Q&A

Cost-Effectiveness of Solar Equipment

Q. *How cost-effective are solar panels?*

A. *Martin Holladay responds*: The term "solar panel" can refer to two different types of equipment: photovoltaic (PV) modules or solar thermal collectors. PV modules generate DC power to charge batteries, or when connected to an inverter, to power house loads or supply electricity to the utility grid. Solar thermal collectors are used to heat swimming pools or to supply a portion of a home's domestic hot water or space heating needs.

Cost-effectiveness calculations are complicated and site-specific. In sunny parts of the country, like Arizona or New Mexico, a PV module or solar thermal collector may have two or three times the annual energy production of the same equipment installed in northern Vermont. Cost-effectiveness calculations also depend on the cost of available conventional energy; when replacing natural gas, a solar hot water system will have a much longer payback than when replacing electricity.

Finally, some utilities are now offering rebates to cover up to half the cost of PV or solar thermal equipment; such incentives obviously improve cost effectiveness.

Here's the summary: PV systems are not yet cost-effective anywhere in the country where utility grid power is available. Where significant rebates are available, however, a PV system installed on a new home in a sunny climate can produce a positive cash flow for the homeowner if the cost of the system is included in a new home mortgage.

Solar thermal collectors are a cost-effective way to heat swimming pools in all areas of the country. In areas with lots of sun and high electric rates, like Hawaii, solar domestic hot water systems are very cost-effective. In California, Florida, Arizona, and New Mexico, and other areas with similar climates, solar hot water systems are also cost-effective, especially if they are being substituted for an electric water heater, although the payback period will be longer than in Hawaii. In most northern states, if maintenance costs are included, an investment in a solar hot water system is probably a break-even or money-losing proposition, especially when replacing natural gas.

Of course, any increase in energy prices will improve the cost effectiveness of all types of solar hardware.

Martin Holladay *is the editor of* Energy Design Update.

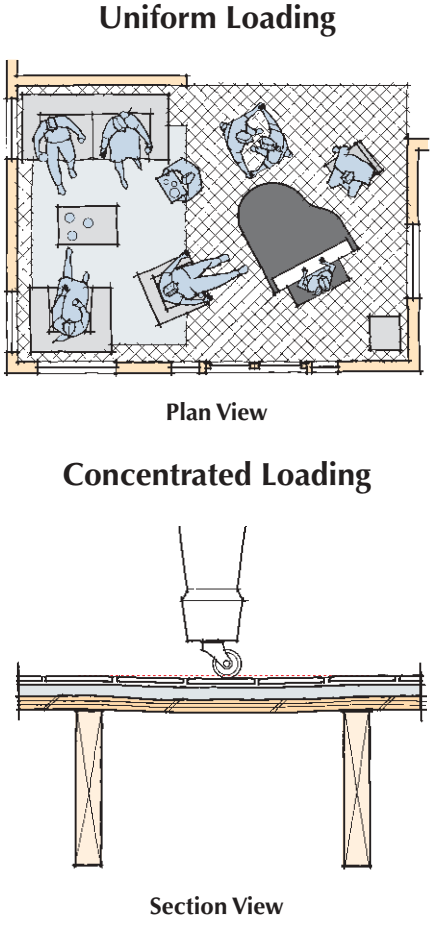
Setting Ceramic Tile Over Long-Span Steel Joists

Q. *The plans for a new house call for saltillo tile over a 3/4-inch plywood subfloor with 1/2-inch concrete backerboard (Durock) thinset and screwed to the plywood. The floor joists are Dietrich Trade Ready Floor System 12-gauge steel joists at 16 inches on-center spanning 24 feet. In your opinion, should I use an isolation membrane under the saltillos?*

A. Michael Byrne responds: I am not comfortable tiling any span over 20 feet without an isolation membrane, unless I can get an assurance from the joist supplier that their system will provide the deflection resistance required for most ceramic tiles:

Maximum deflection = L/360
(where L is the span)

Keep in mind that tiles require the L/360 for both uniform and concentrated loading (loading between the joists, see illustration). Many floor joist systems meet L/360 maximums for uniform deflection only, so make certain that the system you want to use — sawn, composite, or steel — meets the requirements for tile.



The manufacturer of your system has an online chart (www.dietrichmetalframing.com) that can tell you if the particular steel joists you selected provide the strength you need. I suggest you log onto their span tables, email your questions and concerns to the company, and ask for an assurance in writing that the system will work as advertised.

Contributing editor ***Michael Byrne*** *is an expert tilesetter and consultant in Los Olivos, Calif.*