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Solar Ready KC

Solar Installation Policy and Practice in Kansas City and Beyond

A WHITE PAPER BASED ON THE PROGRESS AND OUTCOMES OF SOLAR BEST PRACTICES PREPARATION AND EDUCATION IN 2012-13

May 2013

MARC
MID-AMERICA REGIONAL COUNCIL

AECOM

Executive Summary

In 2012, in partnership with five jurisdictions and a local investor-owned utility, the Mid-America Regional Council (MARC) was named a participant in the U.S. Department of Energy's SunShot Initiative Rooftop Solar Challenge. The five jurisdictional partners, KCP&L and solar industry experts worked to craft a regional response to improve the regional market conditions for rooftop solar installation. The five jurisdictional partners were: Kansas City, Lee's Summit and Clay Co. in Missouri, and Olathe and Johnson County in Kansas.

Background

The Kansas City region is in a unique position for solar energy because of its bistate location, giving it two very different realities for solar. Kansas doesn't have any type of state, local or utility incentive, whereas Missouri does have a utility incentive. Each state has its own net metering parameters, interconnection standards, property owner rights and available financing options. Although at first glance this might appear to be challenging, the opportunity for our region was to create best practices and financing options that could work not only locally, but across the country. Given the local solar market is still in its early growth stage, the crafting of the practices allowed the region to be proactive on solar rather than waiting and risking an explosion of installation demand without clear processes.

Approach

This approach plays to the region's strength of facilitating locally sensitive responses. In particular, the solar work built upon the previous work of the Regional Energy Efficiency and Conservation Strategy (REECS), which fostered energy conservation strategies across the region, including the installation of high-efficiency street lights, weatherization for low-income homes and the adoption of the 2009/2012 International Energy Conservation Code (IECC).

The intended outcomes for the grant were to streamline the permit, net metering and interconnection processes; support property owners' rights to install solar; and improve financing options, with these actions strengthening the local solar market. The result was the

identification of best management practices and a financial inventory. The best management practices illistrate ways to reduce soft costs — those costs outside of the solar panels and associated hardware — thus supporting and furthering the development and establishment of the solar market. The financial inventory examines the financing mechanisms that currently exist and details additional options that could further market development.

Outcomes

The resulting Solar Best Management Practices focused on two areas. Process improvements focus on improving the solar installation permitting process. In particular, process improvements seek to make the permitting process straightforward, permits priced to reflect time involved in review and inspection, and to encourage solar installers to master the local process to reduce the time involved in permitting. Planning improvements focus on establishing, strengthening and protecting a property owner's right to install solar. They also facilitate the adoption of building practices that simplify subsequent solar installations.

The finance inventory reviewed currently available financing options for solar installations, dividing them into those that are more traditional versus those less traditional. In addition to detailing those currently available, additional options that could be made available either through utility commission or state legislature action were reviewed.

The best management practices and finance inventory not only help to document where our region currently stands on solar, but offer a path for local communities and residents to go solar in a clear and safe manner.

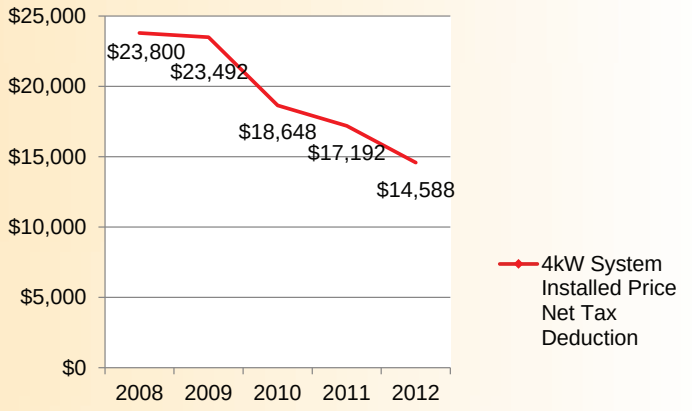
Introduction

In 2012, the Mid-America Regional Council (MARC) formed a partnership with a consortium of city and county governments, Kansas City Power & Light (KCP&L) and solar industry experts to respond to the U.S. Department of Energy's SunShot Initiative Rooftop Solar Challenge. Participants in the Solar Ready KC initiative include: Kansas City, Lee's Summit and Clay Co. in Missouri; Olathe and Johnson County in Kansas; and KCP&L.

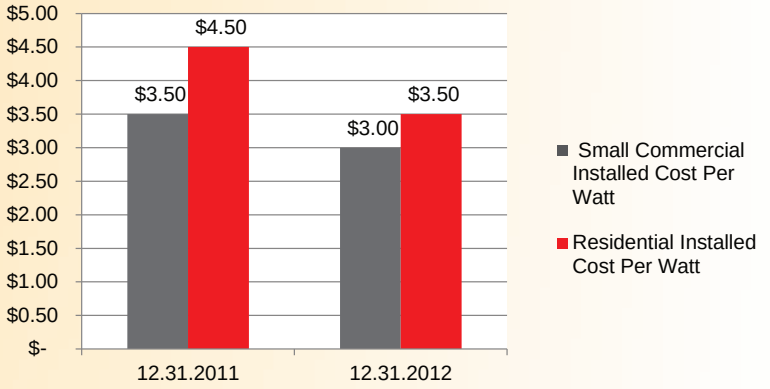
The goal of the Rooftop Solar Challenge is to achieve measurable improvements in market conditions for rooftop photovoltaic (PV) installations across the United States, with an emphasis on streamlined and standardized permitting and interconnection processes. MARC, with its partners, is one of 22 groups nationally that received the Rooftop Solar Challenge grant. The Solar Ready KC project sought to further DOE's grant goals by fostering the solar installation process and planning improvements in the greater Kansas City region through collaboration, education and outreach.

The demand for solar power in the United States is at an all-time high and 2012 was the biggest year yet. By the end of the third quarter, 1,992 megawatts of new PV were installed in the U.S. with a projected annual growth of 70 percent over 2011. The rapidly declining price for solar technologies, in combination with federal, state and local policy changes are bringing increasing amounts of solar energy into the mainstream. Kansas City is experiencing the same trend toward renewable energy and reduction in costs of solar power as the rest of the country. During 2012, KCP&L anticipated receiving an unprecedented 600 requests for net-metered and interconnected solar systems, up from 300 received over the past three years.

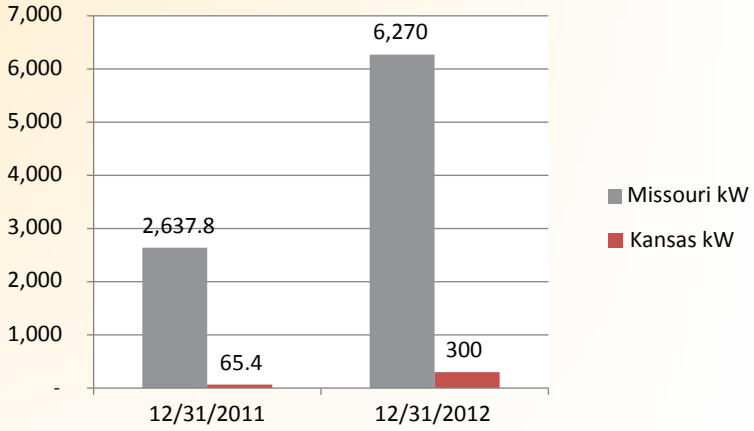
The Solar Ready KC initiative provides local government representatives with the latest information and best practices to prepare for policy and market changes and to position their communities and the region for this new renewable energy economy.



The chart above is based on a Photovoltaic system size of 4 kW. The dollar figures are calculated by multiplying the system size by the SEIA's (Solar Energy Industry Association) annual average installed price as reported in its U.S. Solar Market Insight Reports.



This information is based on the market assessment data required for the Department of Energy's Rooftop Solar Challenge reporting. The numbers represent the AVERAGE installed COST (NOT end consumer price) for a typical PV system. The typical residential system size is 4 kW and the typical commercial system size is 25 kW.



This information is based on the Annual Net Metering Reports that KCP&L must submit to the respective state utility commision boards. The numbers are generating capacity in kilowatts.

Background

MARC and its partners have worked diligently to identify best management practices (BMPs) in the area of solar permitting and planning and to investigate which practices would aid and improve local government processes currently in place in the Kansas City region. Additionally, MARC conducted an inventory of financing models and those available elsewhere.

Improvements in the permitting and planning process are one of the fastest and most effective means to facilitate solar installations, making the process clear and seamless, offering a centralized location for up-to-date information, standardizing permit fees, coordinating utility notification and establishing a process to pre-qualify plans and installers. The BMPs highlighted in this document fall into two categories: process improvements and planning improvements. They are presented in a step-by-step process to guide the reader through the proposed adoption strategy.

The availability of a variety of financing options is integral to the growth and establishment of a healthy solar industry in any community. Expansion of available financing options in the region will help to solidify and strengthen the burgeoning solar market.

"As the solar industry matures in Missouri, it is critical we address 'soft' costs like permitting and interconnection. The cost of solar panels is probably at a low point, in most cases the manufacturers are selling below cost, so that avenue for cost reduction is limited. With declining solar incentives and increased competition, the work of Solar Ready KC is more important than ever."

~ Susan Brown, Principal, Brightergy

"The Solar Ready KC work through the Rooftop Solar Challenge grant was a great vehicle for raising awareness about solar installations with the local jurisdictions. It helped to make it clear that solar installations are a component of normal business for utilities. As more homeowners and business owners look to install solar, clear processes and planning make it a more efficient process."

~ Roland Maliwat, Sustainability Manager, KCP&L

Strategic Framework

The process improvements and planning improvements were crafted each offer a three-step means of improvement to facilitate more solar installations and reduced costs.

Process Improvements

- **Step 1: Streamline permits** so that required documentation can quickly and easily be found and the process expedited.
- **Step 2: Standardize permit fees and notify utility companies**. Clearly communicating permit fees for solar eliminates any surprises in installer bidding. Incorporation of utility notification helps speed the pace of installation, eliminating any lags in progress.
- **Step 3: Pre-qualify plans and installers**. The pre-qualification of plans and installers reduces permitting time for those installers who have an established track record of success.

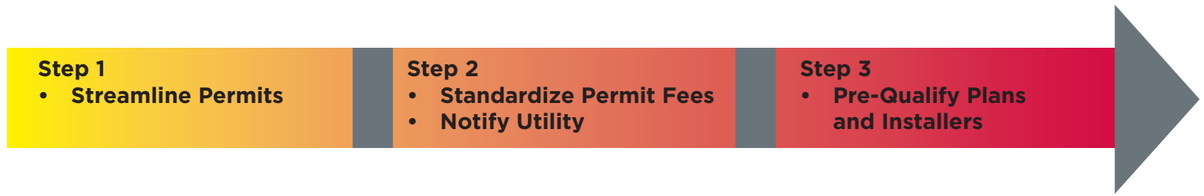
Planning Improvements

- **Step 1: Improve solar access**. Update the comprehensive plan and adopt solar access ordinances. Additionally, educate both developers and homeowners about the importance of solar and its associated aspects.
- **Step 2: Improve solar readiness**. Offer a checklist for solar-ready buildings. The adoption of ordinances and/or building codes ensures that new buildings will be ready to go solar in the future.
- **Step 3: Engage homeowners associations**. Incentivize new development to protect residents' rights to install solar.

The two matrices on the following pages provide further detail about best management practices for both the process improvements and the planning improvements.

PROCESS IMPROVEMENTS

WHY? Permitting process improvements are one of the fastest and most effective means to facilitate solar installations. Offering a centralized location for information that clearly explains the process, standardizing permit fees, incorporating utility notification and pre-qualifying plans and installers will make the process clear and seamless.



IMPLEMENTATION STEPS

Step 1

STREAMLINE PERMITS

Action	Description	Benefits	Solar Ready KC Resources	Example
Provide central information source for potential solar customers.	Provide centralized location, preferably web-based, for solar information: how it works, frequently asked questions, contacts and other relevant details.	• Creates a single reference. • Reduces staff time answering questions.	Template language provided for jurisdiction customization.	Solar San Antonio: www.solarsanantonio.org
Create a checklist summarizing the process to obtain all necessary permits.	Provide a list that documents the steps and necessary items for securing a permit to install solar. The optimal checklist applies to both residential and commercial installations.	• Clearly defines items needed for permit. • Reduces staff time answering questions. • Helps contractors submit complete and consistent permit applications.	Hybrid checklist/permit application developed by MARC.	City of Dallas, Texas: Solar Panel Water Heater or Other Photovoltaic Systems Application Checklist: http://dallascityhall.com/pdf/Building/SolarHotWaterSystemChecklist.pdf
Develop criteria outlining thresholds for "standard" installations and streamline permitting processes accordingly	Provide a template that fosters the quick permitting of installations that do not require additional permit review.	• Concentrates permit review on those installations that need it. • Doesn't slow permitting of standard installations.	Hybrid checklist/permit application developed by MARC.	City of Philadelphia, Pa.: Solar PV System Installations with an Electric Permit Only: www.phila.gov/green/PDFs/Streamlined%20Solar%20Standards.pdf

Step 2

STANDARDIZE PERMIT FEES

Action	Description	Benefits	Solar Ready KC Resources	Example
Establish a fixed fee based on cost recovery for residential PV permit applications.	Create a stated fee list for PV permits.	• Removes unexpected permit costs for installers. • Easy for staff to provide.	Example fee list based on $50/hour internal cost.	Silicon Valley, Calif.: www.SolarPermitFees.org/NorCalPVFeeReport.pdf
Adopt the PV Permit Fee Calculator for commercial rooftop systems.	Use an Excel spreadsheet that quickly calculates commercial PV permit fees based on project parameters and jurisdiction hourly rates.	• Easy for staff to use. • If provided online, installers can better budget for permit fees.	Excel template provided for jurisdiction customization.	Sierra Club, Loma Prieta Chapter: www.solarpermitfees.org/PVFeeCalcCommercial.xls

NOTIFY UTILITY

Notify utility when permit applications are received and electrical inspections are complete.	Jurisdiction contacts utility once electrical inspections are completed.	• Makes installation process seamless. • Removes possibility of miscommunication between contractor and utility.	Process case studies.	San Diego Gas & Electric: http://sdge.com/sites/default/files/documents/nem-30kw-interconnection_appl_0.pdf
Conduct joint inspections with local utility and jurisdiction (municipal utilities only).	Allows municipal utilities and their governing bodies to eliminate redundancy.	• Streamlines process. • Eliminates redundancy. • Reduces costs for jurisdiction.	Process case studies.	City of Santa Clara, Calif.: http://santaclaraca.gov/index.aspx?recordid=558&page=50

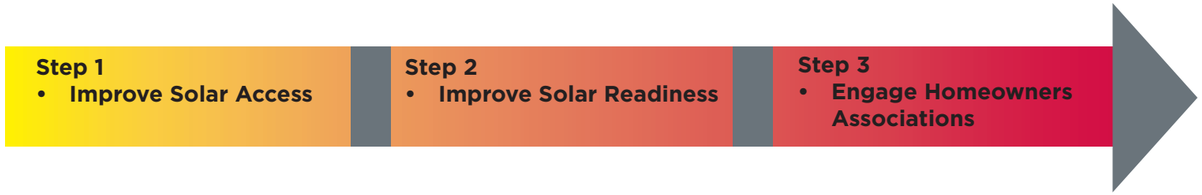
Step 3

PRE-QUALIFY PLANS AND INSTALLERS

Action	Description	Benefits	Solar Ready KC Resources	Example
Develop a process for pre-qualification of standard plans.	Standard electrical permit plans outlining system design and components become "pre-qualified" for installation. The permitting department immediately issues the electrical permit and the inspector confirms the system conforms to the approved design.	• For straightforward PV installations, pre-qualification reduces staff time for permitting. • Allows staff to focus on evaluating permit applications from installers that do not have a proven track record.	Process case studies.	City of Honolulu, Hawaii: www.fsec.ucf.edu/en/certification-testing/index.htm
Develop a process for pre-qualification of installers.	Utilize either the National America Board of Certified Energy Practitioners (NABCEP) or an installer's successful installation record to pre-qualify an installer and simplify the submittal process.	• Reduces staff time required on applications from installers who have proven track record with the jurisdiction. • Streamlines process for installer, reducing time and costs. • A national certification establishes a known and equitable means of guaranteeing installation safety and quality.	Process case studies.	City of Portland, Ore.: www.portlandoregon.gov/bps/47394

PLANNING IMPROVEMENTS

WHY? Planning improvements codify and emphasize a jurisdiction's support of a building owner's right to use solar. Removing local ordinance barriers, adopting facilitating codes, encouraging solar readiness and incentivizing solar acceptance in new developments fosters a community supports individual choice.



IMPLEMENTATION STEPS

Step 1

IMPROVE SOLAR ACCESS

Action	Description	Benefits	Solar Ready KC Resources	Example
Incorporate solar access priorities in comprehensive plans.	Incorporate policies addressing solar siting in land use and landscaping considerations facilitate access to solar power and its use.	• Clarifies importance of solar in the community. • Reduces future challenges concerning solar rights.	Model language provided for jurisdiction use.	City of Shakopee, Minn.: 2030 Comprehensive Plan: www.ci.shakopee.mn.us/pages/2030CompPlan/12%20Solar%20Access.pdf
Adopt a solar access ordinance.	Clearly define unreasonable restrictions and the types of structures that will be covered by the solar ordinance. This should also include a coordinated review of other local ordinances to address conflicting policies.	• Establishes the importance of solar access to developers, builders and property owners. • Reduces the potential for future conflicts about solar access.	Model language provided for jurisdiction use.	City of Kansas City, Mo.: Proposed Zoning and Development Code Amendment to Promote Sustainable Development Practices: www.kcmo.org/CKCMO/Depts/CityPlanningandDevelopment/Resources/EnergyCalculator/SUSTAINDEVTTRPT_050912

EDUCATE DEVELOPERS

Provide tools for new developments.	Use solar education materials to help create awareness of the issues regarding solar energy, tree growth and access to sunlight.	• Enables developers to incorporate solar-friendly policies in CC&Rs before construction starts.	Model CC&R language provided for jurisdiction use.	South Carolina Energy Office Solar-Friendly Communities: www.energy.sc.gov/index.aspx?m=6&t=93

EDUCATE HOMEOWNERS

Provide homeowners and HOAs with recommended strategies.	Provide homeowners with strategies such as adoption of a green mission statement, sustainability audits and covenant language.	• Provides homeowners and their associations with guidelines to improve solar access.	Model language provided for jurisdiction use.	Creekside, Ore.: HOA Solar Guidelines http://lohrman.com/blogimage/ApprovedGuidelines.pdf

Step 2

IMPROVE SOLAR READINESS

Action	Description	Benefits	Solar Ready KC Resources	Example
Develop a solar ready buildings checklist for new construction.	A checklist that outlines a building's site, physical characteristics and electrical specifications that minimize the future cost of solar system installation.	• Reinforces jurisdiction's support of solar energy. • Creates desirable building stock for owners interested in solar energy.	Template language provided for jurisdiction customization.	City of Boston, Mass.: Department of Neighborhood Development Solar Ready Guidelines: www.cityofboston.gov/dnd/PDFs/D_2010_DND_DESIGN_STANDARDS-112010.pdf
Adopt new ordinances or building codes to promote solar ready construction.	The inclusion of either a solar system or electrical conduit for later installation on all new building projects.	• Reinforces importance of solar in the jurisdiction. • Insures design of new construction is solar ready.	Model language provided for jurisdiction use.	Tucson, Ariz.: Citywide Residential Solar Readiness Ordinance No. 10549: http://cms3.tucsonaz.gov/files/agdocs/20080617/june17-08-311.pdf

Step 3

ENGAGE HOMEOWNERS ASSOCIATIONS

Action	Description	Benefits	Solar Ready KC Resources	Example
Create incentives for the adoption of best practices.	Incentives, such as tax breaks or credits, are utilized to encourage new development that includes solar access regulations in covenants, conditions and restrictions (CC&Rs) and homeowners association bylaws.	• Fosters community adoption of solar standards. • Protects residents' right to install solar.		Exemption for Renewable Energy Systems: www.dsireusa.org/documents/Incentives/CO50F.htm

For information on Solar Ready KC and the Best Management Practices, including supporting documents, visit www.marc.org/Environment/Energy/solar_ready_kc.html

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Process Improvements

The recommended best management practices in this section address procedures and policies for improving the permitting process for rooftop solar photovoltaic installations in the MARC region. This is accomplished through streamlining the process, allowing for pre-qualification of installers or plans, adopting a permit fee model based on cost recovery, and improving communication between jurisdictions and utilities.

Step 1: Streamline Permits

RELEVANCE

Best management practices related to streamlining the permit process incorporate several options. To meet the needs of customers, installers and city staff, there are many ways to adapt existing procedures and policies to the regulatory constraints and opportunities of rooftop solar photovoltaic installations. On a broader scale, permit streamlining is a key tool for reducing the administrative red tape associated with solar installation. Not only can the permitting process take a considerable amount of time in some areas, but it can also create uncertainty when the process is not transparent and uniformly applied. A simplified process may result in reduced installation costs as the time and uncertainty associated with the permitting process is reduced. The practice of streamlining the permit process can be organized into three major principles:

- Providing a central clearinghouse.
- Creating a permit checklist.
- Applying a streamlined process to standard installations.

A central clearinghouse for solar-related information is helpful for customers who are interested in solar installations, but unsure of how to navigate the process. A useful clearinghouse will also include information beyond the permitting process, such as cost calculators and available incentives.

Once a customer has made the decision to install a photovoltaic system, a checklist outlining the various permitting steps and requirements provides transparency and clarity to the process. Criteria differentiating between standard and non-standard installations ensure each proposed solar photovoltaic system will receive the level of review appropriate to the risks posed to health, safety and other material concerns, and provides a basis for implementing an impartial system to streamline appropriate systems.

The precise definition of a “standard” vs. “non-standard” installation is likely to vary somewhat by jurisdiction, depending on the age and quality of the building stock, weather conditions and interconnection standards. However, in general, a standard installation can be defined as one that falls below specific structural and electrical thresholds. The permit streamlining process typically involves simplifying the plan review process while also determining what permit(s) are required. For example, Philadelphia has instituted a process for requiring only electrical permits (i.e., no building permit required) for small-scale projects on single- and two-family residential buildings. In San Jose, small-scale solar PV projects on single- or two-family residential buildings must obtain an electrical permit but do not have to undergo a review of electrical plans before installation. Instead, the electrical inspector reviews the electrical plan at the job site during the post-installation electrical inspection.

As the grant work progressed, we found that many jurisdictions typically have smaller, interdisciplinary permitting departments that can provide a single, comprehensive permit plan review. The MARC region is characterized by efficient departments that do not have layers of bureaucracy. The larger jurisdictions offer the option of expedited review to meet market realities. One opportunity for the MARC region is to develop a uniform process that could be easily adopted by member jurisdictions.

Streamlining is most relevant to local jurisdictions that handle the permitting process and installers who regularly navigate that process. Regional organizations may be involved with creating consistency around permitting requirements or operating a central clearinghouse for permit-related information. To a lesser extent, state legislatures may be involved in local permitting when they create statewide standards or model processes for local permitting, as is the case in Oregon. Utilities may also become involved when permitting requirements dovetail with net-metering or interconnection standards and policies.

RECOMMENDATIONS

1-1A Provide a central clearinghouse of solar information

Solar-related information should be provided electronically via a dedicated page on a municipality's (or other relevant jurisdiction's) website. If it is not feasible for individual organizations to provide this information on their own websites, a regional resource may be appropriate. Often, local or regional nonprofits with a solar-aligned mission may provide this information. Clearinghouse information should include:

- At a minimum, the name, email address and telephone number for a designated point of contact to answer solar permit-related questions, as well as the timeframe in which to expect a response.
- Clear and concise language regarding the applicable permitting requirements for solar photovoltaic projects.
- A list of other local, state and national solar-related resources, such as web links to incentive calculators, cost or savings calculators, solar maps to determine individual homeowners' solar potential, regional solar associations, etc.

A central clearinghouse creates a single reference for solar-related questions, which can help reduce staff time spent answering questions. Establishing a regular schedule for validating and updating the clearinghouse information is essential, as is assigning this duty to a specific staff person or team. Access to a nationwide, open-source software tool to streamline the solar permitting process, such as the one currently being developed by Clean Power Finance, would assist the MARC Region with this task.

Examples: Central Clearinghouse of Solar Information

In San Antonio, **Solar San Antonio**, a nonprofit provides information regarding how solar works, frequently asked questions, rebates and incentives. Although the clearinghouse does not include permit-specific information, it does include a checklist for determining if a solar installation can be prohibited or forced to relocate in accordance with Texas state law.

The **Long Island Power Authority** has information online, including a pre-screened list of solar contractors and recommendations for customers to consider before purchasing a photovoltaic system.

Solar Santa Monica is a city-run organization that provides information regarding city standards and initiatives, assistance finding contractors, and a list of potential incentives.

1-1B Create a permit checklist summarizing the necessary regulatory steps

A permit checklist guides an installer or other interested party through the permitting process by clearly stating all the necessary types of plan review and required permits. At its most basic level, a permit checklist only outlines the sequential steps of the permitting process; a more comprehensive checklist will also include applicable standards for each step in the review process. The checklist can help contractors submit complete and consistent permit applications and help reduce the demand on staff to answer questions about the process.

The basic checklist should include all of the information that an individual jurisdiction will require in order to permit a solar installation. For this reason, content tends to vary according to local context. For example, a denser, more urban area may require a site plan showing adequate setbacks, while a more rural area may not. Regions with extreme winter weather may require more detailed information regarding panel weights and roof loads than

Examples: Permit Checklist

The city of **Dallas, Texas,** uses the same checklist for all photovoltaic systems, whether residential or commercial, hot water or electrical. It includes a notice requiring the applicant to agree to comply with any applicable private deed restrictions. The information gathered deals primarily with the type of system being installed and its location on the project site. Commercial installations require more detailed construction plan documents than residential installations.

Similar to Dallas, the city of **Orlando, Fla.**, uses a checklist for residential, commercial, hot water and electrical photovoltaic systems. The checklist requires information related to the technical specifications of the system and a roof plan. The checklist also provides details regarding what is required as part of a system inspection.

Richland Hills, Texas, uses a Solar Panel System Checklist not only as a resource for installers but also for plan reviewers, to reduce the likelihood of missing information. For each required line item, the applicant must initial, sign and date. This checklist is applicable to both residential and commercial installations. Compared with other jurisdictions, this checklist goes into slightly greater detail regarding the information required to meet each requirement.

jurisdictions without such weather. Overall, a basic checklist may require information from the applicant such as:

- Age of structure
- Roof type and material
- Roof structural elements
- Weight of solar panel arrays
- Type of solar panel mounting hardware

Electrical information from the applicant may be required, such as:

- Line diagram of electrical system (array configuration and wiring, grounding, points of interconnection, etc.)
- Array information (number of modules in series, voltage, current, etc.)

Plans may be required, such as:

- Site plan showing location of building in relation to street and property lines
- Structural plans demonstrating sufficient support and uplift of photovoltaic panels

Professional engineer's stamps may be required from:

- Electrical engineers
- Structural engineers

Other required information may include:

- Manufacturer's cut sheets for all components
- Signage requirements
- List of all equipment and components

Jurisdictions interested in drafting their own checklists must start with a review of their own local regulations. MARC has developed a checklist template that incorporates both national best practices and local utility requirements, but allows for customization by jurisdictions as necessary.

> "Kansas City, Mo., is very pleased that by participating in the program we were able to improve our score by over 50 percent during the assessment period. We plan to use the checklist as a tool to assist our customers in the permitting process by having more complete submittals which would lead to more expedient permitting of solar permit applications."
>
> *~ Jomy John, Manager, Permits, City Planning and Development Department/ Development Services, Kansas City, Mo.*

1-1C Develop permit criteria outlining thresholds for "standard" installations and streamline permitting processes accordingly

A permitting criteria document outlines standards related to structural soundness and system complexity that, if not met, will designate the system for additional review and/or require a professional engineer's stamp. This approach is based on the idea that having system standards facilitates the identification of low-risk projects. Standard installations would require less review than more complex installations. A strong example of permit criteria is the model process suggested by the **Solar America Board for Codes and Standards** (Solar ABCs). Permitting criteria differ from the permitting checklist in that the checklist guides an applicant through the overall permitting process, while the criteria are more specific tools for differentiating between standard and non-standard installations.

Jurisdictions interested in drafting their own criteria for the identification of "standard" installations should start with the Solar ABCs document and adjust the criteria to reflect their individual context. There are two primary components to the Solar ABCs model process: a structural review and an electrical review. These review processes have been simplified so that one reviewer may conduct both the structural and electrical reviews. Many of the technical thresholds related to system size and complexity are driven by the need to represent the solar photovoltaic system using a standard, single electrical diagram and standard wire sizing. This makes it significantly easier for city staff to review the application and reduces the amount of back-and-forth between the applicant and city staff.

Examples: Permit Criteria for Standard Installation

In **San Jose, Calif.**, photovoltaic system permitting has four potential steps: building plan review, electrical plan review, building permit application and electrical permit application. For some photovoltaic systems, San Jose waives the requirement for a building plan review or electrical plan review. For the systems which meet the criteria, a building permit is not required if solar panels are to be installed on the rooftop of a building that does not contain more than two dwelling units.

The city of **Philadelphia, Pa.**, waives the requirement for a separate building permit for rooftop solar photovoltaic installations that are on the roof of a one- or two-family dwelling that is not designated historical. Installation and electrical permit criteria closely follow the Solar ABCs model process.

While the Solar ABCs model process is intended for use with small-scale residential projects, it may be applicable to small-scale commercial projects as well. The Solar ABCs model process can be accessed here: **www.solarabcs.org/about/publications/reports/expedited-permit/pdfs/Expermitprocess.pdf**.

At this point in time, permit criteria for standard installations have not been as widely adopted as basic permitting checklists. Structural and electrical thresholds vary greatly within areas that have developed permitting criteria. Examples of streamlining that apply to systems with defined thresholds include the city of San Jose, Calif., and the city of Philadelphia, Pa.

RELATED RECOMMENDATIONS

- **Standardize permit checklists across the region**. There is an opportunity to standardize the permitting of solar projects across jurisdictions, which would create greater consistency for installers and municipal employees, allow resource- and knowledge-sharing among jurisdictions and may also help to increase the perception of the region as a solar-friendly market.
- **Facilitate "one-stop shop" permitting**. Combining structural and electrical reviews into one permit process allows permitees to reduce the number of visits and staff interactions necessary to receive a permit, thereby saving time and eliminating the potential of having to reconcile conflicting information.
- **Conduct staff training**. Especially in jurisdictions that only infrequently receive requests for solar-related structural and electrical permits, staff responsible for processing permits may need additional training on how to apply a streamlined process. Providing adequate training and support also helps to ensure that the process is consistently applied both within and across jurisdictions
- **Map areas where zoning may restrict solar panel placement**. A basic map identifying areas where there are zoning restrictions on solar panel placement will assist electrical permit reviewers. It also provides clarity for applicants as to whether they should expect additional zoning review of their application.

Step 2.1: Standardize Permit Fees

RELEVANCE

Jurisdictions typically compute solar permit fees using a flat-fee method, a valuation-based method or a combination of these methods. The flat-fee method applies the same fee regardless of system cost. The valuation method usually bases fees on the pre-rebate cost of a PV system: the more solar panels one purchases, the higher the fee. A consequence of the valuation method is that the more a PV system owner contributes to a city's renewable energy supply, the higher the financial sacrifice.

In the MARC region, permit fees are typically based on the overall project cost. This approach works well for many conventional projects because it accurately represents the scale of the project. However, with a PV installation, the equipment costs are much higher than with other projects of similar scope. Basing permit fees on the value of the solar equipment inflates permit costs to unreasonably high levels, especially for larger, more expensive solar power projects. The costs of solar modules and inverters do not correlate to the resources required to review PV plans and inspect PV installations. High permit fees can discourage business from making good, long-term and high-yield investments in solar power.

The time needed for jurisdiction staff to review permit applications does not vary linearly by system size. For instance, according to a study by the Sierra Club, the time required to process a 100 kilowatt PV project is about two to three times longer than a 10 kilowatt project — not 10 times as long. To recover costs, therefore, permit fees should be based on specific review times and billable hourly rates, not on PV project valuations. A fixed fee approach for residential systems is appropriate because the time required for plan review and inspection is neither size-dependent nor valuation-based.

Permit fees are most relevant to local jurisdictions who handle the permitting process and installers who regularly navigate that process. Regional organizations may be involved with creating regional consistency around permitting requirements or operating a central clearinghouse for permitting-related information.

RECOMMENDATIONS

2-1A Establish a fixed fee based on cost recovery for residential PV permit applications

The jurisdiction should begin with an assessment of the estimated hours required for a standard PV permit application, according to the following steps:

- Determine the staff time required to review and inspect an average project that will cover costs 80 percent of the time, assuming a well-trained staff and a professional permit submittal and installation.
- The average plan review time should allow for one second-cycle minor correction review but should be based only on the number of required inspections. Additional plan reviews or inspections should be assessed additional fees based on actual incurred costs. This fee methodology rewards proficient customers with fees that reflect actual costs and does not subsidize the less competent.
- To estimate the permit fee, multiply the billable hourly rates for each job function by the staff time required for each task that will cover 80 percent of customer submittals.
- For exceptional cases that do not conform to the norm, simply charge by the hour for the staff time for both the plan review and inspections, based on the billable hourly rate for the job function.

This value would then determine the fixed residential PV permit fee based on the following assumptions:

- An installation is done by a professional and the permit application meets permit submittal guidelines.
- An over-the-counter, same-day permit is issued. If a same-day permit issuance can be instituted, this can significantly reduce administrative processing, saving valuable staff time compared to taking in permits for later review.
- Plan checkers and inspectors are trained for PV installations.

> "Participating in the Solar Ready KC initiative was extremely helpful in bringing a holistic approach to the deployment (and understanding) of photovoltaic solar panel systems within the region. As a result, we have began the implementation of some of the recommendations within our community, and intend on continuing to pursue others. By using the Solar Ready KC initiative, the region will definitely benefit from the initiative."
>
> *~ Mark Dunning, Director of Codes Administration, Lee's Summit, Mo.*

Example: Residential Permit Fee

Audits of **residential PV permit fee schedules** led to initiatives by 27 cities in the Silicon Valley (and over 100 other cities in California) to significantly reduce their fees, removing an important barrier to the installation of solar PV.

2-1B Adopt the PV Permit Fee Calculator for commercial rooftop systems

The PV Permit Fee Calculator developed by the Sierra Club Loma Prieta Chapter allows jurisdictions to determine a reasonable permit fee that enables cost recovery based on specific review tasks, time assessments for each task, and billable hourly rates. These specific factors are most relevant to cost recovery and within the control of individual jurisdictions.

Certain factors beyond a jurisdiction's control can inflate a city's processing costs, and therefore its fees, for a particular permit. This approach accounts for certain variability in each application:

- A building might require structural modifications to support the PV system. In such cases, jurisdictions may calculate the extra fee amount based on the cost of the modifications. This is reasonable, as reviewing and inspecting structural modifications requires more staff hours.
- It could take inspectors longer to drive to the PV installation site in a jurisdictions that cover a large geographic area. This would increase staff time, and therefore cost, to inspect a system.
- Solar permit applicants sometimes submit incomplete or inaccurate applications. Failed reviews cost more time and money for jurisdictions' staff. Having a

Examples: Commercial Permit Fee

In **La Mesa, Calif.**, permit fees are based on the estimated staff time for permit processing, plan review and inspections. This enables cost recovery for a 131 kilowatt commercial project in that town with a fee of $1,669.

The city of **San Diego, Calif.**, published an information bulletin to guide contractors through the permit process for renewable energy projects, particularly solar photovoltaic systems. It also provides information about submittal requirements, plan reviews, project inspections, and required fees.

professional engineer or licensed design professional stamp and sign the PV plans can expedite the permitting process.
- Installations that fail inspections cost more time and money. The jurisdiction may consider charging additional re-inspection fees for failed inspections to help recover costs without penalizing PV installers who perform better quality work.
- Some PV system more complex. For example, if there are inadequate building structures to hold the solar panels, ground mounting or high-wind conditions, inspections would require more staff time. It is reasonable to assess extra fee amounts for such complexities.

RELATED RECOMMENDATIONS

- **Create certainty for contractors**. Transparency in the costs for project review creates certainty on the part of contractors when they apply for project review.
- **Conduct staff training**. Providing adequate training and support helps to ensure that the process is consistently applied both within and across jurisdictions.
- **Integrate review processes**. Incorporating the fire, planning and other reviews into the building department review not only expedites the process, but reduces the overall cost. This might involve training building department staff (see above) to perform standard fire department plan checks on standard PV systems. In this scenario, staff would only submit the application to the fire department for systems that present an unusual design or challenge.
- **Standardize permit requirements**. Adopting a PV permit checklist will make the permit requirements transparent and help facilitate submittal of complete permit applications.
- **Make PV permit checklist available online**. Providing the PV permit checklist information online enables more complete applications, allowing more efficient plan reviews, which facilitates cost recovery using a very fair fee schedule.

RECOMMENDATIONS

Step 2.2: Notify Utility

RELEVANCE

A clear protocol for communication between the utility and local jurisdiction ensures that rooftop PV installations will be not only structurally and electrically sound, but also meet the utility's requirements for safely interconnecting with the grid. When local jurisdictions notify utilities about permit application and inspection results, it can reduce the time between the completion of an installation and the initiation of net-metering, while avoiding the possibility of miscommunication between contractor and utility.

- Conducting the final electrical inspection at the same time as the interconnection inspection reduces travel times for installers and quickly resolves the bureaucratic elements of installation. While clearly to the advantage of installers, utilities typically prefer to inspect and approve interconnection only after the completion of the local permitting process. For this reason, to date, this approach has been most successful in jurisdictions with municipally owned utilities. Within the framework of a municipally-owned utility, the utility and local jurisdiction have greater incentive, and means, to coordinate.
- This strategy is likely to be of most interest to utility companies handling interconnection of solar PV installations to the power grid. It is also of interest to local jurisdictions that can improve communication and coordination with local utilities.

RELATED RECOMMENDATIONS

- **Pre-qualify plans or installers** (Process Step 3). Allowing for joint inspections for installers with documented success and/or pre-approved, standardized system designs will decrease the likelihood that additional utility inspections are needed due to failure to comply with local code.

RECOMMENDATIONS

2-2A Notify utility when permit applications are received and electrical inspections are complete

Develop a standard template and protocol for communication between the jurisdiction and utility that contains relevant information regarding the estimated size and scope of the solar PV installation. To the extent possible, this template should conform to any solar checklist developed as a part of *Step 1: Streamline Permits* (p.1), to reduce duplication of efforts.

Examples: Notify Utility

San Diego Gas & Electric requires that the jurisdictional inspector notify the utility directly, through emailing, calling or faxing the solar release — a form that notifies the utility that the solar installation has received all necessary local permits. The process is modeled after the utility's notification process for the installation of new electric meters.

The city of Kansas City, Mo., places a same-day call to notify utilities that all permits have been inspected and approved. This process is not specific to solar, but is standard for all electrical inspections.

2-2B Conduct joint inspections with local utility and jurisdiction

Provide information on utility requirements for the interconnection process as a part of the checklist and pre-application materials. Where appropriate, create consistency between utility interconnection standards and local permitting standards.

Example: Conduct Joint Inspections

Inspection review is combined with building permit review and conducted over-the-counter at the city of Santa Clara, Calif., Building Department. This consolidation is made possible through Santa Clara's municipal utility, Silicon Valley Power, which found that with proper training, one individual could complete the intake for both the city and the utility. Note that this coordination occurs at the application rather than the inspection phase.

Step 3: Pre-Qualify Plans and Installers

RELEVANCE

Pre-qualification identifies those prospective systems and installers that meet a jurisdiction's standards prior to any installation and provides pre-qualified systems or installers with a more expeditious permitting process. Similar to the permit streamlining process, pre-qualification is a tool for reducing the administrative red tape associated with solar installation. However, there are two key differences between these strategies. First, under pre-qualification, system identification occurs prior to commencement of design or construction of a specific installation; under permit-streamlining, system identification occurs after the commencement of system design and construction of a specific system. The second difference is that pre-qualification does not incorporate electrical- and building-related thresholds to differentiate between "standard" or "non-standard" installations, as permit streamlining does.

Pre-qualifying installers accomplishes many of the same goals as pre-qualifying plans. It avoids significant restructuring or changes to existing permitting processes while recognizing that, for installers demonstrating well-designed systems with quality parts, the permitting application process may be unnecessarily difficult. A strategy for pre-qualifying installers will require less time and energy to implement than one for pre-qualifying plans, since it is about the qualification and experience of the installer rather than the technical aspects of an installation.

Examples: Pre-Qualification of Standard Plans

The city of Honolulu, Hawaii, permitting department allows installers to submit a template of a typical system design and, depending on the installer, a limited number of pre-approved variations. If approved, an installer can skip the electrical plan check process and proceed directly to the inspection process.

The Florida Solar Energy Center approves PV systems and components. Criteria for approvals are based on applicable codes and standards, and consistency with industry-accepted design practices. This approval does not replace or exempt utility or local jurisdiction requirements but it is a resource for expert oversight that local jurisdictions may be unlikely to have on-staff.

However, pre-qualification yields fewer benefits for an installer. Since there is no project-specific review, a pre-qualified installer will typically benefit from a streamlined application process rather than skipping the permit application process.

Pre-qualification is most relevant to local jurisdictions that handle the permitting process and installers who regularly navigate that process. Regional organizations may be involved with creating consistency around pre-qualification requirements or managing a pre-qualification program across an entire region.

RECOMMENDATIONS

3-1A Develop a process for pre-qualification of standard plans

Pre-qualification of plans typically works as follows:

- An installer has a typical template approach or plan for installing a solar panel system.
- The installer meets with local permitting staff to review this plan in terms of system design and components.
- If the permitting staff finds that the plan is compliant with all relevant codes, it is approved.
- If installers intend to install a system conforming to the approved plan, therefore incorporating the approved system design and using the approved components, they inform the permitting department.
- The permitting department then immediately issues an electrical permit.
- During project inspection, the inspector confirms that the system design and components are the same as originally approved.

It is important to note that the steps outlined above typically apply only to an electrical permit process, not to the building permit process. The building permit process would still be required, since the pre-qualification of the standard plan does not address the specific site or structure on which the system is located.

3-1B Develop a process for pre-qualification of installers

This recommendation requires creating criteria for identifying installers eligible for pre-qualification. Two primary criteria can be used: recognition by an outside accrediting organization, or a documented record of success. Recognition by an outside accrediting organization could require installers to provide proof of accreditation from the North American Board of Certified Energy Practitioners (NABCEP). At the state level, accreditation in New York and Florida has been tied to eligibility to access incentive programs. On a local level, a record of success may require installers to demonstrate a certain number of successfully constructed and permitted installations. Currently, Kansas City, Mo., and Johnson County, Kan., maintain a list of licensed contractors; this list could be expanded to include contractors who have NABCEP or other solar-related qualification.

> "The Solar Best Management Practices provide good additions to existing policies and procedures for our region. In particular, the pre-qualification of installers will help to streamline the process for those who have a proven track record of quality installations. There is more work to be done to improve the best practices, but the use of a regional review process to evaluate them furthers our region's consensus approach."
>
> *~ Matt Tapp, AICP, Matt Tapp, AICP, Director of Planning and Zoning, Clay County, Mo.*

In addition to defining the specific criteria for installer pre-qualification, the specific benefit to an installer must be clarified as well. Benefits may include the ability to submit permit applications electronically or receive expedited over-the-counter permit review as appropriate. These types of permit application processes work well and are an efficient use of staff time, provided the applicant has all of the necessary information readily available in the desired format. An applicant who has repeatedly gone through the process successfully is the most likely to be able to provide this information. Reserving these options for pre-qualified installers makes the permit application process more efficient, not only to installers, but to permit reviewers as well.

Examples: Pre-qualification of Installers

In Portland, Ore., installers may use an e-submit process if they have demonstrated familiarity with the statewide solar installation code and successfully applied for PV permits via the traditional in-person submittal process.

The **North American Board of Certified Energy Professionals (NABCEP)** has developed a certification program for renewable energy and energy efficiency professionals. Johnson County Community College currently offers a Solar Technology Certificate and Degree Program to prepare students for the NABCEP entry level exam and provide the design and fieldwork experience to qualify to take the installer exam.

RELATED RECOMMENDATIONS

- **Work closely with installers to develop criteria for pre-qualified plans**. This policy depends on installers submitting applications for pre-approval. If the criteria for pre-approval are too stringent, installers may not embrace them.
- **Recognize pre-qualified plans from other jurisdictions within the MARC region**. The greatest potential for this practice may be at the regional level, especially if smaller cities or counties do not have the staff to maintain a list of pre-qualified plans. A city or county could decide to recognize pre-qualified plans from other jurisdictions with similar permitting standards.
- **Create a regional clearinghouse for pre-qualified plans**. A regional organization, such as MARC, could act as the central administrator of pre-qualified plans. A key benefit of this more regional approach would be that the record and reputation of the installer would extend beyond the boundaries of an individual city or county, further incentivizing safe and proper installations. It is important to note that there would be an administrative cost to such a program that may need to be funded by participating jurisdictions.
- **Incorporate pre-qualification of installers into existing contractor training programs**. Johnson County, Kan., currently operates a contractor academy in which prospective contractors must participate. A similar program for solar installers may provide a useful pathway to pre-qualification. If there is not enough interest for such a program in the short-run, the existing contractor academy could include information on solar installation best practices.

Planning Improvements

The recommended best management practices in this section promote solar system installations for residential and commercial properties through the combination of a registration process, identification of barriers in local ordinances, and creation of solar-ready construction guidelines.

Step 1: Improve Solar Access

RELEVANCE

Suburban neighborhoods with older trees and extensive tree canopies can shade nearby roofs, affecting system efficiencies. In dense urban neighborhoods, nearby buildings may create shadows on solar rooftop installations. Photovoltaic performance is highly susceptible to shading, which has a disproportionate impact on its power production. Since a PV panel is made up of many individual cells that all produce a small amount of current and voltage, if enough of the cells are shaded, the voltage will drop below the low voltage limit of the panel and the entire panel may stop producing electricity. For a single-string, grid-tied PV system, a shadow can represent a reduction in power more than 30 times its physical size.

Solar access policies encourage the adoption of solar energy by increasing the likelihood that properties will receive sunlight suitable for solar energy production in the long-term, protecting the rights of property owners to install solar systems and reducing the risk that systems will be shaded and compromised after installation. Effective and streamlined local rules and regulations help reduce installation costs and can significantly improve the market environment for solar technologies.

Currently, state statutes for solar access in both Kansas and Missouri are voluntary. Since neighboring property owners have property rights over the air space above their property, they may voluntarily grant an easement for light within the air space to the solar owner. Because neither state requires such easement, solar access is subject to the outcome of these private negotiations. By incorporating solar access into zoning codes and ordinances, local governments clarify the responsibilities of various parties, achieve balance between stated government priorities and avoid costly and time-consuming legal action.

Planning and zoning codes provide key policy guidance for protecting the rights of current and future solar system owners. Planning and zoning codes also provide guidance on siting, safety and aesthetic considerations for solar systems, which in turn creates the foundation for a streamlined solar permitting process. Adopting policies addressing solar siting in land use and landscaping can help clarify the importance of solar in the community while reducing future challenges concerning solar rights.

Solar access is most relevant to local jurisdictions that establish and implement policy. Owners of solar systems will benefit significantly from the protection of solar access, and creating a clear policy will mitigate challenges in the future.

RECOMMENDATIONS

1-1A Incorporate solar access priorities in comprehensive plan

Adopt solar access policies within the policy framework of comprehensive plans that incorporate solar siting guidance in the land use planning and landscaping considerations. Recognize solar easements as part of a broader inclusion of a renewable energy component of the comprehensive plan. Prioritize the review and modification of zoning ordinances and other relevant city regulations to remove barriers to the use of solar energy systems and to ensure access to solar.

"A guiding principle of Olathe's Comprehensive Plan, PlanOlathe, is to protect ecological systems and reduce inefficient use of resources. Through participation in the Solar Ready KC challenge, the city of Olathe is creating an environment for citizens and business owners to use alternative energy. The city is currently preparing an update to the zoning code and will include the Solar Ready KC guidelines in the proposed update to the code. The opportunity to participate in Solar Ready KC occurred at the perfect time to align with PlanOlathe, the updates to the zoning code and the recent adoption of the 2012 Building Code."

~ Susan Sherman, Assistant City Manager, Olathe, Kan.

Examples: Comprehensive Plan

The city of **Shakopee, Minn.**, 2030 Comprehensive Plan discusses solar access issues and sets the goal of promoting solar energy use. It recommends both private and public sector tools available to project solar access.

The **Fort Collins, Colo.**, City Plan 2001 promotes the potential for solar energy use in the county and sets numerous detailed goals for solar energy development through planning and development processes.

Greensburg, Kan., Sustainable Comprehensive Plan provides for optimal solar orientation for PV installation in new construction, solar access through setbacks, and protection from shading. The plan recommends the adoption of solar access ordinances.

1-1B Adopt a solar access ordinance

If increased solar energy use is prioritized as part of jurisdiction policy, an ordinance protecting solar access should be created. Include the following elements when developing ordinances:

- Set a clear and quantifiable standard for what constitutes an unreasonable restriction on solar energy systems. A restriction that increases the cost by 10 percent, for example, could be considered unreasonable.
- Define the types of structures covered by the ordinances (e.g., commercial buildings, residences including single-family homes and multi-tenant complexes, garages and other structures).
- Protect solar access by regulation of the orientation of streets, lots and buildings, maximum building height limits, minimum building setback requirements, limitations on the type, height and placement of vegetation and other provisions.
- Consider establishing buffer zones and additional districts to protect solar access that overlaps existing zoning districts.

Revise any local ordinances that pose unintended obstacles, such as building-height restrictions or aesthetic requirements, and formally address potentially conflicting policies, such as tree preservation.

RELATED RECOMMENDATIONS

- **Create a Solar Access Permit.** A solar easement is automatically created when a property owner receives a permit to install a solar energy system. This is a proactive way that local governments can help protect solar access since voluntary solar easements have limited effectiveness.
- **Implement a Green Community Tax Credit**. A state provides a modest, one-time property tax credit to landowners in communities that voluntarily adopt solar-friendly land use laws. No community would be forced to make regulatory changes but those that determine that the benefits of the grant and tax credits outweigh the costs associated with the policy changes may opt in.

Examples: Solar Access Ordinance

Kansas City, Mo. recently proposed zoning and development code amendments to expressly allow solar collectors/panels and to address zoning regulations that apply to district- and utility-scale solar electricity generation systems. Negotiation for solar easements remains the responsibility of the system owner and recorded with the county.

The city of **Boulder, Colo.** designates three Solar Access Areas to protect solar access for a four hour period on December 21. The code requires siting for new residential and nonresidential development.

The **Solar Access Ordinance for New Development** by Clackamas County, Okla., ensures that land is subdivided so that structures can be oriented to maximize solar access and minimize shade by adjoining properties. Santa Cruz County, Calif., provides protection from shading by structures and shading from vegetation.

Step 2: Improve Solar Readiness

RELEVANCE

The upfront cost of solar PV often prevents its inclusion in new construction. However, early consideration of a few simple strategies when designing and constructing buildings will make them compatible for solar installation in the future. Planning for the eventual installation of solar can significantly improve the economics of the solar investment due to more efficient installation, minimized costs and better performance of the overall system. The National Renewable Energy Lab defines a solar-ready building as one that is designed and built "to enable installation of solar photovoltaic and heating systems at some time after the building is constructed."

Specifying and installing a highly reflective, fully adhered thermoplastic membrane roof on a new commercial flat roof has immediate environmental benefits as a cool roof, but will also lower the cost of installing solar at a later date as compared to installing on other roofing types. Alternatively, poor siting due to building orientation or too many roof obstructions on a commercial building may reduce energy production for a solar PV system, extend the payback period and ultimately making a solar project less feasible. Addressing building orientation, available roof space, roof type, electrical system capacity and other features can reduce issues of structural readiness, electrical capacity and future capacity for a solar array at a later date. For greatest effectiveness, these guidelines would be required for some or all new construction within an implementing jurisdiction. At the same time, it is important to acknowledge that solar-ready building ordinances may increase the initial cost of construction, thereby increasing the final sale price of a property.

Several states now require that the option of solar-readiness be given to owners at the time of construction. Rather than requiring new construction to be solar-ready, this provides owners with the information they need to determine whether to opt-in. This approach has had limited impact to date, since relatively few homes and commercial buildings are constructed with a known purchaser in mind; the policy appears to have no documented successes to date.

Requiring solar-ready new construction, on the other hand, addresses features that might be difficult to modify at a later date (such as building orientation, structural loading and shading). Even new buildings may require substantial retrofits to take full advantage of a building's solar resources. Early consideration of solar may provide the developer or building owner with information that may make it easier for future installations and increase the likelihood of installing PV. A solid understanding of what makes a good solar-ready building can inform building design and significantly reduce future installation costs.

Implementing a policy that requires some or all new construction to be solar-ready is a simple way for community leaders to promote solar energy in both the residential and commercial market. While solar-ready buildings do not immediately reduce energy use or generate solar power, these building practices help establish the full potential of solar in the region by removing installation barriers and lowering future installation costs, thereby increasing the potential for widespread solar adoption.

Solar readiness is relevant to developers, developer/owners, architects, builders and contractors involved with new construction projects in both the residential and commercial sectors. Local jurisdictions and public agencies that approve new development and construction are also involved. Additional audiences may include prospective commercial and residential property owners who would be interested in installing solar PV systems on their buildings.

RECOMMENDATIONS

2-1A Develop a solar-ready buildings checklist for new construction

A new construction checklist guides a developer, architect or other interested party through the components of building design required to prepare a building for future solar installation. At the most basic level, the checklist would include recommended best practices by providing guidelines for solar-ready building design to minimize the costs of future PV retrofitting and installation while maximizing potential system efficiency. The checklist would apply to site selection, building design and building construction.

Basic components of a solar-ready building checklist include requirements for: 1) a place on the roof that has unrestricted solar access, is free of obstructions and can structurally accommodate the additional load; 2) a means to connect the solar system to the building's electrical system (called a "chase"); and 3) space for the installation of system controls and components.

A basic checklist may incorporate the following general solar guidelines:

- Minimize shading from trees and neighboring buildings.
- Identify potential placement of future solar arrays.
- Optimize south-facing roof (if sloped) and maximize open area.
- Specify appropriate roof construction.
- Record roof specifications on drawings.

Examples: Solar-ready Checklist

Minneapolis/St. Paul, Minn., **Solar Ready Guidelines** and **Construction Specifications** explain the concept of solar-ready buildings and outline guidance for designing and building a solar-ready structure through site planning, building form, space planning, roofing and mechanical and electrical design.

The **Boston, Mass., Department of Neighborhood Development Solar Ready Guidelines** require new affordable housing developments to limit roof obstructions and avoid roof designs that would complicate future solar installations. The solar-ready standard has been in place since 2007 for all affordable housing projects developed by the department.

It may also outline electrical specifications, such as:

- Location of electrical panel location for interconnection.
- Specification of panel capacity.
- Layout of inverter and other system components.
- Verification of interconnection restrictions for the building location.
- Requirements for running electrical conduit from the proposed solar collector locations to panels.

Other early design requirements or considerations may include:

- Orientation of the building.
- Evaluating a site for solar access.

"The timing of the Solar Ready KC project coincided well with Johnson County's contractor licensing education seminars and renewable energy awareness."

~ Paul Greeley, AICP, Deputy Director, Department of Planning, Development and Codes, Johnson County, Kan.

2-1B Adopt new ordinances or building codes to promote solar ready construction

Solar-ready requirements are a relatively low-cost but effective addition to green building codes and municipal ordinances. After a commercial or residential structure is built, structural and solar access issues can prevent a solar project from being cost effective or may make it entirely unfeasible; thus, addressing solar readiness prior to and during construction can be a critical factor in the future adoption of solar.

One way to achieve solar-ready construction is by adding provisions to the local building code. This would require the design guidelines as outlined above for new construction. The ordinance would include the following requirements:

- For building permit approval, new construction must either include a solar system installation or electrical conduit for later installation.
- The applicable building types or geographic zones where the requirement applies must be specified.

Solar Ready Ordinance Examples

The **2008 Citywide Residential Solar Readiness Ordinance** in Tucson, Ariz., requires solar stub-ins (i.e., conduit) on all new single family and duplex residential units in order to receive a building permit.

A collection of ordinances in **Chula Vista, Calif.**, prepares each new home for future solar PV by requiring installation of electrical conduit during building construction.

The **Colorado Building Energy Code with Mandatory Solar Option** applies statewide to builders who have single-family detached home projects in which buyers are under contract. Builders are required to give the buyer the option to either have a PV system installed on their new home, or have all the necessary wiring installed so they can easily add a solar system at a later date. The builder must also provide the buyer with a list of every solar installer in the area so the buyer can obtain expert help in determining if the home's location is suitable for solar and what the estimated cost savings would be.

RELATED RECOMMENDATIONS

- **Incorporate solar-ready construction as a goal in the jurisdiction's comprehensive plan**. Comprehensive plans can articulate specific policies to guide decision making about solar energy system deployment on public and private land. These policies may address solar access protection, street and building orientation, or preferential locations for new solar energy systems.
- **Provide education on solar-ready construction**. Incorporate a solar-ready construction module in the contractor training programs. Additional audiences include the architecture and design communities.
- **Incorporate solar-ready construction guidelines in the permit checklist**. Provide these requirements early in the permit process by incorporating these standards into a building permit checklist.

Step 3: Engage Developers and Homeowners Associations

RELEVANCE

Maintaining home values is a central concern for local governments, homeowners associations (HOAs) and private property owners. Policies are adopted to preserve or increase the value of homes. Covenants, conditions and restrictions (CC&Rs) are contractual documents that define community rules and are generally established by developers. CC&Rs are contractual documents that property owners must sign and agree to as a condition of purchase; they are typically monitored and enforced by HOAs within planned communities. CC&Rs often inadvertently limit solar installations, one of the major hurdles to solar adoption, according to regional stakeholders.

A growing number of states have enacted statutes that sweepingly invalidate land use restrictions on solar, including those contained in CC&Rs; however, these same statutes frequently undermine the land-use authority of the local community and ignore local issues and concerns. By establishing best practices at the local level, jurisdictions can improve the environment for solar adoption while also proactively negating the need for state-level legislation to create such broad mandates.

Land developers anticipating the future use of solar in subdivisions could include covenants designed to protect access for direct sunlight and may enhance the value of the property overall. Addressing CC&Rs for new developments is considerably more practical and efficient than for existing developments, as it eliminates the need for private negotiations among homeowners and their associations in the future.

Existing CC&R requirements, such as covenants requiring approval of any modification to the original construction by an Architectural Review Committee (ARC), may be vaguely worded and do not provide the homeowner with a clear sense of the standards by which solar design will be judged. For example, many ARCs do not require members to be architects or design professionals and so their motivations and level of knowledge may be quite distinct from those of a developer or individual property owner. This can lead to conflict over the approval of solar improvements.

Some CC&R requirements, such as setbacks and restrictions on vegetation, can actually work to the advantage of the solar homeowner by preventing shading and other interference with sunlight. However, many CC&R restrictions either indirectly or directly impact the placement of solar rooftop, the efficiency of the system, or its cost, including the following:

- Height restrictions may prevent a solar rooftop system that extends above a given height.
- Restrictions on secondary buildings and structures may constrain a homeowner's ability to locate solar collectors on secondary structures such as garages, sheds, pools or cabanas. The solar system itself may be construed as a covered structure; the property would then be limited by the number of structures allowed on a given property.
- Utility screening is a common requirement to provide a visual barrier to mask utility equipment on site. Restrictions on utility screening can be broadly defined and may unintentionally include solar panels.
- Specifications requiring custom colors and discrete locations for conduit may incur additional costs for the homeowner interested in installing solar panels.
- Restrictions on the placement of improvements, such as the requirement that a solar collector be mounted on a backyard-facing façade, can effectively preclude solar installation unless the homeowner is fortunate enough to have a south-facing backyard.
- Conformity with architectural style can be rigidly interpreted to exclude the addition of solar panels.

In many instances, boilerplate CC&R documents are customized by a law firm for a builder/developer for use in a new development and may not address solar access at all. In many of the region's older neighborhoods, HOAs may rely on older CC&Rs that predate solar technology and consequently do not provide any direction for the allowance or incorporation of such systems. Jurisdictions can increase the likelihood of solar-friendly policies at the local level by engaging these stakeholders and providing them with the information they need to make informed decisions about how to incorporate solar-readiness in development.

HOAs that maintain CC&Rs and developers who help establish the initial provisions are the primary focus of these best management practices. In addition, homeowners can help by leading by example and working with their HOAs to effect change as necessary. Legal firms and individual attorneys may also be a target for these recommendations, as they are often retained by HOAs to draft new or update existing language and bylaws for HOAs and neighborhood associations.

RECOMMENDATIONS

3-1 Create incentives for the adoption of best practices

Local jurisdictions may create incentives for new development projects to include solar access regulations in CC&Rs and HOA bylaws. This strategy may overlap with an option to further encourage renewable energy sources and solar installations in the land use code for subdivisions. An incentive program may include offering tax breaks, credits, or a one-time grant to drive demand. A property tax incentive or special improvement district that targets certain neighborhoods or areas deemed to be barriers to adopting solar energy could be established.

If residents within a community react to these incentives and make a push for solar, but find their HOA restrictions do not allow solar installations or make it uneconomical due to installation barriers, these residents may start forcing changes to HOA rules, especially when the incentives are great enough to make solar energy more affordable.

RELATED RECOMMENDATIONS

- **Implement a green community tax credit.** Under this incentive program, the state offers a modest, one-time property tax credit to landowners in communities that voluntarily adopt solar-friendly land use laws. No community would be forced to make regulatory changes; those that determine that the benefits of the program outweigh the costs associated with the policy changes and make eligible regulatory changes would receive the benefit. Communities motivated by the incentive can then advocate for their HOAs or jurisdictions to adopt the necessary policies to be in compliance.
- **Incorporate solar-ready construction into contractor education**. Developer and contractor education could be expanded to include best practices for solar-ready construction to best enable future occupants to install PV panels on rooftops.

Examples: Incentives

Incentives provided by the city of **Scottsdale, Ariz.**, include expedited plan review, green building inspections, lectures, workshops, a homeowner's manual, recognition on the city website and free promotional green building materials, including a job site. The Green Home Rating Checklist contains a point system used to qualify homes as green homes.

The **Unified Development Ordinance** of Bloomington, Ind., offers developers certain bonuses and allowances for buildings including features that help meet particular sustainability goals. These benefits are for developers, not individual residents.

Colorado enacted legislation in 2007 to authorize counties and municipalities to offer property or sales tax rebates or credits to residential and commercial property owners who install renewable energy systems on their property.

Finance Inventory

The material in this section outlines the various financing options that are available in the MARC region. The options fall into two categories, traditional methods and non-traditional methods. Within the traditional financing methods, solar equipment leases and power purchase agreements are examined along with variations on both. The non-traditional methods examined include property tax assessment bonds, qualified energy conservation bonds and community solar.

Traditional Financing Methods

RELEVANCE

Traditional financing models take existing financing vehicles and adapt them for use in the solar industry. Financial institutions, businesses and homeowners are relatively familiar with how these vehicles work, so there is less mystery and concern about them. One new vehicle that is experiencing increasing popularity is solar leases. The other vehicle within this category, the power purchase agreement, has long been a popular vehicle for wind installations and has previously been one of the most common financing models for residential solar projects.

RECOMMENDATIONS

Solar Equipment Leases

The solar equipment lease allows a property owner ("lessee") to enter into a contract with the owner of the solar generation equipment ("lessor") to lease the equipment and consume the electricity that it generates over a set period of time, in exchange for monthly lease payments. The exact terms will be negotiated within the lease but typically the lessor agrees to provide ongoing operations and maintenance services during the term of the lease. At the end of the lease term, the lessee typically has the option to purchase the PV system for its fair market value, extend the lease agreement or have the system removed.

In the state of Missouri, leases are expressly mentioned as valid customer-generator definitions for both the current solar rebate, Proposition C, and for net-metering. In the state of Kansas, a solar equipment lease is permissible by statute and expressly mentioned in the net-metering schedule.

Power Purchase Agreements (PPA)

The power purchase agreement is one of the most common financing models used for solar. Traditionally, in a third-party solar PPA, the host agrees to purchase the power generated by the system. The project developer then installs, operates and maintains the system on behalf of the host, in return for PPA payments from the host. Frequently the project developer will contract with an equity investor who purchases the project rights from the developer. This allows the equity investor to then utilize the full benefits of the tax credits and incentives generated by the project.

In both Missouri and Kansas, the solar PPA runs into the regulatory issue of whether it establishes the system owner as a "public utility." Neither state has clearly defined this issue, although both state commissions have made comments that the definition should be either expanded or clarified. Kansas, in particular, has seen more exploration given the use of PPAs within the wind industry.

Variations on solar lease or PPA

There are three variations on the solar lease or PPA that could be used.

- **Direct Lease/PPA**. Within a typical direct lease or PPA, the developer enters into an agreement with the host customer, such that the project developer will own the system throughout the life of the project and will finance and oversee the installation, engineering and maintenance of the system. In return for the aforementioned services, the customer will submit payments over the life of the project.
- **Sale/Leaseback Arrangement**. Though direct lease/PPAs are transactionally rather simple, in reality they do not present an economically advantageous alternative for project developers. Solar project developers often don't have the ability to fully utilize the tax incentives that stem from installation of a renewable energy project, such as the Federal Investment Tax Credit, Production Tax Credit, or Modified Accelerated Cost Recovery System Depreciation. In order to maximize project value, the ownership of the project must be transferred to an entity that can fully monetize those incentives. In this model, the developer and the host customer enter into a lease or PPA. After installation, the developer

sells the equipment and contract rights to tax equity investor. The tax equity investor and project developer then enter into a lease. Essentially the "leaseback" mirrors the original lease with the host customer payments made under the original lease funding the project developer's payments to the tax equity investor via the "leaseback." When done correctly, the structure allows the tax equity investor to be the legal owner of the project with all the eligible tax benefits.

- **Partnership Flip**. In the partnership flip scenario, a project developer and a tax equity investor will form and jointly own a special purpose partnership entity ("JointCo"). The JointCo will then enter into a solar lease or PPA with the host customer and will own, install and maintain the project.

RELATED RECOMMENDATIONS

The most efficient resolution to issues relating to a state's regulatory authority regarding PPAs or other traditional financing mechanisms, would be for legislators to enact a statutory exemption for renewable energy projects from "public utility" status.

Example: Traditional Financing Methods

The state of Oregon modified its definition of public utility to exempt anyone who is providing heat, light or power from solar or wind to any number of customers. O.R.S. § 757.005 states that there is an express exemption for "[a]ny corporation, company, individual or association of individuals providing heat, light or power [...] [f]rom solar or wind resources to any number of customers."

Non-Traditional Financing Methods

RELEVANCE

As an alternative to the traditional models of solar equipment leases and PPAs, there are a number of finance vehicles that have taken hold in various parts of the country over the last few years. To date, they have only been used in limited cases in Missouri, but they offer interesting alternative financing vehicles that could further the widespread adoption of PV developments.

RECOMMENDATIONS

Property Tax Assessment Bonds or Loans

Across the country, several communities have adopted the use of property tax assessment bonds to finance solar projects. In this scenario, cities or municipalities issue long-term bonds or tap into the city's general fund to finance loans to property owners to cover the costs of PV system purchases, installations and maintenance. The property owner then repays the loan over an extended period of time, 20 to 30 years, through a special property tax assessment collected annually or semi-annually.

Qualified Energy Conservation Bonds

In 2008, the U.S. Congress authorized Qualified Energy Conservation Bonds (QECBs) as part of the Energy Improvement and Extension Act. In this legislation, Congress allocated significant funds to the states to suballocate to entities such as local governments or municipalities with populations of 100,000 or more, counties, school districts or universities. More specifically, the bonds may be issued for the following purposes:

- To reduce energy consumption in publicly owned buildings by at least 20 percent.
- To implement green community programs (including the use of grants, loans, or other repayment mechanisms to implement such programs).
- For rural development (including the production of renewable energy).
- For certain renewable energy facilities (such as wind, solar and biomass).

QECBs are taxable, but the federal government subsidizes the issues by providing either a federal tax credit or a direct cash payment, which ultimately results in the issuer paying significantly lower interest costs than a comparable tax-exempt bond.

The QECB funds that were allocated to Kansas have already been fully committed so it isn't possible to utilize this program. Missouri, on the other hand, has nearly $50 million of QECB funds that haven't been issued. Lack of familiarity with this option seems to be the driving issue in the lack of use.

Community Solar

Two traditional categories that are used to describe the scale of energy generation for renewable projects: utility-scale projects and distributed-generation projects. Over the last few years, a hybrid category has evolved in an effort to maximize the benefits and minimize the challenges of these traditional models. This alternative, known as community solar, networked PV, solar aggregation, virtual net-metering or remote net-metering, essentially consolidates a large number of distributed-generation systems on a common site within a community. Individual customers then purchase or lease rights to those individual systems and have the energy generated by that system credited against their personal energy consumption. In theory, such a configuration would allow the project as a whole to benefit from the economies of scale and provide an opportunity to maximize engineering and construction competence and the tax incentives available to the individual consumers.

Examples: Non-Traditional Financing Methods

The St. Louis County, Mo., has created a program utilizing QECB funds to establish a low-interest loan program to finance residential and commercial energy efficiency improvements.

The SolarShares program through the Sacramento Municipal Utility District, allows customers to purchase a self-determined output of solar energy through the utility company. The program sold out in its first six months and participation has remained constant over time.

In St. George, Utah, the municipal utility, St. George's Energy Services Department and a neighboring electric cooperative operate a community PV system and sell the energy through the SunSmart program. Customers can purchase a unit of production from 0.5 kilowatts to 4 kilowatts. Customers receive a credit on their monthly utility bill for the solar power their unit produced.

Both Missouri and Kansas are unclear as to the use of remote net-metering. Questions remain regarding the compliance with the respective state's net-metering requirements, the public utility issue and the issue of a generator transmitting power over a transmission system owned by a different entity. Clarification in these issues will further the development of remote net-metering.

RELATED RECOMMENDATIONS

The most efficient resolution to any issues relating to remote net-metering would come either from the state legislature or the respective regulatory commissions for each state. Further clarification would then open the path for development by utility companies, investors or non-profits.

For further information regarding the current financial parameters for Kansas and Missouri, please read the Inventory of Current Financial Options for Solar Installation Practice in Kansas City and Beyond. The document can be found at **www.marc.org/Environment/Energy/solar_ready_kc.html.**

Summary of Achievements

Consortium member name population	2011 SM3 Score	2013 SM3 Score	% > Score	2012 actions in solar-related permitting and planning processes	2013 expected actions
Kansas City, Mo. population 459,787	516	799	54%	• Implemented comprehensive review. • Online permitting with solar checklist. • Shortened permit times to 1-8 hours. • Expedited template optional. • Inspections completed in eight hours with specific time stated. • Solar-ready construction guidelines adopted as part of green development codes. • Adopted 2012 ICC/IECC codes.	• Will install 20 25kW solar systems on municipal buildings and install an additional 20 systems in 2014. • Further improvements in web-based permitting processes. • Will consider solar rights and access.
Lee's Summit, Mo. population 91,364	347	764	120%	• Implemented comprehensive review. • Online permitting with solar checklist. • Shortened permit review times to 1-8 hours. • Reduced permitting fees to $174 average. • Expedited template as default. • Inspections completed in eight hours with specific time stated. • Solar-ready construction guidelines adopted.	• 2012 ICC/IECC code adoption. • Further reduction/ standardization in permit fees proposed. • Further improvements in web-based permitting processes. • Will consider solar rights and access.
Clay Co., Mo. unincorporated population 14,442; full population 221,939	461	660	41%	• Implemented comprehensive review. • Online permitting with solar checklist. • Updated information available online. • Adoption of 2012 IECC codes. • Launched green build incentive program. The incentive program includes Solar Ready KC BMPs, model prototypical solar/photovoltaic consultative designation program.	• Further reduction (capping fees). • Standardization in permit fees under consideration. • Further improvements will be made in web-based permitting processes. • Will consider solar rights and access.
Olathe, Kan. population. 125,872	399	643	61%	• Both electric/structural reviews and planning and zoning combined. • Lowered permit times. • Online permitting with solar checklist available. • Updated information available online. • Adoption of 2012 ICC/IECC with solar-ready construction guidelines. • Update comprehensive plan includes solar BMPs.	• Fire protection enhancements being considered. • Further reduction/ standardization in permit fees under consideration. • Further improvements in web-based permitting processes. • Will consider solar rights and access.
Johnson Co., Kan., unincorporated population 14,262; full population 544,179	472	643	36%	• Implemented comprehensive review in permitting process. • Reduced time for permitting and inspections processes. • Trained 326 contractors in PV basics and advanced techniques in biannual contractors academy.	• 2012 ICC/IECC code adoption. • Further improvements in web-based permit; will consider capping fees. • Implement training/pre-qual. of solar installers through Johnson Co. Contractor Academy.

Conclusion

Solar resources in Missouri and Kansas, between 4.5 to 5.0 kWh/m2/day, far exceed those of Germany which leads the world in solar energy production. With significant economic impacts, solar permitting reform represents a compelling opportunity to stimulate economic activity and generate fiscal revenue. Sustained growth in the MARC region will require a proactive focus on policy, streamlined permitting and planning processes to reduce soft costs and prepare for the new economy.

The Solar Ready KC initiative identified best practices and financing options from across the country that can be implemented in the MARC region in preparation for the rapidly growing solar market. The region will experience real progress if both improved processes and standards, along with financing vehicles, are adopted. Jurisdictions adopting consistent procedures and standards that ensure health and safety, while reducing the balance of system or non-hardware costs for consumers, will only be magnified if financing vehicles are available that allow those interested in going solar the ability to proceed.

The defining aspects of the Best Management Practices focus on:

- **Process Clarity**: Providing checklists, clear permit instructions and cost calculators for the solar permitting process will help reduce balance of system costs and create efficient processes for all involved parties.
- **Viability**: The proposed changes advocated by the Best Management Practices facilitate property owners' rights to install solar, but are also structured to minimize the amount of time and resources required to implement them, contributing to the development of a sustainable solar economy.
- **Ease of implementation**: The recommended steps for improving both process and planning were organized to prioritize the improvements in order of ease and impact.
- **Proactive versus reactive**: The regional solar market is in its formative stages but could quickly expand. Implementation of the Best Management Practices allows local jurisdictions to stay ahead of the curve and prepares them for a smoother market expansion.

Real progress can be achieved by our region if jurisdictions adopt consistent procedures and standards that ensure health and safety while reducing the balance of system or non-hardware costs for consumers.

More details regarding the information contained in this document can be found at:

- Solar Best Management Practices: A complete set of the Best Management Practices including model language and calculators can be found at www.marc.org/Environment/Energy/solar_ready_kc.html.
- Finance Inventory: A complete analysis of available and potential financing models for the Kansas City region can be found at www.marc.org/Environment/Energy/solar_ready_kc.html.

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