



Solar Community Engagement Strategies for Planners

Planners work to improve the sustainability and livability of their communities. They are uniquely positioned and qualified to promote policies and practices that improve downtowns and neighborhoods, lessen human impacts on the environment, strengthen local economies, and engage community members in analyzing issues, generating visions, developing plans, and monitoring outcomes (Godschalk and Anderson 2012).

Energy use is an important piece of the sustainability puzzle. APA's policy guides on energy and sustainability exhort planners to support energy efficiency, energy conservation, and renewable energy development, including appropriate on-site applications of renewable energy systems along with regulatory and financial support for these technologies (APA 2000, 2004). States, regions, and local communities have also been taking action to promote sustainability and mitigate global climate change by addressing energy use; examples range from state renewable energy portfolio requirements and financial incentives for purchasing renewable energy systems to local plans that address energy use, greenhouse gas emission reduction, and climate change adaptation strategies.

Many communities are looking to solar energy to help them meet energy and sustainability goals. Solar energy is a safe, clean, and abundant energy resource available across the country for decentralized, on-site power generation. Constant improvements in technology and manufacturing processes

are driving prices down, putting these systems within reach of more and more citizens. Solar energy reduces dependence on fossil fuels, and the energy produced by photovoltaic (PV) systems can reduce residents' energy bills and ease demand on the power grid. Solar panels can be easily placed on roofs and over surfaces such as parking lots, making productive use of these underutilized spaces; in fact, studies have shown that California's entire renewable energy goal (20 percent by 2030) could be met by solar panels on rooftops, parking lots, and brownfields (Weinrub 2011).

Planners can play an important role in this area by initiating and facilitating community conversations about solar energy. These conversations may be in the context of formal visioning or goal-setting exercises; alternately, questions or concerns about solar energy may rise spontaneously in response to specific development proposals. Planners should also be aware of common public concerns and misconceptions about solar energy and be able to provide correct and current information in response. Further, they can help raise local awareness about solar energy by helping to create and distribute information materials, such as brochures and website content, and by providing opportunities for public education, including forums and workshops. And planners should know which stakeholders and local experts should be involved in the process. This briefing paper will show how planners can initiate a community conver-

sation about solar energy, respond to common solar myths and misconceptions, and better engage and educate community members about solar energy systems.

Initiating a Community Conversation about Solar Energy

Community visioning is the process of identifying collective values and priorities. Communities conduct visioning exercises both in the context of formal planning processes and as stand-alone initiatives. Through visioning and goal-setting exercises, planners have opportunities to initiate community conversations about solar energy, and these exercises give planners chances to highlight both the benefits of and barriers to increasing local solar energy production.

While visioning is an ideal venue for initiating a community conversation about solar energy, planners should also be prepared to facilitate conversations about solar that might arise either in response to a specific development proposal or through some other phase of the planning process. Discussions of policy or project alternatives may segue naturally into a community conversation about solar. When this happens, planners must be prepared to provide complete and accurate information about solar energy and how it connects to other community goals and values.

Common Concerns and Misconceptions about Solar Energy

Though just about everyone can recognize a solar panel when they see it, unfamiliarity with basic information about solar photovoltaic technology, systems, and economics can be a barrier to solar implementation. Lack of understanding of the technology was one of the top five challenges to solar implementation identified by local governments in a 2011 survey (ICMA 2011). It is important that planners be aware of the most common public concerns and misconceptions about solar energy and be reasonably knowledgeable themselves. Planners must actively address these issues in order to remove conceptual barriers from community interest in and acceptance of solar energy—whether answering individual requests for information from citizens interested in installing solar energy systems or responding to skeptics in a hearing or other public forum.

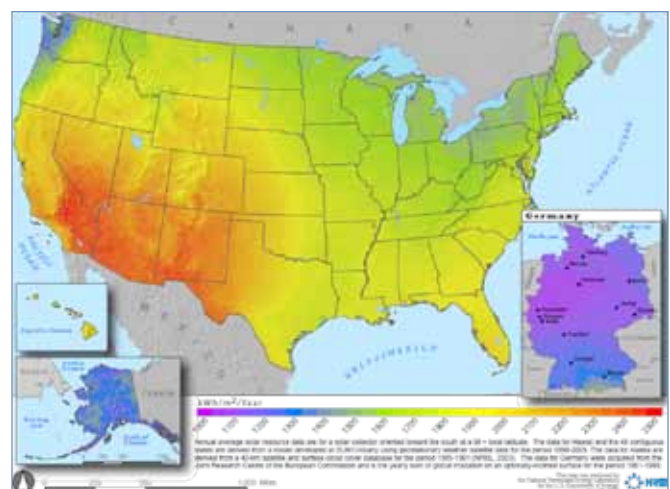
Below is a list of common concerns or misconceptions about solar energy, followed by facts and current research that address these concerns.

Issue: Solar Resource

“It’s not sunny enough in our community to support solar energy production.”

Some see solar energy as a perfect fit for hot and sunny locales such as California or Arizona, but think that their community is too cloudy or rainy for solar production to make sense. However, every state in the U.S. receives as much, or more, sunlight than Germany, which leads the world in solar PV installation and energy production. On a sunny summer afternoon, solar power can offset up to 50 percent of Germany’s total electricity use (Kirschbaum 2012)—and a PV system in Massachusetts will produce 35 percent more annual electricity than its German counterpart (NREL 2012).

Though individual sites vary in the amount of solar insolation they receive due to topography, latitude, and climate, every community in the U.S. receives enough annual solar radiation to make solar a viable energy option. For example, Minneapolis receives 90 percent of the incoming sunlight that Miami sees each year, despite the differences in climate between these locations. Additionally, solar collectors still produce energy in cloudy or overcast conditions, with the panels working more efficiently in the cooler temperatures. According to NREL’s PVWatts solar resource calculator, a 4-kW PV system in Seattle produces more than half of the power of that same system on a Phoenix rooftop—which is still enough to power over half of a typical home’s annual energy needs (NREL 2012).



Most of the U.S. receives more solar resource each year than Germany, the world leader in installed solar capacity. (Image credit: NREL)

Issue: Cost

“Solar is too expensive to consider installing a system on my home.”

Many people support the idea of solar energy production and would love to have their own solar energy systems working away on sunny days but think that the high upfront capital costs of PV panels put solar energy out of reach. Indeed, respondents to the 2011 solar survey identified the high cost of solar as the most significant challenge to solar implementation (ICMA 2011). It is true that solar energy systems are expensive. However, no source of energy is free, and thanks to improvements in manufacturing processes and economies of scale, the cost of solar has been dropping rapidly over the last few years. The installed cost of solar has dropped from \$11 per watt in 1998 to less than \$4 per watt in 2011, with costs falling 36 percent between 2010 and 2011 alone (Barbose et al. 2011; SEIA and GTM Research 2011). In Hawaii, the cost of solar already equals that of other energy sources at current electricity prices (“grid parity”), and by 2020 this is expected to be true for many places across the rest of the U.S. (Denholm et al. 2009).

For homeowners installing their own PV systems, the pay-back period for their investments is falling and in some states can be as little as five to seven years. In some cases, a solar lease or power purchase agreement (PPA) can make a solar system cash-flow positive in the first month. In addition, the longevity of solar PV systems—many are now being warranted for 25 years or more, and most continue to function well long past this point—ensure that homeowners will continue to recoup their initial investment in reduced energy bills and savings for many years after their systems have paid for themselves. In addition, solar systems can add value to homes. Online calculators, such as the Sandia National Labs PV Value Tool, allow homeowners or appraisers to assess the value of solar systems on properties; studies have shown that energy-efficient homes with PV systems gained value faster and sold more quickly than equivalent nonsolar homes in California, with average sale premiums of around \$17,000 for a home with an “average-sized” 3.1-kW PV system (Farhar and Coburn 2006; Hoen et al. 2011).

Finally, a range of financial incentives available from federal, state, and local governments, as well as utilities, are helping to level the playing field for solar and offset the initial up-front costs of PV systems. These include grants, rebates, low-interest loans, and tax credits (DSIRE 2012). Some communities have

established “Solarize” neighborhood collective purchasing programs for residents, which lower upfront costs, reduce complexity, and motivate consumers to act (Irvine et al. 2012). And for those who do not have the resources to purchase their own solar systems, third-party financing arrangements including leases and power purchase agreements (PPAs), in which the homeowner does not own the PV system but gets the benefits of a discounted electricity rate, are becoming more popular and increasingly dominant in markets where policies and rules allow for these options (Wesoff 2012). And cooperative “solar farms” are cropping up as well, in which consumers purchase “shares” in a centralized solar energy facility entitling them to credits for a percentage of the electricity generated by the facility each month. One such example is the Brewster Community Solar Garden Project in Massachusetts, a 1440-panel, 345.6-kW array located on a former sandpit owned by the Brewster Water Department; through “virtual net metering” each shareholder receives monthly credits equal to the energy output of 28 panels (Brewster Community Solar Garden Cooperative 2012).

Issue: Technology

“Solar technology is still improving; it’s better to wait a few years and install a more advanced system.”

As discussed above, the solar industry is making steady improvements in its manufacturing processes, which is helping to drive costs ever lower. But unlike iPods or computers, the basic product of PV technology itself—the delivery of electrons—has not changed and will not change in the future. In addition, PV is a modular and expandable technology that allows for the addition or replacement of existing systems with new equipment if desired. While prices of PV equipment will most likely continue to fall and efficiencies will continue to increase, if solar makes economic sense today there is no reason to wait to install a system.

Issue: Glare

“Glare from solar panels could be annoying to my neighbors or dangerous to drivers.”

The aesthetics of solar panels may raise concern for some residents, and one aesthetic aspect of PV that could shade into the area of nuisance is the potential for glare. However, solar panels

are designed to absorb radiation, not reflect it: constructed of dark-colored materials and covered with anti-reflective coatings, today's typical solar panels reflect as little as 2 percent of incoming sunlight. In addition, individual projects can be analyzed and adjusted to mitigate potential glare issues. A number of solar installations have been successfully located at or near several U.S. airports (including Boston, New York, San Francisco, and Denver), where glare is of paramount concern, and evidence thus far suggests that glare has not been a problem for airport personnel in these instances (FAA 2010).

Issue: Economic Viability

"Solar isn't worth pursuing. It needs too many subsidies to compete with other energy sources, and companies keep going bankrupt."

Renewable energy production, both from wind and solar, has been boosted in the past several years by financial incentives at both the federal and state levels, which may lead to a conception that renewable fuels are not economically feasible energy sources compared to traditional fossil fuels. However, closer examination reveals that not only has oil and gas production been the recipient of significantly more financial subsidies than renewables—an annual average of \$4.86 billion for the former versus \$37 million for the latter—the petroleum industry has been receiving those subsidies since 1918, compared to 1994 for renewable energy (Pfund and Healey 2011). In addition, subsidies for oil and gas production are stable compared to those for wind and solar energy, which have not remained constant or predictable since their inception, resulting in a much more unpredictable market. Indeed, current solar federal incentives are slated to expire in 2016, while fossil fuel subsidies are set to remain intact. Despite these comparative shortcomings in economic support for solar energy, the cost per watt of this energy source is dropping, as noted above, and solar is expected to equal the cost of other electricity sources even without subsidies by 2020.

Likewise, despite the much-hyped bankruptcy of solar manufacturing companies such as Solyndra in 2011, data shows solar as a whole to be a robust and growing industry, with a 28 percent expansion in U.S. manufacturing capacity in 2011. Further, the U.S. saw a 109 percent growth in PV installations in 2011, and these trends are expected to continue (SEIA and GTM Research 2012).

Issue: Environmental Impacts

"Solar panels are manufactured with toxic metals that could contaminate installation sites and pollute landfills if discarded."

Though solar technology and manufacturing may be complex, solar panel composition is fairly simple: most panels are constructed of glass (silicon), with common metals such as aluminum and copper wiring, and don't tend to contain heavy metals or other potentially toxic substances. The one exception is thin-film solar products, which may contain heavy metals. Because few solar panels contain toxic chemicals, they pose little threat of site contamination. And when panels reach the end of their productive lives, they can be broken down into their component parts and recycled. More than 90 percent of a PV module can be recycled; 80 percent of that is glass, with the remainder metals (including silver and aluminum), plastic components, and semiconductors. Furthermore, a number of manufacturers offer voluntary panel take-back programs (Sniderman 2012). Like all manufactured products, the production of solar panels does cost energy—however, studies show that the panels' energy production more than pays off the energy cost of their manufacture, with energy-cost paybacks of less than two years (Sanchez 2008).

Issue: Values

"Solar is only for environmentalists."

Solar energy—and renewable energy in general—is an important source of clean energy and a key strategy for reducing greenhouse gas emissions and mitigating climate change. However, solar is not just for environmentalists. There are a number of other benefits to solar besides "being green"—primarily, saving money on electricity costs. Once solar panels are installed, they will provide a source of free energy for decades with minimal maintenance costs, translating into substantial savings on electricity bills. Municipalities across the country are adding solar PV to city buildings, parking lots, and other structures to help reduce their energy bills for building and plant operations over the long term. For example, a 1-MW solar array installed in 2012 by California's Santa Barbara County at its Camino Real campus, which houses its jail, sheriff's depart-

ment, three public hospitals, and several administrative offices, is expected to offset one-third of the facility's annual energy use, saving the county \$12 million over the life of the system (Solar World 2012). The U.S. military is heavily investing in rooftop solar to power facilities and reduce dependence on costly foreign oil, and local emergency service providers are adding solar facilities to provide alternative sources of power for operations. Even NASCAR is joining the solar movement—it has installed a solar array at its Pocono track in Pennsylvania that will be able to power that entire facility, along with 1,000 homes.

Research and experience is proving that solar is a safe and abundant source of clean energy. Apart from ensuring that local plans and development regulations allow residents to easily install approved solar energy systems in appropriate contexts and locations, planners can help communities tap into this resource by providing current and accurate information on solar energy to the public and addressing any concerns that may be voiced.

Strategies for Community Engagement

One of planners' main roles is to make sure that local residents have access to reliable information about planning issues and other topics of interest. Besides simply being repositories of information on solar energy, planners are in a position to educate and inform their communities about the general benefits of solar, as well as promote solar-related goals and policies their local governments have adopted or solar programs they may be offering. There is a need for public education and outreach around solar energy; "lack of interest in or awareness of solar energy development" was the third most commonly reported challenge in the 2011 solar survey (ICMA 2011).

Planners can assist with local solar efforts by developing materials about and conduits for information on solar technology, policies, and programs to help educate the public, as well as facilitate hands-on opportunities for residents to learn more about solar energy. There are a number of tools and strategies planners can use.

Solar Fact Sheets, Brochures, or Guides

Planners can help develop solar fact sheets, brochures, or guides on a number of helpful subjects, including the benefits of solar energy; answers to common questions and concerns (see above); local solar visions, goals, policies, and programs; the specifics of local solar regulation and permitting; and federal,

state, or local incentives.

For example, Seattle's Department of Planning and Development has created a Client Assistance Memo on solar energy system permitting, which describes solar PV and hot water systems and outlines permitting and land-use requirements, design and installation standards, contractor selection considerations, and financial incentives. Similarly, the Bureau of Development Services in Portland, Oregon, offers detailed program guides for residential dwellings as well as commercial buildings that define solar PV and water heating systems and provide information on installation, permitting, and inspection requirements. In lieu of creating new documents, planners can also help connect residents to existing material, such as the information resources available through the SunShot Initiative at www1.eere.energy.gov/solar/sunshot/resources.html.

Solar Maps

Planners can help guide the development of a solar mapping application for their community. A number of local governments have developed interactive online maps that track solar installations within their jurisdictions and allow residents to determine the solar potential of their home or property. For example, San Francisco's solar map highlights existing solar PV and water heating installations in the city (identifying locations, system sizes, and installers) and allows users to enter a city address to find a property's solar electric and water heating potential. The second briefing paper in this series, "Solar Mapping," provides more information on this educational tool.

Solar Websites

Planners can create online, one-stop information portals for solar energy for residents in their community. These sites can provide links to solar information resources; local policies, regulations, and permitting information; a calendar of events for solar workshops or educational events (see next section); profiles of and contact information for local solar installers; or information on local demonstration projects.

For example, Knoxville, Tennessee, a 2008 Solar America Communities city, designed their solar energy website, www.solarknoxville.org, to be a "one-stop shop for citizens, business owners, and students wishing to learn more about solar energy and how it can be used in our community." It provides basic information about solar PV and water heating systems, links to local installers, a list of exemplary local solar installations, and

local events, workshops, and solar tours. The City of San Jose, California, offers a one-stop shop website that lists the city's Green Vision and solar goals; describes the benefits of solar energy and different types of solar technology; lists financing incentives and permitting requirements; and provides additional solar resources and information.

Local Solar Recognition Programs

In order to raise awareness and promote pride in local solar energy installations, planners can develop local recognition or awards programs for solar energy systems. The City of Santa Barbara, California, adopted solar design guidelines and created a recognition program in 2006 as part of the city's participation in the federal Million Solar Roofs program. Both passive and active solar projects that are completed in compliance with the city's Solar Energy Systems Design Guidelines are considered "Sustainable Santa Barbara" leadership solar projects eligible for annual awards in several categories, including "Design Challenge" projects that are publicly visible and "Special Challenge" projects on Mission-style tile roofs or on historic structures. By 2011, the city had seen at least 426 systems installed, with more than 140 systems pending installation.

Solar Workshops

Planners can help organize public workshops about solar energy and implementation. Apart from providing information about solar energy systems directly to participants, workshops provide an opportunity for meaningful public dialogue about solar myths, misconceptions, and local concerns. These discussions can help planners identify barriers to and strategies for adoption and acceptance of solar energy. Possible partners include industry groups, nonprofits, and educators.

For example, Portland's Solar Now! Program has teamed up with the outreach and education nonprofit Solar Oregon to connect local residents to a range of public workshops for both residential and commercial solar applications. Similarly, Seattle's publicly owned electric power utility, Seattle City Light, partnered with Northwest SEED, a sustainable energy nonprofit, to offer free "Solar Works in Seattle!" workshops over a period of 12 months at Seattle Department of Parks and Recreation community facilities throughout the city. Workshops covered the basics of solar electric and hot water systems, as well as more in-depth views of the technologies

and installation processes, and reached an estimated 500 residents (U.S. DOE EERE 2011c).

Solar Curriculums

Planners can work with organizations and educators to develop and promote teaching units about solar energy. This offers important opportunities to instill interest and excitement about renewable energy sources and sustainability in younger generations. The City of Austin, Texas, worked with science coordinators and curriculum directors from the Austin Independent School District to develop hands-on learning curriculum materials designed to be used in conjunction with PV installations at local schools (U.S. DOE EERE 2011a). The city has 13 PV installations at local schools and community colleges that feature web-based monitoring systems, allowing students to monitor the performances of systems at their schools and compare them to those at other schools.

Solar Demonstration Projects

A number of municipalities are installing solar installations on public buildings to both cut energy use and costs and promote sustainability principles and practices. Planners can help coordinate the use of these installations as teaching tools through educational and outreach elements, such as information kiosks at installation sites, real-time online tracking of power generation on the city solar website, and tours of installation facilities. Many private-sector corporations and organizations are also installing solar energy systems as part of their facilities for much the same reasons, and planners can work with these entities to coordinate similar educational opportunities.

For example, the City of Bellingham, Washington, installed a 12-panel, 2-kW solar PV system on the roof of its Environmental Learning Center at Maritime Heritage Park, in partnership with Puget Sound Energy's Green Power Program and the Bonneville Environmental Foundation. An interactive kiosk details the real-time and historical performance of the system and visually depicts how solar energy is generated; the kiosk will later be moved to Bellingham's city hall. As another example, in 2009, the Township of Hardyston, New Jersey, installed a 75-kW PV array on a solar support structure that doubles as a carport for police vehicle parking, which meets about 30 percent of the municipal complex's annual energy needs and is projected to save the township \$1.5 million over a 15-year period. A web-

One Community's Experience: Salt Lake City, Salt Lake County, and Utah Clean Energy Opening the Door to Solar Energy

In 2007 Salt Lake City and Salt Lake County, Utah, established a goal to achieve 10 MW of solar PV installed by 2015. At the time they had virtually none of the foundational pro-solar policies, rules, and incentives in place in surrounding states. What's more, community stakeholders had limited exposure to solar energy, which translated to limited awareness and understanding of solar technologies and applications. Undaunted by the formidable task at hand, the city and county joined forces with a trusted local nonprofit, Utah Clean Energy, and other partners to tackle the barriers to solar one by one. Their strategic public-private initiative, known as the Solar Salt Lake Partnership (SSLP), laid the foundation for significant solar market growth. Five years after Salt Lake City was named one of the U.S. Department of Energy's first thirteen Solar America Cities in 2007, the installed rooftop solar PV capacity in the city and county has increased nearly 4,000 percent, growing from a nominal 158 kW to nearly 6,500 kW in 2011. In recognition of their successes and their ability to build bridges from brick walls, the SSLP has received "Barrier Buster" and "Mountain Mover" awards from the U.S. Department of Energy.

Instrumental to the success of the SSLP was a concerted focus on community engagement and outreach to diverse stakeholders, including utilities, regulators, policymakers, planning and zoning officials, building officials, businesses, citizens, and solar installers. As manager of the SSLP, Utah Clean Energy worked closely with the city and county to implement several of the following community engagement strategies, which helped garner broad support for solar and eliminate roadblocks to solar energy:

- Solar workshops with well over 100 stakeholders to inform the development of Powering Our Future: Solar Salt Lake Implementation Plan, a toolbox for elected officials, government agencies, and affiliated partners to grow the local solar market
- A solar mapping website with calculator, developed by the city's GIS specialists and IT consultant Critigen, to help local citizens better understand their solar resource potential
- A brief billboard and media campaign to direct people to the solar mapping website and implementation plan



Billboard from the Solar Salt Lake Partnership's solar campaign. (Image courtesy of Utah Clean Energy)

- Solar Code Trainings with solar code experts to educate building and permitting officials about solar technologies, facilitating easier permitting of solar projects
- Peer-to-peer and community forums and workshops, through the city's Sustainable Code Revision Project with Clarion Associates, to review and develop new solar-friendly zoning ordinances, which the city ultimately adopted
- Strategic collaborations with businesses and citizens to garner support among key decision makers for a state law enabling third-party power purchase agreements (PPA) for Utah's governments, schools, and churches
- Engagement with over 100 stakeholders in the utility regulatory arena to increase the allowable interconnected solar project size from 25 kW to 2 MW and give fair value to excess solar generation

While major strides have been made on the solar front and the solar market continues to expand, Salt Lake City, Salt Lake County, and Utah Clean Energy remain steadfast in their efforts to unlock the local solar market. As part of U.S. DOE's Rooftop Solar Challenge, the three partners have united with four other local governments to tackle solar permitting, financing, and solar zoning.

Sara Baldwin, Utah Clean Energy

site tracks the system's energy production, and the township installed a monitor screen in the local middle school as an educational tool for students.

Partnerships with Experts

Planners can't do all of this work alone; in many cases, planners and municipal governments do not have the expertise, the time, or the resources to provide solar energy information or education. Many cities and counties have developed relationships with local experts in solar energy to help promote solar awareness in their communities—from hiring consultants to partnering with nonprofits, local industry professionals, or educators to provide information or educational opportunities on solar energy systems.

To illustrate, the city of Berkeley, California, has partnered with local nonprofit Community Energy Services Corporation (CESC) to provide free, independent energy education and site-specific installation advice for residents and businesses. As part of the partnership, CESC will walk homeowners and businesses through the solar energy system planning and installation process. CESC also offers free energy efficiency and solar potential assessments of individual properties, maintains a preapproved vendor list of solar installers, and will assist residents in analyzing and choosing the best project bid from those vendors. Similarly, the city of Madison, Wisconsin, hired a Midwest Renewable Energy Association–certified consultant through 2012 to act as a “solar agent” for home and business owners. The prospective solar owner agent (PSOA) performed free site surveys for interested residents, and if the property received a favorable rating, the agent arranged an on-site assessment, prepared a financial assessment of the potential system, and helped the resident gather and compare quotes from local solar contractors (U.S. DOE EERE 2011b).

Conclusion

Energy use is an important issue for communities to address both for environmental and economic reasons. Renewable energy is an important piece of the energy puzzle, and solar energy is a promising resource that municipalities and their residents can tap into to reduce energy costs, greenhouse gas production, and dependence on fossil fuels and foreign sources of oil. Planners can help their communities meet their solar energy visions and accomplish implementation items by ensuring

that residents know the facts about solar energy and are aware of local programs and goals. By becoming knowledgeable about common solar energy concerns and by using a variety of strategies and tools for increasing public awareness, planners can help their communities move toward greater sustainability.

■ *This solar briefing paper was written by Ann Dillemoth, AICP, Research Associate at the American Planning Association, with assistance from Sara Baldwin, Senior Policy and Regulatory Associate at Utah Clean Energy, and Chad Laurent, Senior Consultant, Meister Consultants Group.*

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Planning for Solar Energy Briefing Papers

This is one in a series of briefing papers providing planners with guidance on promoting solar energy use in their communities to help meet local energy and sustainability goals. APA produced this paper through its participation in the SunShot Solar Outreach Partnership (SolarOPs), a U.S. Department of Energy-funded initiative designed to help accelerate solar energy adoption on the local level by providing timely and actionable information to local governments.

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