

Distributed Solar Power

Distributed thermal solar energy is the least glamorous, but perhaps easiest way we can currently use this important resource. Solar hot water panels use a black surface to absorb heat behind a glass cover—they look somewhat like photovoltaic panels. Water circulating in pipes crisscrosses the black surface and transfers the heat to a large insulated tank. The tank can be used as a source of hot water, or to provide a source of radiant heat for a structure.ⁱ

Other schemes utilize well-known design principles to passively harvest heat from the sun to reduce the need for other forms of energy. For instance, large south-facing windows (double-glazed, please) under an overhang allow sunlight to warm a structure during the cold winter, but not during the hot summer. Deciduous trees on the South and West shade the structure during the summer, but allow the sunlight through in winter. Structures oriented on an East-West axis absorb more heat in winter than do ones oriented North-South. There are dozens of such techniques, and they have been known for decades if not centuries.ⁱⁱ

Distributed photovoltaic schemes involve the placement of photovoltaic panels on rooftops.ⁱⁱⁱ To work well, this scheme relies on a concept known as *net metering*. When the structure demands power, if the sun is shining, the panels supply electricity towards the structure's needs. If the sun isn't shining, the structure draws power from the grid, just like it would without the panels. When the sun is shining but the structure isn't demanding power, the electricity supplied by the panels is fed into the grid. The power the end user provides to the grid is deducted from the power drawn, and the end user is charged only for the difference.^{iv}

Distributed photovoltaic schemes cause power supply and power demand on the grid to fluctuate, and they cause safety issues (when one needs to de-energize the grid to work on it, how does one disconnect it from thousands of point sources of power?). In addition, they are a competitive challenge for electrical generating facilities, which would see a decrease in electricity sales if a large amount of distributed photovoltaic power was installed.^v

All distributed solar schemes rely on energy-wise building practices, as the amount of energy gathered from the sun is less than the amount wasted by inefficient structures. Proper insulation, energy efficient windows, proper sealing of the structure, and proper ventilation are all required to make distributed solar energy schemes work. As unglamorous as they are, passive solar design elements and energy efficient building techniques are among the easiest and most cost effective ways to save energy.^v They have not been as widely used as they should because it has been cheap and easy to ignore them. Missouri does not have statewide standards for energy efficient structures; we should. LEED and EnergyStar are the leading national green building programs.^{vi} Other ways to encourage solar design and energy efficient building techniques include trade-offs during the permitting process and tax credits. Missouri needs those, as well.

Some energy efficient practices are easy to retrofit, like adding insulation or weatherstripping. Others are practical only during initial construction or major remodeling. The economics of photovoltaics and Missouri incentives/rules around solar energy will be discussed separately.

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- ⁱ *Solar hot water*. Wikipedia. Retrieved online 1/14/2008 at http://en.wikipedia.org/wiki/Solar_hot_water.
- ⁱⁱ Passive solar design is a complex subject that involves the integration of many individual design elements. For a general discussion of some of the principles, one good starting place is *Passive solar building design*, Distributed Energy Program, Electricity Deliverability & Energy Reliability office, Department of Energy. Retrieved online 1/14/2008 at http://www.eere.energy.gov/de/passive_solar_design.html.
- ⁱⁱⁱ For resources on photovoltaics, see *Related links on solar electricity for homes*, Energy Efficiency and Renewable Energy Office, Department of Energy. Retrieved online 1/14/2008 at http://www1.eere.energy.gov/solar/solar_electricity_homes.html.
- ^{iv} Net metering was required of all public utilities in the U.S. by the Energy Policy Act of 2005. For a discussion, see *Net metering*. Wikipedia. Retrieved online 1/14/2008 at http://en.wikipedia.org/wiki/Net_metering.
- ^v Energy efficient building practices involve the integration of many small elements. For a discussion of some of the basic practices, see *Energy solutions for your building*. Energy Efficiency & Renewable Energy Office, Department of Energy. Retrieved online 1/14/2008 at <http://www.eere.energy.gov/buildings/info/homes/index.html>.
- ^{vi} The LEED program is operated by the U.S. Green Building Council. See <http://www.usgbc.org/DisplayPage.aspx?CategoryID=19>. The EnergyStar program is jointly operated by the Environmental Protection Agency and the Department of Energy. They rate appliances as well as buildings. See <http://www.energystar.gov>.