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 integral to any discussion of green building design, yet in order for either approach to be viable, the systems must have unobstructed solar access for a certain period of each day. Without careful consideration of solar access during the planning stages of new development, future opportunities for the installation of both active and passive features can be dramatically reduced or even eliminated altogether.

In order to ensure that the sustainable features are considered in relation to the entire development site, not just what falls within the building envelope, planners and architects must take additional, concerted measures. 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 of solar access. For now, the application of these provisions is limited primarily to 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 energy 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 are significant. At the most basic level, the opportunity for a community to reduce its energy consumption is diminished substantially. Without provisions in place to insure solar technologies are permitted and that access to them is protected, solar technologies become more difficult and costly to implement—and therefore, may be passed over by all but the most "green" developers and homeowners. Choosing not to establish solar access provisions may also prove costly to local governments because of increases in the staff time necessary to process variances and other requests.

Some utility companies are also increasingly, though tentatively, supportive of measures that encourage solar access for new and existing development. As they grapple with aging and overburdened power production facilities, utilities are faced with the prospect of having to construct costly new power plants and infrastructure to accommodate the ever increasing demand for power. This cost is in turn transferred to power consumers. Municipalities that choose to enact solar access provisions can, to a certain point, help insulate their constituents from such cost increases without detrimentally affecting utilities.

On the other hand, establishing solar access provisions can be beneficial at a variety of levels. At the 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 twenty-five percent.[3] In its Solar Access

[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.



Design Manual, the City of San Jose, California found that proper solar orientation of new homes built in the San Jose area produced a total energy savings of eleven to sixteen percent—with up to forty percent savings generated 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 can make future installations much easier and less costly.

Goals for Solar Access

While this chapter cites numerous examples of local governments adopting regulations to protect solar access opportunities, there is still much to be done. This section outlines specific strategies and actions to be taken by communities wishing to elevate and enhance solar access-related policies. A range of examples are provided to help illustrate how these strategies can be adapted to a variety of situations depending on 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
- Promote an overall reduction in energy usage

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[4] City of San Jose, California. Solar Access Design Manual

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. Department of E
Series, High-Performance Home Technologies: Solar Thermal and Photovoltaic Systems. Available online. Last accessed online 10/29/08.

Sustainable Community Development Code Framework

RENEWABLE ENERGY

KEY STATISTICS:

- Only about nine 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 eleven to sixteen percent—with up to forty 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 twenty-five percent
- Between 200,000 and 250,000 U.S. homes and businesses have solar panels today, a number that has increased by more than forty 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 (Note: higher levels generally incorporate actions of lower levels)				
		Bronze (Good)	**Silver (Better)**	**Gold (Best)**	**References/Commentary**	**Code Examples/Citations**
	**Remove Obstacles**	▪ Identify provisions that limit solar access (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. Retrieved February 8, 2011. ▪ 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. Retrieved February 8, 2011.	▪ City of Los Angeles, CA, *Historic Preservation Overlay*. Available online. Retrieved February 8, 2011. ▪ City of Fort Collins, CO, Land Use Code, Solar Access, Orientation, and Shading. Available online. Retrieved February 8, 2011. ▪ City of Gresham, OR, *Oregon Development Code, Solar Access Standards*. Available online. Retrieved February 8, 2011. ▪ Multnomah County, OR, *Solar Access Provisions for New Development.* Available online. Retrieved February 8, 2011. ▪ City of Berkeley, CA, T*itle 23 (Zoning Ordinance) Section 23D.04: Lot and Development Standards*. Available online. Retrieved February 8, 2011. ▪ Teton County, WY, *Solar Access Regulations*. Available online. Retrieved February 8, 2011.

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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. Retrieved February 8, 2011. ▪ City of Tucson, AZ, offers a tiered Solar Fee Incentive Waiver for new construction and renovation. Available online. Retrieved February 8, 2011. ▪ 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. Retrieved February 8, 2011.	▪ Eagle County, CO, *Efficient Building Code*. Available online. Retrieved February 8, 2011. ▪ City of Austin, TX, *Development Code: Subchapter E: Design Standards and Mixed-Use*. Available online. Retrieved February 8, 2011. ▪ City of Pullman, WA, *Development Code, Planned Residential Development: Section 17.107* (incentives for solar access). Available online. Retrieved February 8, 2011.
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 whereby property owners can 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. Retrieved February 8, 2011. ▪ U.S. Department of Energy, B*uilding America Best Practices for High-Performance Technologies: Solar Thermal & Photovoltaic Systems*. Available online. Retrieved February 8, 2011. ▪ Guide: Putting Renewable Energy to Work in Buildings. Available online. Retrieved February 8, 2011.	▪ City of Fort Collins, CO, *Colorado Land Use Code, Solar Access, Orientation, and Shading*. Available online. Retrieved February 8, 2011. ▪ City of Portland, OR, *Solar Access Regulations*. Available online. Retrieved February 8, 2011. ▪ Teton County, WY, *Solar Access Regulations*. Available online. Retrieved February 8, 2011.

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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. Retrieved February 8, 2011.	▪ City of Ashland, OR, Municipal Code. Available online. Retrieved February 8, 2011. ▪ City of San Francisco, CA, *Tree Dispute Resolution Ordinance*. Available online. Retrieved February 8, 2011. ▪ City of Berkley, CA, *Title 23 (Zoning Ordinance) Section 23D.04: Lot and Development Standards*. Available online. Retrieved February 8, 2011. ▪ City of Boulder, CO, *Solar Access Regulations.* Available online. Retrieved February 8, 2011. ▪ City of San Luis Obispo, CA, *Municipal Code: Section 16.18.170, Easements for Solar Access.* Available online. Retrieved February 8, 2011. ▪ Village of Prairie du Sac, WI, Land Use Regulations, Chapter 8: Solar Access. Available online. Retrieved February 8, 2011. ▪ Clackamas County, OR, *Zoning and Development Ordinance, Solar Access Ordinance for New Development.* Available online. Retrieved February 8, 2011.