

BULLETIN

Western's monthly energy efficiency and planning newsletter dedicated to customer activities and sharing information.

POUDRE VALLEY REA JOINS COMMUNITY SOLAR BOOM

Community-shared solar arrays—sometimes called solar gardens or solar farms—are springing up across the country, with several taking root in Colorado. Among the Western customers hosting these facilities are Colorado Springs Utilities, Delta Montrose Energy Association, United Power and, most recently, Poudre Valley Rural Electric Association (PVREA) a member-owned electric cooperative in Northern Colorado serving 35,000 consumers.

Local and state government officials, representatives from developer Clean Energy Collective (CEC) and consumer-owners gathered at the PVREA campus on Aug. 28, 2012, to dedicate the community solar farm. The community solar farm consists of 494 solar panels generating 116,090 watts of electricity, equivalent to the annual average energy use of 14 homes. The environmental impact over the life of the array is equal to taking 17,000,000 automobile miles off the road.



Customers of Poudre Valley Rural Electric Association were quick to purchase more than 400 panels comprising the utility's community solar farm. (Photo by Poudre Valley REA)

PV FOR ALL

The idea behind solar gardens is to make renewable energy systems available to anyone with an electric bill, including renters, people who don't have enough solar exposure and those who simply can't afford the cost of a whole system.

A utility, nonprofit group, business or municipality teams up with a developer to build a medium-scale, grid-connected array. Subscribers then buy a portion of the system's power and get credit on their electric bills. The arrangement allows consumers to support clean energy for a fraction of the cost of a home array, no matter where they live. If they move within the utility service territory, panel owners have the option to transfer their credits to their new account.

EVERYBODY ONBOARD

Support for solar power at PVREA is very strong, starting with the board of directors. At the dedication, PVREA CEO Brad Gaskill commented, "We are committed to economically incorporating renewable energy initiatives and seeking ways for our consumers to benefit from a more diverse energy portfolio."

Customers share the board's commitment, and let their utility know it. Inspired by neighbors who had installed home arrays, those who couldn't were asking about alternatives. "And some customers who'd heard about the community model urged us to look into it," recalled Myles Jensen, member services and external affairs manager for PVREA during the

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SOLAR WATER HEATER PROGRAMS SLOW TO WARM UP

Utility and energy services professionals are all too familiar with the reasons an energy-saving technology has difficulty gaining a foothold in the market. Solar water heating (SWH) is only the latest system to be plagued by the usual suspects—high up-front costs, inconsistent regulation, lack of qualified contractors, lack of consumer awareness.

DETAILS MAKE DIFFERENCE

Location is a factor that matters, even within the same state. Geoff Sutton of the Arizona Solar Center said that hybrid solar thermal home heating systems enjoy some popularity in the northern part of the state. In the southern part of the state, installations of residential SWH systems are pre-dominately for domestic water needs.

The type of fuel being replaced makes a big difference. Customers of Valley Electric Association (VEA) in Nevada see their annual energy costs drop an average of 11 percent when they replace electric or propane water heaters with SWH. In urban areas where natural gas is the water-heating fuel of choice, it's a different story. Solar thermal control manufacturer Amatis Controls estimates the annual savings from replacing an electric water heater with SWH to be around \$388 annually,



Solar water heating systems like this one are common throughout the world, but have yet to reach wide acceptance in the United States. Utilities and the industry have ideas about how that could change. (Photo by Steelhacks Industries)

but replacing a natural gas unit saves only about \$125. "With the price of natural gas so low, the systems have a long payback period that tends to discourage consumers," noted Joyce Kinnear, Marketing Services manager for the City of Palo Alto Utilities (CPAU).

CPAU launched a rebate program for residential, commercial and industrial SWH systems in 2008 aimed at installing 1,000 units by 2020. Meeting that goal would significantly reduce the utility's peak load and carbon footprint, but those benefits haven't proved strong selling points for most consumers.

PV VERSUS THERMAL

The popularity of photovoltaic (PV) systems might actually be part of the problem in California. The California Solar Initiative (CSI) has been very successful promoting rebates for installing PV arrays. "Fewer people are aware of the incentives for solar hot water," Kinnear said.

It can be difficult to persuade that customer—the one who is drawn to the most high-tech (and expensive) solution—to consider a less expensive technology. Piper Foster calls SWH the family renewable. Foster works

for Amatis Controls, a partner in the Energy Department's Utility Solar Water Heating Initiative. "In many markets, a system can be installed for a fraction of the cost of a solar PV array," she said.

Sometimes, though, the PV array can be a better deal, Sutton pointed out. PV simple payback periods can be in the eight- to 10-year range. The simple payback for SWH systems varies widely, and can be substantially longer especially with the gas backup systems.

CONTRACTORS HARD TO FIND

A shortage of qualified contractors—that nearly universal challenge to energy-efficiency programs—has hit SWH programs particularly hard. Shoddy business practices gave the technology a black eye in the 1980s, and too many of those problems persist today.

Sutton, who performs SWH field audits in Arizona, has seen a marked improvement in the quality of work from the program's early years, when 97 percent of the installations failed to comply with standards. The problems ranged from issues that had no effect on system performance, such as

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ENERGY SERVICES BULLETIN

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correct system labeling or pressure relief valves, to systems that were simply not operating. Today, approximately 80 percent of the systems pass on first inspection.

Technology often gets the blame for performance problems that stem from installers who create unreasonable expectations and consumers who haven't been thoroughly educated about SWH. To increase the confusion, not all SWH systems use the same technology, and a different type of system may not deliver the results the customer was led to expect. These issues partially explain why PV consumers are generally more likely to say they are happy with their systems, while solar thermal customers are not. "The fact is that the industry still needs to improve training and quality control nationwide," said Foster.

The Center for Sustainable Energy California, which manages CPAU's program, requires contractors to be licensed in the state. Contractors and self-installers must attend a one-day installation workshop to be eligible for the rebate. The CSI-Thermal Program publishes a list of all eligible contractors for consumers.

VEA hired a general contractor, selected by the utility's senior management, to supervise subcontractors, and is working with the local community college to train more technicians. This strategy might not be a good fit for a major metropolitan area, but Sutton liked the idea of program models that give the utility more control over contractor choice, especially when the utility is paying a cash incentive.

HANG IN THERE

If many barriers to SWH adoption are common to other energy-efficiency measures, so are some of the solutions.

Rebates need to be more generous to hasten the payback period, asserted



Solar water heaters have been slow to catch on with consumers, due to many of the same factors that confront other new energy-efficiency technologies. (Photo by City of Palo Alto Utilities)

Foster. "Recently, California increased its residential solar thermal rebate by 49 percent," she said. "It's a step in the right direction, but SWH programs don't start to see a bigger uptake until rebates grow. I'd estimate that total rebates need to reach 30 or 40 percent of the total installation cost to encourage adoption."

Companies that could offer systems in a comprehensive, affordable package would improve both price and the installation experience. "What the solar thermal industry needs is a company like [PV contractor] Solar City to simplify the process for consumers," Kinnear observed.

A trustworthy, full-service vendor must have well-trained, certified installers and inspectors. Utilities that are serious about capturing the benefits of solar thermal might follow VEA's lead, building training partnerships that provide qualified workers for the jobs SWH programs create. Advocates should also keep an eye on local codes and permitting requirements, advised Sutton. "Permitting has become much more streamlined, but there is still a lot of red tape surrounding solar thermal permitting," he said.

Other policies that could make SWH systems more attractive include rate

structures that reward customers for offsetting peak demand, and requiring timer boxes to be installed on systems.

BEYOND UTILITY SCOPE

Some solutions will require utilities to work more closely with the SWH industry, as well as regulating entities at the municipal, state and even national level. The Arizona Solar Center cites the need for more training for contractors, and more transparency in marketing the systems. Stronger policies, best practices and code enforcement would enhance the quality of design and installation and give greater protection to the consumer. Changing the tax code to allow people to write off SWH systems over time, like commercial and utility generators, could drive more installations and help to change the hard-sell approach often used to market the systems now, Sutton observed.

Utilities should be prepared to experiment with different approaches to deploying solar water heating systems, advocate for favorable policies and, above all, be patient. Every technology seems to face an uphill battle in gaining acceptance, but if it delivers real benefits for the customer, it will eventually succeed. ⚡

For links to more resources,
visit <http://ww2.wapa.gov/sites/western/es/pubs/esb/Pages/esb2.aspx>

TECHADVANTAGE 2013 EXPLORES TECHNOLOGIES, TRENDS, SOLUTIONS

Advanced metering, grid technologies and mobile communications are playing an ever-growing role in customer programs and resource plans, and TechAdvantage 2013 offers utility professionals a forum to explore these issues and more.

Presented by the National Rural Electric Cooperative Association (NRECA), this year's event takes place Feb. 18 to 21 in New Orleans. "The TechAdvantage Conference is the single place where CEOs, directors and staff from electric cooperatives can come to focus on core and cutting-edge information and technologies to enhance the value provided to cooperative members," said NRECA Executive and Staff Education Director Gary Pfann. "We are pleased to work with many vendors and partners to put this event together. We are also excited to be presenting the 11th annual Wind Cooperative of the Year Award during the conference proceedings."

GENERAL TO SPECIFIC

The general sessions reflect the big picture, with speakers covering leadership, resource management and the future of the grid. The keynote address will be delivered by retired Lt. Gen. Russel Honoré, who led military relief efforts in New Orleans following Hurricane Katrina. Honoré now consults with businesses and organizations on creating a culture of preparedness. The Cooperative Research Network study, Steps to a Resilient Grid, will be the topic of a presentation by Systems Engineer Craig Miller. Water resource expert Robert Glennon will speak on Feb. 21 about the inefficiencies in the nation's water delivery system and offer suggestions for dealing with it.

Learning labs drill down to present an in-depth look at the latest technologies and preview new developments

coming down the pipeline. Engineers, Information Technology, supply chain and member service professionals can choose from an extensive menu of more than 75 sessions to assemble a schedule that addresses their own and their utility's needs.

Several sessions should be of particular interest to program and planning professionals. Advanced metering infrastructure (AMI) is one area where a better understanding of the technology can make all the difference in program success. A number of sessions focus on AMI strategies and applications that yield the most benefits for power providers and customers.

CRN continues to provide references and resources for program innovation. Presentations on CRN demonstrations will cover combined heat and power projects, energy storage systems, transmission upgrades and the toll marginal line loss takes on energy-efficiency programs, to name only a few topics.

How you use the technology is just as important as the hardware, as the Business Strategy sessions highlight. Discussions on billing systems, prepayment programs, and board and customer communications will show attendees how technology can help them to work smarter, not harder.

MEET AND MINGLE

One of the best things about attending any professional conference is the chance to network with people who understand your world. Three scheduled receptions give attendees time to meet exhibitors, question speakers or forge new partnerships.



Utility professionals meet technology developers and manufacturers, ask questions and form partnerships at the TechAdvantage Exhibition. (Photo by National Rural Electric Cooperative Association)

Sessions, breaks and mealtimes offer plenty of opportunity throughout the conference to catch up with colleagues and learn about their latest achievements. The Wind Cooperative of the Year Award will be announced at the general session lunch on Feb. 21.

THE BUSINESS CASE

Finding time to attend even the most valuable and information-packed conference can be a challenge to busy utility professionals. Also, senior managers or the board of directors may need to be reminded of the importance of keeping up with the utility industry's latest technology. To help you make your case, NRECA has put together a guide to justifying the trip to TechAdvantage.

This step-by-step process lays out the benefits of professional development, not just for your boss, but for anyone who may have lost sight of the big picture. That picture is one of an industry that relies on high-tech systems and equipment that seem to evolve almost daily. TechAdvantage is a showcase for the tools cooperatives will need to continue providing the first-rate service their members expect. ⚡

For links to more resources, visit <http://ww2.wapa.gov/sites/western/es/pubs/esb/Pages/esb3.aspx>

SMART RESIDENTIAL THERMOSTATS

Utilities and consumers are not yet convinced about the value of smart thermostats, the next generation of home heating and cooling controls. In the face of confusing energy savings claims, more information is needed to determine how the devices perform compared to manual and programmable thermostats.

AUTOMATIC COMFORT

Manual and programmable thermostats are the baseline technologies for residential comfort control. Programmable thermostats are in widespread use and sell for as little as \$25. Many state energy codes require them in new construction. They allow users to enter heating and cooling temperature set-points and night setback temperatures for each day of the week. Most devices also let the user specify an “away” setting. Comfort control is automatic unless the user changes the settings.

LEARN FROM OWNERS

Smart thermostats typically cost between \$100 and \$250 and have many more functions than the programmable variety. They run different programs for each day of the week and use temperature setbacks at night or when no one is at home. Users can communicate externally with the thermostat through a web portal that offers set-point control, energy use information and energy tips.

Most smart thermostats include:

- Easy installation
- “Intelligent recovery” that pre-heats the home based on the outside air temperature so that the room temperature reaches the user’s set-point by a selected time.



The Nest smart thermostat
(Photo by Nest)



Venstar ColorTouch T5800 Smart Thermostat
(Photo by Venstar)

- User-friendly programming approaches that make it easy to engage the owner. Different models offer specialized features:
 - The ecobee and E2MS thermostats have built-in energy optimization programs that learn the occupant’s needs and habits over time.
 - Venstar’s ColorTouch Wi-Fi smart thermostat is also a digital picture frame that directly downloads photos from an SD card.
 - Honeywell’s Prestige 2.0 smart thermostat comes with voice-controlled programming – ideal for elderly people or those with physical disabilities.
 - EnergyHub’s Mercury software programs thermostats based on user responses to an on-line interview.
 - The Nest self-programs by operating as a manual thermostat for the first week, and then creating a programmed schedule based on user preferences. Its built-in

occupancy sensor resets to “away” settings when it detects no presence for a period of time. The Nest promotes energy-efficient behavior by displaying a green leaf icon when the user selects an economical set-point. A monthly email report tells users how many days they earned green leaves and compares their score with other Nest users.

Some thermostats have optional appliance control features that allow the homeowner to turn appliances on and off from their personal computer or mobile device. For example, the ecobee smart thermostat can provide remote on/off control for up to 32 devices.

UTILITY CONTROL

Informed homeowners can help utilities reduce peak demand by modifying their energy use when needed. Several companies offer residential thermostats utilities can control during peak demands. Homeowners who agree to install these thermostats

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The only behavior change that is likely to come from a campaign of lecturing and scare tactics is an increase in people digging in their heels, plugging their ears and chanting, “La, la, la.” A better way to get consumers to use less energy or water is to show them how their automatic behaviors cause waste. Better yet, get someone like Rip the Drip, star of Wasting Water is Weird, to show them for you.

According to the sustainability consultants at The Shelton Group, 36 states will face serious water shortages within the next five years. At the same time, Americans each use about 100 gallons of water a day. The Knoxville, Tenn.-based agency’s Green Living Pulse Survey found that 69 percent of Americans believe it is important to personally reduce water consumption, but only 25 percent take action.

So in 2011, the company used videos, an interactive website and social media to launch Wasting Water is Weird and raise awareness of the amount of water wasted during daily activities. Created in conjunction with the Environmental Protection Agency’s WaterSense, the campaign is sponsored by Bosch home appliances, Kohler, Lowe’s and Procter & Gamble.

WATCH THE VIDEOS

The campaign features three 30-second videos of familiar behaviors: running water while you brush your teeth, leaving the hose on while washing the car and running the dishwasher with only a few dishes. Rip is a hilariously creepy character who appears suddenly, when an unsuspecting person is casually wasting water. He makes strange, invasive comments to the culprits until they



Rip the Drip shows off his new fire hydrant showerhead. A long shower may not seem weird until you realize how much water your inefficient old nozzle is sending down the drain. (Photo by The Shelton Group)

realize that “wasting water is just plain weird,” and stop whatever activity they are doing.

Making people aware of their habits in a humorous way seems to work, too. The Shelton Group reports that 29 percent of the people who saw the campaign said they would be moved to change their water usage behaviors.

HAVE FUN, TAKE ACTION

The interactive website gives users the opportunity to get to know Rip better (hint: He’s a Pisces) and connect with his twitter feed. Fans can download wallpaper and ringtones as well.

Rip’s antics may make visitors laugh—or cringe—but they are also intended to inspire them to

cut down their water use, if only to avoid a surprise visit. The navigation at the top of the page moves users around the site to learn more about water conservation. “Don’t be weird” takes you to a screen of free, easy water-saving tips and includes a link to WaterSense.

The “Partners” screen lists the companies that donated time and money to the campaign. The links here connect users to more information about products and equipment to reduce water waste around the house.

BEYOND THE MESSAGE

Water utilities that want customers to think a little more about their daily habits can place a link on their websites to Wasting Water is Weird. Invite customers to visit the site in a bill stuffer or monthly newsletter. Tell teachers in your service area about the campaign—it’s a great way to start a conversation about conservation in science and social studies classes.

But program managers have more to learn from Rip the Drip than common sense measures. If you find that customers don’t seem to be interested in a program you believe in, be willing to step outside your usual marketing box. Use multiple platforms—from bill stuffers to social media—to get your message across to the broadest audience. Tell a great story, find industry allies that share your goals and above all, pay attention to your customers’ needs. Offer them straightforward ways to save money on utility bills, make their homes safer or more comfortable or to just stop being weird, and you will earn their participation—and their trust. ⚡

For links to more resources, visit <http://ww2.wapa.gov/sites/western/es/pubs/esb/Pages/esb5.aspx>

receive reduced rates for participating in the demand response programs.

EnergyHub allows utilities to see how much load is available for a demand response event and shows achieved demand reductions in real time. EcoFactor, a subscription-based energy management platform, works with a variety of smart thermostats to determine the thermal characteristics of a home and occupants' preferences. It then automatically implements energy-efficiency programs for each thermostat, optimizes energy use and documents savings, house by house and day by day. Utilities can also use EcoFactor's centralized information to target energy-intensive households for their incentive programs, or identify homes with poorly performing HVAC equipment.

ENERGY SAVINGS POTENTIAL

Smart thermostat manufacturers claim their product can reduce heating and cooling loads by up to 20 percent. But it has been difficult to verify that a smart thermostat saves more energy than a properly programmed conventional thermostat or a conscientiously monitored manual one. Some studies have shown that about two-thirds of homeowners already operate their manual or programmable thermostats in an energy-efficient manner.

Energy Star's program indicates that a properly programmed thermostat can save homeowners about \$180 per year. However, energy-saving performance varies considerably depending on heating system type, baseline thermostat use patterns, weather zones and annual variations and occupancy patterns. Backup heating systems (wood and pellet stoves) are another variable that affects smart thermostat results.

Electrical energy savings are greatest in households with central electric, forced-air space heating and cooling systems that currently operate with a fixed temperature set-point; that is, the temperature in the home remains constant even if no one is at home or the occupants are asleep.

CONCLUSIONS

Smart thermostats are relatively new and still evolving, and no clear winner stands out among the currently available devices. Responding to the dynamic marketplace, several manufacturers provide remote, auto-updates of their existing thermostat software at no cost. This reduces the likelihood of the device becoming obsolete soon after purchase.

Look for new information about energy savings, as utilities conduct their own tests to determine if the new generation of smart thermostats meets customer needs and produces real energy savings.

ADDITIONAL READING

1. *Can Smart Thermostats Rise from the Ashes of Their Programmable Predecessors?*
Lee Hamilton; E-Source, Sept. 26, 2012
2. *Home Energy Management Products & Trends*
Janelle LaMarche, et al.; Fraunhofer Center for Sustainable Energy Systems
3. *Thermostat Interface and Usability: A Survey*
Alan Meier, et al.; Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, September, 2010.
4. *Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity-Saving Opportunities*
Karen Ehrhardt-Martinez, et al.; American Council for an Energy-Efficient Economy, Report E105, June, 2010.
5. *Technologies and Trends for Residential Smart Grid*
Peter May-Ostendorp; DOE EERE Residential Energy Efficiency Meeting, Denver, Colo., June 21, 2010.
6. *Building Integration with Smart Grid Project*
David Holmberg; NIST Engineering Laboratory. ⚡

For links to more resources, visit <http://ww2.wapa.gov/sites/western/es/pubs/esb/Pages/esb4.aspx>

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project development. Jensen is now products and rates manager for Tri-State Generation and Transmission Association, PVREA's wholesale cooperative.

PVREA didn't take that enthusiasm for granted when it launched its marketing campaign in early spring of 2012. The cooperative worked with developer Clean Energy Collective to promote the solar farm, starting with bill stuffers and web announcements. A strong media outreach landed coverage in newspapers, magazines and local TV station websites. Presentations to renewable energy organizations, community groups and PVREA's annual meeting rounded out the efforts. By the time CEC broke ground in early summer the solar farm was fully subscribed.

CLOSE TO HOME

Key decisions about the solar garden had a distinctly local focus. As a potential development partner, Clean Energy Collective (CEC) offered the convenience of a turnkey package. The

Carbondale, Colo.-based company handles development, sales and contracts, marketing, customer administration, bill crediting and operations and maintenance. But word of mouth may have had more influence with PVREA. "It's a local company that has worked with other Tri-State members," explained Jensen. "I was able to ask Holy Cross [Energy] and San Miguel [Power Association] about their experience. CEC had a good track record."

In choosing a site, PVREA always wanted the installation as close to its headquarters as possible. Finding a parcel of land on its own campus that was the right size with good solar exposure made the decision easy. "Education is an important part of the project," said current Member Services Representative Mark Daily. "We want the community to be able to see and visit their solar farm."

PRICE TAG

Making PV affordable to a wider pool of customers is also central to "solar gardening," and

PVREA was able to sell panels for \$618 each.

To get the price down, PVREA applied solar rebates, tax credits and land lease revenue. "Basically, we executed a power purchase agreement with CEC and they can take advantage of the tax credits," said Daily.

From the utility's point of view, Daily advises learning as much as possible about the project financing. "The more you know, the stronger your position will be," he said.

STAY TUNED...

Poudre Valley REA's solar garden can be counted as a success for the utility and its customers, as well as for the growing phenomenon of community solar. Although the board is taking a "wait-and-see" approach to planning any further installations, more projects are on the drawing board throughout Colorado. With 300 days of sunshine per year and a state policy on solar gardens, don't be surprised to see Colorado cash in on this crop. ⚡

For links to more resources, visit <http://ww2.wapa.gov/sites/western/es/pubs/esb/Pages/esb1.aspx>

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or contact Clean Energy Ambassadors at 406-969-1040
for more information.

