Balancing Solar Energy Use with Potential Competing Interests

Most communities pursue multiple goals simultaneously through a range of plans, policies, regulations, and programs. The decisions communities make in support of one goal may have a positive, negative, or negligible effect on other goals. When a community considers each goal in isolation, it may miss opportunities to address potential conflicts before they occur. Once a conflict exists, it may be too late to pursue a mutually beneficial solution, and communities may be forced to choose between competing interests.

As Godschalk and others have pointed out, sustainability goals are not immune to these potential conflicts of interest (Godschalk 2004; Campbell 1996). When the goal in question is promoting the installation of solar energy systems, historic preservation, tree protection, and even urban redevelopment may represent competing interests. Fortunately, planners' comprehensive approaches to problems and long-range perspectives make them uniquely positioned to address this dilemma. They consider potential tradeoffs and are charged with finding ways to balance different—and sometimes competing—community priorities and goals. Moving forward, planners can serve as key players in ensuring that these potentially competing interests successfully co-exist in the future.

Solar and Historic Preservation

Historic preservation and solar power generation are often both part of of a community's plan to become more sustainable. They have some notable similarities. Both are environmentally friendly. Historic properties were typically built with attention to climate and air circulation and with locally sourced materials, and they are usually located on walkable streets and in relatively central locations. Additionally, preservation of historic properties is "greener" than tearing down and rebuilding because of the energy and materials savings (WBDB 2012). Similarly, using renewable power from the sun in place of fossil fuels helps reduce carbon emissions that contribute to global warming.

Both have economic benefits as well. Designating a property or district as historic increases property values and attracts investment in and around the area. Homes with solar installations sell for more money while saving owners money on their energy bills (NTHP 2011).

However, while solar is part of an energy solution for the future, historic preservation is the key to protecting the community's past. Tension has developed between these two interests as communities struggle with how to both preserve their past and ensure a sustainable future.

The following discussion focuses on historic properties and historic districts, as planners have indicated that this is where they have experienced the highest potential for conflict. It should be acknowledged, however, that historic preservation is much broader than historic properties and historic districts

alone. Communities should also consider potential conflicts between solar and other historic resources including public lands, cultural landscapes, tribal properties, historic landmarks, and archaeological sites during their planning processes.

The Dilemma

Historic preservationists and residents alike have strong desires to preserve the buildings and spaces that represent our nation's heritage and tell the stories of our past. Professional preservationists have ethical obligations to protect the integrity of these resources for future generations. Changes to a building's structure or façade to support a solar installation, as well as improper placement of an installation, can threaten the historic character and architectural integrity of historic resources. Unlike solar proponents, preservationists typically recommend that historic properties exhaust all possible weatherization options prior to the installation of a renewable energy system, including sealing windows and doors and installing insulation.

In addition to the intrinsic value associated with preserving our past, there are economic arguments for preserving historic properties and districts in their unaltered state. Historic districts often have significantly higher property values than comparable undesignated areas. They also help stabilize and revitalize declining neighborhoods (NTHP 2011). Neighboring property owners and other stakeholders may be concerned that architecturally insensitive changes associated with solar installations could reduce property values for nearby properties.

Proponents of solar, however, feel that solar technology can help strengthen the environmental profile of older buildings and help jurisdictions meet aggressive energy goals. Some proponents argue that renewable energy systems are necessary for older buildings to achieve the same level of energy efficiency as modern ones and that prohibiting homeowners from installing solar on their historic properties might doom those properties to replacement by new, greener structures (Musser 2010). How a community chooses to address this potential conflict can greatly impact its ability to maximize its solar potential or to protect its historic resources. Only a few states and local governments have addressed the issue head on.

Solar and State Historic Preservation Legislation

Many states have enacted solar rights legislation, which prohibits local governments from enacting restrictions that prohibit solar. Some states allow restrictions if they are "reasonable," which is defined differently from state to state (Kettles 2008). In most cases, historic buildings or districts are not explicitly addressed, which makes it unclear whether historic preservation is viewed as a reasonable restriction.

There are a handful of states, however, that have specifically addressed the issue. North Carolina makes its general prohibition on the adoption of laws restricting solar energy systems on residential properties applicable to historic districts but authorizes local jurisdictions to regulate the location or screening of solar collectors by "requiring the use of plantings or other measures to ensure that the use of solar collectors is not incongruous with the special character of the district" (N.C. Gen. Stat. §160A.400.4(d)). Even under the general prohibition, though, local governments may restrict solar energy systems to the extent that they are visible from the ground and installed on any facade or roof slope that faces common or public-access areas, or installed on a property within the area between the facade of a structure and common or public-access areas (§160A-201(c)). New Mexico prohibits a county or municipality from imposing restrictions on the installation of solar collectors except in a historic district (N.M. Stat. §3-18-32). And Connecticut prohibits a preservation commission from denying an application for a certificate of appropriateness for a renewable energy system unless "the commission finds that the feature cannot be installed without substantially impairing the historic character and appearance of the district." The commission may impose conditions on the issuance of a certificate of appropriateness, including design modifications and limitations on the location of the feature, provided that the effectiveness of the system is not significantly impaired (Conn. Gen. Stat. § 7-147f).

Local Actions Addressing Solar and Historic Preservation

Some municipalities have taken steps to explicitly address solar and historic preservation in their codes and ordinances. Howard County, Maryland (2009), and Alexandria, Virginia (1993), have adopted guidelines for solar panels in historic districts. Bayfield, Wisconsin, developed a document that details best practices in sustainability from a historic preservation perspective (NTHP 2012). In Texas, the City of Austin's zoning ordinance allows for a preservation plan in historic districts to incorporate sustainability measures such as solar technologies and other energy generation and efficiency mechanisms (§25-2-356, §25-2-531).

Two other communities, Montgomery County, Maryland,

and Portland, Oregon, have recently adopted guidelines and recommendations that address solar and historic preservation. Montgomery County amended its General Rehabilitation Design Guidelines in 2011 to specifically address solar panels. Portland revamped its zoning code to eliminate discretionary review of all new solar installations that comply with community design standards (Chap. 33.218). The community design standards make it easier for property owners to know what will be approved and what level of review a property owner can expect based on the location of the property.

However, these municipalities are the exception rather than the rule. Many jurisdictions fail to address solar in any capacity in their comprehensive plans or zoning ordinances, let alone specifically in their design guidelines for historic districts and properties. This ambiguity can create challenges on many levels. Residents are unclear about where they can install solar energy systems or whether these systems are even allowed, and persons serving on review boards and commissions may have trouble making consistent determinations. In some instances the uncertainty can discourage the installation of solar systems, which may work against solar energy goals. In other instances property owners may install systems without approval (knowingly or unknowingly) and officials can only react, issuing penalties and requiring "after the fact" applications for certificates of approval. If a community attempts to force a property owner to remove an installation, it opens itself up to a lawsuit if the property owner decides to appeal the decision or attempts to recoup installation costs.

Some communities may allow solar in historic districts or on historic properties, but their ordinances impose so many obstacles and restrictions on permit approvals that installing solar energy systems becomes unfeasible or impossible for applicants. Many times these restrictions were crafted to address other issues, such as alterations to historic roof lines or installation of satellite dishes, or are simply out of date. Some communities experiencing a sharp increase in the number of applications for solar systems have hastily developed historic preservation guidelines without identifying and engaging the appropriate stakeholders. Finally, some communities explicitly prohibit owners of historic properties from taking advantage of clear standards for the installation of solar energy systems in nonhistoric areas.

Solar installations on historic buildings and in historic districts are often considered on a case-by-case basis, leaving municipal review boards, commissions, and councils to resolve solar and historic preservation conflicts through their discretionary powers. Adding an additional level of ambiguity is the lack of any case law on the subject that could potentially provide local jurisdictions clear guidance on the subject matter.

A solar panel system was installed on the rear elevation of this historic property in the Heritage Hill Historic District of Grand Rapids, Michigan. By locating the system in the rear of the property, the views from the public right-of-way remain preserved. (Image courtesy of Kimberly Kooles, N.C. Solar Center.)

Can Solar Panels and Historic Preservation Get Along?

The variety of regulations, guidelines, and policies that have been developed pertaining to solar and historic preservation indicate that there is no uniform or concrete approach to determining whether a solar installation is appropriate on a historic resource. Most often disagreements arise not around the installation itself, but how the installation is done. Most agree that installation of solar panels is not acceptable when the installation involves removal of historic roofing materials, when the historic roof configuration has to be removed or altered to add solar panels, or when the installation procedure would cause irreversible changes to historic features. There are, however, multiple situations when installation of solar panels on a historic resource is generally viewed as acceptable. Panels are generally viewed as acceptable when they are

- installed on a building with a flat roof, at a low profile, and are not visible from the street;

Resources: Solar and Historic Preservation

Some widely agreed upon guidelines have been developed to illustrate when a solar installation may be appropriate and when it is not. These include

- "Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings" (U.S. Department of the Interior, National Park Service, Office of Technical Services, 2011; www.nps.gov/tps/standards/rehabilitation/sustainability-guidelines.pdf). These guidelines include a section dedicated to solar technology.
- "Design Guidelines for Solar Installations" (National Trust for Historic Preservation, n.d.; www.preservationnation.org/information-center/sustainable-communities/sustainability/solar-panels/design-guidelines-for-solar.html). This document provides a foundation for the adoption of local guidelines related to solar energy installations.
- "Sample Guidelines for Solar Panels in Locally Designated Historic Properties" (Kimberly Kooles, National Alliance of Preservation Commissions, 2009; www.preservationnation.org/information-center/sustainable-communities/sustainability/solar-panels/additional-resources/NAPC-Solar-Panel-Guidelines.pdf). This resource is intended to serve as a starting point for local preservation commissions developing their own guidelines for solar panels.
- "Implementing Solar PV Projects on Historic Buildings and in Historic Districts" (A. Kandt et al., National Renewable Energy Laboratory, 2011; www.nrel.gov/docs/fy11osti/51297.pdf). This technical report focuses on the implementation of photovoltaic (PV) systems on historic properties.
- "Developing Sustainability Design Guidelines for Historic Districts" (Nore Winter, National Trust for Historic Preservation, 2011). Communities can refer to these guidelines when developing or updating guidelines for solar installations in historic districts. Although this resource discusses sustainability guidelines in general, it does include specifics on renewable energy.
- installed on secondary facades and shielded from view from a primary façade (below and behind parapet walls and dormers or on rear-facing roofs);
- ground-mounted on nonhistorically significant landscapes and inconspicuously located on historic sites;
- located on new buildings on historic sites or new additions to historic buildings; or
- located complementary to the surrounding features of the historic resource (Kooles et al. 2012).

The following recommendations will assist planners in ensuring that solar and historic preservation can successfully coexist in their communities:

- Advocate for development of state solar-access laws (for states that do not have them) and changes to state solar-access laws (where they exist) to specifically address historic preservation.
- Identify historic preservation as a reasonable restriction in state solar-access laws and craft clear language that indicates when an installation is not acceptable.
- Revise, develop, and adopt local preservation guidelines or ordinances (tailored to the community) that address renewable energy and sustainable technology.
- Address historic preservation and solar jointly during the planning process. This includes discussing priorities during visioning and goal-setting exercises, addressing potential conflicts during the development of goals, policies, objectives, and action items, and identifying unintended barriers in existing guidelines and regulations.
- Perform an audit of the community's historic preservation guidelines and regulations to determine unnecessary or overly stringent barriers to solar installations.
- Ensure that the appropriate stakeholders, both historic preservationists and solar experts, are involved in the development of solar access guidelines and development regulations. Also ensure that they serve as members of local solar-advisory committees.
- Designate a board to make decisions regarding solar and historic structures. Ensure that the board has decision-making authority and representation from appropriate stakeholders.
- Design a review system and criteria to review and evaluate projects after installation on historic properties.

Consider updates to guidelines and ordinances when appropriate.

- Educate and increase citizen awareness of the benefits of both solar and historic preservation and best practices of sensible planning to avoid future conflicts.

Solar and Trees

Maintaining and enhancing the tree canopy is another common sustainability goal. Trees and solar energy systems also share similarities. Both require access to the sun, and both help reduce carbon emissions and curb pollution. When a tree's shade impacts the efficiency of a solar system, however, trees and solar become unlikely adversaries. The conflict has sparked debate about which is the higher local priority.

As states make commitments to promote alternative energy sources and reduce energy consumption, they have simultaneously made commitments to increase solar capacity. The California Solar Initiative (CSI), for example, has set a goal to reach 1,940 MW of installed solar capacity by the end of 2016 (California Public Utilities Commission 2012). These ambitious goals, coupled with the increasing affordability of solar energy systems and the adoption of financial incentives and financing programs, make an already contentious issue likely to become even more so as more people seek to install solar panels on their homes and businesses.

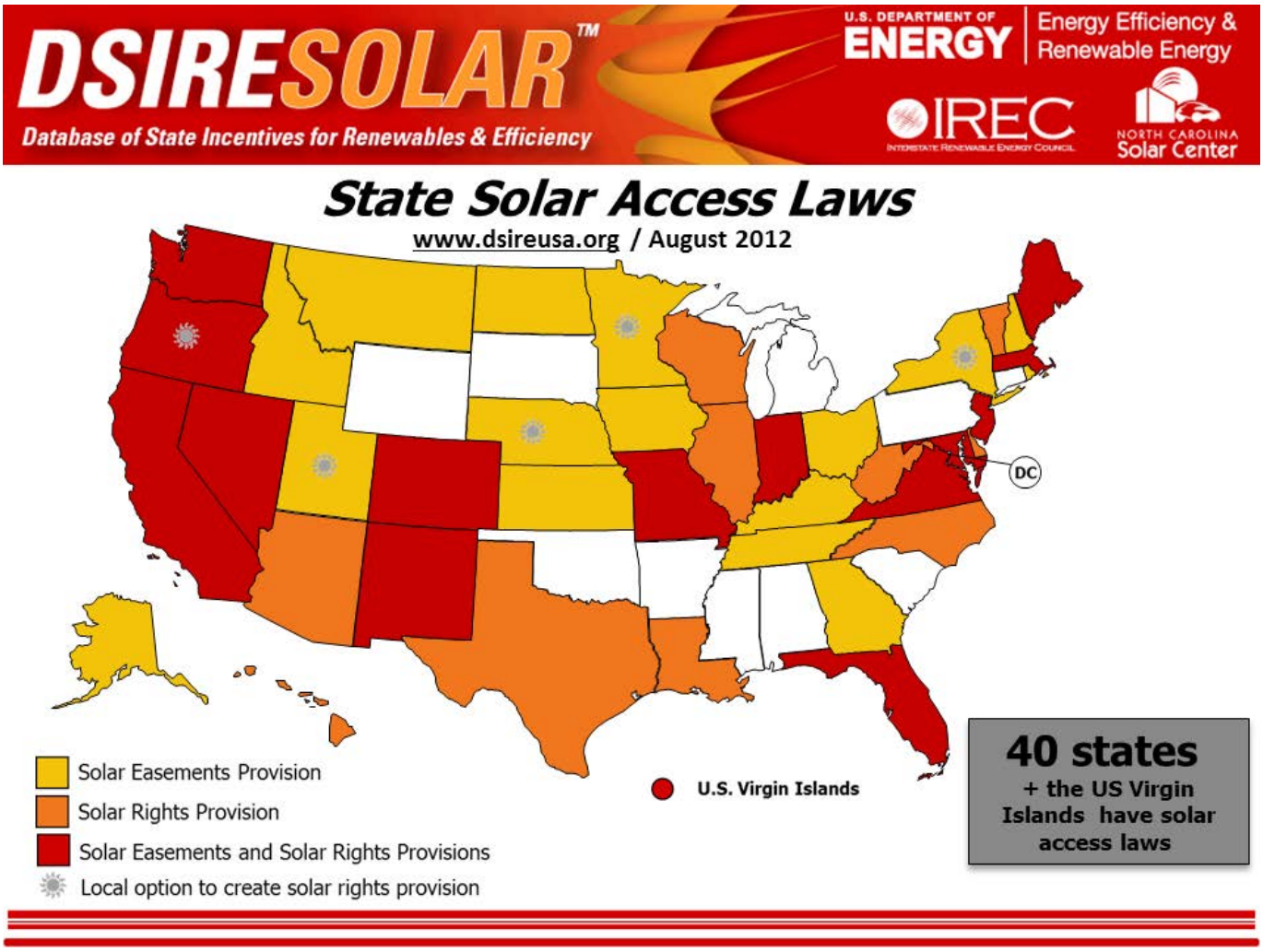
The Dilemma

Urban foresters, other allied professionals, and residents can list many reasons to maintain a mature and healthy tree canopy. Trees provide a wide range of environmental, social, and economic benefits including improving air quality, reducing stress, and increasing property values. Despite these benefits, urban tree coverage is on the decline across the U.S. In fact, according to a 2012 study published in *Urban Forestry & Urban Greening,* 17 of the 20 cities analyzed had statistically significant declines in tree cover (Nowak 2012). Solar energy systems could represent another potential threat to an already increasingly threatened resource.

In order to protect urban forests, advocates have implemented tree-planting and protection campaigns and have developed tools, such as the U.S. Forest Service's i-Tree software suite (www.itreetools.org), to interpret canopy change. Despite these efforts, tree canopy has continued to decline. Solar energy systems contribute to this concern. First, some states require the removal of trees that grow to interfere with solar energy systems, even if the trees were planted prior to the installation of the system. Additionally, many of the alternatives to tree removal recommended by solar proponents, including trimming, pruning, and height restrictions, can reduce the benefits the tree canopy can provide. Finally, areas with high concentrations of solar energy systems may effectively become buffers against future tree plantings. Tree advocates worry about the implications of today's solar installations on the future of the urban forest.

A redwood tree received a "poodle cut" to avoid shading the solar collector on the neighboring property. (Image courtesy of Jim Wilson, The New York Times.*)*

Tree advocates also believe that many questions related to solar installations remain unanswered. For example, while solar advocates have offered solutions for addressing solar during infill development and new construction, impacts to mature trees in older, established neighborhoods have not been addressed. Houses in older neighborhoods are often constructed on smaller lots, which limits the options for tree placement on the lot. Ad-



Solar access laws vary from state to state. (Image courtesy of Database of State Incentives for Renewables & Efficiency [DSIRE].)

ditionally, trees in these neighborhoods have already reached maturity, so few measures can be taken to reduce conflict.

Solar Legislation Relating to Trees

Many communities are taking steps to remove regulatory barriers to solar installation. But even if regulations allow property owners to install solar systems on their properties, shading may limit the efficiency of those systems to a degree that makes their installations economically infeasible.

In the United States, there is no nationwide "right to light," meaning there is no statute, inherent common law basis, or policy at the federal level addressing or affirming solar rights (Staley 2012a). This property-rights issue has been left to the states to resolve, with the result being a hodgepodge of statutes, ordinances, and case law as states take up the issue of solar access rights. Adding the competing interests of tree owners to the mix muddles the issue even further. What happens if access to the sunlight necessary to operate the solar system requires trimming or removal of trees on the individual's property or a neighboring property?

Most states have adopted some type of legislation to ensure solar access rights, but some states have remained silent on the issue. Additionally, legislation varies from state to state and in some states, such as California, legislation has been significantly amended as a result of decisions rendered by state courts. If the rules governing adequate access to sunlight are not predictable and easy to apply, people may be reluctant to invest in solar energy systems, and conflicts will arise that could have easily

been avoided. Does a property owner have a "right to light," and should this right be offered without conditions or limitations?

The following are the types of existing legislation states have adopted related to solar in attempts to guarantee reasonable solar access rights in the face of competing interests, such as urban tree growth:

- **Prohibition of Conditions, Covenants, and Restrictions**: These laws prevent homeowners' associations from adopting or enforcing covenants, conditions, and restrictions that bar or place undue burdens on installation of solar energy systems.
- **Solar Easements**: These laws typically allow a landowner to enter into an agreement with an adjacent landowner to ensure that sunlight reaches the property.
- **Local Zoning Authority to Adopt Solar Access Regulations**: These laws permit local zoning authorities to adopt rules and regulations in the permitting and zoning process that preserve solar access, including consideration for shading from other structures or vegetation.
- **Solar Shading**: These laws ensure that the performance of a solar energy device will not be compromised by shade from vegetation on adjoining properties (Kettles 2008).

As of August 2012, 40 states have adopted one or more types of solar access laws (DSIRE 2012). Some of the states with more notable legislation include Wisconsin and California.

Wisconsin is one of the most protective states regarding a resident's right to install and operate a solar energy system, with laws that limit zoning and private land use restrictions on solar and guarantee system owners' rights to unobstructed access to solar resources. Its solar access laws declare vegetation that interferes with solar panels to be a private nuisance, even if the trees predate the solar installation (DSIRE Solar and Wind Rights 2012).

California's solar access law was scaled back in scope after public outcry over its broad reach. Under the original Solar Shade Control Act enacted in 1978, shade cast by a property owner's trees on more than 10 percent of a neighboring solar panel system between the hours of 10 a.m. and 2 p.m. was considered a prosecutable public nuisance. After an unpopular prosecution that required residents to severely cut back redwood trees planted prior to the installation of their neighbor's solar panel system, the act was amended in an attempt to balance the planting of trees and shrubs for shade and visual appeal with increased use of solar energy devices. The 2008 amendment exempts all trees and shrubs planted prior to the time of a solar collector's installation (Anders et al. 2010).

Local Actions Addressing Solar and Trees

The patchwork of statutes, ordinances, and case law at the state level is reflected at the local level. Though many communities have developed urban forest management or green infrastructure plans, tree protection regulations, tree pruning guides, street tree standards, or tree ordinances to protect their urban forests, only a few address both trees and solar installations. These regulations vary greatly; some are more encouraging of solar development whereas others favor protecting the urban forest. Communities who have added these solar regulations to their municipal codes include Ashland, Oregon (§18.70); Madison, Wisconsin (§16.23(8)(a)); Sunrise, Florida (§16-130, §16-172, §16-277); and Greenwich, New Jersey (Ordinance No. 17-2011).

Several types of disputes related to trees and solar energy systems are common at the local level. One relates to property owners who would like to cut down trees on their properties to install solar systems but are prohibited from or charged fees for doing so by local regulations. Another arises when a neighbor of a property with a solar energy system already in place plants trees that are likely to grow to block solar access. A third type occurs when existing trees grow to block a new solar installation on a neighboring property: Do the trees prevail because they were there first, or do they effectively become a nuisance when they grow into the solar access zone?

A number of local disputes over the past few years provides evidence of the growing conflict between solar and trees. City commissioners in Winter Springs, Florida, changed a tree protection policy to allow tree removal for solar devices after a property owner who installed a solar system couldn't fully utilize the system because it was shaded by trees on the property. In Des Moines, Iowa, the Parks and Recreation Board reluctantly voted to cut down 11 mature trees on the town property to accommodate installation of a solar energy system during renovations of the city's library. Several board members noted that they might not have sought the grant that funded the solar energy system installation if they had known it would have required removal of the trees (Alliance for Community Trees 2010). A dispute in California ended up in district court: In

2008 a Sunnyvale couple was ordered to cut twelve-year-old redwood trees on their property so as not to interfere with their neighbor's new solar panels (Barringer 2008). As noted above, community outcry spurred by this case contributed to the decision to amend California's Solar Shade Control Act.

These examples show that to date, when solar energy systems and trees conflict, the trees often lose, even if they were planted before the solar energy systems were installed.

Can Trees and Solar Co-Exist?

The variety of regulations, guidelines, and policies that exist pertaining to solar and trees reveal the challenge communities face in trying to prioritize these two valuable resources. Which is greener? Which is better for the environment? Does it matter which was there first, how many hours the installation is shaded, or how much of the installation is shaded?

Instead of trying to answer questions that result in an outcome where one resource "wins" out over the other, communities should refocus their efforts on taking measures to ensure these interests can successfully coexist. There are a number of recommendations that can assist planners in these efforts:

- Ensure that the right tree is planted in the right place and for the right reason (Staley 2012b). Factors such as how tall a tree will grow to at maturity, how much shade it will likely cast, and in what direction that shade will fall will help determine the optimum placement for minimizing the chance of conflict at a later date. Involve both urban foresters and solar experts in the site plan review process as well as the development of design standards. Ample opportunity exists for making more informed decisions during infill or new construction projects.
- Address urban forests and solar collection together during the planning process. Explicitly acknowledging in the comprehensive plan that trees can be in conflict with solar collection and that efforts must be made to ensure their coexistence provides a basis for addressing this issue in ordinances, development review, and code enforcement (Staley 2012b).
- Invite and encourage urban foresters to become members of local solar advisory committees and councils.
- Consider creating and adopting overlay zoning for "solar access zones" in suitable areas that specifically acknowledges the need to consider plant size to maintain clearance for solar collection (Staley 2012b).
- Amend the subdivision ordinance to require neighborhoods and developments to be laid out in a manner that minimizes conflict between solar and trees. Consider designing future subdivisions as solar subdivisions that have streets, buildings, and roofs oriented to receive sunlight.
- Replace removed trees where possible, and track tree removals to ensure there is no net loss in trees.
- Educate citizens as to the benefits of both solar and trees, and increase their awareness of best practices of sensible planning to avoid shading and ensure that solar and trees can coexist.
- In instances where a solar installation would result in the removal of mature trees, encourage or require other energy conservation strategies first. Additionally, encourage or require homeowners to prune trees before permitting removal.
- Actively identify the best places to locate solar in a community, and direct installations to these areas. These include already developed areas and areas where existing infrastructure is already in place, such as parking lots, roads, brownfield and greyfield sites, landfills, and big-box stores. These areas should be selected over areas that are heavily forested or other areas where conflicts are likely.
- Incorporate planning software and tools, like i-Tree and solar maps, that provide relevant data on tree growth, urban forest benefits, and shading into the project review process (other freeware tools include Google Earth, Sketchup, and Paint.NET). Train planning staff or hire an arborist to conduct these analyses during the review process.
- Stay on top of solar technology. Encourage the development of smaller, more efficient systems, and encourage or require the selection of systems that are least impacted by shading (when shading is unavoidable).

Solar and Urban Redevelopment

A potential competing interest with solar energy systems that remains largely overlooked is urban redevelopment. Many communities seek to concentrate development in targeted areas like downtowns or transit-oriented developments (TODs) in an attempt to reduce vehicle miles traveled (VMT), provide more efficient services, and to provide transportation and housing alternatives. This often means changes to regulations, including height restrictions, to accommodate future growth. At the same time, these are the same areas where communities are often

encouraging solar projects. Just as shade cast by a tree over a solar energy system can reduce the installation's efficiency, so can the shadow of a tall building. As targeted areas redevelop, the possibility for solar conflicts rises.

As discussed above, many states have adopted legislation in attempts to ensure that existing solar installations have access to an adequate amount of sunlight. Even the states with notable "right to light" legislation have not specifically addressed the issue of solar and urban redevelopment, however. Solar maps, developed by some communities to help property owners determine the solar potential of their properties, can account for shade from existing neighboring buildings, but cannot predict impacts that result from redevelopment that has not occurred.

To date there have been little to no documented disputes in the U.S. Besides a handful of property owners attempting to block development applications at local board meetings, the issue has been nonexistent. But the potential for conflicts in the future is high. If the solar versus trees debate is any indication, it is likely that most communities have not thought about the impact that solar regulations could have on their urban areas or their redevelopment goals. If a community is unable to build up, it could be limiting its ability to meet future population demand and combat sprawl. It could also be reducing its ability to provide the density necessary to support its public transportation system. Developers may also argue that without additional square footage the costs of redevelopment in these areas outweigh the investment.

Additionally, it is unclear what would happen if a property owner built a building or addition that impacted an existing solar system. Removing a building (or floors of a building) in a densely developed area will be much more difficult and costly than removing trees and other vegetation. Some communities with strong solar access laws may impose high costs to mitigate impacts. Others may not have guidelines or regulations in place for compensation. Finally, many areas targeted for redevelopment are located immediately adjacent to residential neighborhoods of much lower density where the likelihood of shading is relatively high. This gives another piece of ammunition to neighborhood advocates looking to prevent higher-density developments in proximity to their neighborhood (Feldman 2009).

These risks and uncertainties could discourage, delay, or prevent development activity or solar installations in areas targeted for increased future redevelopment. Communities need to think through the potential tradeoffs and develop strategies to

Resources: Solar and Trees

A number of published works have examined local approaches to solar access generally and conflicts with trees in particular, including the following:

- "A Comprehensive Review of Solar Access Law in the United States: Suggested Standards for a Model Statute and Ordinance" (Colleen Kettles, Solar America Board for Codes and Standards, 2008; www.solarabcs.org/about/publications/reports/solar-access/pdfs/Solaraccess-full.pdf). This publication (pages 10–11) identifies the recommended elements of solar access legislation.
- "Trees and Solar Power Coexisting in an Urban Forest Near You" (Dan Staley, 2012; http://danstaley.net/Staley%202012%20Trees%20And%20Solar%20Power%20Coexisting%20in%20an%20Urban%20Forest%20Near%20You%200012%20WREF%20Solar%202012%20FINAL.pdf). This paper describes several innovative policies to facilitate the successful coexistence of urban trees and rooftop solar energy collection.
- "California's Solar Rights Act: A Review of the Statutes and Relevant Cases" (Scott Anders et al., University of San Diego School of Law Energy Policy Initiatives Center, 2010; www.sandiego.edu/epic/research_reports/documents/100426_SolarRightsAct_FINAL.pdf). This resource discusses California's solar access legislation and the current exceptions from its provisions.
- "My Tree Versus Your Solar Collector or Your Well Versus My Septic System? – Exploring Responses to Beneficial but Conflicting Neighboring uses of Land" (R. Lisle Baker, Boston College Environmental Affairs Law Review, 2012; http://lawdigitalcommons.bc.edu/ealr/vol37/iss1/2/). This law journal article reviews legal cases illustrating historic solar tree conflicts in the U.S.
- "A Western Street Tree Management Symposium Presentation: Integration of the California Solar Act with Urban Forestry" (Dave Dokter, City of Palo Alto Planning Department, 2010; www.streettreeseminar.com/ppt/Dockter.pdf). This presentation looks at shading studies and proactive measures to plan buildings and craft ordinances that harmonize urban forestry and solar goals.

address conflicts before they arise. This may involve determining prime areas for both solar installations and redevelopment and identifying them for the public through the use of tools like overlay districts. When these areas overlap, communities could develop interface (or zone of transition) design guidelines or standards that specifically address the impacts of massing on existing solar installations. Additionally, communities could modify solar-access zone provisions to address redevelopment in addition to trees. It should be noted that these recommendations will be most effective in areas slated for large-scale redevelopment. Situations of lot-by-lot redevelopment will be much trickier. With no solar access laws in the U.S. specifically addressing this issue, communities should also consider looking internationally to see how other countries' solar access laws for urban areas are evolving.

Conclusion

While promoting the installation of solar energy systems, communities are increasing their potential for conflict with other community interests including historic preservation and tree protection. To date, few communities are considering the effects the decisions made in support of solar can have on these other community interests. Planners are uniquely positioned to spearhead efforts to determine mutually beneficial solutions to ensure these interests can successfully coexist in the future. They can lead tough community discussions, bring the appropriate stakeholders to the table, develop relevant guidelines and regulations, and educate residents on all of the angles of an identified interest. Instead of having to choose between competing interests, communities and planners should undertake these efforts to help them obtain the truly sustainable futures they desire.

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References and Resources

Alexandria (Virginia), City of, Department of Planning and Community Development. 1993. *Design Guidelines for the Old and Historic Alexandria District and the Parker-Gray District*. Available at http://alexandriava.gov/uploadedfiles/planning/info/pnz_historic_designguidelines.pdf.

Alliance for Community Trees. 2010. "Environmental Grudge Match: Solar Panels vs. Trees." Webinar and resource list. May 20. Available at http://actrees.org/what-we-do/training-and-conferences/events/environmental_grudge_match_solar_panels_vs_tr/.

American Planning Association Planning Advisory Service. 2011. *Planning and Zoning for Solar Energy*. PAS Essential Info Packet 30, July. Available at www.planning.org/pas/infopackets/open/eip30.htm.

Anders, Scott, Kevin Grigsby, Carolyn Adi Kuduk, and Taylor Day. 2010. *California's Solar Shade Control Act: A Review of the Statutes and Relevant Cases*. University of San Diego School of Law Energy Policy Initiatives Center. Available at www.sandiego.edu/epic/research_reports/documents/100329_SSCA_Final.pdf.

Barrenger, Felicity. 2008. "Trees Block Solar Panels, and a Feud Ends in Court." *The New York Times*, April 7. Available at www.nytimes.com/2008/04/07/science/earth/07redwood.html?pagewanted=all.

Benfield, Kaid. 2012. "When Values Collide: Balancing Green Technology and Historic Buildings." *NRDC Switchboard*, June 25. Available at http://switchboard.nrdc.org/blogs/kbenfield/when_values_collide_balancing.html.

Campbell, Scott. 1996. "Green Cities, Growing Cities, Just Cities?: Urban Planning and the Contradictions of Sustainable Development." *Journal of the American Planning Association* 62(3): 296–312.

California Public Utilities Commission. 2012. "About the California Solar Initiative." Available at www.cpuc.ca.gov/puc/energy/solar/aboutsolar.htm.

Database of State Incentives for Renewables & Efficiency (DSIRE). 2012a. "Solar Access Laws." Available at www.dsireusa.org/solar/solarpolicyguide/?id=19.

———. 2012b. "Wisconsin: Incentives/Policies for Renewables & Efficiency." Available at www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WI04R.

Denholm, Paul, and Robert Margolis. 2008. *Supply Curves for Rooftop Solar PV-Generated Electricity for the United States*. Technical Report NREL/TP-6A0-44073. Golden, Colo.: National Renewable Energy Laboratory. Available at www.nrel.gov/docs/fy09osti/44073.pdf.

Energy Law Wisconsin. 2012. "Solar Access & Urban Forestry in Wisconsin. Laws, Conflicts, and Potential Solutions." Presentation at 2012 Wisconsin Arborist Association Annual Conference and Trade Show, January 31. Available at http://energylawwisconsin.com/blog/wp-content/uploads/2012/02/WAA-Annual-Conference-Presentation-1-30-12-Final.pdf.pdf.

Feldman, Gail, and Dan Marks. 2009. "Balancing the Solar Access Equation." *Zoning Practice*, April.

Godschalk, David. 2004. "Land Use Planning Challenges: Coping with Conflicts in Visions of Sustainable Development and Livable Communities." *Journal of the American Planning Association* 70(1): 5–13.

Godschalk, David R., and William R. Anderson. 2012. *Sustaining Places: The Role of the Comprehensive Plan*. Planning Advisory Service Report no. 567. Chicago: American Planning Association.

Howard (Maryland), County of. 2009. "Design Guidelines: Use of Solar Panels and Other Solar Devices In Historic Districts." Available at www.howardcountymd.gov/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=6442454109.

Jaffe, Eric. 2012. "U.S. Cities Are Losing 4 Million Trees a Year." *The Atlantic Cities*, February 9. Available at www.theatlanticcities.com/arts-and-lifestyle/2012/02/us-cities-are-losing-4-million-trees-year/1183/.

Kandt, A., E. Hotchkiss, A. Walker, J. Buddenborg, and J. Lindberg. 2011. *Implementing Solar PV Projects on Historic Buildings and in Historic Districts*. Technical Report NREL/TP-7A40-51297. Golden, Colo.: National Renewable Energy Laboratory. Available at www.nrel.gov/docs/fy11osti/51297.pdf.

Kettles, Colleen. 2008. *A Comprehensive Review of Solar Access Law in the United States*. Solar America Board for Codes and Standards, Florida Solar Energy Center. Available at www.solarabcs.org/about/publications/reports/solar-access/pdfs/Solaraccess-full.pdf.

Kooles, Kimberly. n.d. "National Alliance of Preservation Commissions Sample Guidelines for Solar Panels in Locally Designated Historic Properties." National Alliance of Preservation Commissions. Available at www.preservationnation.org/information-center/sustainable-communities/sustainability/solar-panels/additional-resources/NAPC-Solar-Panel-Guidelines.pdf.

Kooles, Kimberly, Patrice Frey, and Julia Miller. 2012. *Installing Solar Technology on Historic Properties: A Survey of the Regulatory Environment*. North Carolina Solar Center and National Trust for Historic Preservation. Available at http://ncsc.ncsu.edu/wp-content/uploads/Installing-Solar-Panels-on-Historic-Buildings_FINAL_2012.pdf.

Montgomery (Maryland), County of. 2011. *Design Guidelines for Historic Sites and Districts in Montgomery County, Maryland*. Chapter 3, Part 9.0. Solar Panels. Available at www.montgomeryplanning.org/historic/designguidelines.shtm.

Musser, George. 2010. "Are Old Houses Doomed? The Conflict Between Historic Preservation and Energy Efficiency." *Scientific American Blogs: Solar at Home*, March 26. Available at http://blogs.scientificamerican.com/solar-at-home/2010/03/26/are-old-houses-doomed-the-conflict-between-historic-preservation-and-energy-efficiency/.

Nowak, David and Eric Greenfield. 2012. "Tree and Impervious Cover Change in U.S. Cities." *Urban Forestry & Urban Greening* 11(1): 21–30. Available at http://nrs.fs.fed.us/pubs/jrnl/2012/nrs_2012_Nowak_001.pdf.

Staley, Daniel. 2012a. "Solar-Smart Arboriculture in the New Energy Economy." *Arborist News*, April. Available at http://danstaley.net/Daniel_Staley_solar-smart_ArbNews2012-4.pdf.

———. 2012b. "Trees and Solar Power: Coexisting in an Urban Forest Near You." DCS Consulting Services. Available at http://danstaley.net/Staley%202012%20Trees%20And%20Solar%20Power%20Coexisting%20in%20an%20Urban%20Forest%20Near%20You%200012%20WREF%20Solar%202012%20FINAL.pdf.

The National Trust for Historic Preservation. 2011. "12 Economic Benefits of Historic Preservation." Available at http://my.preservationnation.org/site/DocServer/Economic_Benefits_of_HP_April_2011.pdf?docID=9023.

———. 2012. "Solar Panels and Historic Preservation." Available at www.preservationnation.org/information-center/sustainable-communities/sustainability/solar-panels/.

U.S. Department of Energy. 2012. "Solar and Wind Easements & Rights Laws & Local Option Solar Rights Law." Provided by Oregon Department of Energy. Available at http://energy.gov/savings/solar-and-wind-easements-rights-laws-local-option-solar-rights-law.

U.S. Department of the Interior. 2011. "Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings." Available at www.nps.gov/tps/standards/rehabilitation/rehab/stand.htm.

Whole Building Design Guide. 2012. "Sustainable Historic Preservation." Available at www.wbdg.org/resources/sustainable_hp.php.

Cover: A solar panel system was installed on the rear elevation of this historic property in the Heritage Hill Historic District of Grand Rapids, Michigan. By locating the system in the rear of the property, the views from the public right-of-way remain preserved. *(Image courtesy of Kimberly Kooles, N.C. Solar Center.)*

Planning for Solar Energy Briefing Papers

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

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