy O&M Solution
Rue Phillips, CEO, Co founder

26 February 2015
Presentation: NREL PV Performance Lab



Vision & Mission

■ Vision

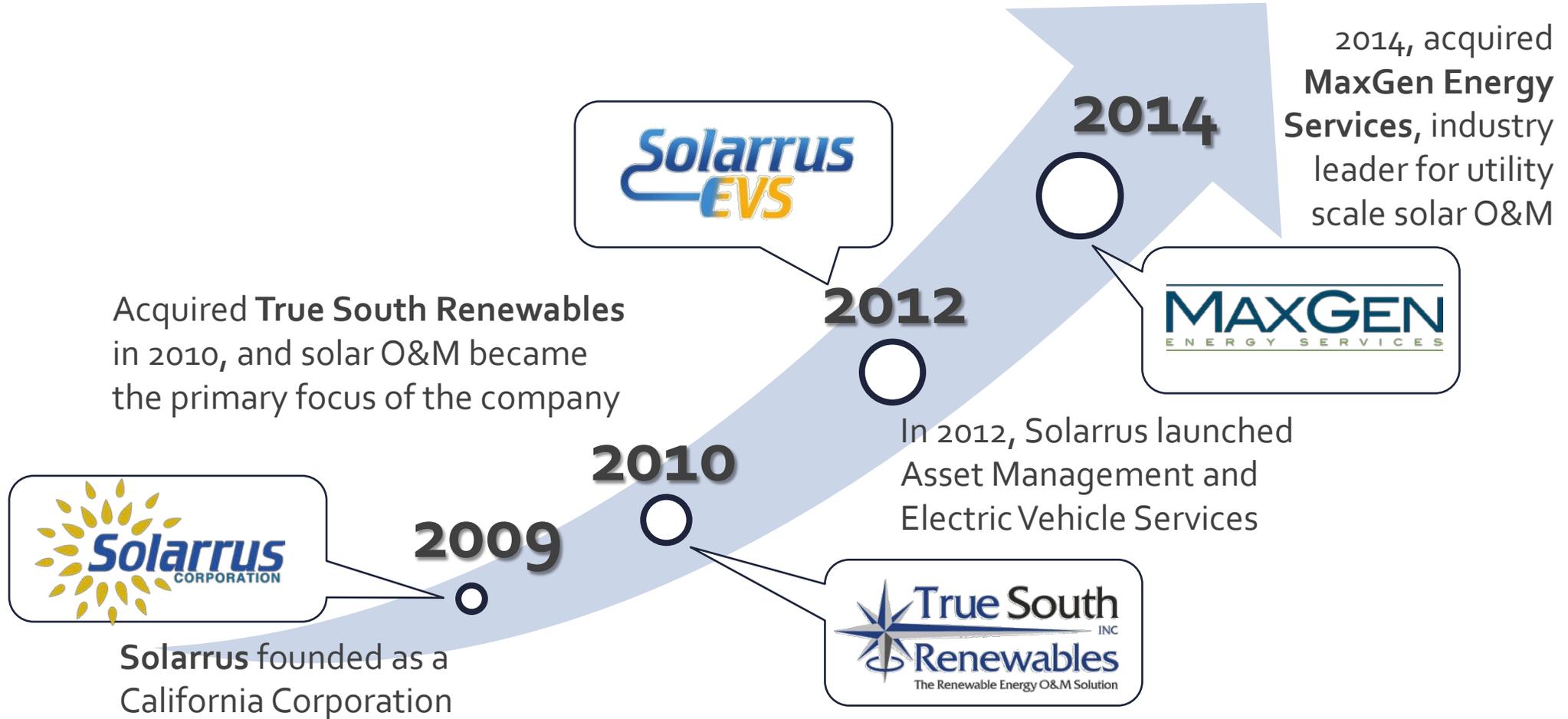
- Dedicated to developing, maintaining, and operating infrastructure that supports alternative energy technologies

■ Mission

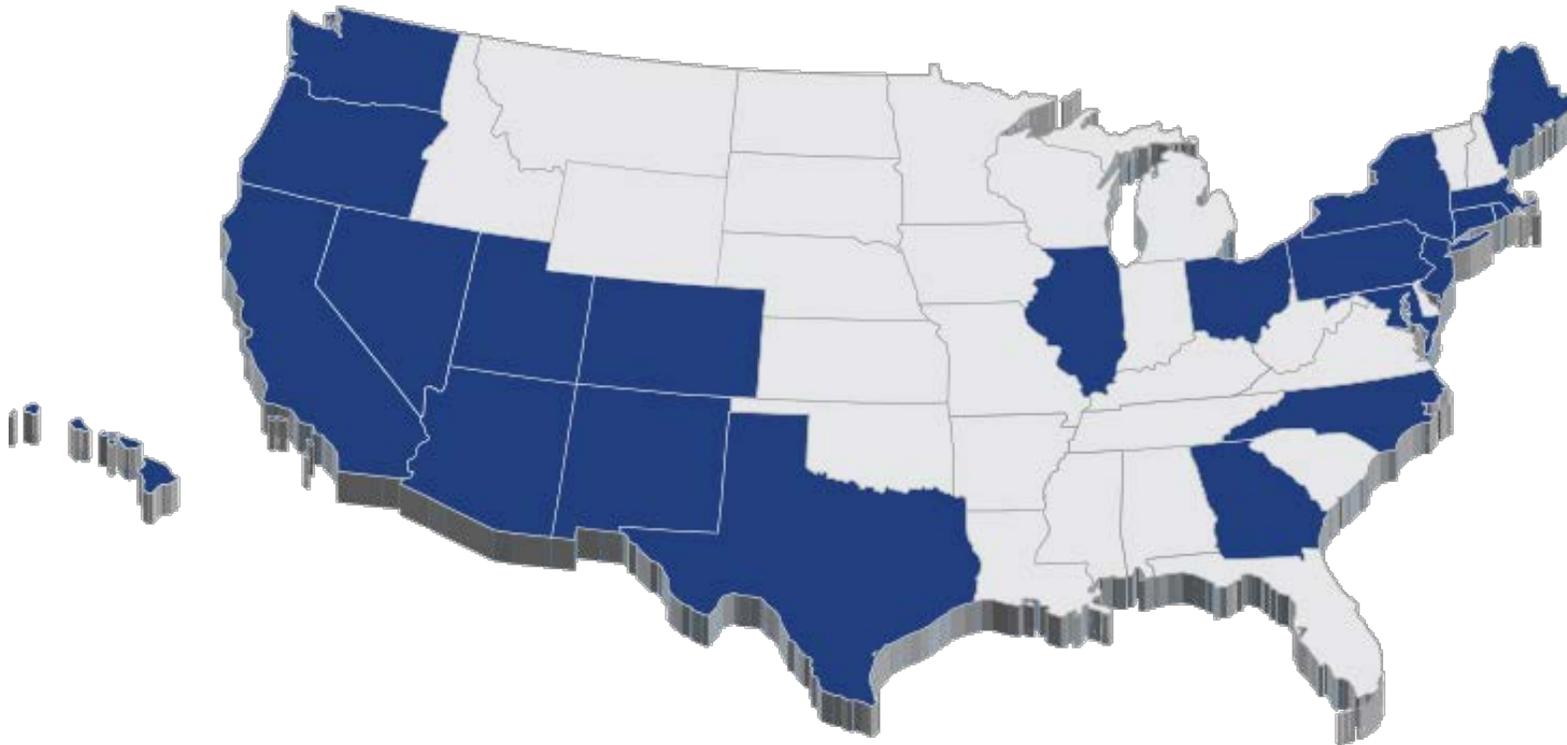
- Leverage our capabilities to meet our customers' requirements, in order to mitigate risk, optimize performance, and offer a better return on their capital



About Solarrus

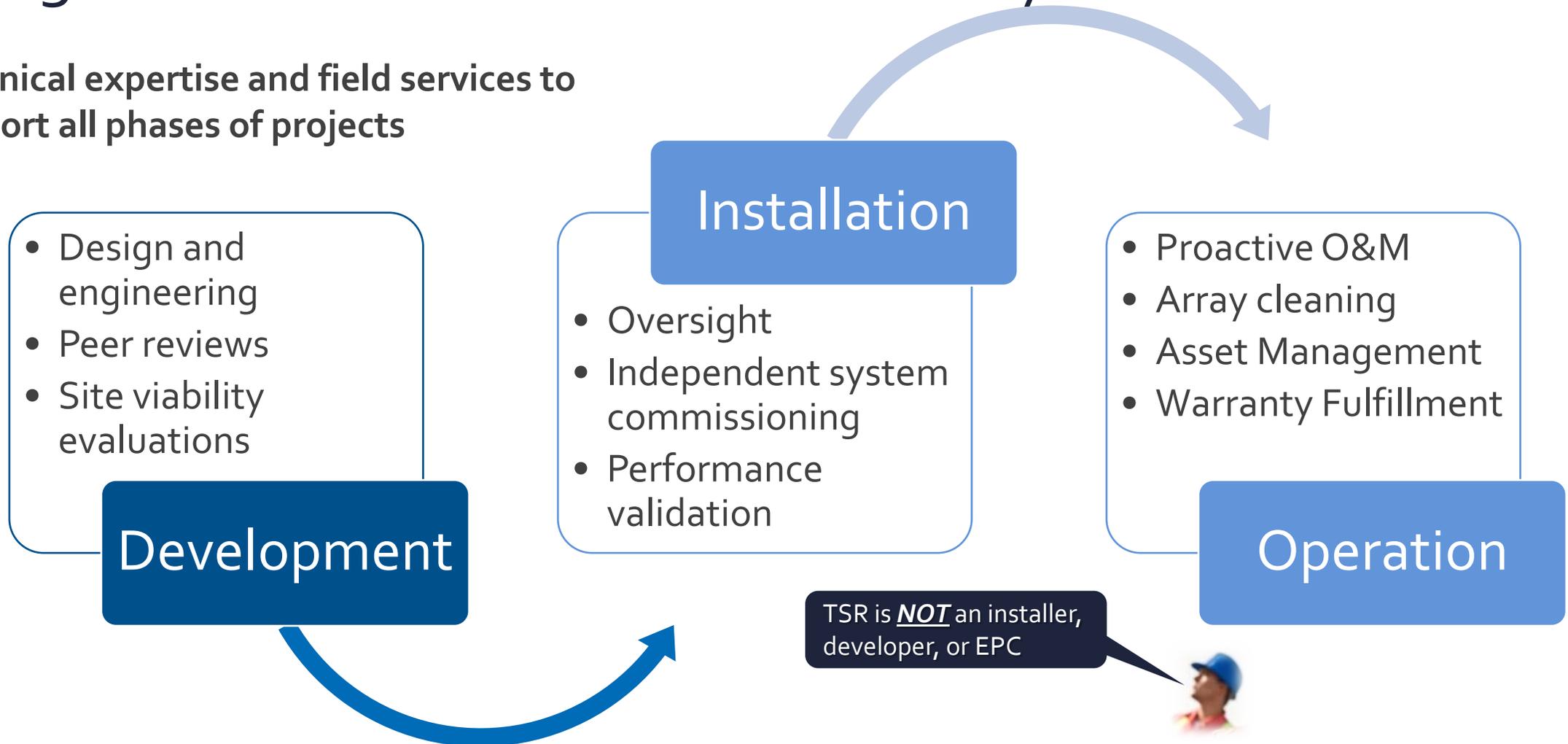


About Solarrus – Nationwide Coverage



Range of Services for the Solar Industry

Technical expertise and field services to support all phases of projects

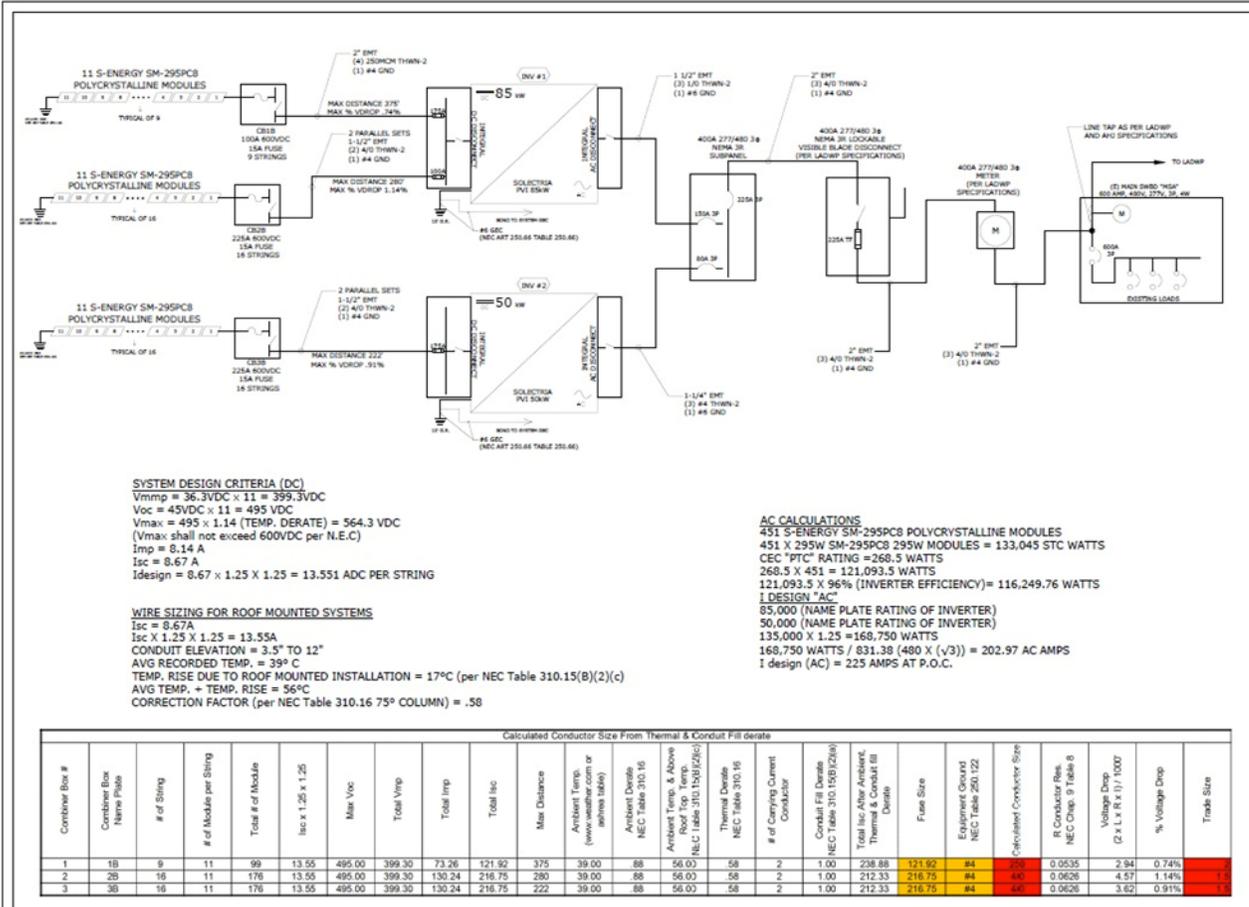


Operations & Maintenance – Independent Industry Leader



- First mover in the market and leading reputation in the industry
- More than doubling in size with existing customers, and adding new customers as the industry grows – 89 customers now +2000 sites
- Customers are market leaders
- TSR helps set industry standards
- Focus on quality, performance, and safety in the field

Design & Engineering Services



- In house design and engineering capabilities
 - PE, electrical engineer, and team of CAD technicians
 - Over 300MW engineering experience
 - Utility, commercial DG, and Residential projects
 - Peer Reviews
 - Permit Packages, PE + CE Stamp
 - Conceptual & Design Packages
 - Site Feasibility Analysis
 - PVSyst Analytics
 - Owner's Representative / Construction Monitoring
 - Medium voltage design & field expertise

Utility-scale Experience

▪ Long Island Solar Farm

- 37.5MW, fixed tilt
- 164,312 solar modules
- Largest project on East Coast
- Powers 4,500 homes

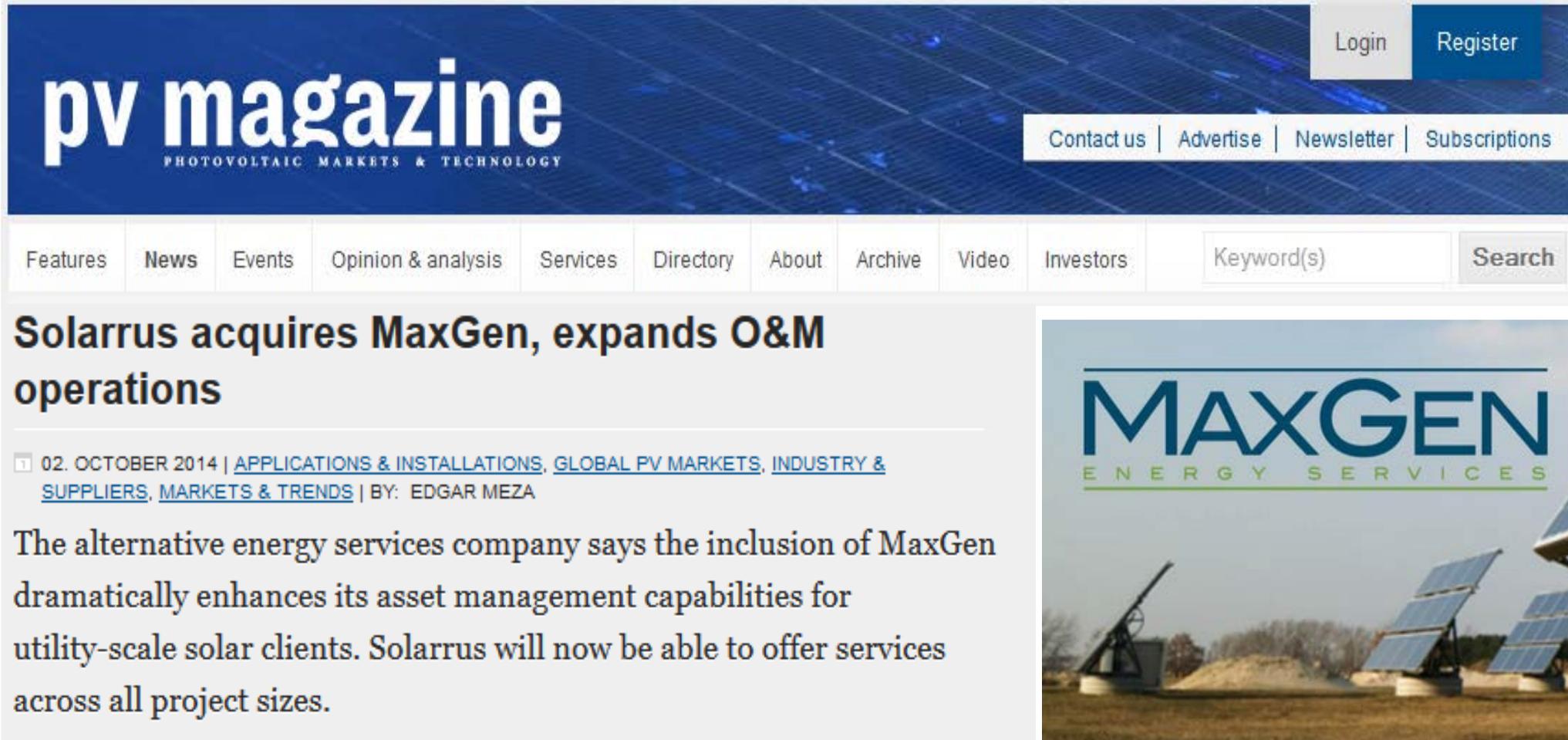


▪ Webberville Solar Farm

- 35MW, single axis tracker
- 127,000 solar modules
- First utility scale project in Texas
- Powers 5,000 homes



Utility-scale Experience



The screenshot shows the homepage of pv magazine, which focuses on photovoltaic markets and technology. The site features a navigation menu with categories like News, Events, and Services, and a search bar. The main article is titled "Solarrus acquires MaxGen, expands O&M operations" and is dated October 2, 2014. The article text states that Solarrus is expanding its utility-scale solar services by acquiring MaxGen.

pv magazine
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Keyword(s) Search

Solarrus acquires MaxGen, expands O&M operations

02. OCTOBER 2014 | [APPLICATIONS & INSTALLATIONS](#), [GLOBAL PV MARKETS](#), [INDUSTRY & SUPPLIERS](#), [MARKETS & TRENDS](#) | BY: EDGAR MEZA

The alternative energy services company says the inclusion of MaxGen dramatically enhances its asset management capabilities for utility-scale solar clients. Solarrus will now be able to offer services across all project sizes.

The image shows the MaxGen Energy Services logo, which consists of the word "MAXGEN" in large blue letters above "ENERGY SERVICES" in smaller green letters. Below the logo is a photograph of a solar farm with several solar panels mounted on tracking systems in an open field.

Utility-scale Experience



- Leader in utility-scale solar O&M and Asset Management Services
- Currently operating over ~300MW of solar PV, growing to ~600MW in 2015
- Specialize in commissioning services, plant operations, plant maintenance, and asset management services
- Experts with over 2GW of power plant experience (solar & wind)

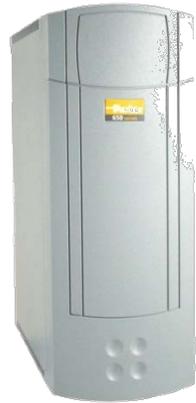
Markets Served – Inverter Equipment

Battery Energy Storage

Solar Inverter



ABB



Parker

EV Service Equipment

NISSAN



Industrial Lift
Vehicle Charger

PosiCHARGE
AeroVironment®



The same technology that is fundamental to maintaining solar inverters is applicable to other industrial applications

- Same training
- Same equipment
- Same manufacturers
- Multiple markets

Capabilities to handle advanced energy technology requirements for design, installation, operation, and ongoing service needs

Charging Equipment Infrastructure Services



- Aligned with companies shaping this market
- Industry leaders rely on Solarrus as part of their own infrastructure capabilities
- Growing faster than solar
- Industry leading with multiple OEMs, standards, and technologies
- Focus on quality and performance in the field

Battery Energy Storage Systems (BESS)



Peak Demand



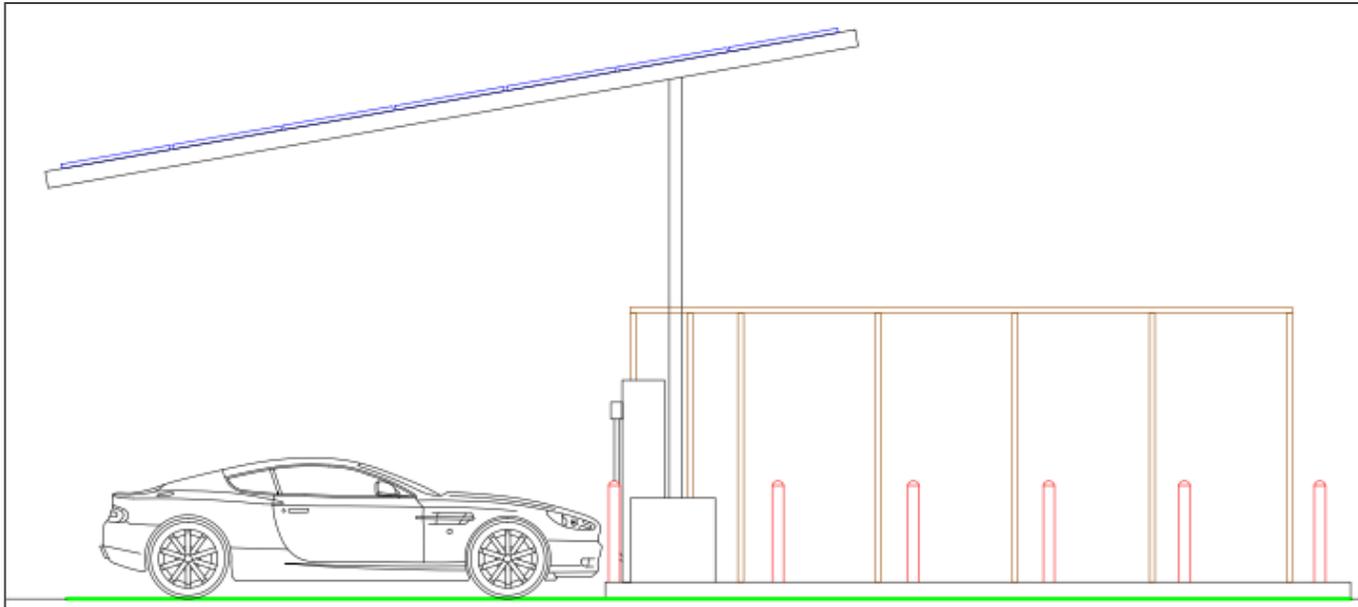
Renewable Support



EV to Grid

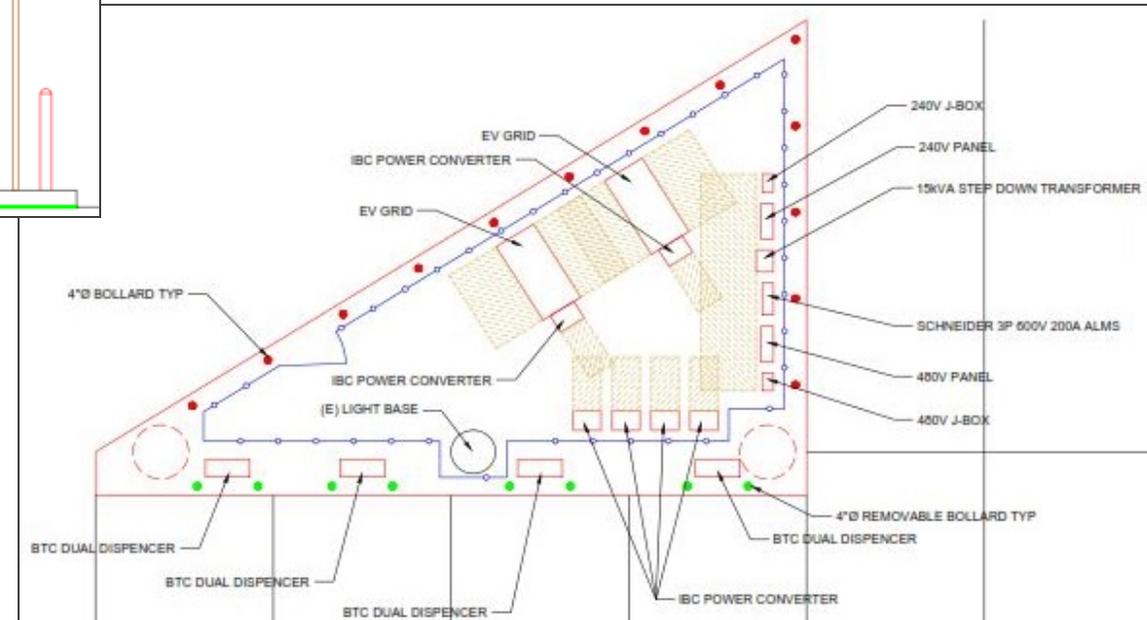
Leveraging expertise from our capabilities for design/engineering, solar operations and maintenance, and electric charging equipment

Convergence of Technologies



Integration of technology to evaluate means to lower operating costs of public infrastructure by eliminating peak demand charges

- 20kW solar canopy
- 40-60kW Level 3
- 24kWh storage batteries



Commissioning.
Certification.
Acceptance.
Performance.
Testing.

What do they mean ?

Commissioning

- What is Commissioning ?

A full mechanical and electrical system test upon substantial completion or COD of a solar asset to check the functionality, operation of a system to compliment AHJ or EOR inspection.

- What are the standards and protocols ?

ASTM, IEC, Sandia, NREL, True South !

- Who performs ?

Third Party independent testing company. Established Engineering companies. EPC's !!

- For whom ?

Asset owner such PPA's, financial institutions, large EPC or IPP's

- Issues ?

The industry has mistaken commissioning for all other testing of solar assets, is is not a statement of the good health of a solar asset merely a test function at the end of construction in order to move from construction to operation and further testing. Further commissioning of system (particularly unstable plants bought on line) should have additional commissioning until the plant is stable in its operation as a solar generating plant.

Acceptance Testing

- What is Acceptance Testing ?

At test or protocol to officiate hand off from one stakeholder to the next. EPC to OEM, PPA to new equity owner

- What are the standards and protocols ?

Lots of work within the industry needed here with an emphasis to established organized such as IEC, ASTM, NREL , SANDIA

- Who performs the test?

Independent third party agent on behalf of the stakeholder. Banks, Engineers, O&M companies

- For whom ?

Stakeholders such as banks, PPA's , IPP's , Yield Co's, O&M companies

- Issues ?

Market is dangerously moving faster than the protocols and adopted standards

Validation of Assets

- What is Validation of assets ?

A comprehensive and analytic test of a solar asset towards its design, installation, operation, code compliance, permit admin, functionality, 'BENCHMARK' performance setting, stability, and warranty status.

- What are the standards and protocols ?

More work needed here ! Market is way ahead of the protocols.

- Who performs the validation ?

An engineering discipline and representative Stakeholder such as O&M service provider.

- For whom ?

Owners, banks, IPPS, PPA's, OER, AHJ's

- Issues ?

Standards are not conclusive, often a verbal acceptance of an asset is enough 'legally' to validate the system, or one years monitoring data is used for such a test !!!!

Performance Testing

- What is performance testing ?

A comprehensive analysis of a solar PV systems performance in reference to its design, financial model and actual deliverable energy production

- What are the standards and protocols ?

ASTM E2848 / E2939. IEC. NREL. EPRI, Sunspec Alliance

- Who performs the performance tests ?

Stakeholders or their service providers such EOR, O&M. this is a new and open market

- For whom ?

Stakeholders and potential asset acquisition parties, PPA, bank yield co's

- Issues ?

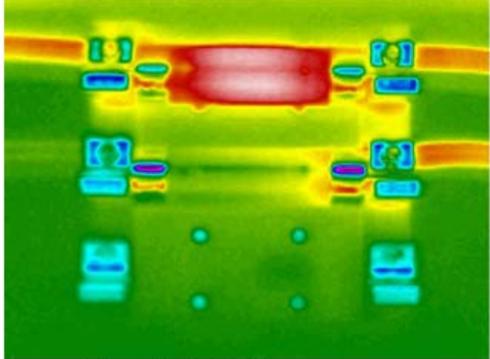
If the asset is new then the test is merely a snapshot in time and NOT a guarantee that the system will function (without O&M) as it should

Commissioning

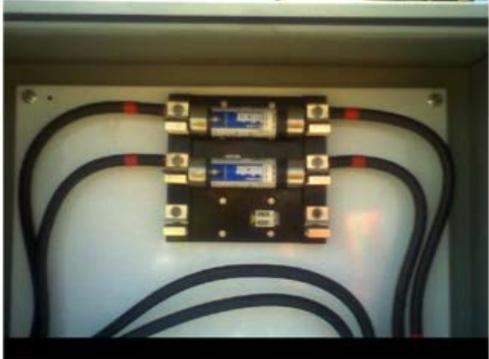
Site Location:
Safeway - Vons
369 Magnolia Ave.
Corona, CA 92879

THERMAL IMAGE REPORT

Date: 07/29/09
Description of Image:
Sub-combiner # 3



Sub-combiner #3 073009.is2
7/29/2009 10:56:17 AM



Visible Light Image

NOTES:
See non-conforming report # 0709-08 for more information on improper bussing. Thermal image shows large temperature variations between the two parallel fuses. See non-conforming report # 0709-02.

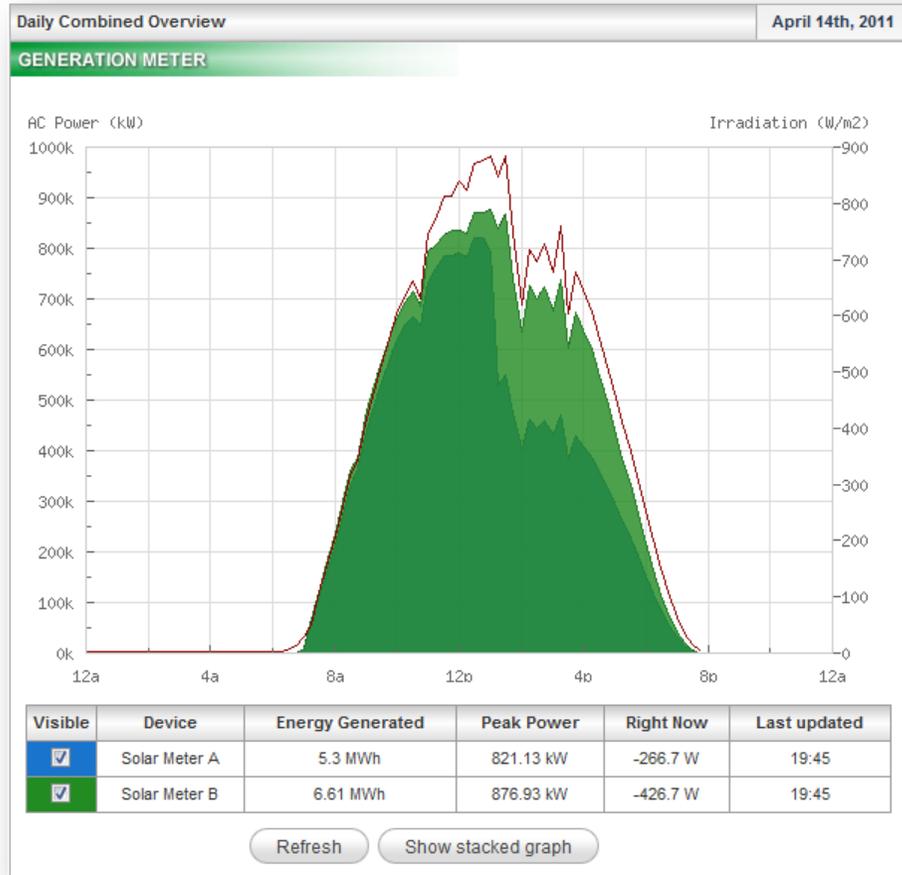
Common faults. Bad connections, wrong specifications of BOS. Poor workmanship. A thorough and comprehensive commissioning check should be mandatory on all solar assets

Validation of Assets

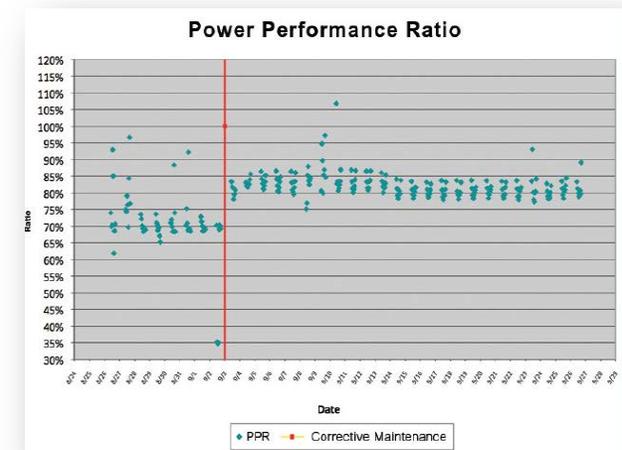
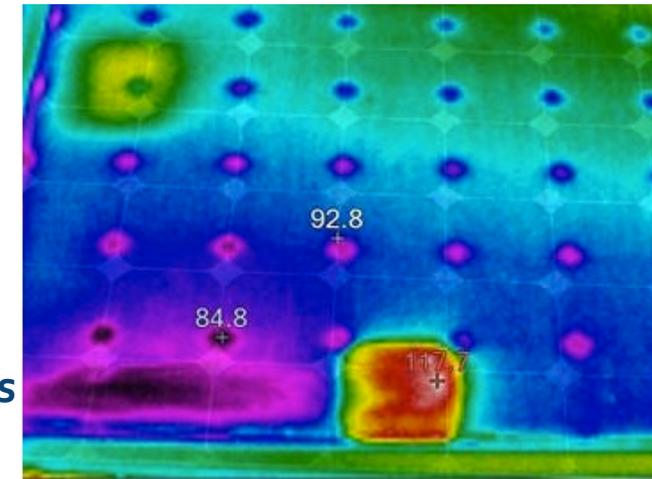


T rue South verifies the value of your solar electric facility with a full system appraisal. Our technicians perform an intrinsic audit of all mechanical and electrical components throughout your solar power plant.

Performance testing



We're in the business of ensuring your solar system's performance modeling withstands the testament of time. That is why the foundation of our success is built upon raising performance ratios and increasing total energy generation.





This system could have been a \$6M solar asset being monitored by a sophisticated and reputable asset management team and technology. Full system checks are required annually in order to fully protect the asset !