

2015 TOP SOLAR PRODUCTS

175 WAYS TO MAKE THE SUN MORE POWERFUL, PROFITABLE & PREDICTABLE

Just when you think solar components can't get any cheaper, the industry continues to surprise you. While module prices have somewhat flattened out, the total installed cost of solar keeps falling—9% from 2013 to 2014 and 8% in the first half of 2015, according to a Lawrence Berkeley National Laboratory survey.

Cheaper systems doesn't mean cheap-quality products. On the contrary, solar product innovation is on the rise, and impressive developments made their debut this year.

The following pages show *Solar Power World's* picks for the Top Products of 2015. We have frameless modules, multi-panel microinverters, rail-less mounts and 5,000-cycle lead-carbon batteries, in addition to advanced components and inventive software programs. We attended the many solar conferences across North America and were excited to see most of these products on the show floors. Take a look at the best and brightest products to come out of solar industry this year.



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Axitec
Canadian Solar
Centrosolar
CertainTeed
Hanwha Q CELLS
Hulk Energy Technology
itek Energy
JA Solar
Jinko Solar
Lumos Solar
Mitsubishi Electric
REC
Silfab Solar
Solaria
Strathcona Energy
Wuxi Suntech Power Co.
Trina Solar
Upsolar America
WINAICO
Yingli Solar

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Advanced Racking Solutions
Clenergy
DPW Solar
EcoFasten Solar
Ecolibrium Solar
IRFTS
IronRidge
Magerack Corporation
Pegasus Solar
Quick Mount PV
Roof Tech
S-5!
S:FLEX
SnapNrack
Solar Clam-P
Solar SpeedRack
SolarRoofHook.com
Spice Solar
SunModo
Unirac
Zilla

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DynoRaxx
Everest Solar Systems
OMG Roofing Products
Orion Solar Racking
PanelClaw
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Renusol
Sollega

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AP Alternatives

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HST Solar
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Powers Solar Frames
RBI Solar
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SunLink
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AllEarth Renewables
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Exosun
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NEXTracker
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Fronius USA
HiQ Solar
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ENACTSystems
Energy Toolbase
Folsom Labs
Geli
GeoCF
Interplay Learning
PVComplete
SolarNexus
Velocify

Most of the solar panel manufacturers on the following pages say their models have high efficiency and are the best modules yet, and this year there seems to be some truth to those claims. As panel prices have started to level off, attention has turned to efficiency. There are some interesting technologies in our Top Generation Products, like more busbars, dual glass designs and higher accepted voltages. Treat this as a preview of even more innovation in the year to come.

2015 TOP SOLAR PRODUCTS

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REC TwinPeak Series Panels

(see on page 23)
MAG Family Life Center
213 kW
Marlton, New Jersey

MODULES

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1

AXITEC AXIplus smart module

Axitec would like to introduce the AXIplus smart module optimized by SolarEdge. The combination of high-quality German engineering and the cutting edge technology from SolarEdge, installers can now benefit with reduced installation time and costs. Please contact your closest distributor about getting your hands on this unique product.

2

CANADIAN SOLAR Smart DC Module

Canadian Solar is proud to introduce the Smart DC module (CS6P-260|265P-SD), featuring an innovative integration of Canadian Solar's module technology and SolarEdge's power optimization for grid-tied PV application. By replacing the traditional junction-box with a power optimizer, the Smart module optimizes power output at module-level. This module also eliminates module-level mismatch and decreases shading losses.

3

CENTROSOLAR AMERICA B-Series

Centrosolar has, amongst other products, released the much anticipated B-Series modules. It is made in America and designed to deliver superior performance by combining chemical resistance, anti-reflective glass, PID free certification, heavy snow load, extreme temperature capability and a 25-year warranty, on a superior quality black-on-black panel.

4

CERTAINTEED Solstice Solar Roofing System

CertainTeed Solstice Solar Roofing System features highly efficient, 60-cell monocrystalline or polycrystalline panels with power ratings from 260-W to 285-W. The rack-mounted modules are attractive, durable and can be installed onto either a low-slope or steep-slope roof. Solstice is backed by a comprehensive electricity output and installation workmanship warranty.

5

HANWHA Q CELLS Q.PRO BFR-G4

The Q.PRO BFR-G4 is the result of the continued evolution of Hanwha's Q.PRO family. Thanks to improved power yield, excellent reliability and high-level operational safety, the Q.PRO BFR-G4 generates electricity at a low cost (LCOE) and is suitable for a wide range of applications.

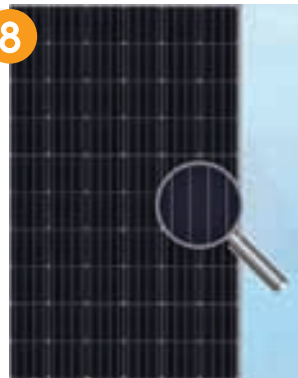
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6

HULK ENERGY TECHNOLOGY (HULKET) Cigs-3000 Series

The Cigs-3000 Series is the most powerful green CIGS solar module, achieving 324 W, certified by Fraunhofer ISE and generating 20-26% more power (kWh/kWp) than crystalline silicon modules. This zero cadmium and lead module achieved industry-leading temperature coefficient of $-0.23\%/^{\circ}\text{C}$ and the average BOS cost is much lower than conventional thin-film PV modules.

7

ITEK ENERGY 280HE Module

The 280HE Solar Module by itek Energy is a high-quality product proudly built in the United States. This 60-cell module features high efficiency monocrystalline PERC cells for exceptional power density. It is manufactured with top-of-the-line components for superior reliability and performance in a variety of conditions.

8

JA SOLAR JAM6(L)-72-345/PR

The high efficiency PERCIUM module (JAM6(L)-72-325-345/PR) by JA Solar is uniquely designed to confront and conquer the array of challenges faced by the 21st Century solar professionals. As with all JA Solar cells, the PERCIUM PV cell utilizes the state-of-the-art PERC architecture design to deliver one of the most efficient, mass produced, solar modules in the PV industry.

9

JINKO SOLAR JinkoMX

JinkoMX performs maximum power point tracking (MPPT) separately on each cell string, which is equivalent to three optimizers per module. This limits performance loss caused by soiling, shading or unfavorable building orientation. No additional hardware is required and there is no operational or installation labor impact, saving users time and money.

10

LUMOS SOLAR LSX Module System

Frameless and transparent, Lumos Solar's LSX Module System blends functionality, solar power generation and architectural aesthetics. LSX is mounted using a proprietary through-bolt mounting method into pre-positioned LSX Rail, creating unique, visually stunning, low-profile solar arrays that are easy to install and weatherproof.

MODULES

11



13



11

MITSUBISHI ELECTRIC Diamond Premium

Mitsubishi Electric's Diamond Premium is designed to the highest standards of quality, reliability and performance. The innovative half-cut, four busbar cells boost efficiency while dual four-layer junction boxes ensure exceptional safety. Built with 100% lead-free solder and now 1000 VDC rated, the Diamond Premium excels in nearly any environment—even next to saltwater.

12



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12

REC TwinPeak Series

The REC TwinPeak solar panel features 120 half-cut multicrystalline cells, four busbars, passivated emitter rear cell (PERC) technology and a split junction box to provide enhanced reliability and performance for residential, commercial and industrial markets. The panel is rated up to 280-Wp, delivering high power output (nearly 10 Wp).

13

SILFAB SOLAR SGA 280B

Fully automated, North American manufacturer of high-efficiency modules. Silfab Solar has leveraged decades of experience along with its OEM relationships to create a high-quality, cost-competitive U.S. product.

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SOLARIA High-Density Module

Solaria's High-Density Modules employ proprietary automation/process technologies to manufacture modules with 15% greater power output than current modules. Solaria ensures lower costs and higher energy yield using standard materials and Solaria's core technology to cut, interconnect, string and laminate cells. Solaria technology is deployed by leading manufacturers and project developers worldwide.

15

STRATHCONA ENERGY ME2 Series

Strathcona Energy International's domestically manufactured high-efficiency ME2 Series is now available as 325-W monocrystalline modules with 72 cells. Quality tested to perform at 0 to +5 watt tolerances exclusively, SEI modules are ARRA compliant and certified by the most rigorous domestic and international standards, featuring the company's signature 10-year product and 25-year linear 80% power warranty.

17



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WUXI SUNTECH POWER HyPro

The average mass production cell efficiency of HyPro can reach 20.5%. The module sustains higher power output at 200-W/m² compared to conventional module in weak lighting conditions. The HyPro has a lower probability of micro-cracks and hotspots, making the modules less susceptible to malfunctions that lead to significant power degradation.

17

TRINA SOLAR DUOMAX

Trina Solar DUOMAX is the industry-leading PID resistant, reliable and durable dual-glass, frameless modules. The product comes with a 30-year power warranty, low annual degradation and higher lifetime power. The 1,500-V system voltage allows more modules per string, thus reducing BOS costs. The DUOMAX is engineered for extreme climates.

18

UPSOLAR AMERICA Upsolar Performance Solution

Upsolar's Performance Solution comes complete with Tier-1 Upsolar modules, all equipment required to bring the PV system to life, a long-term loan with fixed monthly payments and interest rates as low as 4.99%. Installers empower their customers with this turn-key solution while growing their business at the same time.

19

WINAICO WSP-310M6 PERC

The 310-W module from WINAICO is the highest power 60-cell monocrystalline PERC module in the world. It is especially suitable for U.S. residential rooftops to maximize power output in a small installation area.

20

YINGLI SOLAR YGE-U 1500 Series

With a maximum system voltage of 1,500 volts, Yingli Solar's next generation YGE-U 1500 Series reduces BOS costs and increases system-level energy yield in large-scale solar power plants. It is one of the few 1,500-V modules to feature a sturdy aluminum frame, which simplifies installation and enhances durability.

MODULES

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HOT WATER

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NEXT GENERATION ENERGY Sun Bandit Solar PV Water Heating System

Sun Bandit is a simple, clean and dependable on-site energy storage solution featuring patented micro-grid technology that received certification as the world's first ICC-SRCC OG-100 solar PV water heating collector. Sun Bandit uses typical solar PV module installation methods that eliminate the need for net metering, grid-tie connection or utility approval for installation and operation.



Turn-Key Solar Resource MET Stations

SOLAR1000-SCE

SOLAR800

SPI Booth #1243

Campbell Scientific, the industry standard for high-performance solar met, now offers the SOLAR800 and SOLAR1000—turn-key, fast-to-field solutions for solar MET applications.

Trust us when your measurements matter.



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www.campbellsci.com/spw



NEXTracker
(see on page 39)
Crucero Power Plant
73 MW
Calama, Chile

2015 TOP SOLAR PRODUCTS

175 WAYS TO MAKE THE SUN MORE POWERFUL, PROFITABLE & PREDICTABLE

MOUNTING SYSTEMS

Installation simplicity is still the name of the game for racking and mounting systems. The number of bits and pieces to mounting systems have continued to decrease over the last few years, so much so that companies are starting to go off the rails. Rail-less designs, last year a drop in the bucket, today take up a larger share of our Top Products. Even trackers are getting simpler and more precise. The following mounting products are some of the best the industry has ever seen.

SLOPED ROOF



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1

ACECLAMP[®] A2 Clamp

The A2 clamp can now be used with the new micro L foot to install inverter boxes to S.S.M.R. without compromising manufacturers' warranties. This fully assembled product is just another way to get on and off the roof faster. After all, "The proof is on the roof."

2

ADVANCED RACKING SOLUTIONS[®] FlashGuard

FlashGuard incorporates features to prevent water infiltration and manage moisture that may wick beyond the initial barrier. The intelligent design does not use EPDM gaskets and includes an offset in the base plate to prevent the L foot and rail from twisting on the roof. Cost is the biggest advantage.

3

CLENERGY[®] PV-ezRack SolarRoof EVO

The PV-ezRack SolarRoof EVO is a universal roof-mount with an optimized triangle rail that is lighter and stronger. It provides the optimal balance between cost and structural compliance. The Omega clamp ensures effortless installation while the high-quality aluminum and stainless steel components provide certainty and peace of mind.

4

DPW SOLAR[®] AMP Clamp

DPW Solar offers a fully integrated grounding solution for its Power Rail mounting system. The primary component is the third-party tested and certified AMP Clamp. This module clamp penetrates and electrically bonds the module frame directly to the mounting rails, eliminating the need for separate bonding washers.

5

ECOFASTEN SOLAR[®] Rock-It System

Top-down leveling and north-south adjustability provide an extremely fast, easy, no-hassle installation. Only one tool is required to install any size or orientation array, and the system features integrated electrical bonding and an attractive array skirt. Conforming to UL subject 2703, the Rock-It System holds a Class "A" Fire Resistance Rating when using Type 1, listed PV modules, and can be used on both low-slope and steep-slope applications.

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6

ECOLIBRIUM SOLAR: EcoX

EcoX is an innovative, rail-less racking system, proven to organize the installation process. The flexible design offers a clean aesthetic and simplified logistics, and it delivers a higher quality installation at a lower cost per watt.

7

IRFTS: Easy Roof Evolution

Increase the speed of PV installation with Easy Roof Evolution, a building-integrated mounting system for photovoltaics. Thanks to overlapping mounting systems with no seal, no cut, Easy Roof installs like tiles. Easy Roof is ideal for all kinds of roofs, including tiles, shingles and slates.

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IRONRIDGE: Tilt Mount System

The IronRidge Tilt Mount System is an attached, fixed-tilt assembly for flat roofs. The system pairs IronRidge XR Rails with north and south Tilt Legs to achieve a wide range of mounting angles while supporting the most extreme wind and snow loads. The Tilt Mount System is compatible with seam clamps, membrane attachments and standoffs from major attachments manufacturers.

9

MAGERACK CORPORATION: Magerack Solar Mounting System

The Magerack Solar Mounting System is UL 2703 certified with a Class A fire rating and integrated bonding. It is reliable with a 20-year warranty, easy to install with patented L-foot with flashing and height-adjustable tile hook with flashing, and it's cost-effective.

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PEGASUS SOLAR: LightSpeed Mount

LightSpeed Mount is the new standard in residential rail-less mounting systems. The proprietary corner hinge system is installed on standard module frames at the panel manufacturer and delivered to the installer fully ready to install. Pricing is at or below comparable rail and substantially lower when including labor savings and free shipping.

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QUICK MOUNT PV: Accessory Frame Bracket

The Accessory Frame Bracket offers fast, on-the-ground installation for mounting SolarEdge Power Optimizers directly to the module frame, saving time and money. The Accessory Frame Bracket is extremely versatile and works with Quick Mount PV's Quick Rack rail-free mounting system, as well as rail-based racking systems, ballasted and ground-mounted systems.

12

ROOF TECH: E Mount AIR

The E Mount AIR offers all the benefits of RT-[E] Mount while providing 3 in. of clearance from the roof surface to improve cooling in warmer climates. Ideal for PV installations that use a microinverter, the E Mount AIR can be shipped with its own microinverter mounting bracket, a microinverter wire harness mounting bracket and an array skirt.

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S-5i S-5-PV Kit

With groundbreaking features, the S-5-PV Kit fits the majority of metal roofs on the market and universally fits field and end conditions. Designed to be simply anchored with the kit, it automatically provides a ground path in the module frame. With no lugs or wires required, except to connect the modules and ground it to the system, the S-5-PV Kit offers low installation costs.

14



14

SFLEX: 12-Kit

The compact packaged S:FLEX 12-Kit includes all components and rails required for 12 framed photovoltaic modules in portrait. Shorter rails, pre-assembled parts such as the Bonding Splice and universal height-adjustment, patented "Click-Technology" Module Clamps allow for a hassle-free installation and reduce time on the roof for most module array combinations.

17



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SNAPRACK® 100 Residential Roof Mount System

The system features snap-in installation and integrated bonding hardware that leads to an overall reduction in material costs and dramatic reduction in labor. It is also UL 2703 certified and Class A fire rated for Type 1 and Type 2 modules ensuring installers provide the best-in-class installations in quality, safety and efficiency.

16

SOLAR CLAM-P® A Beam

With just one lag screw, the A Beam structurally secures and bonds two solar modules, while also giving installers the option to install a J-Box Mounting Plate or an Array Cap. The A Beam also features "on the fly" leveling with the center bolt and also features a "flashing flange" that secures the Slip and Slide Flashing into the A Beam.

17

SOLAR SPEEDRACK® Solar SpeedMount

Solar SpeedRack racking systems are innovative clamp-free shared rail racking systems. Universal, fully certified rails fit PV module frames with 32-mm to 50-mm thickness and have integrated grounding. The shared rail design reduces roof penetrations 30% to 60% and provides maximum attachment spans.

18

SOLARROOF HOOK.COM® QuickBOLT

The QuickBolt is the future of low-cost mounting systems for asphalt shingle roofing. By replacing large, clunky aluminum flashing with an expertly designed stainless steel and EPDM rubber washer, contractors now have a reliable alternative to more costly, traditional methods of waterproofing.

19

SPICE SOLAR® Spice

With Spice, installers need 50% fewer parts on the roof, reducing equipment and labor costs on every job. Spice components quickly connect and ground modules in portrait or landscape orientations. Gone are the days of transporting 20-ft rails and tons of little parts. Spice reduces the hassle along with costs.

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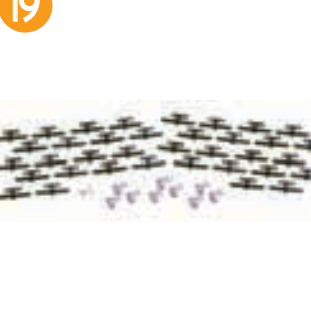
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SUNMODO® Ridge Bridge Metal Roof Mount

Designed for maximum flexibility, the Ridge Bridge Metal Roof Mount can be attached to most traditional or trapezoidal corrugated metal roof profiles. Combined with L-Adaptor to change the orientation of rail at right angles to corrugations. The vertical slot feature provides adjustment to the solar array when roofing is uneven.

21

UNIRAC® SUNFRAME MICRORAIL (SFM)

SUNFRAME MICRORAIL (SFM) is a hybrid system including a Trimrail with module mounting for fastest array alignment and superior aesthetics. Minimize total labor with pre-assembled parts, integrated bonding hardware and one tool installation. Compact packaging lowers logistics costs from the warehouse to the roof. Patented mounting components provide post-height adjustment and allow for removal of individual panels for maintenance.

22

ZILLA® Double Stud XL Flashing-Sheathing Attachment

The Zilla Double Stud XL Flashing is designed for attachment to both sheathing and structural members, allowing for faster installations and more flexibility in mounting on pitched roofs. The Zilla Double Stud XL Flashing installs quickly with standard tools and hardware, and ensures a secure and watertight attachment.

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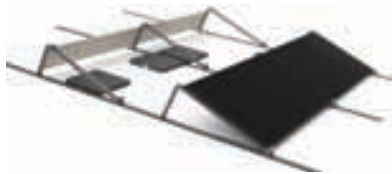
SLOPED ROOF

SLOPED ROOF

FLAT ROOF

FLAT ROOF

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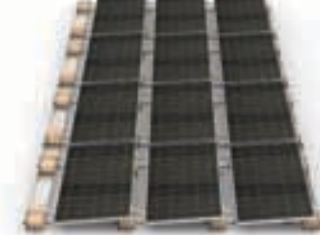
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23

BISOL EasyMount ALU Base

The EasyMount ALU Base is designed for use with most module types and with pre-assembled components to shorten the installation time and deliver the projects on a tight budget. Key features include adjustable inclination, lower pressure for the roof surface, economical packaging, 10-year product warranty and free-of-charge project design via EasyTool.

24

DYNORAXX Evolution FR V 2.0

The Evolution FR V 2.0 provides installers with the fastest and most cost-effective professional mounting system. The system maintains its versatility, light weight, ruggedness, speed of installation, module manufacturer's mounting guidelines and extremely low expansion and contraction properties, while now providing favorable pricing to make all flat roof-mounted projects advantageous.

25

EVEREST SOLAR SYSTEMS D Dome Railless

The east-west system D Dome Railless reduces labor on the roof. Pre-built parts are delivered to the site, and the array is assembled in three easy steps. Align the components, add modules and ballast, and connect wiring. Wind tunnel tested and SEAOC peer-reviewed.

26

OMG ROOFING PRODUCTS PowerGrip Plus

PowerGrip Plus is watertight, easy-to-install and provides a secure connection to the roof deck. Once heat welded, PowerGrip Plus helps eliminate rack movement that can damage commercial roofs. PowerGrip is made from the same material as the roof for 100% compatibility. 2,000 lbs. tensile strength; 1,075 lb of shear strength.

27

ORION SOLAR RACKING Orion's Belt Ballasted Mount Solution

Orion's Belt system is a unique UL-listed, wind tunnel-tested, pre-assembled, rail-less design, consisting of only three main components: ballast pan, brackets and interconnect-belts. Despite its simplicity, it retains the rigidity and structural integrity to provide an innovative and versatile solution for any flat roof. Available options include 0° to 15° tilt, penetration and east-west.

28

PANELCLAW Polar Bear Gen III 5 degree

Polar Bear Gen III 5 degree delivers the highest roof coverage ratio of any 5° product on the market today, along with low installed cost and life-cycle cost. The engineering team behind the product is armed with masses of data to satisfy even the toughest permitting jurisdictions in the United States.

29

PERMACITY SolarStrap

The SolarStrap roof attachment system is designed for 0° to 15° mounting options and features integrated grounding and UL 1703 certification. The SolarStrap requires neither penetrations nor ballasts, while being both easy to install and a low cost system. A proprietary design employs heat sealing technology to secure the framework to the roof and allows for rapid installation with minimal tools.

30

RENUSOL EW

The Renusol EW is a ballasted east-west facing mounting system for flat roofs that allows for greater array density and lower ballast weights. No long rails or wind deflectors are needed. The system has integrated ballast blocks and utilizes the universal clamps from Renusol pitched-roof systems. The mounting posts assemble with just one nut.

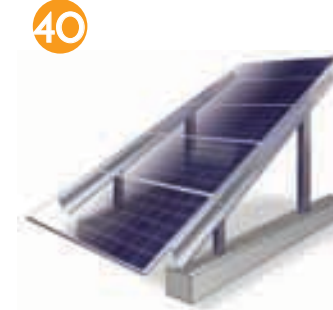
31

SOLLEGA FastRack 510

The FastRack 510 comes in 5° or 10° mounting options and 10- or 13-in. row spacing, with fully ballasted, anchored and hybrid options. The modular, one-piece design stacks for low cost shipping. FastRack 510 is compatible with all framed modules and First Solar frameless thin-film modules. The system, which comes ready to install, features integrated grounding to UL standards.

GROUND MOUNT

GROUND MOUNT



32 APPLIED ENERGY TECHNOLOGIES (AET) Rayport-G ECO

AET's Rayport-G ECO utility-scale ground-mount system is easy to install, scalable and delivers significant savings on total installed cost. High shipping density lowers freight bills. The system, which fits all panels available today, is wind tunnel tested and UL 2703 listed, with a 25-year limited warranty. Connects at a single point to system ground.

33 AP ALTERNATIVES MOD Series Racking

The AP Alternatives modular racking solution is designed for utility-scale solar fields. The turnkey system allows for streamline field installation. The helical anchors are rapidly installed using automated drivers and modular racking is totally pre-assembled prior to delivery, including module installation, grounding and wire management.

34 DCE SOLAR Cap Rack

The Cap Rack is a simple-to-install ground-mount for solar arrays. Cap Rack is delivered 80% preassembled, making installation fast and easy, which is critical in markets with high labor rates. The Cap Rack uses locally made, precast ballast blocks and requires less overall ballast weight due to unique features that increase drag coefficient.

35 DUAL RACK GBS-P6 Grounding Lug

Using Dual Rack's GBS-P6 will result in lower cost and faster installations. The GBS-P6 is a stainless steel grounding, bonding splice lug, compatible with all racking and framed solar modules. This multipurpose lug is the first to be grounding and a jumper. UL 467 certified and UL 2703 recognized.

36 GAMECHANGE RACKING GC Max-Span

GC Max-Span features long spans with few foundations—as few as 260 per megawatt. The post, beam and brace assembly has a low part count. Rugged design enables 150 mph wind and 90 psf snow loads. With a 20-year warranty, the Max-Span is ETL UL 2703 tested.

37 HST SOLAR HRack

HRack uses configurable manufacturing to optimize PV structures. It comes with several foundation options including cast-on-site ballast and pile-driven. Listed to UL 2703, HRack uses proprietary multi-dimensional optimization to cut BOS costs by 15% to 40% while improving energy yield by 2% to 8%, site dependent.

38 MOUNTING SYSTEMS Sigma Steel

Mounting Systems' Sigma Steel ground-mount combines the design of aluminum with the strength of steel. Unique cold-rolled steel module rails and rafters allow fast installation and on-site flexibility with Clickstone technology module clamps. Self-healing zinc-magnesium coating provides G235 protection at the cost of G90, eliminates the need to recoat scratches and leaches less zinc into the ground than hot-dip galvanization.

39 NUANCE ENERGY GROUP Osprey PowerPlatform

The Osprey PowerPlatform is revolutionizing how solar ground-mount structures are engineered and simplifies how racking structures are permitted under 2013 CBC regulations. No geotechnical report. No concrete piers, pads or foundations required. Made of U.S. recycled steel, proprietary modular units assemble easily, deploy in minutes and scale from one to thousands using non-skilled labor.

40 POWERS SOLAR FRAMES 5-High Ballast Ground Mount

This concrete ballasted ground-mount solution for residential, commercial, landfills and brown field applications consists of box, posts, solar purlin, connection hardware and 20 patented gator clamps for connecting modules to purlin, with tilt ranging from 5° to 30°. A simple solution that reduces install time and costs.

41 RBI SOLAR Single Source Racking Solution

Custom designed and engineered to site-specific conditions, RBI ground-mount racking is ETL classified to UL 2703. With in-house engineering and project management capabilities, RBI takes a single source responsibility for a solar project that involves structural design, engineering, manufacturing and installation.

GROUND MOUNT

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SOLAR FLEXRACK: FlexRack Series G3-X

Solar developers and EPCs demand choices and continued innovation to maintain their leadership position. The field-assembled G3-X ground-mount joins Solar FlexRack's flagship pre-assembled G3L and G2P series as the latest advancement in the company's ongoing quest to provide products that meet project-specific needs.

43

SUNLINK: Large-Scale GMS Portrait

With an industry-leading 20% east-west terrain following, Large-Scale GMS Portrait can be installed on ungraded sites, those with constant slope and rolling terrain. It is designed for incremental array sizing via smaller tables to streamline project design. Module independence also eliminates delays formerly posed by changes in module choice.

44

TERRASMART: TF2

TerraSmart's turn-key racking solution was designed with the ground screw foundation in mind. The TF2 racking solution offers unprecedented tolerances for ultimate flexibility in the field to lower overall site preparation and installation costs. Additionally, with design, engineering, manufacturing and construction offered by one trusted partner, installers can be assured of a streamlined and successful ground-mount project.

CARPORTS & CANOPIES

45



46



45

SOLAIRE GENERATION: Long Span 360

Solaire offers the Long Span and other innovative and economical canopy designs for virtually any ground or garage parking facility, including California schools (DSA). Solaire's canopies pair form with function, providing safe, durable structures with optional advanced features like snow and water management and variable wing inclination on all designs.

46

BAJA CONSTRUCTION CO: Box "T" Solar Support Structure

Baja Construction's vertical implementation of steel structures is ideal for solar support applications. From design to installation, Baja offers an innovative alternative to supporting solar projects with high-tensile, light-gauge steel custom-designed by its in-house team of engineers, making for a high versatile asset to nearly any business.

Mounting systems for solar technology

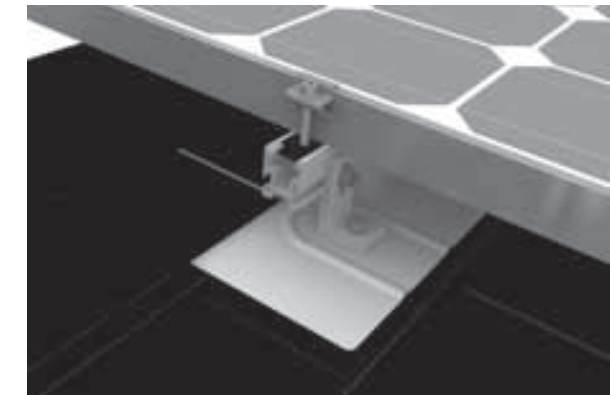


Announcing...

UL 2703 SYSTEM LISTINGS!

All testing performed at Underwriters Laboratories in the USA!

CrossRail System



UL 2703 Bonding Mid Clamp



UL 2703 Bonding End Clamp

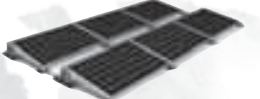


D Dome east/west



Flat Roof Ballasted or Attached
 → High GCR / Energy Density
 → Wind Tunnel Tested with SEAOC peer-reviewed results

S Dome south facing



Simple • Versatile • Fast • Durable

To learn more visit us at
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INNOVATION – QUALITY – DURABILITY – SERVICE – SUPPORT



48



47

ALLEARTH RENEWABLES: AllEarth L20 Solar Tracker

The AllEarth L20 Solar Tracker utilizes the proven pole-mounted tracking system by AllEarth Renewables, enabling higher power 72-cell modules and increasing the tracker advantage, while reducing material costs. The new orientation also improves wind loading and is visually appealing in the landscape orientation, particularly for residential uses.

48

ARRAY TECHNOLOGIES: DuraTrack HZ v3

The DuraTrack HZ v3 offers differentiating installation advantages, optimizing processes from the ground up. Equalized post specifications, fewer foundations per megawatt and terrain flexibility all streamline site prep and civil works. A single-bolt-per-module clamp, which does not require specialized tools to install, makes module installation fly. Ultimately, ATI's 4 gigawatts of experience saves contractors valuable time and resources.

49

BIG SUN ENERGY TECHNOLOGY: Dual-Axis iPV

The Dual-Axis iPV Solar Tracking System accurately locates sunlight, providing sufficient power especially during sunrise and sunset times to fulfill energy demands. Simple lever principle design helps reduce O&M costs. Features uncomplicated installation and painless maintenance.

50

EXOSUN: Exotrack HZ v2

Exotrack HZ v2, the newest version of Exosun's tracking technology, has been engineered to maximize energy output and further reduce overall costs and delivery lead times, offering a highly reliable, LCOE-friendly solution for utility-scale solar plants.

51

MECHATRON SOLAR: D170 Gearless Dual-Axis Tracker

Mechatron has designed and deployed a unique patent-protected gearless mechanism that provides reliability to its trackers. More than 3,600 are deployed with zero failures. The tracker's platform allows the mounting of as much as 40 kW on each tracker. A sophisticated software platform empowers users and support personnel to perform remote and local maintenance and monitoring.



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NEXTRACKER: Self-Powered Tracker (SPT)

NEXTracker's horizontal tracker maximizes energy yield and increases solar project profits. The Self-Powered Tracker (SPT) eliminates wiring to tracker motors, reducing material and installation costs, making each row truly plug-and-play with faster and more precise operation. Leveraging world-class design and installation expertise, NEXTracker has delivered trackers across five continents.



53



53

SUNFOLDING: T1 Horizontal Single-Axis Tracker

Sunfolding's T1 Horizontal Single Axis Tracker offers tracker performance with the ease and simplicity of fixed-tilt systems. The T1 eliminates motors, gearboxes, torque tubes and bearings with a modular, scalable approach that radically cuts costs while improving performance.



The SMP10 Pyranometer

the smartest way to measure solar radiation



ISO 9060 Secondary Standard pyranometer
No change of desiccant for 10 years
Smart, more than just digital
RS-485 Modbus® communication

A perfect combination of two of our recent successful launches combined in one instrument; a low maintenance pyranometer with smart digital signal processing. Now with all-new Smart Sensor Explorer software that allows for set-up with RS-485 to USB or TCP/IP converters and data logging to a computer.

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2015 TOP SOLAR PRODUCTS

175 WAYS TO MAKE THE SUN MORE POWERFUL, PROFITABLE & PREDICTABLE

INVERTERS

The lines between string, central, off-grid and microinverters continue to blur as manufacturers develop new models that incorporate features of multiple inverter types. We've seen new designs based on 2014 National Electric Code requirements, like decentralized string units with easy-to-install designs and rapid shutdown capabilities. But there are also a few unique products, like dual-use microinverters, across the following pages in our Top Inverter Products.

APsystems YC500-A microinverter

(see on page 45)

HOPE Animal Foundation installation

58 kW

Fresno, California

STRING

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4



1

ABB PRODUCT GROUP SOLAR: Rapid shutdown string accessory

ABB's rapid shutdown device is a low-cost accessory simplifying NEC 2014 compliance within residential solar applications. String combining models are available to further reduce BOS cost. Shutdown occurs within 10 seconds at the rooftop box when utility power is lost or the PV system's AC disconnect switch is opened.

2

CHINT POWER SYSTEMS AMERICA: 36kW 3-phase

This string inverter is ideal for rooftops, carports or ground-mounts. Other features include: 36-kW, 1,000-Vdc, dual-MPPT, 98% CEC efficiency, 1.5 DC:AC ratio, up to 10 string inputs, HECO compliant, Rule 21 ready, 2.5-MW reference designs available. One part number: CPS SCA36kW.

3

FRONIUS USA: SnapInverter Line

This lightweight line, available from 1.5 to 24.0 kW, offers easy installation. The hinged mounting system, field serviceability and design flexibility are unique to the entire line of inverters which includes both residential and commercial options. The inverters offer communication and safety features completely integrated, such as Wi-Fi, free lifetime monitoring and AFCI.

4

HIQ SOLAR: TrueString

This NEMA6 3-phase string inverter is a rugged problem-solver. Have a difficult roof layout? Unequal strings are no problem. Harsh conditions? It's sealed and ready. A retrofit with no mounting space or a carport with difficult aesthetic restrictions? Tuck it under the array, out of sight. Try the award winning 480-V or new 208-V model.

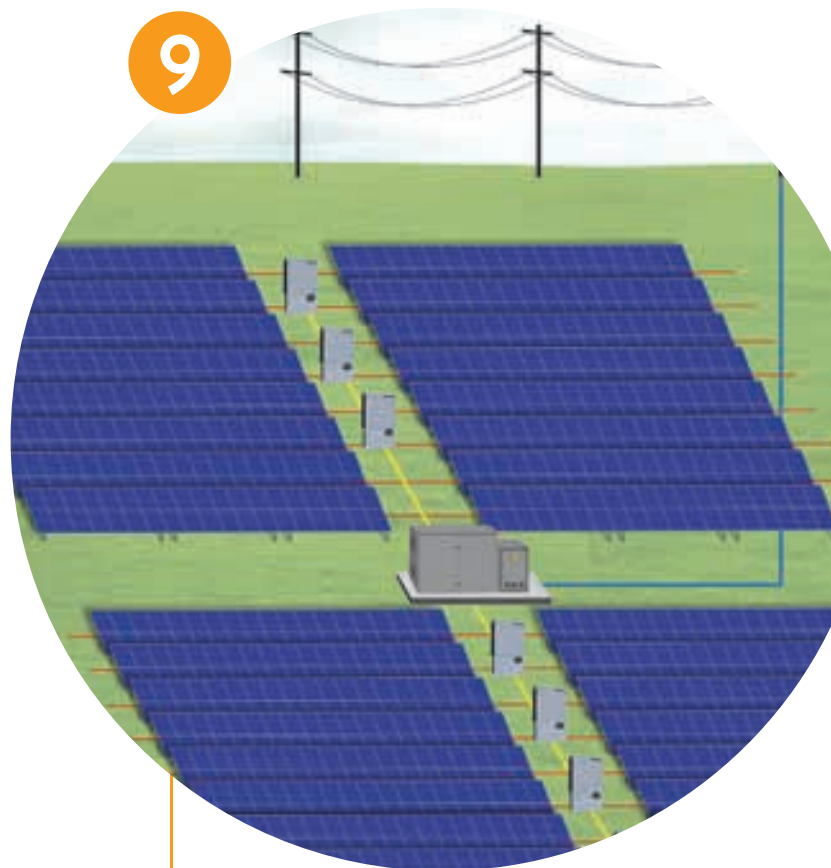
5

NINGBO GINLONG TECHNOLOGIES: Solis-6-10/K-2G-US

Ginlong offers the industry's first 3- and 4-MPPT Solis-6-10 K-2G-US single phase inverter, suitable for large residential homes with complex rooftops. It features outstanding energy yields, thanks to its MPPT level power optimization, and excellent design flexibility due to its unique string mismatch. Ginlong Solis inverter is third-party qualified by DNV GL.

2015 TOP SOLAR PRODUCTS

STRING



6 PIKA ENERGY: Pika Energy Island

This solution connects PV, storage, loads and the grid. It's 7.6 kW, ideal for residential/light commercial use. Energy Island uses Pika PV Link, a sub-array optimizer that's 85% faster to install than module-level electronics. The inverter can directly charge high voltage batteries without a separate charge controller and can island without a separate autotransformer.

7 SMA AMERICA: Sunny Tripower 3-phase, transformerless

The Sunny Tripower 12000TL-US/15000TL-US/20000TL-US/24000TL-US is the complete decentralized commercial solution, optimizing design, production and reliability while reducing the levelized cost of energy and improving financial returns. The Sunny Tripower 60-US is ideal for medium-voltage interconnection and combines the advantages of a decentralized layout with the sophistication of a central inverter.

8 SOLAREEDGE TECHNOLOGIES: SE33.3KUS

The SE33.3KUS SolarEdge 3-phase inverters for the medium voltage grid offer a 1.35 times DC-to-AC ratio for loading of up to 45 kW of DC power. It supports increased string stretching of up to 15 kW per string for 2.5 times longer strings than traditional inverters and supports three DC inputs with an integrated fused combiner.

9 SOLECTRIA (YASKAWA-SOLECTRIA SOLAR): Decentralized MW solution

Solectria's decentralized MW solution is the first of its kind in the industry. By combining multiple system components, this solution will simplify the customer experience by eliminating the additional work to find panel/switchboards, transformers and monitoring that pair perfectly with Solectria inverters.

10 TABUCHI ELECTRIC: EneTelus Intelligent Battery System (EIBS)

Tabuchi's EIBS is an all-in-one home inverter and battery system that is easy to install and highly customizable. EIBS can cycle up to 5,000 times, giving homeowners a faster payback over a 10-year warranty. The system is also grid-friendly, key to helping utilities optimize, monitor and scale solar power generation.

CENTRAL



11 GE LV5 Series

GE's 1,500-Vdc breakthrough technology helps drive investment performance by converting solar energy into powerful, reliable and cost-effective electricity. Inverter input voltages of 1,500 Vdc increase the output power by up to 50%, enabling a more efficient farm layout while significantly reducing investment costs for cables, buildings, combiner boxes, fuses, inverters and transformers.

12 IDEAL POWER: Grid-resilient 30-kW multiport power conversion system

The 30B3-4DF uses Ideal's Power Packet Switching Architecture (PPSA) in an AC/DC/DC configuration to directly integrate solar and storage, serving both grid-tied and off-grid applications. PPSA also provides transformerless isolation and significant savings in equipment weight and size compared with conventional PV and battery solutions. This dramatically lowers installation costs.

13 INGETEAM: IS 1165TL U B420

This PV inverter maximizes the power density, as it provides more power in less space. The input and output connections are integrated in the same cabinet. Moreover, it integrates low-voltage ride-through capability and a control unit that runs faster and performs more efficient and sophisticated inverter control.

14 POWER ELECTRONICS: HEC PLUS US

Power Electronics' HEC PLUS outdoor modular and redundant inverters are powerful and reliable in utility-scale projects. 1,000-Vdc class upgraded inverters offer extended MPPT voltage range and maximum efficiency in AC output voltages ranging from 400 Vac to 440 Vac, covering all commercial and utility-scale PV facilities.

15 SATCON (SIC USA): 2-MW Equinox UL and MX platforms

The UL-approved and field-proven 2-MW Equinox container platform includes factory integration and is available now. This improves overall quality and reliability, while reducing the time and cost to system commissioning. Containers range from 0.5 to 2 MW. The New Equinox MX model is more integrated, offering greater cost savings, available in 2016.

The NEW Power Peak™ GS

The second generation Power Peak™ GS is a cost effective, utility scale mounting system manufactured from high strength galvanized steel. The new innovative design features preassembled clamps, field adjustable components, and bottom access clips to ensure faster build rates. Similar to the field proven Power Peak AL, the Power Peak GS rack easily assembles over pile driven "H" beams and adjusts to changes in terrain. Wind tunnel tested and code compliant, the Power Peak GS promises long term reliability.

DPW Solar is a major manufacturer of PV Solar mounting solutions since 1993. Professional installers from coast to coast rely on our POWER-FAB® product line of high strength and easy to install mounting systems and enclosures.

Made in the U.S.A.



phone: 800.260.3792 • web: www.power-fab.com • email: info@power-fab.com

CENTRAL

16



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16

SCHNEIDER ELECTRIC Conext Core XC-NA

This is designed for high efficiency and flexibility. It comes with an integrated DC combiner with fuse and monitoring options and a next generation ground fault detection system to reduce hazards from PV array blind spots. It is 3R rated for outdoor applications and can be provided as part of Schneider's PV skid or box solution.

17

TMEIC PVH-L2500ERM

TMEIC's new SAMURAI PV inverter provides full output of 2,500 kW/2,700 kVA at 1,500-Vdc input. Equipped with a hybrid cooling system, it minimizes particle and dust entrance into the inverter with heatpipe-based cooling technology. The PVH-L2500ERM achieves high efficiency levels for 1,500-V system design.

MICROINVERTERS

18



18

APSYSTEMS YC500

The YC500 microinverter handles two PV modules simultaneously with dual MPPT. Maximum power output is 500 W per module pair; serves up to 14 panels (7x YC500s) in a string with a single 20-A breaker. Using half the microinverters per project saves installers real time and money on the job site.

19

CHILICON POWER CP-250-60-208-240-MC4

Chilicon Power microinverters provide comprehensive inverter and monitoring. With its 7-in. LCD touch controller, the CP-100 gateway is the ultimate microinverter controller and smart home-hub. The CP-100 enables inverter setup in less than 10 minutes and provides home security (door/window sensors/ alarm) and wireless net metering.

20

CYBOENERGY On/off-grid CyboInverter

The 4-channel 1.2-kW on/off-grid CyboInverter has an on-grid output port and an off-grid output port. When the grid is on, it works like an on-grid inverter. When the grid goes down, it automatically switches to off-grid mode providing backup power. Each input channel has its own MPPT to maximize power production.

21

DARFON AMERICA ACRak 300

The ACRak 300 combines Darfon MIG300 microinverters with IronRidge XR rails for an easy-to-install, out-of-the-box solution. Locking cable connectors and XR100 splices eliminate cutting rails, installing cabling or mounting microinverters. Building a solar array is as simple as mounting and grounding rails, connecting sections and mounting the panels of your choice.

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MAGNUM ENERGY, SENSATA TECHNOLOGIES, 4400W 48-VDC pure sine wave inverter charger

The MS-PAE 120/240V Series inverter/charger from Magnum Energy is a pure sine wave inverter designed specifically for the most demanding renewable energy applications. The MS-PAE Series is powerful, easy-to-use and cost effective.

23

OUTBACK POWER, FLEXpower Radian

The FLEXpower Radian line, available in 4 kW and 8 kW, allows installers to complete faster, more flexible installations that meet customers' unique energy scenarios with OutBack's grid/hybrid technology, including grid-interactive and stand-alone functionality and GridZero and advanced battery charging operation. The prebuilt systems can save solar professionals as much as half a day to set up.

24

PRINCETON POWER SYSTEMS, GTIB-100 G1.2

Princeton Power Systems' GTIB-100 G1.2 is a 100-kW four-quadrant power converter with a wide DC voltage range that can act as both a PV inverter and a battery charge controller. The product is used as a building block for complex energy storage systems, hybrid renewable energy systems and microgrids.

OFF-GRID

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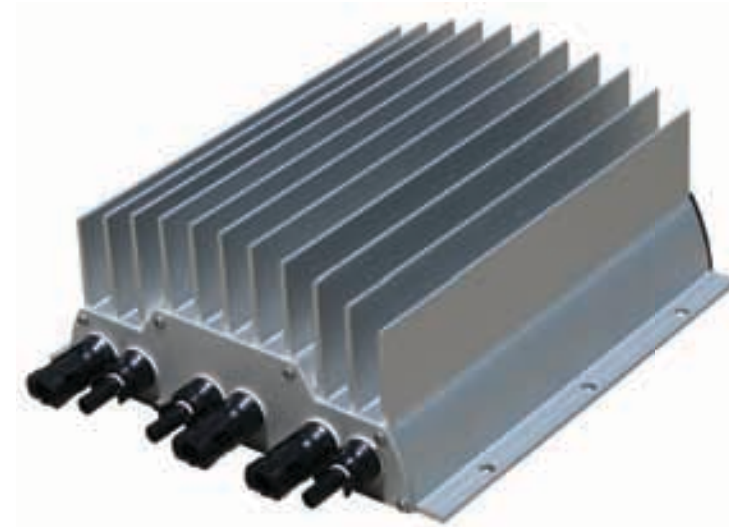
POWER OPTIMIZERS

25

AMPT, V1000 string optimizer

Ampt V1000 string optimizers are DC converters that lower the cost and improve the performance of large-scale PV systems. Ampt's technology includes 2 MPPTs per string and eliminates half of the eBOS components while increasing inverter rated output power by 50% to lower total system cost on Day 1.

25



MAGERACK SOLAR MOUNTING SYSTEM



\$4.50 L-foot & Flashing

Patented unique design
Absolute waterproofing
Easiest to install
Lowest cost

\$6.90 Flat Tile Hook

Strongest tile hook
Only 0.25" deflection at 356 lb uplift force

Optional flashing
Double flashing to meet building code and roof manufacturer warranty

\$8.50 Flat tile hook and flashing



\$0.12/w System

UL 2703 Listed, Class 'A' fire rating

Built-in integrated bonding
No WEEB needed

As low as \$0.12 per watt
Including L-foot and flashing

Strong and reliable
Up to 8 feet rill span



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A solar installation is only as good as the quality of its components and service providers. Choosing reliable charge controllers and connectors helps extend the life of your project. Solar+storage is a growing market, and one that is expected to flourish past the ITC cliff. Using the right storage options will boost project performance and ROI. Here are some of the best balance of systems technologies we've come across this year.

Trojan Smart Carbon

(see on page 55)
Old Fort Village
72 kW
St. Ann, Jamaica

2015 TOP
SOLAR
PRODUCTS

175 WAYS TO MAKE THE SUN MORE POWERFUL, PROFITABLE & PREDICTABLE

COMPONENTS

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1

CONE DRIVE, 5-in. CD Slew Drive

This advanced motion solution for PV tracking systems is manufactured in the United States. Proprietary double-enveloping gear technology drives more torque with less material, cost and weight to manage in the field. A range of assembly options, including installation of motors and torque transmission tubes, makes field installation simple, and improves overall system quality.

2

CONTINENTAL CONTROL SYSTEMS, WattNode Energy and Power Meters with Fast Power

The "Fast Power" WattNode provides power register updates every 200 milliseconds allowing for feed-in response times of 500 milliseconds. The fast power reading supports utility feed-in limit requirements for utilities limiting their incoming AC power into the grid. With the Fast Power Modbus connected, the smart inverter can monitor and adjust generated power going to the grid quickly.

3

DUNKERMOTOR, GEN 4 Solar Tracker Motor

The Solar Tracker Motor (STM) with integrated programmable controlled DC brushless GEN 3 motors now introduces the GEN 4 STM, an integrated solar power motor unit that works effortlessly with either 230- or 110-V AC supply. No switching cabinet, no cabling, no wiring and no intensive labor needed. Just "plug and track."

4

EATON, KwikSplice

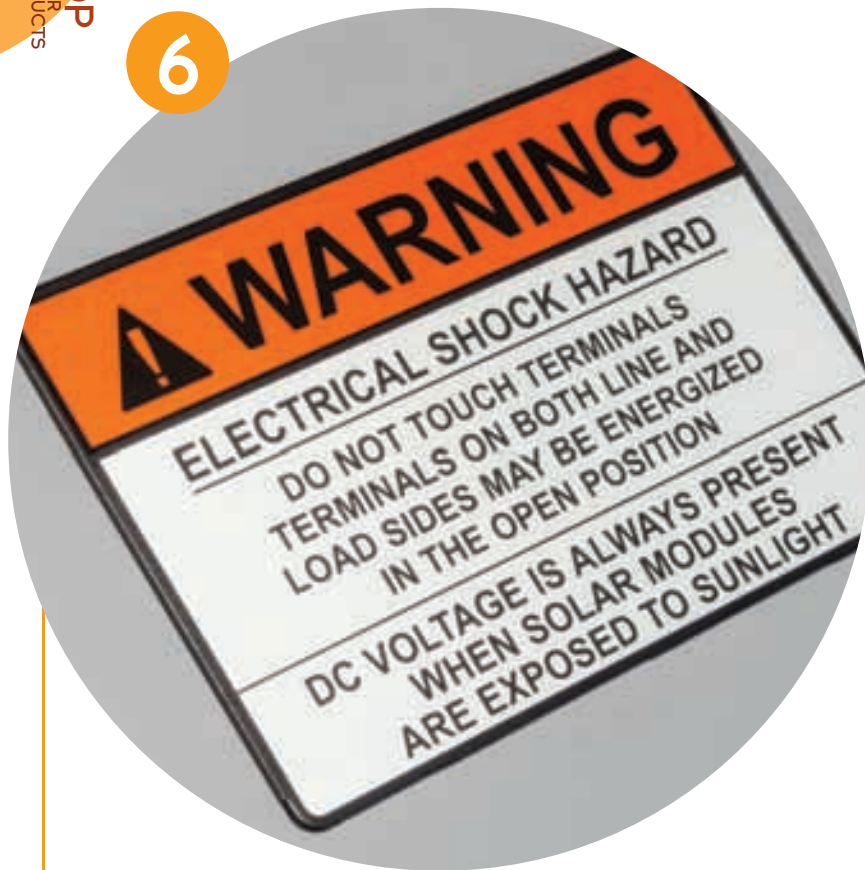
KwikSplice is a light-weight, yet durable cable management system that is rated for NEMA 12A and 12B load classes. Featuring an industry-first two-bolt splice connection, KwikSplice reduces labor by up to 50%. Available in the United States and Canada, the KwikSplice is perfect for ground-mount and commercial rooftop solar applications.

5

GENERAL CABLE, SunGen UL 4703 PV Wire

General Cable is a global wire and cable provider for renewable energy applications. Engineered to withstand the harsh operating environments of solar applications, the SunGen line of fully-colored UL 4703 PV Wire offers superior resistance to UV sunlight, while providing stable electrical properties over a broad temperatures range (-40°C to 90°C).

6



6 HELLERMANN TYTON: Metal Solar Placards

Passing inspection or code compliance sometimes calls for PV identification expected to last 25 years. The first product of its kind in the industry, HellermannTyton Metal Solar Placards offer 25-year rated performance, are available in pre-printed, hand-writable and engravable styles, and meet NEC, IFC, OSHA and ANSI labeling requirements.

7

7 MARATHON SPECIAL PRODUCTS: 1,500-V PV Fuse Holder

Marathon Special Products' PV15BW series was developed to meet the growing demand for 1,500-V photovoltaic components for the solar industry, and incorporates Marathon's unique busbar terminal that allows customers to eliminate custom fabricated comb busbars. The 1,500-V fuse holder is designed to improve performance and reduce material & labor costs.

8

8 MAXWELL TECHNOLOGIES: 56V Module

Cloudy skies got you down? Ultracapacitors by Maxwell Technologies can provide reliable and stable renewable energy firming for your solar installations. Maxwell's 56-V module provides scalable energy grid storage, fast-response power stabilization and improves grid connection reliability. Weather is unpredictable. Your power delivery shouldn't be.

9

9 MEGGER: PVM210 Irradiance Meter

The Megger PVM210 provides the solar PV engineer a pocket-sized instrument. Single-handed operation is possible because the solar detector and meter is housed in one unit, ideal when on a sloping roof or at the top of a ladder. The PVM210 may be used as an aid to select a site for placing solar panels, and then to verify short circuit current.

10

10 MIDNITE SOLAR: MPPT charge controllers

MidNite Solar is now offering the NEW Classic 150-SL, Classic 200-SL and Classic 250-SL SOLAR ONLY MPPT charge controllers with a streamlined menu. The Classic SL series has all the power of MidNite's Classic line of charge controllers and are a breeze to install and setup.

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11 MORNINGSTAR: Prostar MPPT charge controller

The Prostar MPPT solar charge controller with TrakStar Technology charges lead acid and lithium batteries in off-grid PV systems up to 1,200 W. This controller comes in 25- and 40-amp versions with lighting load control and allows multiple modules in series on 12- or 25-V battery systems.

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12 MOXA: UC-8100 Series Starter Kit

Moxa's UC-8100 Series Starter Kit offers cellular or Wi-Fi modules that users can easily install to enable wireless communication between the UC-8100 and peripheral devices. Also, system integrators can evaluate the feasibility of using remote management for specific industrial tasks, such as data acquisition and system integration.

13

13 MULTI-CONTACT: MC4 PV Connector

Multi-Contact's MC4 photovoltaic connectors are the global industry standard and can be found on more PV modules than any other connector system in the world. The MC4 family of connectors now offers 1,500-V UL and 1,500-V TUV solutions. Rely on the original.

14

14 PARKER HANNIFIN INDUSTRIAL CYLINDER DIVISION: Hybrid Actuation System (HAS)

Reinvent active solar tracking through the use of Parker's Hybrid Actuation System (HAS) actuators. HAS features the controllability of electromechanical actuators combined with the power density, longer life and resistive force capabilities of traditional hydraulic systems. The resulting hybrid offers a robust, long-life tracking solution for solar power.

15

15 NINE FASTENERS: NFI-1463 Clip

The NFI-1463 clip is for use with a single Enphase Engage trunk cable. Most clips on the market are designed for multiple Enphase Engage cables, but this product is a great fit for installers needing to only secure a single Engage cable in each clip.

COMPONENTS

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COMPONENTS

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PHOENIX CONTACT·PACT RCP Rogowski coil

Current transformers are necessary for AC current measurement. There are several issues with traditional CTs: physical packaging, high voltage shock hazards and fixed measurement ratios are among the principle disadvantages. Phoenix Contact's Rogowski coil solution eliminates all three of these problems with a touch-safe, flexible and configurable CT solution.

17

SCHURTER·FMCC SOL & FMER SOL Filter Solutions

EMC Standards place strict limits on AC and DC line disturbance. Schurter's FMCC SOL tackles AC interference. The complementing FMER SOL DC filter ensures (DC) EMC compliance, increasing reliability of the entire PV system. Together, they provide a complete filter solution for inverters that require AC and DC line filtering for PV systems.

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SHOALS TECHNOLOGIES GROUP·BLM (Big Lead Monitor)

The Shoals BLM (Big Lead Monitor) is a current, voltage & IV curve monitor that works in conjunction with the Shoals BLA (Big Lead Assembly). Making use of these two revolutionary products, makes it possible to have zero combiner boxes on site which significantly reduces the eBOS cost and speeds up installation.

19

TAMURA CORP. OF AMERICA·L34SXXD15 Open Loop Hall Effect Current Sensor

This DC current sensor series is applicable for use in PV system re-combiner boxes, especially in commercial applications. It can also be used in commercial inverters. Other features include open loop, high current and flexibility to mount vertically or horizontally.

22



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AQUION ENERGY·Aqueous Hybrid Ion (saltwater) battery

Aquion's Aqueous Hybrid Ion (AHI) saltwater batteries are a modular and sustainable energy storage solution and Cradle-to-Cradle Certified. Aquion batteries deliver thousands of real-use duty cycles for long-duration (4- to 20-hr) applications, such as load shifting, renewable energy storage and demand charge reduction.

21

CROWN BATTERY·CRP Power Module

Crown Battery's 2-V CRP Power Module batteries are designed from the ground up for renewable energy. Crown's robotic welding is 40 times more precise than standard manual welding, for longer life. Automated assembly allows for SolidCast internal connectors that handle high electrical loads with unmatched reliability. Capacity ranges from 710 to 3,690 amp-hours.

22

FULLRIVER BATTERY USA·DC Series deep-cycle AGM battery

Fullriver DC Series AGM batteries are built to withstand even the harshest conditions. With long runtimes, high AH ratings and a seven-year warranty, its solar batteries are made to provide many years of reliable service without maintenance or corrosion.

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GRIDTENTIAL ENERGY·Silicon Joule

Designed to meet the gigawatt storage needs of the grid, Gridtential's Silicon Joule technology couples two commodity infrastructures—silicon and lead acid—in a novel approach that cracks the solar-storage cost challenge. Higher energy density, longer cycle life and deeper depth-of-discharge than incumbent solutions make it the economic storage solution.

24

GS BATTERY·SLR1000-2 advanced lead-carbon battery

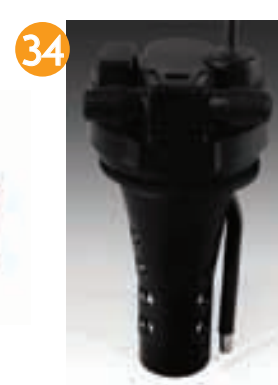
The ECO R SLR1000-2 from GS Battery is an advanced lead-carbon battery that provides an unprecedented 5,000 cycles at 70% DOD. These maintenance-free, sealed, VRLA batteries offer the value, safety, reliability and recyclability of lead with the cycle performance of lithium.

COMPONENTS

STORAGE

STORAGE

STORAGE



25 IMERGY POWER SYSTEMS, ESP250

Imergy's ESP250 vanadium flow batteries provide utilities, developers and commercial and industrial customers with a low-cost, high-performance solution for large-scale applications like peaker plant replacements and renewables management. Combining cycle depth and infinite lifetime of VRFBs with Imergy's use of low-grade vanadium, ESP250 boasts low costs and environmental impact.

26 JUICEBOX ENERGY, JB86 energy storage system

The JuiceBox Energy JB86 is an 8.6-kWh lithium ion residential energy storage system that supports energy peak shifting, load shaving and backup power, all controlled over a robust cellular network designed to maximize home energy management. The JB86 supports new and existing renewable energy installations, including grid edge services.

27 LITHIONICS BATTERY, 10-kW solar harvest module

The module addresses the need for a single, light-weight battery storage solution capable of harvesting and delivering 10 kW of usable energy at or above 48 V. Both the charge and discharge efficiencies are 99%, making the round-trip harvest-discharge efficiency a total of 98% (at least 50% greater—amp-hour for amp-hour—than any other non-lithium battery system).

28 ROLLS BATTERY ENGINEERING, 2V, 2 YS 62P flooded deep-cycle battery

Broadening its 5000 Series flooded range, Rolls introduces the new 2 YS 62P. Specifically designed to offer unparalleled capacity (4,860 AH), this 2-V model offers customers a versatile, high capacity solution to meet the storage needs of large-scale off-grid and grid-tied applications.

29 SAFT AMERICA, Intensium Mini

Intensium Mini complements Saft's Intensium Max range of containerized lithium-ion battery solutions, providing up to 480 kWh of energy in a compact outdoor cabinet system. Available in high-power, medium-power and high-energy versions, Intensium Mini can be tailored to meet the energy storage needs for commercial and industrial power and small microgrids.

30 S&C ELECTRIC CO., PureWave SMS-250 storage management system

Simplifying complexity, S&C's PureWave SMS-250 storage management system provides 250 kW of scalable energy storage for solar power needs. Engineered with the company's three-phase, four quadrant converter system and proven control algorithms, the SMS delivers every use case from solar smoothing to energy arbitrage.

31 SHARP ELECTRONICS CORP., SmartStorage energy storage system

Sharp's SmartStorage energy storage system is a battery-based demand management system designed to reduce expensive peak demand charges for commercial and industrial buildings, backed by Sharp's more than 100 years of experience. SmartStorage energy storage systems are available with an optional 10-year asset management service agreement and a demand reduction performance guarantee.

32 SIMPLIPHI POWER, OES2 2.6-kWh energy storage battery

Since 2002, SimpliPhi Power has manufactured efficient, portable lithium-ion batteries. Starting in the entertainment industry and now expanded into on/off-grid residential, commercial and military markets, SimpliPhi's non-toxic, lithium ferrous phosphate batteries feature: 98% efficiency, 5,000+ cycles, 100% depth of discharge, with no need for cooling, and a 10-year warranty.

33 TROJAN BATTERY CO., Smart Carbon

Trojan's Smart Carbon technology is formulated to address the impact of partial state of charge on cycling batteries in renewable energy, inverter backup and remote telecom applications. Designed to improve life and performance, Smart Carbon is featured in Trojan's Industrial and Premium lines of flooded deep-cycle batteries.

34 U.S. BATTERY MANUFACTURING, Sense Smart electrolyte sensor

The Sense Smart takes the guesswork of knowing when to add water to a set of batteries used for storing solar energy. Without drilling or modifications to the battery, it features a built-in probe and processor that sends a signal to an external LED, indicating if the battery set needs water.

The best kind of project management relieves the stress of project planners and owners alike. Just take a look at our Top Products: Site assessment offerings help with production measurements and forecasting, software assists with making sales and streamlining design and monitoring programs allow individuals to have 24/7 surveillance of their solar projects. Using these Top Products is key to understanding how to keep your plant performing and profitable.

skytron energy PVGuard supervision platform

(see on page 57)

BETHEL
5 MW AC
Bethel, North Carolina

2015 TOP SOLAR PRODUCTS

175 WAYS TO MAKE THE SUN MORE POWERFUL, PROFITABLE & PREDICTABLE

MONITORING

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1

ALSOENERGY: SCADA-plus-monitoring site controller

AlsoEnergy offers a fully integrated SCADA-plus-solar monitoring solution with its own site controller. Control variables include power curtailment, ramp rate and power factor. Remotely access SCADA controls in the AlsoEnergy software interface, and get service and support for the full system from a single source provider.

2

EGAUGE SYSTEMS: 3 Series

The eGauge energy meter displays real-time system data, utility feeds and electricity consumption of sub-panels, circuits and equipment. The hardware features a 30-year data-logger, built-in web server and ports for 12 current transformers. Communication options include Ethernet, PLC, Wi-Fi, and cellular.

3

ENPHASE ENERGY: Envoy-S

The Envoy-S gateway enables more cost-effective, reliable solar installations and energy storage and provides solar production data, energy consumption data and remote maintenance. Integrated Wi-Fi, revenue-grade metering and an optional cellular modem help installers standardize on installations, while bi-directional communication makes it fully adaptable to future utility requirements.

4

LOCUS ENERGY: PVIQ Excel Datalink

PVIQ Excel Datalink provides direct access to performance data within Excel spreadsheets. The software allows users to automate the analysis and presentation of key performance data. By making data queries directly from an Excel spreadsheet workbook, fleet owners and operators can dramatically reduce the time required to prepare performance reports.

5

SKYTRON ENERGY: PVGuard supervision platform

PVGuard allows software access all available working memory. The resulting performance boost will make PVGuard substantially more responsive and simplify the analysis of large data volumes. PVGuard Local allows all the functionality of PVGuard to be used when there is only a sporadic Internet connection or even none at all.

MONITORING

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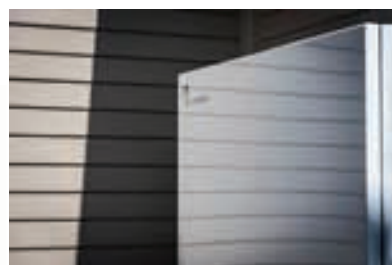


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**SOLAR-LOG:
Solar-Log & GE
Meter**

Solar-Log & GE Meter is a cellular-based, revenue-grade, solar PV monitoring device that is simple to install and use. Its compact design includes Solar-Log technology and GE's I-210+ residential meter. Options include consumption monitoring, inverter direct, power management and weather station. Includes five years of cellular data plan and Solar-Log WEB monitoring.

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**SUNVERGE
ENERGY:
TI-S Vantage
integration system**

This intelligent, fully integrated energy storage system maximizes the value of solar PV, lowers costs, increases energy reliability and accelerates the adoption and integration of distributed renewable energy. Sunverge has more than 5 MWh of distributed storage under management and has provided more than 9,600 hours of backup power to date.

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**TRIMARK
ASSOCIATES:
TI-S Vantage**

Gain ultimate power over PV resources with this monitoring and control solution. TI-S Vantage presents real-time status from revenue meters, MET stations, PV inverters and trackers. Users can view and acknowledge alarms and produce resource reports via an app in the palm of the hand or on your desktop browser.

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**CAMPBELL
SCIENTIFIC:
Solar1000-SCE**

Campbell Scientific's Solar1000-SCE solar monitoring station meets CAISO PIRP standards and is compatible with SCE Exhibit T specifications. Station design, fabrication, pre-shipment test and an installation guide helps minimize installation errors and deployment time. Technical support from Campbell's application engineers is included (no additional charge) for the life of the system.

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**ITRON: Itron Total
Solar**

Itron Total Solar is a complete offering that combines production measurement, asset monitoring, sensing applications and forecasting in a managed services offering for solar generation. Itron's experts run, manage and maintain the solar offering, including revenue-grade solar meters. The service provides an accurate, reliable way to measure and monitor solar production.

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**KIPP & ZONEN:
SMP10 smart
pyranometer**

The SMP10 is a secondary standard smart pyranometer that requires low maintenance. It has a Modbus interface, amplified analogue output, improved response time and temperature corrected measurement data. Thanks to the identical sensitivity and connections of every SMP10, exchanging instruments for recalibration is easy.

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**RENEWABLE
NRG SYSTEMS:
SymphoniePRO data
logger**

Many solar resource assessment (SRA) practitioners have relied upon general purpose measurement equipment—the problem being this complex equipment necessitates highly trained operators. For project developers seeking repeatable, finance-grade SRA campaigns on a global scale, the SymphoniePRO purpose-built data logger combines the latest performance requirements with unmatched ease of use.

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**SOCOMEQ:
Sunsys PCS2
UL**

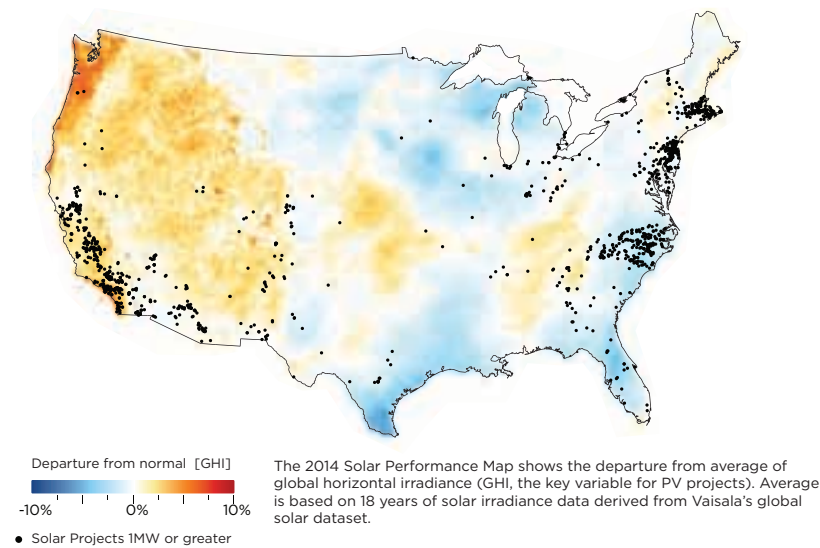
Sunsys PCS2 is the solution for behind-the-meter energy storage, helping reduce peak consumption and maximize PV energy self-consumption. Sunsys also manages the intermittence of renewable energy production within PV plants and provides grid support that meets the challenge of demand-response energy balance.

SITE ASSESSMENT & MEASUREMENT

SITE ASSESSMENT & MEASUREMENT

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United States
2014 Solar Performance Map



14

VAISALA[®] Operational optimization services for PV projects

Vaisala services can help evaluate operational projects and identify areas for improvement. Services to optimize project performance are available for residential portfolios to utility-scale projects. Vaisala provides one-time analysis as well as ongoing reconciliation services that are always weather adjusted for the highest accuracy.

SOFTWARE

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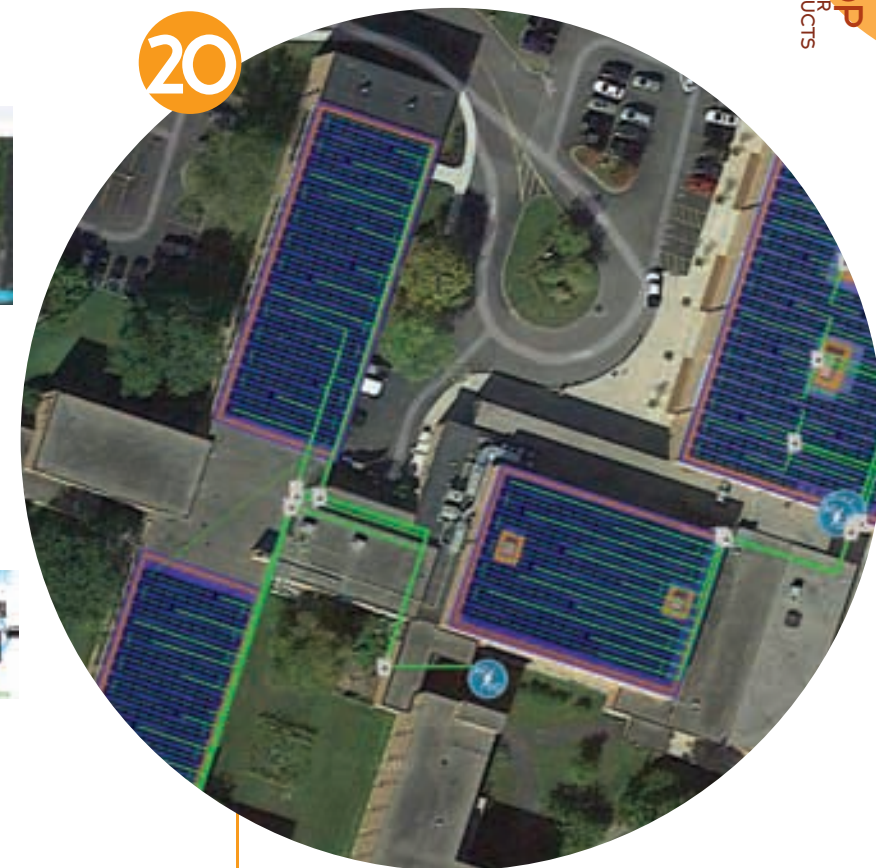
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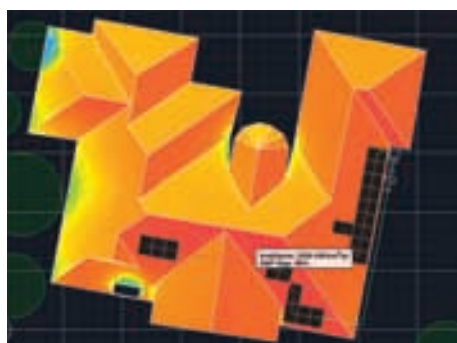
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3MEGAWATT[®] BluePoint

3megawatt's BluePoint web-based software offers a complete set of tools for solar portfolio management all in one platform. The BluePoint platform helps solar asset owners and operators to manage their solar portfolios more effectively.

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AURORA SOLAR[®] Aurora

Aurora is a one-stop software platform for solar sales and design. Its integrated process takes users from address to completed system design and sales proposal within minutes. With remote shading analysis, NEC validation, beautiful visuals and more, Aurora brings the state of the art to solar professionals.

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EAGLEVIEW TECHNOLOGIES[®] Measurement- grade data and imagery

EagleView Technologies offers Pictometry Intelligent Images and analytical tools for 360° views of every property. After closing the sale, Solar Roof Reports deliver detailed measurements and CAD files of the roof for precise solar design and installation.

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ENACT SYSTEMS[®] Solar business automation software

The ENACT Systems software platform provides complete business process automation for solar developers, installers and investors. Users can lower costs for customer acquisition, operations and financing to enable incremental revenue growth. Services include energy analytics, CRM, sales proposals, document management, financing options for customers as well as working capital installers.

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ENERGY TOOLBASE

Energy Toolbase is an industry leading software platform for modeling and proposing solar PV and energy storage projects. The SaaS product is used by hundreds of the leading developers nationwide to accurately, objectively and transparently analyze the economics of their projects.

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FOLSOM LABS[®] HelioScope

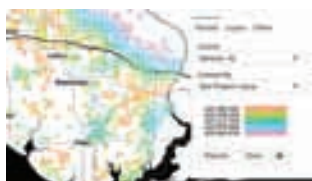
HelioScope helps solar installers design and sell solar arrays more effectively by putting easy and powerful software tools into the hands of everyone in the organization. By empowering the front-line sales team to collaborate with the customer directly, installers achieve shorter sales cycles and higher close rates.

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GELI[®] ESyst

Geli's free design tool analyzes electricity-use data to size energy storage systems, providing maximum savings and attractive investor returns. Geli ESyst customizes the system and connects users directly with equipment suppliers to order components enabled by the Geli EOS (Energy Operating System).

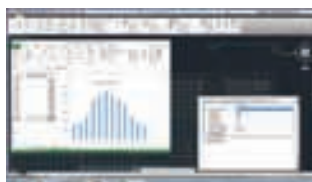
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SOFTWARE

SOFTWARE

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**GEOCF:
Smart Power
Maps**

Smart Power Maps is an all-in-one web-based software platform designed for utility-scale solar that streamlines the entire process of project siting, evaluation and development, enabling users to comprehensively evaluate and manage large-scale solar projects and investments at any stage.

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**INTERPLAY
LEARNING:
Interplay Solar**

Interplay Solar is a complete online solar training solution that delivers digital training for on-the-job knowledge. Installers amplify their training by providing employees access to an engaging learning portal featuring 3D simulations. The content library includes compelling curriculum for almost every employee at the company from new installers to sales.

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PVCOMPLETE

The platform automates all electrical design and module layout and features integrated production modeling with an interface to NREL's System Advisor Model. It enables comparison across multiple design iterations and exports a bill of materials and electric calculations for easy review. PVComplete integrates with AutoCAD and available as an application or a bundled "solar CAD" solution.

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SOLARNEXUS

SolarNexus combines CRM, design and sales proposals and project management functionality into a single software platform for independent solar sales and installation companies. Unifying processes and information into a single software application radically simplifies business operations and enables profitable managing and scaling solar business.

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**VELOCIFY
PULSE AND
LEADMANAGER**

Velocify, a sales acceleration platform, helps more than 1,500 sales teams and many top solar companies sell more by bringing speed and control to the entire sales process. Velocify helps solar sales professionals prospect with more precision, quickly respond to new leads and follow a proven sales workflow to find and convert more leads.