Passive Solar Energy

In a Nutshell

Passive solar minimizes energy use through the strategic design of a structure, including site placement, natural climate, and building materials. Unlike other renewable energy sources, where the structure is still technically consuming electricity, passive solar energy harnesses the sun's natural warmth to supply at least part of a building's heating and lighting needs. By using certain materials and designs to capture heat and light from south-facing windows, buildings can reduce their energy consumption.

The “How To”

Using Passive Solar at Home

For the home or property owner, implementing passive solar technologies is an active home-improvement project. The U.S. Department of Energy provides awebsite that has a variety of information on assessing, planning, and executing a passive solar energy plan for your building. This webpage onPassive Solar Design provides an in-depth look into passive solar technology.

Passive solar is most easily done when building new construction. However, some remodeling projects are possible with existing homes. Regardless, any passive solar project will address:

- Structure's directional orientation
- Energy-efficient architectural desi
- Glass size and design
- Glass glazing techniques
- Thermal mass use
- Overhang design and use
- Natural ventilation
- Exterior shading techniques
- Distribution - conduction and convection
- Direct vs. Indirect Gain

Local Governments

For local governments, it is more of an exercise in ensuring regulations allow (if not also putting incentives in place) the use of passive solar energy in building design. Passive solar design will be handled by building, housing, and zoning codes the same as any current structure or construction project. The Planning & Zoning tab contains more information.

Planning & Zoning

Local Governments & Solar Energy Statutes

Local governments will be most directly involved through the issuance of a building permit. Passive solar does not fundamentally change the way your city or county processes permits or performs inspections now. As noted, you will want to ensure your local codes and regulations allow this style of design.

There are two important regulatory areas for local governments to address:

- Solar Rights: the legal protections that grant a homeowner access to solar energy on their property
- Solar Easements: a legal agreement with associated property owners and/or users to protect access to solar energy on the property

These two areas of law are determined by state law. Both Illinois and Missouri address these topics:

Illinois

Illinois law establishes solar rights. However, as of August 2013 there is no state statute addressing solar easement law. The solar rights law went into effect in 2011.

Missouri

Missouri allows for the use of both enacting a property owner's solar rights, as well as negotiating easements. The Missouri law was passed in 1979.

Model Ordinance Language

Solar America Board for Codes & Standards presents a Comprehensive Review of Solar Access Laws which offers eight examples of effective policies, including two municipalities. Those case studies include model ordinance language.

Dollars & Cents

The U.S. Department of Energy provides tips to the homeowner on usingpassive solar,daylighting,whole house design,window types. They also offer information on strategies forfinancing energy efficiency home-improvements.

TheDatabase of State Incentives for Renewables and Efficiency has webpages for Illinois and Missouri. These pages have information on the various kinds of incentives available in each state.

Impact on Local Governments

At the most basic level, there will be virtually zero expenditure impact on local governments. Passive solar projects or new home construction designed using passive solar architecture will not alter plan reviews or building inspections. If a city or county moves to update any regulatory language or local codes there will likely be staff time and perhaps legal fees. It would be most cost effective to reform such codes at once, addressing all energy efficiency and green solution technologies simultaneously. After the codes are in place, the city should not notice any major increase in costs.

If a unit of local government wishes to enact incentive programs, such as Tucson, Arizona's building permit fee waiver program, then there will be greater cost to the agency. Other traditional mechanisms such as community

workshops, public education campaigns, and home tours will also impact staff time and carry some minor costs. However, many of these efforts can be coordinated using volunteer labor; an Architectural Review Board (ARB) can be a good source of technical knowledge and expertise, if a city or county is currently using one.

Measuring Success

For Homeowners

Generally the success of a passive solar system, for either heating/cooling or daylighting, can be measured in the cost-savings and reduced energy consumption associated with your renewable energy solutions. By working with your contractor you can develop monitoring and tracking mechanisms to ensure cost savings are achieved. Tracking your monthly energy bill savings is the clearest measure of success.

For Local Governments

Ultimately the success of these projects will largely be a homeowner's success. A city or county can be more engaged by creating a building permit tracking system within existing systems that identifies passive solar projects as well as other renewable energy technologies at homes and businesses in the community. A local government could monitor the increase in installation and use of such technologies over time. Public information campaigns could be evaluated for effectiveness and increases in requests for information and the installation of such systems by residents. In individual cases, a Mayor, City Council/County Board, or other individuals within the community may want to publicly recognize homeowners with particularly energy efficient homes. Some communities have found success with home tours featuring properties that are particularly "green" and/or energy efficient. If the community begins to have a high percentage of energy efficient homes it may want to work with the local utility to attempt to estimate the cost savings and pollution reduction associated with the community's efforts - such case studies could likely yield regional, if not national, media attention.

Discover More

More External Resources

- The U.S. Department of Energy's Oak Ridge National Laboratory features aBuilding Technologies Research & Integration Centerthat offers a host of information about these architectural building design strategies.
- Similarly, theFlorida Solar Energy Center at the University of Central Florida provides a wealth of additional research on these technologies.
- A news article profiles an entirely new passive solar home in the Dogtown neighborhood of St. Louis.

One STL Tools

There are a variety of other energy efficiency tools in the One STL toolkit that can help build upon a homeowner strategy for energy consumption and cost savings:

- Building & Energy Codes
- Composting
- Energy Efficiency
- Geothermal Heat Pumps

- Home Energy Audits
- Home Improvement Guide
- Low Flow Water Technology
- Native Landscaping
- Rain Barrels
- Rain Gardens
- Rainscaping
- Renewable Energy for the Home
- Tree Maintenance & Preservation
- Yard Waste Recycling & Management