Site Design Strategies for Solar Access

Introduction

A great deal of attention has been placed on the role of sustainable building design and construction techniques in recent years. Many communities have adopted standards that encourage or require compliance with programs such as The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™. The LEED system has become the nationally accepted benchmark for the design, construction, and operation of high performance green buildings. The program encourages the use of products and techniques to promote sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.[1]

Much less emphasis, however, has been placed on the role of site planning in a sustainable design program—and more specifically, on site design for solar access. The incorporation of both active and passive solar techniques are highlighted in any discussion of green building design, yet in order for either approach to be viable, they must have unobstructed solar access for a certain period of each day. Without careful consideration during the planning stages of a new neighborhood, future opportunities for the installation of active or passive features can be dramatically reduced or even eliminated altogether.

In order to ensure that the concept of sustainability encompasses the entire development site, not just what falls within the building envelope, additional steps must be taken. A pilot program currently being developed by the U.S. Green Building Council (USGBC) entitled LEED for Neighborhood Development or LEED ND[2], represents an important step towards broader consideration for solar access. For now, however, the application of these provisions is limited primarily to the individual developers who choose to use them. Zoning regulations play a significant role in the implementation of solar energy technologies at the local level, defining where, how, and when they may be used. Many communities have recognized the importance of addressing solar access within their zoning regulations and have taken steps to define the degree to which solar will be allowed, encouraged, or even required.

Implications of Not Addressing the Issue

The implications of not establishing provisions for solar access at the local level can be significant. At the most basic level, the opportunity for a community to reduce its energy consumption is diminished substantially. Without provisions in place to ensure solar technologies are allowed and that access to them is protected, they become more difficult and more costly to implement—and thereby may be passed over by all but the most "green" developers and homeowners. Choosing not to establish solar access provisions may also be costly to local governments as staff time needed to process variances and other requests increase.

On the other hand, establishing solar access provisions can be beneficial at a variety of levels. At a site planning level, organizing new development to achieve proper solar orientation can improve the energy efficiency of buildings on the site at little or no additional cost. When combined with other sustainable building techniques, the benefits of requiring and/or protecting solar access can be dramatic. For example, placing a building's long face on an east-west axis with a large percentage of its windows on the south side can reduce fuel consumption by up to 25%.[3] In its Solar Access Design Manual, the City of San Jose, California states that it found that proper solar orientation of new homes built in the San Jose area produced total energy savings of 11 to 16.5 percent—with up to 40 percent savings from space cooling.[4] In addition to promoting a measurable reduction in energy usage, solar access provisions can also help



ensure that the conversion of homes from traditional energy sources to solar energy over time can be accomplished relatively easily. Homes that are pre-designed to accommodate solar devices, not only from a site planning standpoint, but from a plumbing, wiring and structural standpoint as well can make future installations much easier and less costly.

Goals for Solar Access

While numerous examples of local governments adopting regulations to protect solar access opportunities are cited in this chapter, there is much yet to be done. This section outlines specific strategies and actions to be taken by communities wishing to take their policies to the next level. A range of examples are provided to help illustrate how the strategies can be adapted to a range of situations depending upon the level of policy commitment, available staff resources, and political environment.

The primary goals of this chapter are to:

- Remove regulatory obstacles and streamline processes for the installation of solar technologies
- Implement protective regulations to ensure that property owner investments in solar technologies are protected
- Preserve the opportunity for increased use of solar technologies in the future;
- Provide incentives for the use of solar technologies in new construction and in the renovation of existing homes; and
- Promote an overall reduction in energy usage

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Photos: Left and right, "Taking the Lead in Building Production-Style Solar Homes", by Peter Hildebrandt. Available online. Last accessed online 10/29/08; Center, U.S. D Practices Series, High-Performance Home Technologies: Solar Thermal and Photovoltaic Systems. Available online. Last accessed online 10/29/08.

[1] U.S. Green Building Council, LEED Rating Systems. Available online. Last accessed online 10/30/08.
[2] U.S. Green Building Council, LEED Rating Systems. Available online. Last accessed online 10/30/08.
[3] Guide: Putting Renewable Energy to Work in Buildings. Available online. Last accessed online 10/30/08.
[4] City of San Jose, California. Solar Access Design Manual

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KEY STATISTICS:

- About 9 percent of electricity in the U.S. is generated from renewable sources
- Most electricity in the U.S. is generated by burning nonrenewable fossil fuels
- Proper solar orientation of new homes built in the San Jose area produced total energy savings of 11 to 16.5 percent—with up to 40 percent savings from space cooling
- Placing a building's long face on an east-west axis with a large percentage of windows on the south side can reduce fuel consumption by up to 25%
- Between 200,000 and 250,000 U.S. homes and businesses have solar panels today, a number that has increased by more than 40 percent a year since Congress passed a federal tax credit for solar energy in 2005

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SITE DESIGN STRATEGIES FOR SOLAR ACCESS

		ACHIEVEMENT LEVELS				
		Bronze (Good)	Silver (Better)	Gold (Best)	References/Commentary	Code Examples/Citations
	Remove Obstacles	▪ Identify limiting provisions (e.g. accessory structure limits, historic district regulations) and craft exceptions to permit solar energy devices ▪ Prohibit solar restrictions in new private CC&Rs in subdivision regulations	▪ Allow modest adjustments to side, front and/or rear yard setback requirements (or other conflicting regulations) that allow applicants to meet solar access requirements	▪ Override existing private covenants restricting solar devices ▪ Allow solar panels as a by-right accessory use except in special districts (e.g., historic districts)	▪ In the last five years, advances in technology have resulted in photovoltaic systems that can be installed in some roofing systems to make them nearly invisible—providing an alternative to tradition panels in areas where aesthetics are of significant concern (e.g. historic districts). See US Department of Energy, Building America Best Practices for High-Performance Technologies: Solar Thermal & Photovoltaic Systems. Available online. Last accessed online 2/11/09. ▪ The LEED ND pilot program incorporates a section on Solar Orientation intended to, "achieve enhanced energy efficiency by creating the optimum conditions for the use of passive and active solar strategies." The section is one of twenty potential credits under the section entitled Green Construction & Technology. Available online. Available online. Last accessed online 2/11/09.	▪ Los Angeles, Historic Preservation Overlay. Available online. Available online. Last accessed online 2/11/09. ▪ Fort Collins, Colorado Land Use Code, Solar Access, Orientation, and Shading. Available online. Available online. Last accessed online 2/11/09. ▪ Gresham, Oregon Development Code, Solar Access Standards. Available online. Available online. Last accessed online 2/11/09. ▪ Multnomah County, Oregon Solar Access Provisions for New Development. Available online. Available online. Last accessed online 2/11/09. ▪ City of Berkeley, California, Title 23 (Zoning Ordinance) Section 23D.04: Lot and Development Standards. Available online. Available online. Last accessed online 2/11/09. ▪ Teton County, Wyoming, Solar Access Regulations. Available online. Available online. Last accessed online 2/11/09.

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		Bronze (Good)	Silver (Better)	Gold (Best)	References/Commentary	Code Examples/Citations
	Create Incentives	▪ Reduce or eliminate permit fees for the installation of solar devices on an existing structure	▪ Reduce building permit fees for projects that incorporate solar concepts in the overall design ▪ Provide staff assistance to homeowners to orient new homes for solar access	▪ Allow applicants to "earn" additional density or height by incorporating solar concepts into a project's overall design	▪ Database of State Incentives for Efficiency and Renewables (DSIRE). Available online. Last accessed online 10/29/08. ▪ The City of Tucson offers a tiered Solar Fee Incentive Waiver for new construction and renovation. Available online. Last accessed online 2/11/09. ▪ The City of Oakland, CA expedited its solar energy use through a 2001 initiative that waived design review requirements for installation of solar production facilities. The initiative expired in 2003; however, the city is evaluating the impact of this ordinance and evaluating the feasibility of its continuance. ▪ A range of articles and other materials on renewable energy are available in the American Planning Association's February 2008 PASInfoPacket entitled Planning and Zoning for Renewable Energy..Available online. 2/11/09.	▪ Eagle County, Colorado Efficient Building Code. Available online. Last accessed online 2/11/09. ▪ Austin, Texas, Development Code: Subchapter E: Design Standards and Mixed-Use. Available online. Last accessed online 2/11/09. ▪ Pullman, Washington, Development Code, Planned Residential Development: Section 17.107 (incentives for solar access). Available online. Last accessed online 2/11/09.
	Enact Standards	▪ Require key features of a development plan to have access to sunshine ▪ Enact regulations to preserve solar access	▪ Require variation in width of lots to maximize solar access ▪ Include solar access as an optional or required standard in residential and commercial design guidelines ▪ Establish a tree dispute resolution process and criteria by which property owners may resolve issues regarding the obstruction of solar access to a property by a tree or trees on a neighboring property	▪ Require a minimum percentage of solar-oriented lots or buildings in new developments ▪ Require a minimum percentage of energy in new developments to come from solar	▪ State of New Mexico Solar Collector Standards Act. Available online. Last accessed online 2/11/09. ▪ US Department of Energy, Building America Best Practices for High-Performance Technologies: Solar Thermal & Photovoltaic Systems. Available online. Last accessed online 2/11/09. ▪ Guide: Putting Renewable Energy to Work in Buildings. Available online. Last accessed on line 2/11/09.	▪ Fort Collins, Colorado Land Use Code, Solar Access, Orientation, and Shading. Available online. Last accessed online 2/11/09. ▪ Portland, Oregon, Solar Access Regulations. Available online. Last accessed online 2/11/09. ▪ Teton County, Wyoming, Solar Access Regulations. Available online. Last accessed online 2/11/09.

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		Bronze (Good)	Silver (Better)	Gold (Best)	References/Commentary	Code Examples/Citations
	Enact Standards		▪ Require buildings to be solar ready. Key considerations for solar readiness include: orientation for solar exposure, wiring, plumbing, and roof structures pre-designed to handle solar collectors		▪ U.S. Green Building Council, LEED for Neighborhood Rating System (See Green Construction and Technology chapter. Available online. Last accessed online 2/11/09.	▪ Ashland, Oregon, Municipal Code. Available online. Last accessed online 2/11/09. ▪ City of San Francisco, California, Tree Dispute Resolution Ordinance. Available online. Last accessed online 2/11/09. ▪ Berkley, California, Title 23 (Zoning Ordinance) Section 23D.04: Lot and Development Standards. Available online. Last accessed online 2/11/09. ▪ Boulder, Colorado, Solar Access Regulations. Available online. Last accessed online 2/11/09. ▪ San Luis Obispo, California, Municipal Code: Section 16.18.170, Easements for Solar Access. Available online. Last accessed online 2/11/09. ▪ Prairie du Sac, Wisconsin, Land Use Regulations, Chapter 8: Solar Access. Available online. 2/11/09. ▪ Clackamas County, Oregon, Zoning and Development Ordinance, Solar Access Ordinance for New Development. Available online. Last accessed online 2/11/09.