Making Solar Carports Happen

CSVP Webinar Series
August 18, 2016

Jill Cliburn, Cliburn and Associates for CSVP
Dan Ciarcia, Two Willows Consulting
Bob Boscamp, PowerParasol™

Community Solar Value Project

CommunitySolarValueProject.com

Powered by SunShot
U.S. Department of Energy

The Community Solar Value Project

- Led by Extensible Energy, with expertise of 3 additional firms
- Funded by U.S. Department of Energy SunShot Initiative
- Utility-led community solar programs, using a variety of project ownership options

Community Solar Value Project

www.communitysolarvalueproject.com

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extensible ENERGY

Cliburn and Associates, LLC

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Join Us For Future Webinars

- Thursday September 29: Solar Plus Storage Solutions
- Thursday October 27: Keeping It Local
- Thursday December 1: Smarter Procurement for Community Solar Programs

For registration information, contact
stacey@communitysolarvalueproject.com

And seen more news, events and resources at:
www.communitysolarvalueproject.com

Today's Guests

- **Dan Ciarcia, of Two Willows Consulting,** a clean tech business and technical consultant, who manages product development and advises organizations the E&E sustainability. Integral in rolling out the Parksmart Certification program (for USGBC, formerly Green Parking Council). Also worked with GE EV program and Mueller's Smart-Grid networking technology, among other projects.
- **Bob Boscamp, President of PowerParasol™** and a veteran in providing innovative products and services to the electric and gas utility industry. He created the first home energy analysis program approved by the US Department of Energy and developed the award winning "In Concert With the Environment" education program. Bob also served as President & CEO of Axiom Power Solutions, a subsidiary of Pinnacle West Capital.

Community Solar Parking

Jill Cliburn, Cliburn and Associates for CSVP
Erik Sonnenberg, UNM Research Assistant

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Keeping the Community in Community Solar

- The trend in utility-based community solar programs is to offer a subscription-based program, where the utility owns or purchases power from a solar project and charges subscribers a rate, with added benefits that resemble those of a rooftop option.
- The utility typically works with a third-party provider on one or more aspects of the program.
- Different customer groups have different expectations.
- According to the Shelton Group, in US DOE SunShot-sponsored work for SEPA, most customers want community solar to be located within their communities.
- CSVP is working on new ways to keep it local, to build net value, to price it right, and to keep it utility-forward.

Emerging Issue

- SunShare to GTM: “We need to build larger community solar projects, in the 20-MW range.”
- First Solar to PV Tech: “Small one-off installations cannot match the economies of scale realized by utility-scale portfolios…”
- CSVP: “Community solar is perfectly suited to collaboration with customers and third-parties to replicate **local projects** with emerging “flexible-grid” benefits and clean electrification, e.g., customer-side storage and EVs.”
- Which will it be?

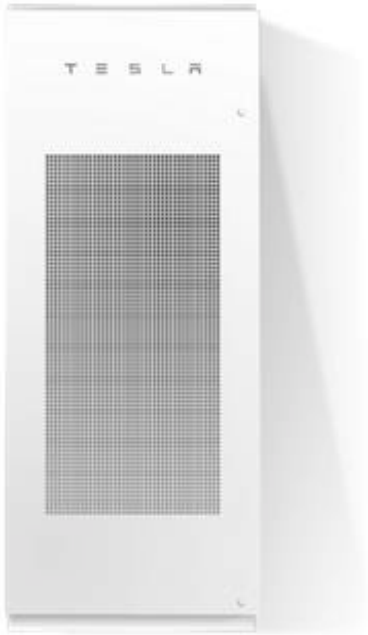
The Relevant Questions for Community Solar

- A relatively simple analysis shows centralized PV and local solar options for community solar can be deployed in utility-driven programs at about parity. Stay tuned for our October webinar.
- If customers want local community solar, questions include
  - Can you site multiple projects that are similar, to reduce portfolio costs?
  - Can you work with other stakeholders and assign costs and benefits equitably?
  - Can you apply lasting project value to customer retention?
- Should we learn more about carports?

Quick Update

- GTM Research 2014 noted carports make up 10-15% of non-residential market nation-wide.
- Top state markets through 2014E: California (<50%), NJ, AZ, MA, NY, and others. Markets grow with incentives, practical advantages, sustainability targets, relative lack of other available sites.
- Price premium ($/Wdc) varies. GTM estimated 60 to 80 cents through 2018. We found premiums of 45 to 60 cents viable today, except for custom designs.
- We wonder if the carport premium may be less relevant as solar costs come down. Based on estimated costs, solar carports today cost less than solar rooftop did in 2013.
- Market uncertainties: structural innovations, pre-assembly, cost of steel, local sustainability goals, solar-plus, water value, utility initiatives.

- Solar City deal with Temecula schools: 6 MW including mostly carport solar + 2.6 MWh of Tesla battery storage. Promises to save >$500K in Year 1 ($35M total?)
- Corporate buys (Intel 6.5 MW! Dow Jones 3.6 MW!)
- Google 1.6 MW carports + EVs; who's next?
- Palo Alto solar program carports; will PAU *or others* demonstrate community solar viability?



Coming in September to CSVP's Website

- Recording of this webinar
- Annotated resource list: documents and web links relevant to solar canopies, shade structures, carports
- Our Community Solar Parking brief, including a sampling of industry offers, from turnkey project providers to carport structural specialists
- Then, October 27, on our *Keeping It Local* webinar, hear more about how the utility can design a strategic fleet of local community solar projects or a mixed fleet of local and centralized resources to meet a range of customer needs.

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Solar PV Carports
Secondary Benefits

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Parksmart

U.S. GREEN BUILDING COUNCIL
USGBC

The Parking Lot Opportunity

- Hundreds of Millions of Parking spaces (US)
- 8 parking spaces for every car
- Urban blight – up to 1/3 of cities are parking
- Environmental Impact
- Resources Underutilized

Green Surface Parking Concepts

Demonstrator Sites

Solar Carports: Secondary Benefits

- Realized Beyond the Financial ROI Calculation
- Difficult to assess
- Often more significant than ROI

Heat Island Mitigation

- Pavement MUCH hotter than vegetated surfaces
- PV Panels Don't Contribute to Heat Island
- Safer to breath! More Energy Efficient!

Happier Vehicles

- Cooler Vehicles
- Reduced A/C
- People & Pets Less Stressed
- Reduced Fuel Evaporation
- Lower Food Spoilage
- Extends Vehicle Life

Let It Snow

- 70% power offset (~40 homes)
- 1 work week gained per storm
- Reduced liability insurance

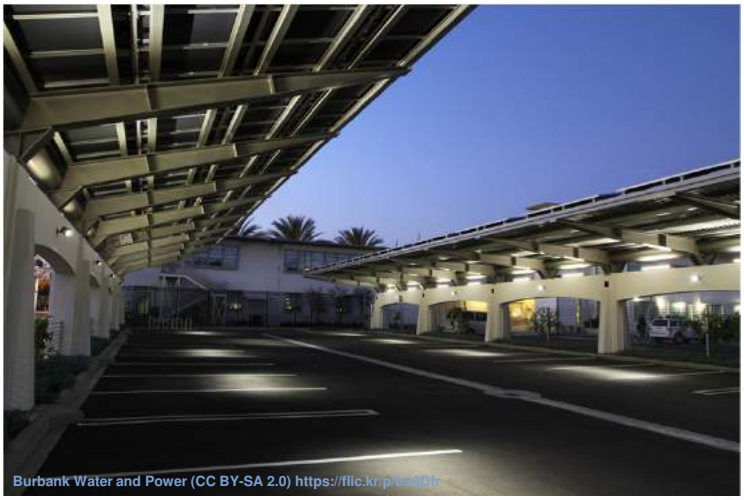
Energy Storage & EV

- Great Locations for Storage
- Smart Grid Integration
- Offsets EV Charging & Peak Power Demand
- Vehicle to Grid (V2G) is Emerging

Community Use

Placemaking • Event Space • Educational

Improved Area Lighting



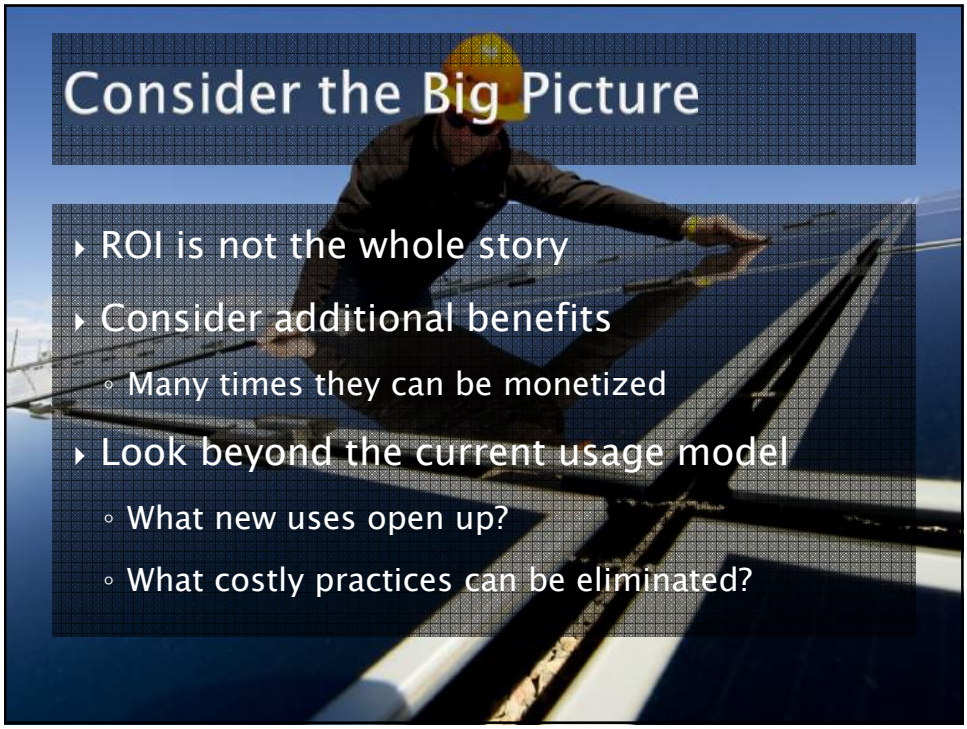
Customers

Photo courtesy of Power Parasol

- Increased Customer Traffic, Loyalty and Sales
- Opportunities for Advertisements / Promotions

Certifications & Recognitions

LEED Certification, AlbertHerring, (CC BY 2.0)
https://commons.wikimedia.org/wiki/File%3ALEED_Certification_(9578633104).jpg



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"Out of the desert.

Off the rooftops.

Into the community."SM

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A new era in solar shade

- Patented technology
- Creates a unique environment -turns unused spaces into a cool, welcoming environments
- Creates dappled shade, allowing trees, plants and grass to thrive in open, airy spaces
- Contributes to sustainability, reducing carbon emissions and improving the environment
- Adds value to the real estate
- Produces clean solar energy

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Value Proposition

- Drives revenues by attracting customers and patrons by turning unused/under-used space into a welcoming gathering place
- Documented increases in same store sales and increased opportunities for advertising sales
- Load leveling system when used with storage
- Incorporates vehicle charging stations
- Achieves sustainability goals & environmental commitment

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Environmental Proposition

- Contributes to sustainability goals, (e.g. Fortune 500 companies, US Green Building Council, Green Parking Council)
- Adds value to existing land rather than consuming land for the sole purpose of generating energy
- Communicates a commitment to sustainability and emissions reduction
- Contributes to Dark Sky Initiative and Heat Island mitigation

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Community Solar Opportunities

- Any large area where shade adds value: schools, shopping malls, community centers, retail stores . . .
- Multipurpose gathering, event locations enhances quality of community
- Applications that show commitment to sustainability and emissions reduction including Dark Sky Initiative; heat island mitigation
- Flexibility: energy credits applies to individual users energy bills; generation assets owned by utility, shade owned by landowner/landowners

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Case Studies – Parking Areas

Cool, comfortable, safe parking

- Keeps cars and walkways cool
- Highly visible "green" message
- Preserves retail sightlines
- Reduces heat island effect
- Signage and lighting opportunities Attractive nighttime lighting
- Creates attractive locations for community events/tailgating
- Drives customer satisfaction and traffic

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Covered Parking – ASU Lot 59

- 5.26 acres
- 7,584 solar panels
- 852 parking spots
- 2,124 kilowatt capacity
- Generates 3,639,713 kilowatt hours per year

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Use of ASU Lot 59 to host the PF Chang's Marathon events and finish line

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Fry's Food Store

- 1.5 acres
- 1,936 solar panels
- 175 parking spots
- 581 kilowatt capacity
- Generates 1,013,140 kilowatt hours per year

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Case Studies – Malls and Parks

Cool community gathering areas

- Turns unused or under-used spaces into welcoming places to gather
- Grass and native vegetation grow underneath
- Festive nighttime lighting
- Outdoor nighttime entertainment areas
- Highly visible “green” message

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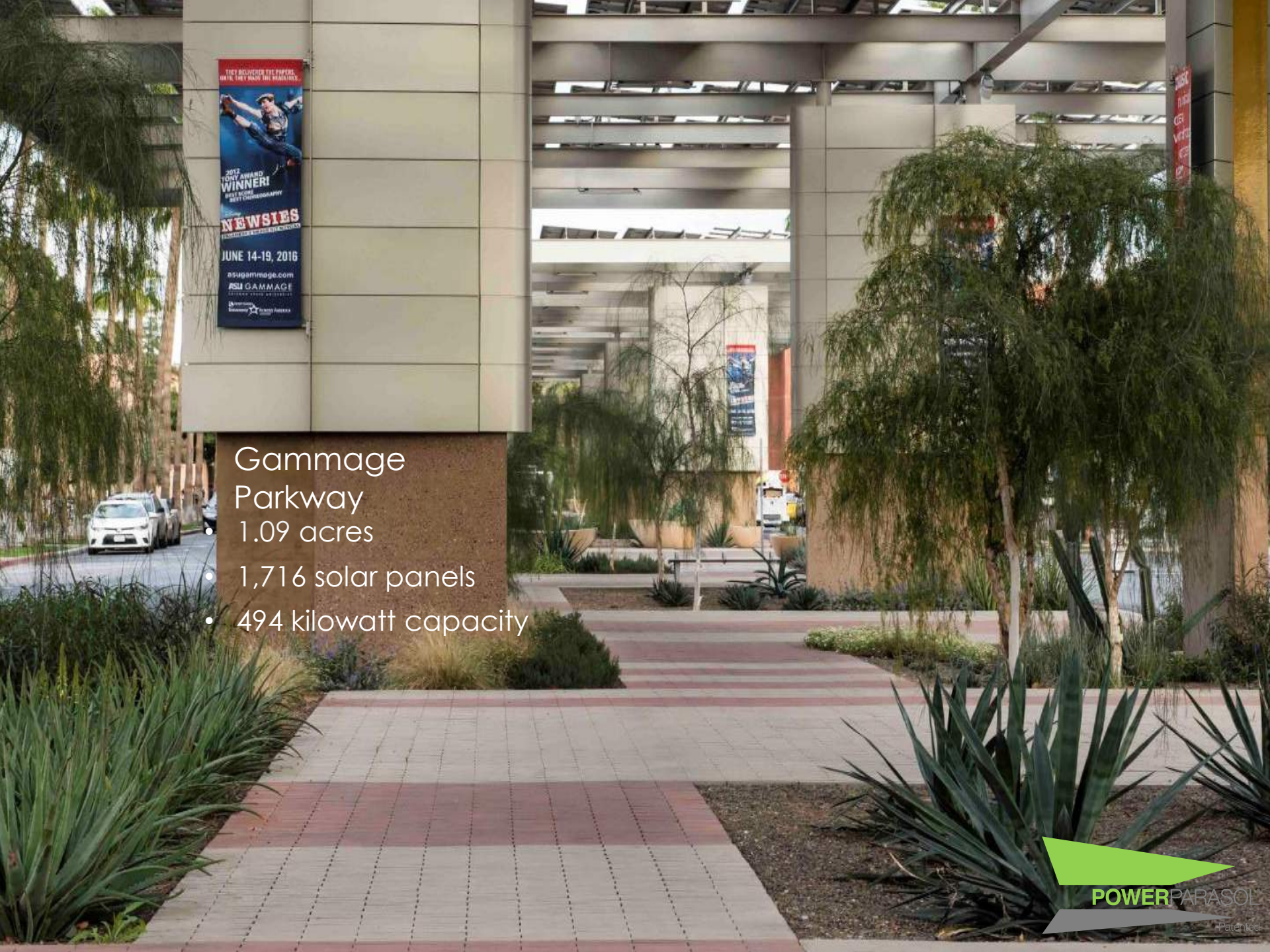

Gammage Parkway

- 1.09 acres
- 1,716 solar panels
- 494 kilowatt capacity

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Other Applications

- Auto/RV/boat dealerships
- Power centers and malls
- Casinos
- Airports
- Military
- Hospitals
- Civic areas
- Theme parks and zoos
- Community solar installations

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