Bring Solar to Your Community

Themes, Summaries, and Insights from 27 Case Studies

Photo: A 105 kW solar PV installation on a leased commercial property in Gainesville, Florida. Photo courtesy of Solar Impact.

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SOLAR OUTREACH PARTNERSHIP

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The U.S. Department of Energy (DOE) launched the SunShot Initiative in 2011 "to make solar energy fully cost-competitive with traditional energy sources before the end of this decade, making this clean renewable energy resource more affordable and accessible to Americans."[1] Specifically, SunShot aims to bring the total installed cost of solar photovoltaic (PV) systems to $.06 per kilowatt hour (kWh) by 2020. To achieve this goal, both the hard and soft costs of installations must be reduced. Hard costs are those associated with the hardware of a solar PV system, such as panels and racking systems. Soft costs are those associated with permitting, customer acquisition, and other "non-hardware" costs. While these efforts are focused on both utility- and nonutility-scale solar PV, this report focuses on only non-utility scale solar PV and the efforts of local municipalities to overcome challenges to increased deployment of solar PV on the rooftops of homes, businesses, and public facilities.

In 2012, the SunShot Initiative conducted the SunShot Vision Study, which evaluates the impact of a 75 percent reduction in the cost of solar technology—the hard costs. The study projects that reductions at that level (the SunShot scenario) will result in substantial outcomes, including 330 gigawatts (GW) of combined solar PV and concentrating solar power (CSP)[2]—equivalent to 14 percent of the nation's energy needs—by 2030, and 715 GW of combined PV and CSP—equivalent to 27 percent of the nation's energy needs—by 2050.[3] If reductions in both hard and soft costs decrease the total installed price to $.06/kWh, the projected installations would reduce electrical bills for homes and businesses by up to 14 percent—an annual savings of $20 billion by 2050.[4] Further, the manufacturing, distribution, installation, and maintenance of these systems are projected to create 390,000 new jobs.[5]

Photo courtesy of City of El Paso

Aztec Pavilion powered by a 5-watt solar array in El Paso

To achieve these outcomes, the SunShot Initiative provides private companies, academic institutions, laboratories, municipalities, and the solar industry with direct financial resources, technical assistance, and access to information. Together these entities work to reduce the cost of solar technology, enable high penetrations of solar energy on the electrical grid, and accelerate the adoption of solar technology in the marketplace. Progress toward these goals is discussed in the 2014 SunShot Initiative Portfolio Book.

According to DOE, the soft costs associated with rooftop solar PV account for up to 64 percent of the price of a residential solar energy installation.[6] Along with efforts to reduce hard costs, reducing soft costs is an important component of the SunShot Initiative's approach to making solar energy systems cost-competitive with other energy sources and achieving the 75 percent reduction in costs by 2020.

Another challenge of addressing the soft costs of solar PV installation is the diffused nature of rules, plans, permitting processes, economies, and financing tools across 50 states, 3,000 utilities, and 18,000 jurisdictions.[7] Turning this challenge into an opportunity, the SunShot Initiative is engaging local public agencies, citizens, and industry leaders across the country to discuss their successful solar PV efforts and lessons learned. To this end, it has conducted case studies of different municipalities' approaches to solar PV and made them available for others to identify practices that may fit their unique contexts and facilitate increased solar PV deployment.

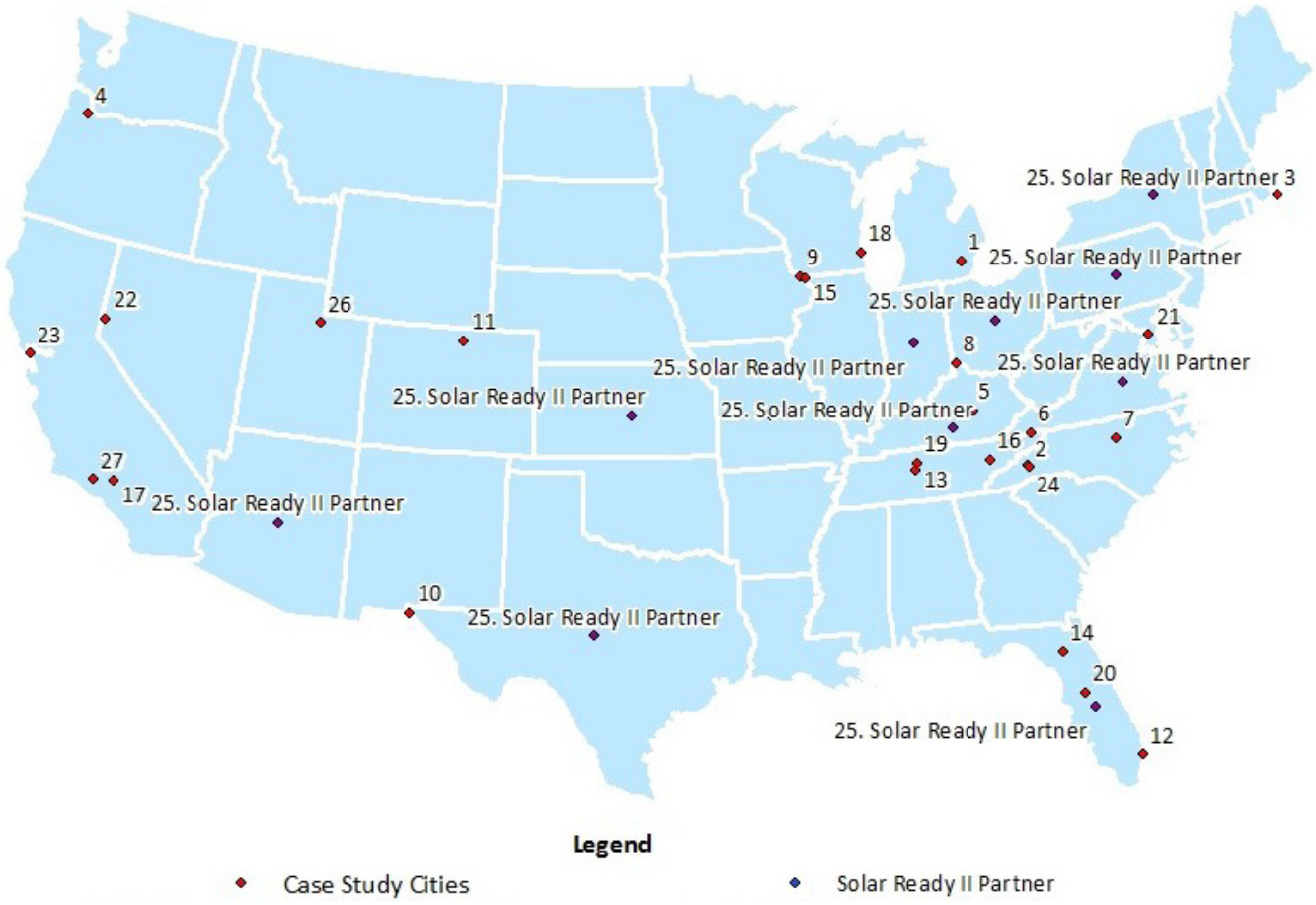

Figure 1: SunShot Case Study Cities

In addition to hard and soft costs, the SunShot Initiative recognizes that there are other barriers to increasing solar energy deployment. These can include a substantial need for continued education for electrical customers and for increased collaboration among utilities, public agencies, and the installation industry.

This document distills themes and insights of rooftop solar PV deployment gained from 27 case studies of local government efforts regarding policies, planning, investments, financing mechanisms, partnerships, and education. It is organized into an easily searchable format so readers can quickly identify what is of the most value to them, learn about the experience of others, and develop a strategy for their own communities. It also provides one-page summaries of 10 select case studies. The 27 case studies reviewed for this report are from the following jurisdictions:

1. Ann Arbor, MI
2. Asheville, NC
3. Barnstable, MA
4. Beaverton, OR
5. Berea, KY
6. Bristol, TN
7. Chapel Hill, NC
8. Cincinnati, OH
9. Dubuque, IA
10. El Paso, TX
11. Fort Collins, CO
12. Fort Lauderdale/Broward County, FL
13. Franklin, TN
14. Gainesville, FL
15. Galena, IL
16. Knoxville, TN
17. Lancaster, CA
18. Milwaukee, WI
19. Nashville, TN
20. Polk County, FL
21. Prince George's County, MD
22. Reno, NV
23. Richmond, CA
24. Solarize Asheville
25. Solar Ready II
26. Summit County, UT
27. Ventura County, CA

The goal of the case studies and this document is to provide a resource for stakeholders that identifies successful practices that have increased deployment of rooftop solar PV on residential buildings, small businesses, and public facilities in other communities. Stakeholders are units of local government, solar PV advocates, citizens, job-training programs, utilities, and other organizations or individuals interested in renewable energy, job creation, and a sustainable energy system.

These case studies and this document also provide a snapshot of the "state of the nation" in facilitating rooftop solar PV. This snapshot establishes a baseline of understanding so that the SunShot Initiative and other solar leaders can track the evolution of successful ideas to help stakeholders identify solutions with the greatest chance of succeeding in their unique political, market, environmental, and community contexts and achieve compelling outcomes, such as increased solar PV deployment, reduced carbon dioxide (CO2) emissions, green-collar job growth, lower utility bills, and more resilient communities.

To review all 27 case studies, visit the SunShot Solar Outreach Partnership website at www.solaroutreach.org/resources.

How to Use this Document

This document describes key themes identified in the 27 case studies (see Table 1 on page 8). Once readers select a particular theme, practice, or example to pursue, they can find the full case study at www.solaroutreach.org/resources. Within the case study, they can review more detailed information about the topic of interest and how it fits in to each particular community's approach to solar PV. Readers can then contact the municipality(s) for additional context.

Themes

Each theme serves as an umbrella under which specific practices are described. Collectively, the themes are a dissection of successful rooftop solar PV efforts and, as such, are considered critical components (in one form or another) of successful rooftop solar PV deployment.

Improved permitting: Significant contributors to rooftop solar PV soft costs are the fee, schedule, and, often, technical expertise needed to secure permits. In this regard, municipalities have successfully used several approaches tailored to meet their specific needs, including creating permits specific to solar PV, guaranteeing and expediting review times, setting affordable fee schedules, making documents and information available online, and providing permitting guidance.

Solar PV in state and local plans and policies: Whether at the state or local level, solar PV has found a place in zoning ordinances, comprehensive and neighborhood plans, climate action plans and policies, and sustainability plans. Sometimes solar PV is included with wind, biomass, or other technologies as one of many tools used to achieve broader renewable energy goals; other times, it is called out specifically within plans and policies as a tool used to achieve environmental, economic, public safety, or climate change resilience goals.

The importance of identifying solar PV in plans and policies, whether alongside other technologies or by itself, is related to the role of plans and policies in public and private investment. Including solar PV in plans and policies paves the way for investment in solar PV on public facilities, allows for or even mandates solar PV on new development, provides benchmarks against which progress is measured, and demonstrates commitment to renewable energy.

Financing, reward, and compensation programs: Programs that provide financial incentives for the installation of rooftop solar PV are created and managed at the state and local levels. A state's involvement often consists of legislation that enables or mandates municipalities and/or investor-owned utilities to provide incentive programs. Such programs may address the hard and soft costs of solar PV installation, such as bulk purchasing (see, e.g., Property Assessed Clean Energy [PACE]) programs; financially compensate property owners for energy they generate through rooftop solar PV that is diverted to the grid (net metering and Feed-in Tariff programs); or provide a one-time financial incentive for installing rooftop solar PV. This theme includes loan programs specific to solar PV installation.

Local solar PV champions: Individuals or organizations that champion the increased integration of solar PV into the energy matrix play an important role. In every case study, these champions—local elected leaders, municipal and investor-owned utilities, municipal staff, citizens, and/or community-based organizations—have successfully used their influence to create and amend policies and direct investment toward the installation of rooftop solar PV.

Partnerships: Apparent in all the case studies is that successful solar PV programs or investment does not occur through the will and efforts of one person or organization alone. Partnerships have proven to be a critical component of increased solar PV deployment. This theme broadly identifies partnerships as between any two or more organizations across different sectors, such as public-private partnerships, multijurisdictional collaboration, and contractual relationships between public agencies and the solar PV industry.

Solar PV on public facilities: Many of the case studies show that municipalities are leading by example, installing solar PV on public facilities and amenities. This has produced operational cost savings, reductions in greenhouse gas (GHG) emissions, publicly accessible renewable energy, and public educational opportunities that result in increased solar PV installations. Approaches to finance, locate, and communicate solar PV benefits vary among the municipalities and thus suggest options for others to evaluate for their own applications.

Formal solar or sustainability programs: Growth in solar PV is often attributable to solar PV resources being initiated and managed by formal programs dedicated to sustainability and renewable energy. These programs can have goals specific to rooftop solar PV, which can help direct public investment, decision making, and policies, and tend to have staff dedicated to realizing their missions. Long-range planning, permitting, public works, and parks departments can integrate rooftop solar PV into their plans, policies, and practices. Formal programming also includes leadership by such entities as task forces and commissions with related missions, which provide not only the organizational capacity that can leverage political and financial support but also a solid framework so that solar PV can evolve with changing political, economic, environmental, and technological changes.

Table 1: Theme Table for All 27 Case Studies

CASE STUDY	IMPROVED PERMITTING PROCESS FOR SOLAR PV	SOLAR PV INCLUDED IN STATE AND LOCAL PLANS AND POLICIES	FINANCING, REWARD, AND COM-PENSATION PROGRAMS	LOCAL SOLAR PV CHAMPIONS	PARTNER-SHIPS	SOLAR PV ON PUBLIC FACILITIES	FORMAL SOLAR OR SUSTAIN-ABILITY PROGRAMS
Ann Arbor, MI		x	x	x	x	x	
Asheville, NC	x		x	x	x		x
Barnstable, MA		x	x	x	x	x	x
Beaverton, OR	x	x	x	x	x	x	x
Berea, KY			x	x	x	x	
Bristol, TN		x		x	x	x	
Chapel Hill, NC		x	x	x	x	x	x
Cincinnati, OH		x	x	x	x	x	x
Dubuque, IA				x	x	x	x
El Paso, TX	x	x	x	x	x	x	x
Fort Collins, CO	x	x	x	x	x	x	x
Fort Lauderdale/ Broward County, FL	x	x	x	x	x		x
Franklin, TN		x		x	x	x	x
Gainesville, FL			x	x	x		
Galena, IL				x	x	x	
Knoxville, TN	x		x	x	x	x	x
Lancaster, CA	x	x		x	x	x	x
Milwaukee, WI	x	x	x	x	x	x	x
Nashville, TN		x		x	x	x	
Polk County, FL	x	x	x	x	x	x	
Prince George's County, MD		x	x	x	x	x	
Reno, NV	x	x	x	x	x	x	x
Richmond, CA	x	x	x		x		x
Solarize Asheville, NC	x		x	x	x		x
Solar Ready II	x	x	x	x	x		x
Summit Community Solar	x	x	x	x	x		x
Ventura County, CA		x		x	x	x	

Case Study Summaries

Local governments across the country are using various approaches to grow the role of rooftop solar PV in their energy supply and thereby create jobs and improve the environment. These approaches are profiled in the 25 case studies conducted under the DOE SunShot Initiative. This section contains summaries of 10 of those case studies; full versions of all 27 case studies can be found here www.solaroutreach.org/resources.

These 10 summaries were selected because they provide a snapshot of practices employed by small towns and large cities distributed geographically across the country. Some communities emphasize permitting, policy, and financing, whereas others have a stronger emphasis on installing solar PV on public facilities.

Barnstable, Massachusetts

The largest town on Cape Cod, Barnstable comprises seven unincorporated villages within 76.2 square miles and hosts a population of nearly 46,000 full-time and 146,000 summer residents. It is a major transportation hub for the Cape Cod region and the islands of Nantucket and Martha's Vineyard. Barnstable achieved the most total solar energy capacity and the third-highest solar PV installations of any municipality in the Commonwealth of Massachusetts. Two organizations in the Cape Cod region—the Cape Light Compact (CLC) and the Cape and Vineyard Electric Cooperative (CVEC)—have been central to the success of solar PV and other renewable energy projects in Barnstable.

Regional renewable energy infrastructure: CLC, established in 1997, is an energy efficiency administrator and municipal electricity aggregator. It was organized through a formal intergovernmental agreement signed by 21 member towns in Cape Cod and Martha's Vineyard, including Barnstable and Dukes Counties. CVEC was founded in 2007 as the result of a strategic planning process led by CLC to determine how to develop electric generation projects and enter into long-term power purchase agreements (PPAs), which CLC and member towns could not do. CVEC designs, finances, and operates renewable energy projects that benefit its local government members by improving electric service and reliability and acquiring the best electricity supply rates for consumers and local government members.

819 KW Solar Array at Barnstable Water Pollution Control Facility

THEMES IN BARNSTABLE CASE STUDY	
Plans and policies	x
Financing and incentives	x
Local champions	x
Partnerships	x
Public facilities	x
Formal programs	x

Local government collaboration: As the regional entity responsible for procuring and facilitating the development of renewable energy projects for its member towns, CVEC has helped Barnstable install more than 5 megawatts (MW) of solar PV on public-owned facilities—again, the most total solar energy capacity and the third-highest solar energy installations of any municipality in the commonwealth.

Strong state and local leadership: Key to Barnstable's success is strong state and local leadership. When Massachusetts's goal of producing 250 MW of solar energy by 2017 was actually achieved in 2013, the commonwealth responded by setting a more ambitious goal of 1,600 MW of solar energy by 2020. It also established the legal infrastructure (S. 2395, An Act Relative to Competitively Priced Electricity in the Commonwealth) and policies and programs (Green Communities program and Solarize Mass) to support local governments, businesses, and residents in reducing energy consumption and developing and using clean, renewable energy.

Town manager leadership: The history of Barnstable's solar energy commitment dates back to Town Manager John Klimm (1999 – 2011), who was an early advocate for renewable energy. Mr. Klimm made a point to institutionalize renewable energy programs through the creation of the Renewable Energy Commission, advocating for ordinances such as the Ground Mounted Solar Photovoltaic Overlay District. Town Manager Thomas Lynch (2011 –) continues this sup-

port: "Reducing our greenhouse gas emissions through energy efficiency and renewable energy is central to the town's management and growth strategy. Being a coastal community, we are on the front lines of sea level rise, major storms and other effects of climate change. Our government leaders and residents understand the challenges we face and take responsibility for doing our part."

El Paso, Texas

El Paso has a population of more than 800,000 within a land area of 248 square miles in West Texas. City officials are outspoken about their intention of making El Paso the most livable city in the country and are relying on strategic policy and investment decisions—focused on sustainability—to achieve their goals, which include the advancement of solar PV. Their plans are working: solar PV installations jumped from 4 in 2009 to more than 400 in 2013—a 9,900 percent increase. Below are the key factors in this success.

Offering rebates: The city established a solar PV rebate program through a partnership with El Paso Electric. It estimates that this effort has reduced CO2 emissions by 3,300 metric tons between 2008 and 2013 and has yielded more than 1.5 MW of renewable energy for homes.

Retrofitting the permitting process: Tackling a cumbersome permitting process, the city created solar PV – specific permitting with a fee ceiling of $150, and it generally takes no more than three days to review and approve applications.

Making sustainability official: The city established the Office of Sustainability and formally adopted the Livable City Sustainability Plan. The guiding principle of the office is that sustainability is fundamental to a livable and well-managed community.

Having a voice: With partners such as the Sustainable Energy Advisory Board, the city advocates for progressive statewide solar PV policies to foster the growth of the solar economy.

Growing a solar workforce: In 2009 the city conducted a SWOT (strengths, weaknesses, opportunities, threats) analysis with its partners to evaluate solar PV's potential in El Paso. One of the key opportunities identified was to create a solar PV workforce. To move forward on this finding, the city and the El Paso Electricians Joint Apprenticeship and Training Committee worked to expand job-training programs to include solar PV – related skills and certification. Since 2010, the programs have collectively certified a regional-scale workforce.

THEMES IN EL PASO CASE STUDY	
Permitting process	x
Plans and policies	x
Financing and incentives	x
Local champions	x
Partnerships	x
Public facilities	x
Formal programs	x

Leading by example: The city installed solar PV on several public facilities, including the Municipal Service Center. At El Paso International Airport, solar PV – covered parking saved $345,280 in capital investment and will yield a 587-ton CO2 reduction and save more than $250,000 over 10 years.

Rooftop solar PV on El Paso Municipal Service Center

Fort Collins, Colorado

Fort Collins, with a population of nearly 150,000 and a land area of 54.28 square miles, is located in a state with one of the nation's strongest renewable portfolio standards. A number of additional factors have created a desirable environment for the development of solar PV systems: strong public advocacy for renewable energy policies and practices, the city council's willingness not only to listen to citizens but also to collaborate with the local electric utility in the development of solar incentives and programs, and city ownership of the utility.

In Fort Collins, as in most of the nation, up-front costs make solar prohibitive for many homeowners and businesses. Although federal incentives have helped mitigate these expenses, residents and elected officials have

The Fort Collins Museum of Discovery 36 kW PV array

recognized that more is needed. To create incentives for solar PV, the city has established several programs, including a solar rebate program, on-bill financing, a community solar garden (CSG) program, and a feed-in tariff (FIT) program.

Solar rebate program: Recognizing that the development of solar PV can help achieve local and state energy goals, the city council made solar PV rebate funds available through Fort Collins Utilities, the city-owned utility. In both 2013 and 2014, the city allocated $250,000 for the rebate program, which supports approximately 30 new PV projects annually, with a combined capacity of 125 kW. This popular program is always fully subscribed, often with a waiting list, and has generated more than 200 PV systems in the past five years.

THEMES IN FORT COLLINS CASE STUDY	
Permitting process	x
Plans and policies	x
Financing and incentives	x
Local champions	x
Partnerships	x
Public facilities	x
Formal programs	x

On-bill financing: As another means of helping with up-front costs and providing an incentive for solar PV, the city chose on-bill financing, which allows homeowners to repay loans (between $1,000 and $15,000) through installments on their utility bills.

CSG program: Under the CSG program, which expands small-scale PV options for utility customers who do not have favorable sites for rooftop solar, residential and business customers are able to buy into a 250 kW city project and receive incentives comparable to those for rooftop PV systems.

FIT program: Under the program, which is intended to create incentives for the installation of 4 – 5 MW of solar capacity, Fort Collins Utilities will enter into a 20-year PPA with commercial customers for solar projects that are within its service area and sized between 10 and 1,000 kW. The energy output of the installations will go directly to the company's electric grid, and customers will be paid on the basis of their PPAs.

In addition to these incentive programs, Fort Collins participated in the Solar Friendly Communities (SFC) project, which was established to promote rooftop solar by streamlining local government permitting processes, thereby helping to bring down the soft costs associated with solar. Through the SFC project, Fort Collins learned about modest, high-impact changes that allowed the city to streamline its permitting process for little to no cost and without substantial political commitment.

> "Always, permit and rebate applications take time and effort, but solar kudos to Fort Collins Utilities. They are very helpful and responsive in administrating solar rebates and net metering programs. I also appreciate the concerted effort of Fort Collins Building Services and Utilities working together to help expedite the permitting process."
>
> **Clara Burnham, local installer, Burnham and Sun**

Franklin, Tennessee

Franklin is a historic community located in Williamson County, about 20 miles south of Nashville. Roughly 30 square miles in size, the city has a population of 59,000. Determined to become one of America's greenest cities, Franklin successfully integrated solar into the community through a public-private partnership, installing a low-impact 200 kW array at the municipally owned wastewater treatment facility at no cost to the city. It also successfully integrated solar into its historic structures without losing the cultural integrity of the community.

Public-private partnerships yield revenue and renewable energy: The city entered into a PPA with Energy Source Partners (ESP), a private solar developer, for a 20-year ground lease of one acre to produce solar power at the city's wastewater treatment facility. With no up-front cost to the city, ESP provided the design, construction, funding, and maintenance of a 200 kW ground-mounted solar array at the facility. ESP sells

Ground Mounted Solar Array at the Franklin Wastewater Treatment Facility

all the energy produced onsite to the Tennessee Valley Authority as part of the Generation Partners Program and shares a percentage of the revenue with Franklin. The city anticipates earning $11,530 per year until the estimated payoff in year nine, after which the average projected annual revenue will be $31,530 through the end of the lease agreement. The partnership will then continue for a second phase. The team submitted an application to install a megawatt of power at the wastewater treatment plant. The increased production will raise the monthly offset from $5,000 to $30,000.

THEMES IN FRANKLIN CASE STUDY	
Plans and policies	x
Partnerships	x
Local champions	x
Public facilities	x

Solar and historic preservation are compatible: Franklin's approach to historic preservation is consistent with the city's vision for sustainability. Believing that historic preservation should not preclude renewable energy use, city leaders updated Franklin's Historic Guidelines to include the use of solar PV on historic structures. These guidelines preserve character-defining features and the historic fabric while accommodating the need for solar access to the greatest extent possible. Many of the structures planned for solar installations are listed on the National Register of Historic Places (NRHP), so leaders worked with the state historic planning office to ensure that their designations were not compromised. The city has completed three solar projects in the historic district, including a 200 kW array on The Factory, which was built in 1929. A member of the NRHP, The Factory is rich with history, and a very careful renovation has preserved many of its original features and architectural details.

> "This project is a public-private partnership that allows the city of Franklin to generate both revenue and renewable energy that lowers its carbon footprint. . . . Franklin will lead by example as a city committed to being a better steward of both its resources and the environment."
>
> **Ron Mercer, CEO, ESP**

> "Franklin is a historic community that maintains its identity while incorporating solar without compromising who they are. "We start with the premise that historic preservation is sustainability, so solar fits well within that."
>
> **Amanda Hall, Preservation Planner, City of Franklin**

Gainesville, Florida

The city of Gainesville encompasses roughly 61 square miles in northern Florida and boasts a population of 124,354. Gainesville's leaders have been pursuing the advancement of solar technologies for more than a decade. Through Gainesville Regional Utilities (GRU), a municipally owned utility, solar installations have increased from 328 kW to more than 14,000 kW, a 4,000 percent increase between 2009 and 2014, and are on track to reach the intended goal of 32,000 kW by 2016. The city's success is largely attributable to its highly acclaimed and groundbreaking solar Feed-in Tariff (FIT) program.

Gainesville's FIT program was the first of its kind in the United States. The model has received overwhelming support from residents and businesses, even after commercial and residential property owners rejected net metering. Net metering offers utility customers incentives for energy generated in excess of what is being used, whereas FIT pays property owners for all energy produced through solar PV systems.

THEMES IN GAINESVILLE CASE STUDY	
Financing and incentives	x
Local champions	x
Partnerships	x

A 250-kilowatt solar installation undertaken by third party lease on the roof of an apartment complex for graduate students. This photovoltaic panels also provide covered parking on the top floor of the parking garage.

City implements policies to diversify energy supply: In 2004, the city established policies to move away from a coal-dependent energy supply; in 2007, it created a net metering program that provided a financial incentive to install solar PV systems. However, net metering proved ineffective, in part because the incentive went to the utility customer, not the property owner, so there was no incentive offered to owners of leased or rented properties. As the program did not yield the number of solar PV installations hoped for, the city looked for a solution. Inspired by Germany's adoption of the FIT model, encouraged by wide community support, and underpinned by the city's commitment to renewable energy, Gainesville's FIT program was launched in 2009.

The FIT program offers broad benefits and has wide appeal: The FIT program is heavily favored over net metering by commercial property owners because it is the property owners rather than the utility account holders/tenants who gain direct benefits. Further, the FIT program guarantees that 100 percent of the energy generated will be purchased at a competitive rate for an extended period. From the perspective of the utility, the FIT model is attractive because payment is based entirely on the performance of the systems, which increases property owners' incentive to maximize energy output. As for tax-exempt institutions such as libraries and schools, the FIT model provides financial incentives that they cannot receive under tax rebate–based programs. Finally, the guaranteed long-term rate at which GRU purchases solar energy creates an attractive return on investment for local financial institutions and thereby encourages private investment.

Lancaster, California

Lancaster, a city with a population of 160,000 within 94 square miles, is located in an area that has a wealth of solar resources: temperatures reach triple digits in summer months, and elevation in relation to the sun is ideal. Recognizing the economic, social, and environmental benefits of tapping this renewable energy resource, the city is using all available methods at its disposal to become the "Alternative Energy Capital of the World."

Lancaster is leading California in solar production per capita. Most of the city's solar production comes from utility-scale projects; however, the number of solar PV installations on homes, businesses, schools, and city-owned properties has risen significantly over the past three years.

THEMES IN LANCASTER CASE STUDY	
Permitting process	x
Plans and policies	x
Local champions	x
Partnerships	x
Public facilities	x
Formal programs	x

City leadership and staff, along with community advocates, are extremely committed to the city's renewable energy goals, especially as they relate to solar. In regard to becoming the solar and alternative energy capital of the world, the attitude is not "if we can do it" but "how quickly can we get there." To this end, city leadership embraces the following ideas:

Climate change is a public safety issue: The city has framed climate change as a public safety issue. For a politically conservative community like Lancaster, framing climate change in this context has given the subject traction.

Solar array at Lancaster's Performing Arts Center

> "The city of Lancaster truly understands the word "partnership": their low-cost approach of doing business provides endless potential for growth. Their commitment to the business community is evident from the top down, from the mayor and city manager to city staff. For example, the city approached us for insight when they proposed their new solar ordinance. While we are not supportive of mandates, the city listened to our concerns and welcomed our expertise. This inclusive process helped them create an innovative and flexible solution that best met the need of all stakeholders."
>
> **Thomas DiPrima, Executive Vice President**
> **Southern California Division, KB Home**

Solar is probusiness: The city created a probusiness environment, including an easy permitting process. Lancaster now provides an expedited plan review for residential PV installations; a process that used to take several days is now an over-the-counter process that takes 15 minutes.

New standards are called for: In March 2013, Lancaster became the first city in the nation to pass an ordinance requiring solar PV on new residential construction. The ordinance, which became legally effective on January 1, 2014, is the result of the city's effort to amend the residential portion of its zoning code to allow an easier path for alternative energy, especially solar, and other progressive updates.

Partnerships leverage resources: Absent a lot of money to put into programs, it becomes almost essential to reach out to anyone with the same goals to make the right connections and leverage resources. The city has created several strategic partnerships to promote solar, three of which are as follows:

- ***Solar Lancaster***, a partnership between the city and SolarCity, an all-in-one solar service provider, to create a solar financing program for homeowners and businesses
- ***Lancaster Power Authority***, a joint powers authority between the city, Lancaster Housing Authority, and Lancaster Economic Development Agency to establish a municipal utility specializing in solar projects
- ***Build Your Dreams (BYD)/KB Home***, a partnership between BYD, a green energy technology and manufacturing firm, and KB Home, one of the country's largest homebuilders, to build net-zero production homes in Lancaster.

Milwaukee, Wisconsin

With a population just shy of 600,000 within 96 square miles, Milwaukee is the largest city in Wisconsin. In recent years, the city has built a reputation for sustainability, earned through the leadership of Mayor Tom Barrett and the support of the business community.

Working to "redefine Milwaukee as a clean, green city of economic opportunity that is diverse, sustainable and innovative,"[8] the city created the Office of Environmental Sustainability; created a Green Team; and launched its first sustainability plan, "ReFresh Milwaukee," which sets ambitious targets for increasing energy efficiency citywide.

THEMES IN MILWAUKEE CASE STUDY	
Permitting process	x
Plans and policies	x
Financing and incentives	x
Local champions	x
Partnerships	x
Public facilities	x
Formal programs	x

In 2008, DOE designated Milwaukee as one of 25 Solar America Cities. In response, the city formed a new program within the Office of Environmental Sustainability called Milwaukee Shines, which is focused solely on solar energy. Primarily through Milwaukee Shines, the city has addressed the following issues:

Education: To educate the public about solar, the city is working in partnership with the Midwest Renewable Energy Association to provide online resources and in-person seminars for home- and business owners.

Photo courtesy of the City of Milwaukee

City of Milwaukee

> "With innovative programs like Milwaukee Shines, Milwaukee is demonstrating that investing in clean energy is not only essential for creating a sustainable city, but it is also good for the bottom line and puts our citizens back to work."
>
> **Tom Barrett, Mayor of Milwaukee**

Financial incentives: The city provided a DOE-funded $2,000 cash-back incentive and partnered with Summit Credit Union to create a low-interest loan up to $20,000.

Group purchasing: Milwaukee Shines initiated a pilot solar purchase program resulting in more than 52 kW of solar, the availability of which expanded in 2014.

Improved permitting: The city passed a solar zoning ordinance in 2012 and implemented a new solar permitting process. That process assigns a single point of contact and combines the electrical and building permits together for a flat fee of less than $100.

Municipal installations: Milwaukee boasts 11 solar installations at municipal facilities—most notably, a massive green-roof project at the historic Central Library.

Workforce development: Milwaukee Shines ensured that 40 percent of the labor hours of its pilot program were provided by unemployed and underemployed Milwaukee residents. Continuing its support for a local workforce, the city continues to partner with job-training programs to ensure that there is a trained workforce in solar PV.

Prince George's County, Maryland

Prince George's County, with a population of 863,420 within a geographic area of 483 square miles, wraps around the eastern, northern, and southern borders of Washington, D.C. Because the county has long been focused on energy efficiency, renewable energy, and green building, its energy programs are based on a strong legislative and policy framework. In January 2015, the Maryland Smart Energy Communities Program recognized Prince George's County government for its leadership in advancing renewable energy and energy efficiency.

Maryland Energy Administration's (MEA) Smart Energy Communities Program: MEA's Smart Energy Communities Program provides local governments, including Prince George's County, with funding to develop and implement energy policies through energy efficiency, renewable energy, and transportation projects. A key goal of the county's updated policy is to reduce

Photo courtesy of Office of Central Services, Prince George's County

Solar photovoltaic panels at the Consolidated Warehouse and Fleet Maintenance Facility

conventional centralized electricity generation serving applicable county government buildings by meeting 20 percent of those buildings' electricity demands with distributed renewable energy generation by 2022.

Solar energy tax credit: Prince George's County Council adopted a bill that expands energy-conservation real-property tax credits by allowing county residents who enter into a solar PPA or leasing arrangement to receive a tax credit of $1,000 to cover part of the up-front installation cost or the first 12 months of lease payments.

Clean Renewable Energy Technology in Public Buildings law: Prince George's County passed a law requiring clean renewable energy technology in the construction of new public buildings or in major renovations of existing public buildings. This legislation is the first of its kind in Maryland. Since passing the law, the county installed a 404 kW PV solar array at its Consolidated Warehouse and Fleet Maintenance Facilities in Landover and Capitol Heights, and a 65 kW PV solar array on the roof of the University Park Elementary School.

THEMES IN THE PRINCE GEORGE'S COUNTY CASE STUDY	
Plans and policies	x
Financing and incentives	x
Formal programs	x

Collaboration of Municipalities Solar Energy Recovery Plan (SERP): In an effort to reduce electric bills and GHG emissions and to demonstrate how municipalities in Prince George's County could unite around a common goal, the town manager of Bladensburg

established the Collaboration of Municipalities SERP. The SERP is an action plan to install solar PV systems on the roofs of government buildings in nine county municipalities, which would reduce CO2 emissions by 209.05 tons and energy costs by $29,058 annually. This innovative collaboration has resulted in more than 150 kW of installed solar across those municipalities.

Reno, Nevada

Reno, the "biggest little city in the world," has a population of 227,511 within nearly 106 square miles in northwestern Nevada and is the county seat of Washoe County. While Reno enjoys adequate power supplies, its current solar energy strategy can be linked to the energy crisis of 2000 and 2001, which put pressure on the city and state to find new sources of electric power. Nevada, and especially Reno, responded with legislative policies to significantly increase solar capacity.

THEMES IN RENO CASE STUDY	
Permitting process	x
Plans and policies	x
Local champions	x
Partnerships	x
Public facilities	x
Formal programs	x

In 2001, Nevada incorporated a renewable energy standard (RES) that requires 25 percent of the state's electricity to come from renewable sources by 2025, with at least 6 percent coming from solar energy sources by 2016. Over the last decade, more solar has been installed in Reno than in Las Vegas, which has six times the population. Solar currently provides about 22 percent of Reno's municipal energy.

Most notable about the growth of solar in Reno is a bill introduced in 2003 by the state legislature that established a solar rebate and changed the code for cities, counties, and homeowners. The code now allows installation of solar PV with a simple building permit. The rebate program, RenewableGenerations, is administered by NV Energy.

Nevada's solar energy incentive programs: Nevada's solar energy incentives program allows schools, public agencies, qualified nonprofits, residential customers, and small businesses a one-time cash incentive. Customers who install the solar systems take part in the net metering program. A program called HomeFree Nevada (EnergyFit) pays up to 50 percent of a home energy retrofit.

Public facilities: Reno has installed solar PV systems on several facilities as part of its city council's priority of greening city facilities. The city has made a point of working with all local firms and makes real-time information on the city's solar installations available on the Green Energy Dashboard.

Economic development: As part of Reno's Sustainable Economy initiative, the city's economic development team is working with private industry to install solar PV and attract renewable energy companies. It produced a *Low Impact Development Manual* to encourage builders to install solar PV systems as part of a more sustainable community and to protect the local river system.

Summit County, Utah

Summit Community Solar (SCS) was a community-driven and local government–supported initiative designed to increase the adoption of residential PV solar in Summit County (population 36,324) and Park City (population 7,558), Utah, between January and November 2013. SCS combined the financial incentives of bulk purchasing, which drives down the cost of solar panels, with a streamlined permitting process, contractor preselection, and a robust community outreach effort.

The program was inspired by Salt Lake Community Solar (SLCS), a similar effort that had been undertaken in neighboring Salt Lake County in 2012 and led by Utah Clean Energy (UCE).That project, in turn, had been based on the highly successful Solarize Portland (Oregon) program.

Black Rock Solar. From left to right: College of Southern Nevada, Pershing General Hospital, Pyramid Lake High School.

The SCS project team, with staff from Summit County, Park City, UCE, and residents.

Planning for SCS began in January 2013; the program formally launched the following May, and all installations were complete by March 2014. At that point, more than 1,200 solar PV panels were installed on 59 homes, generating a cumulative 330 kW of energy. The level of interest and participation was more than twice the 150 kW goal at which participants received the best bulk-purchase price discount, and the installed capacity exceeded that of the SLCS program by 100 kW.

From the beginning, SCS has been supported by local government officials and staff, facilitated by nonprofit partners, and welcomed by the community. Keys to success include the following:

Local leadership: Local officials from both Summit County and Park City have identified sustainability (renewable energy in particular) as a priority for their communities. Both local governments supported the SCS program by streamlining and expediting permitting processes, providing detailed information about the program and solar installation on their websites to educate the public, and either completely eliminating (Park City) or temporarily reducing (Summit County) solar permitting fees.

Nonprofit support: SCS was based, in large part, on the success of a similar program in Salt Lake County led by UCE, a nonprofit whose mission is to advance renewable energy in Utah and across the West. UCE has been the backbone of SCS, providing administrative support and project management, and serving as a trusted advisor to the city, county, and residents.

Community involvement: Residents were brought into the program from the very beginning to guide program development and prepare for implementation. Two committees were formed: the Contractor Selection Committee and the Education and Outreach Committee. Both committees were citizen-led and engaged staff from the city, county, and UCE as advisors.

While SCS has received strong support from local government officials and expert guidance from UCE, all partners agree that the program owes much of its success to the dedication, enthusiasm, and involvement of the community.

THEMES IN SUMMIT COUNTY CASE STUDY	
Permitting process	x
Plans and policies	x
Financing and incentives	x
Local champions	x
Partnerships	x
Public facilities	x
Formal programs	x

Noteworthy Approaches Taken to Promote Solar

This section highlights noteworthy approaches that the municipalities profiled in these case studies have taken to promote solar in their communities. The examples presented describe the creative thinking and actions taken to reflect the distinctive economic, community, and political structures of each place, underscoring the importance of structuring solar PV efforts specific to each community so as to inspire similar creativity in other communities around the country.

Renewable energy utility creation (Lancaster, CA): Lancaster is maximizing its use of abundant solar resources with the Lancaster Power Authority (LPA), a state-registered utility exclusively providing solar PV electricity. The LPA is a joint powers authority between the city of Lancaster, Lancaster Housing Authority, and Lancaster Economic Development Agency specializing in renewable energy as allowed under California's constitution.

Regional and multijurisdictional collaboration (Fort Lauderdale/Broward County, FL; Barnstable, MA; Prince George's County, MD): Areas served by utilities and solar installers are rarely confined to a single jurisdiction. The permitting process, fee schedules, and other rules and policies vary from one municipality to the next, all within what utilities and installers consider to be one market. This variation is a significant hurdle to the cost-effective and efficient delivery of solar services. By creating regional permitting systems for solar PV, these communities are setting the stage for greater growth in this area.

Historic preservation and solar PV (Franklin, TN; Milwaukee, WI): Balancing the preservation of the historic character of structures with the aesthetic realities of rooftop solar PV requires a delicate approach. Often, when the two sides cannot reach an accommodation, cities must step in and make decisions about what is and is not allowed on historic structures and/or in historic districts. By updating its Historic Guidelines to include the use of solar PV on historic structures, Franklin affirmed that the two goals are compatible, and it put a process in place for deploying solar PV on historic structures, thus avoiding administrative problems and delays. Leading by example, several city agencies in Milwaukee partnered to include a solar electric system as part of a massive green-roof project at its historic Central Library.

Solar thin film on a renovated 1888 Victorian home, Knoxville, Tennessee.

Solar PV as an energy independent/climate change adaptation and public safety effort (Lancaster, CA; Reno, NV): There are often multiple drivers that cause municipalities to embrace and implement rooftop solar PV programs. Increasingly, municipalities, especially those affected by energy supply shortages, are driven by a desire for energy independence as climate change issues persist. In Lancaster, a politically conservative community, the mayor and city representatives effectively framed climate change as a public safety issue, thus giving the issue traction and providing a basis for Lancaster's solar PV programs and policies. The energy crisis of 2000 and 2001 significantly affected Nevada, which prompted the state to adopt an RES that supports solar production. The city of Reno is working to secure its energy future by taking advantage of its abundant sunshine and state policies and incentives, including the RES and legislation that simplifies the solar PV permitting process and establishes a solar rebate program to increase solar PV production.

Guaranteed pricing (Beaverton, OR): Through a competitive Request for Proposal process among private companies, Beaverton offered to provide marketing and outreach for rooftop solar PV in exchange for guaranteed below-market installation rates and no direct financial investment. As city staff conducted the marketing and outreach activity, the cost of customer acquisition for the solar installation companies was lowered. This innovative approach highlights the advances in rooftop solar PV deployment that can be achieved through highly cost-effective partnerships and city leadership.

Affordable financing for homeowners through public-private partnership (Milwaukee, WI): To help homeowners finance the costs of solar installation, Milwaukee partnered with Summit Credit Union to create a low-interest loan program. Homeowners in the city are eligible for low-interest loans of up to $20,000.

Nonprofits leadership (Reno, NV; Summit County, UT): Black Rock Solar, a 501(c)3 nonprofit in Reno, provides low-cost, high-quality clean energy services to clients in the nonprofit, public, low-income, and educational sectors, especially those in rural and tribal areas. The organization gets funding from Nevada's solar energy incentives program, grants, donations, and other various fundraising efforts. As of July 2013, the organization built 3 MW of solar power capacity across the state, including 61 arrays for schools, nonprofits, and Native American tribes, which now realize nearly $547,000 of combined savings annually on their energy bills.

Collaboration on solar energy recovery plan (Prince George's County, MD): To reduce electric bills and GHG emissions, and to demonstrate how municipalities in Prince George's County can unite around a common goal, Town Administrator John Moss of Bladensburg established the Collaboration of Municipalities Solar Energy Recovery Plan (SERP). Moss facilitated the development of an action plan to install solar PV systems on the roofs of government buildings in nine county municipalities, thereby reducing CO2 emissions by 209.05 tons and energy costs by $29,058 annually. With the cost savings generated by the reductions in electricity bills and the income generated by the sale of the renewable energy certificates (RECs), each jurisdiction was able to contribute to a joint fund supporting energy assistance for senior citizens and a scholarship fund for students wishing to pursue green careers. The cost savings and the REC sales also enabled municipalities to set aside funding for maintenance and enhancements of solar energy projects.

Insights

This section provides general insights about the critical elements contributing to the success of the local governments profiled in all 27 case studies. By using the experiences of others, local stakeholders may be able to more efficiently develop and implement a solar PV strategy.

Approaching from multiple fronts: Municipalities across the country are approaching rooftop solar PV from multiple directions to grow the solar share of their energy supply and create cost savings for public operations, smaller environmental footprints, more jobs, and more sustainable home and small-business operations. Through their initiatives to improve permitting, implement policies, make investments, and partner to promote solar PV, municipalities have proven that the market demand for rooftop solar PV has only just begun to be met.

Adapting with the market: If latent demand is to be met, municipalities, states, and utilities need to continue evolving to reflect shifting market factors and the availability of federal financial resources. Many municipal solar programs and initiatives were started with grant funding, primarily from DOE. Other sources include American Recovery and Reinvestment Act (ARRA) funds, Solar America Communities grants, and Rooftop Solar Challenge awards. As is the case with most grant programs, these sources of funding were not intended to be the sole sources of capital for long-term sustainability. Rather, they were provided as catalysts to fund short-term investments that could be leveraged by local political, financial, and community support for long-term local operation and growth. Once these funds have been used to establish programs and initiatives, municipalities must evaluate how to fund continued operations and growth.

Providing financial incentives for up-front and ongoing benefits: Approaches to create local financing for the up-front costs of rooftop solar PV installation include group purchasing models, such as Solarize (Implemented by Solarize Asheville and being considered by Chapel Hill, North Carolina); Property Assessed Clean Energy (PACE) programs; and public-private partnerships, such as PPAs/third-party ownership. To provide ongoing financial incentives for homeowners to install rooftop solar PV, solar programs are promoting continued net metering and FIT policies, and more efficient interconnection processes.

Thinking of the future with grant funding: To extend the impact of one-time funding (e.g., federal grants), some communities are using those funds to establish self-sustaining operations. For example, the regional permit systems developed in Fort Lauderdale/Broward County, Florida, will provide long-term reductions in the soft costs of rooftop solar PV installation by making the permitting and interconnection process both time- and cost-efficient, and by providing technical documents through an online permitting system specific to rooftop solar PV.

Array on the home of Matt Menee in Asheville, NC

Using state policy to influence local policy: Municipalities in states that have strong Renewable Portfolio Standards (RPS) and other state-level solar policies are finding it easier to work with utilities to advance solar at the community level. Because the Colorado's RES provides a 3x multiplier benefit for solar electricity generation located in the territory of a municipal utility, the city of Fort Collins could justify its investment into solar incentives programs. Legislative policy in Nevada allowed Reno to make significant strides with energy efficiency measures and to install more solar to help lessen the need for more electricity. Massachusetts has established the legal infrastructure, as well as policies and programs, to support local governments, businesses, and residents in reducing energy consumption and in developing and using clean, renewable energy. Because of strong state policies and regional utility cooperation, the town of Barnstable achieved the most total solar energy capacity and the third-highest solar energy installations of any municipality in the commonwealth.

Spurring solar deployment with strong local leadership: Local support for solar comes from both within and outside government. Having the support of a mayor or other elected official is invaluable. For example, the mayor of Beaverton, Oregon, made

sustainability and solar PV a major component of his 10-point plan for achieving the city's official vision. In Asheville, North Carolina, solar was driven by community leadership through the first Solarize program in the southeastern United States. Solarize Asheville began with a group of neighbors who wanted to "go solar" but didn't know where to start. These residents believed that if they could organize a group of neighbors to go solar together, they could collectively make an informed purchase and negotiate a volume discount.

Introducing solar PV with energy efficiency: Local governments often address energy efficiency concurrently with solar PV. Prince George's County, Maryland, developed an energy efficiency and conservation strategy to meet the strategic planning requirements of the Energy Efficiency and Conservation Block Grant program funded by ARRA and to give priority to projects that would enable the county to most effectively meet its energy efficiency, climate change, and renewable energy goals. This led to the creation of a solar power tax rebate and solar PV installations on public facilities.

Taking advantage of local utility control: City-owned utilities may have an advantage over other types of utilities regarding solar PV development because they have the ability to make decisions on the basis of community need and direction from city leaders. Such decisions may include installing smart meters, implementing rate changes, and creating and administering solar PV financing and incentive programs. Because Fort Collins, Colorado, owns the electric utility, it can directly influence solar actions by selecting, creating, and promoting solar incentives and programs, such as a Solar Rebate, Community Solar Gardens (CSG) and the Fort Collins Solar Power Purchase Program (FCSP3) programs. This has been a major factor in spurring local solar development. Furthermore, because the Colorado RES provides a 3x multiplier benefit for solar electricity generation located in the territory of a municipal utility, local leaders could justify the investment in solar incentive programs such as CSG and FCSP3.

Conclusion

Compelling advances have been made in the deployment of rooftop solar PV throughout the country, and significant opportunity remains to make even greater gains. As demonstrated in the case studies, continued success can be achieved by combining proven methods with the creative thinking of solar PV stakeholders to develop tailored approaches that reflect the economic, political, and community dynamics of the area.

Local governments that have not yet taken strides toward rooftop solar PV should explore the innovative practices profiled in these 27 case studies for their own applications. They can do so with confidence, knowing that other communities have pioneered financing, permitting, partnership, and leadership practices that were once considered new and risky but have since proven to be effective and reliable. Additionally, these pioneer communities have demonstrated that proactive political and community leadership that responds to changing economic and community-wide factors can have a significant impact on the financial feasibility and market acceptance of rooftop solar PV. Examples such as Lancaster, California, emphasize that conservative and liberal constituencies support solar PV.

If the successes profiled in the case studies are an indication of the future of rooftop solar PV in the United States, we should expect to see solar play an increasingly larger role in our daily lives for years to come.

Endnotes

1. See SunShot Initiative Mission (February 6, 2015), http://energy.gov/eere/sunshot/mission.
2. CSP uses mirrors to concentrate sunlight onto receivers that convert it to heat, which turns turbines.
3. U.S. Department of Energy (DOE), *SunShot Vision Study: Executive Summary* (February 2012), http://energy.gov/sites/prod/files/2014/01/f7/47927_executive_summary.pdf
4. Ana Mileva et al., "SunShot Solar Power Reduces Costs and Uncertainty in Future Low-Carbon Electricity Systems," *Environmental Science & Technology* 47, no. 6 (2013): 9053 – 9060.
5. http://energy.gov/eere/sunshot/mission.
6. http://www.energy.gov/eere/articles/help-solve-solar-s-big-challenge.
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