



HIGH



Considering solar energy? Here are five things to look at.

>> By Paul McGill, PE, CEM, LEED AP

Are you considering solar power for your facility? There are plenty of good reasons to do so, including:

- A short payback period for the investment at a commercial facility with federal and, typically, state incentives (some of which expire at the end of 2011)
- Reduction in greenhouse gas generation by fossil fuel burning central power plants
- Reduced stress on the fragile power grid

However, there are also pitfalls and caveats to be aware of if you're the one responsible for implementing solar at your facility. In the interest of trying to help you cut through the marketing rhetoric, here's a quick summary of five key issues to look at as you consider solar power for your facility.

PHYSICAL LOCATION

Where would a solar array be located on your property? Normally, the first place to consider is your roof. It makes great sense to use your roof for solar because:

- The roof is an underutilized asset just laying there and deteriorating due to exposure to the sun and other weathering conditions. Putting a solar panel array on the roof not only produces electricity for your facility, it also protects the roof from UV damage and extends the life of the roof.
- You don't normally need to get planning or zoning board approval for a solar system installed on your roof because it is out of sight, doesn't create additional stormwater runoff or otherwise impact the neighborhood.

- The electrical connection from the rooftop to your incoming power distribution is probably shorter and less costly than if the array is located somewhere else.

Don't forget to consider the following issues when looking at your roof as a possible location for solar:

- If it's not in good condition, you may want to consider re-

placing it before you install solar on it. Solar modules and mounting systems usually last 25-40 years, and while they can be removed and reinstalled, you probably want to avoid doing so if you can since it'll cost money and you won't be generating electricity at the same time.

- A ballasted, non-penetrating, flat roof-mounted solar array can weigh anywhere from 3-7 pounds per square foot (psf). Does your roof have the capacity to handle this additional load? If not, you or your solar provider will need to look into upgrading the structure or locating a different place for your system.
- How large is your roof compared to how much electricity you use? Typically, a flat roof solar energy system in New Jersey can produce about 8-12 kWh annually per square foot of roof used. While it's not often that a rooftop solar installation can produce 100 percent of a facility's electricity over the course of a year, some facilities, especially warehouses or distribution centers with low electrical loads, may use such small amounts of electricity that the entire annual consumption can be provided by solar.
- Solar modules are typically mounted on a flat roof with non-penetrating, ballasted racking. This avoids potential leak points or voiding the roof warranty. Even so, you may want to have your solar vendor provide a letter from the roof warrantor stating that the proposed system will not void the warranty.

If the roof is not a viable option for location your solar energy system, there are other options. Solar arrays can also be ground-mounted or mounted as a parking canopy over cars. In both cases, additional costs are incurred due to site preparation requirements such as foundations and structural steel supports. On the other hand, parking canopies do provide the welcome benefit of providing shade and weather protection for vehicles.

COST

Cost is an important consideration in any business investment, and solar is no different. However, proposals you obtain for adding solar to your facility will likely be for different sizes and use different efficiency panels. Also, many providers show costs after incentives. Therefore, make sure you're comparing apples to apples. I'd suggest looking at a) total cost per watt and b) total cost per annual kWh. Since you're most

FINANCIAL ASSUMPTIONS

Most companies selling solar power systems have spreadsheet programs that can provide annual cash flow estimates for a specific proposed installation. However, a number of assumptions are required for these calculations, and you'll want to make sure they're both realistic and consistent in order to make an informed choice between vendors. Even better, specify what numbers should be used for their financial assumptions. The assumptions that should be identified somewhere on your proposal include:

- Your current cost of electricity
- Rebates or other governmental incentives
- The rate at which electricity costs will increase in future years
- The selling price for SREC's in future years (in states where there is an SREC market, like New Jersey)



interested in how many kWhs your system will generate, \$/kWh is my preferred metric for comparison purposes, but you need to check how each proposer determined the annual kWhs your system is expected to produce. It's a fairly complicated calculation that includes a number of factors, including:

- The geographic position of the facility
- Azimuth of the array (how far away, in degrees, from direct south does the array face)
- Tilt of the modules (what angle from horizontal are the panels)
- Efficiency of the panels, inverters and other system components

Given the complexity of determining the kWh output for a given design, it is normally done by computer program, but you'll want to review the input factors to be sure one supplier isn't being overly aggressive in the numbers used for the above system parameters.

- Federal and state income tax rates for your business
- Depreciation schedule (used for tax-related calculations)
- kWhs produced by your system in the future (it will decline by approximately 0.5 percent per year)
- Discount rate (used for calculating net present value of cash flows)
- Loan interest rate (in case the financial model includes a loan scenario)
- Maintenance costs (sometimes ignored since they are low relative to the other figures)
- Insurance costs (in case adding a solar system asset increases your property insurance premium)

EQUIPMENT MANUFACTURERS AND WARRANTIES

Solar panels are not a commodity. While silicon may arguably be a commodity, solar panels are not despite the fact that they may be presented that way. They are designed and assembled differently



by many different companies at many different plants. In addition, module quality (i.e., durability, reliability, output variances, etc.) is still a highly debatable issue since they often carry 25-year performance warranties, but few modules have actually been around that long to see if they have survived and performed as expected. Also, recognize the difference between a performance warranty and a workmanship or product warranty. While almost all module manufacturers offer 25-year performance warranties, product warranties are normally only for five years.

It's also quite possible, in the rapidly growing module manufacturing business, that the inevitable industry consolidation will cause some manufacturers to go under or merge with others. The 25-year performance warranty is then either worthless or difficult to enforce. The point is: You want to buy equipment manufactured by a company that has a good likelihood of being around throughout the warranty period. While that may be difficult to determine, I'd suggest avoiding module manufacturers that have less than 10 years experience making modules.

INSTALLER REFERENCES

The rapid growth of the solar industry has caused literally hundreds of businesses to become solar installers. They come from a wide variety of backgrounds and, unfortunately, include some with little or no training and others with little or no scruples. Since many installers expect their relationship with a customer to be "one-and-done," their concern for turning over a high-quality project and performing additional work for the customer is secondary to their desire for the highest possible profit on the project. This motivation will lead to shortcuts, cutting corners and generally lower quality. Look for an installer that wants to do multiple projects for you, as well as one that willingly provides owner references of past projects you can talk to. You may also be able to find comments or recommendations online regarding installers.

Second, you're going to want to deal with a solar company that has in-house design capabilities. It shows the company is committed to the solar business if they've made the investment in having people dedicated to designing systems. In addition, they are more likely to be able to come up with customized, unique solutions for you. Ongoing dialog between designers and installers, as you will find in firms that have both functions in-house, makes both groups more effective and serves customers better.

Very few investments offer the opportunity to earn returns as high as solar power does right now — plus, it's good for the environment and generates positive press and public relations for your company. **SF**



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