



## Appendix B

### Self-Guided Solar Screening

A preliminary solar energy site screening provides a rough estimate of the solar resource, energy production, and cost of a PV system. It also provides information for a go- or no-go decision to proceed further in the procurement process. A more thorough solar energy site screening may be needed later to better quantify the energy production and costs before proceeding further.

A summary sheet is included at the end of this section to record the data and observations. The summary sheet, along with any drawings or photographs, is needed for the next steps in procuring a PV system. Shooting photographs of the site and equipment is critical, as they allow others to confirm the preliminary estimate or make recommendations without visiting the site.



General Services Administration, Ralph H. Metcalfe  
Federal Building PV arrays, Chicago, Illinois.  
(Credit: Patrick Engineering. PIX 09514)

## Solar Site Screening

### PRIOR TO A SITE VISIT

Preview the site using IMBY ([www.nrel.gov/eis/imby/](http://www.nrel.gov/eis/imby/)) or Google Earth (<http://earth.google.com>) to identify possible land or roof areas for a PV system.

- Identify roof areas with flat or equator-facing surfaces (e.g., south in the northern hemisphere) with little or no equipment on the roof.
- Identify large, open land areas.
- Print an overhead map of the site and mark these potential land and roof areas on the map for ease of location during site visit.

Use PVWATTS version 1 or 2 ([www.nrel.gov/rredc/pvwatts/](http://www.nrel.gov/rredc/pvwatts/)) or IMBY. Calculate, and print out, the energy production for a 1 kW PV system tilted at 10 degrees, and use the defaults for all other inputs. The monthly and yearly energy outputs for a 1 kW system are useful numbers for scaling to larger systems. For example, a 55 kW PV system produces 55 times the energy of a 1 kW PV system.

### WHEN ON-SITE

Access the roof or land area being considered for PV systems. Note the tilt angle and orientation of the equator-facing or flat roof area. Also note the type, condition, and age of the roof. If it is a land area, note the approximate grade and orientation of the land area. Take photographs.

The objective now is to determine the area of the site for a potential solar system as this will allow an estimation of the potential system size. The site needs to be very clear of objects that could cast shadows on the proposed site. While standing on the proposed site, use your thumb and fist to estimate the angle of the object from the horizon to the top of the object. A sideways thumb held at arm's length is about 2 degrees from the bottom to the top of the thumb. A fist held in front of your body is about 10 degrees from the bottom (little finger) to the top (pointer finger) of the fist (see [www.vendian.org/mncharity/dir3/bodyruler\\_angle/](http://www.vendian.org/mncharity/dir3/bodyruler_angle/)). Objects that are less than 20 degrees in height above the site, that are skinny (e.g., power poles), or that can be removed should be ignored for this preliminary estimate. For objects that are on the site, make height-angle measurements close to the roof or ground where the collectors will be placed. Determine the square footage of the site that is not shaded by objects, as determined above. For a preliminary estimate, the distances could be paced off. If available, use a measuring device such as a range finder or a rolling wheel tape measure. Take several photographs that could be used to make a panoramic photograph.

If a roof area is being considered, ask the people on site if the roof leaks, when it was last replaced or repaired, or if they have any concerns about it. Note their answers. Take photographs of the roof and the underside from inside the building if possible. Ask about the roof construction and whether any drawings are available. Make a copy or take a photo of any drawings.

## Photovoltaic Specific Assessment

Identify the nearest location for housing the inverters. It is best if this location is shaded or enclosed. Small inverters (6 kW or less) can hang on a wall. Larger inverters (greater than 6 kW) are placed on the ground or floor. Note the distance from the proposed PV system location to the inverter bank. Take photographs.

Identify the nearest electrical panel and record the location and distance from the inverter bank to the electrical panel, voltage at the electric panel (V), the number of phases (1 or 3), capacity of the main breaker (amps), and the capacity of the panel (amps). Take photographs of the equipment, including the circuit breakers.

## Energy Production Estimate

Estimate the size of the PV system by multiplying the proposed site area (ft<sup>2</sup>) times 9.3 W/ft<sup>2</sup>. This corresponds to a fairly typical 14% efficient crystalline PV module. This preliminary solar energy site assessment is for no, or relatively few, solar obstructions. If the solar obstructions become numerous or complicated, then a more detailed solar energy site assessment should be made.

## Site Energy Requirements

Prior to a site visit, or while on site, determine the annual energy usage from the utility bills. Ask the site personnel if any energy efficiency changes will be made or if electrical load increases are anticipated.

Determine the annual electrical energy consumption for the building or site. Compare this number to the estimated energy production from a PV system. In most locations there is little economic sense to produce more energy than is consumed. If needed, reduce the PV system size to just meet the annual electrical energy usage.

Divide the estimated PV system production by the annual electrical energy usage. This is the percentage of annual energy supplied by the PV system.

## Cost Estimate

A conservative price estimate for a fully installed PV system is \$6,500 to \$8,000 per kW of PV. Large PV systems (greater than 100 kW) or PV systems on sites with uncomplicated site access or conditions have been installed for less money. This price range is for a simple grid connected PV system without batteries. Systems with batteries can easily double the installed price.

## Incentives

Available incentives for solar projects can be critical to the economic feasibility of a prospective project. Look up and list incentives that apply to the project. The DSIRE Web site lists most incentives available for solar projects from federal, state, local, and utility sources. ([www.dsireusa.org](http://www.dsireusa.org), accessed July 19, 2010)

## Go- or No-go Decision

The information compiled here will form the basis of the economics that will be used for a decision to explore the feasibility of the project further.

# Summary of Preliminary Solar Energy Site Screening for Photovoltaics

Name of Location:

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Latitude and longitude, or ZIP code:

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Assessment performed by:  
(include contact information)

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Date of Assessment:

**POSSIBLE SITE ISSUES**

Historic building issues?

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Structural issues (if rooftop)?

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Roof age and condition? Planned replacement?

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Area (ft <sup>2</sup> )	
Maximum PV system size (kW)	
Estimated annual PV system energy production (kWh/yr) (from PV WATTS or IMBY)	
Building or site annual energy consumption (kWh/yr)	
Percent solar contribution (production divided by consumption [%])	
Distance from PV system to inverter (ft <sup>2</sup> )	
Electrical service (voltage and # of phases)	
Total installed price estimate (\$)	
Present price of energy (\$/kWh)	
Estimated annual energy savings (\$/yr) (estimated annual energy production multiplied by present price of energy)	

List available incentives for solar projects on the site:

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Comments (use another page if necessary):

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*Attach drawings, photographs and printouts.*