



## **NorthWestern Energy USB 2003 Residential Solar Electric Demonstration Project System Specifications**

*General:* Owner shall be responsible to assure compliance with all applicable codes and standards.

*Solar Modules.* The contractor/homeowner will install photovoltaic (PV) modules with a UL 1703 listing and be warranted by the manufacturer to provide no less than 90 percent of rated power for 10 years and 80 percent for 20 years.

*Mounting Structure.* The contractor/homeowner will provide all the materials for mounting the PV array. Roof, ground, or pole mounts will be capable, at a minimum, of withstanding winds of up to 90 mph and will be constructed of corrosion-resistant steel or aluminum. Tracking structures are acceptable, but not required.

*Inverter.* Contractor/homeowner will supply and install an inverter to allow grid connection (120VAC, 60Hz). The inverter will have a UL- or ETL-1741 listing. Additionally, it will have maximum power point tracking, islanding protection, over/under voltage and frequency disconnect capable of disconnecting from the electric distribution utility when the voltage is greater than 128 volts and less than 112 volts, and when the frequency is greater than 60.03 Hz or less than 59.7 Hz. The inverter shall be equipped with automatic fault condition reset for loss of grid and voltage/frequency variations, GFI protection, AC and DC disconnect switches, and a five-year warranty.

*Disconnect Switch.* Contractor/homeowner will provide a lockable AC disconnect switch located in an outdoor-rated enclosure mounted near the main electric meter for utility personnel use. The disconnect switch will be mounted within sight of the electric meter and labeled with a weather resistant placard stating: "Solar Electric Generator Disconnect Switch" in letters large enough to be read from 15 feet away. In cases where the PV system is not visible from the service drop, the contractor will label the meter base with a weather resistant placard stating "This meter is connected to a solar electric generating system. Follow all utility safety and grounding procedures." and will indicate where the utility accessible disconnect is located. .

*Miscellaneous Electrical Equipment.* Contractor/homeowner will provide all wire, conduit, and hardware required to connect the PV modules, source combiner box, inverter, outdoor AC disconnect switch, AC connection to the breaker panel, and a watt-hour meter to accumulate the kilowatt-hours of electricity produced by the PV system.

### **Site Specifications:**

Buildings must be within the NorthWestern Energy electric service area and the solar electric system must be connected at an active NorthWestern Energy electric meter.

In addition, the building must be occupied by the homeowners (or long-term renters) year-round. The building owner will provide, on request, the building's electric bills for the previous 18 months or allow NCAT access to the bills (for a baseline determination). The homeowner must sign and send in a net metering agreement to NorthWestern Energy (attached).

For safety reasons, single story structures will be given preference.

One of the building's roof surfaces should ideally face due south (not magnetic south) and have an area of at least 300 square feet (for a 1kilowatt system). A deviation of 25-30° east or west of south will be considered. The PV arrays must be shaded as little as possible between 9:00 a.m. and 3:00 p.m. solar time, when nearly 90 percent of the sun's energy reaches the site. In any solar energy system design shading should be avoided and solar access maximized; even partial shading on a PV array will significantly reduce the system's electrical output. At a minimum the installation site should be shade free from 10 a.m. to 2 p.m. on Dec. 21st.

Roof pitch considerations for a direct-mounted PV system. The preferred roof slope is 45 degrees (a 12/12 pitch), but roof slopes between 23 degrees (5/12 pitch) and 60 degrees (21/12 pitch) are considered acceptable. Although most roofs can support the added weight of a PV system, homeowners must check the condition of the rafters and determine if the roof can safely support the added dead load of the PV array/mounting rack and the temporary live load imposed by the installation crew. The PV array and mounting rack add ~3 pounds per square foot of dead load to the roof.

The south-facing roof should be near the main electrical service entrance. To minimize wiring runs, the breaker panel containing the building's main disconnect switch and the household's electrical end-use breakers will be easily accessible and relatively close to the PV array. The breaker panel will have space available for installing a 120/240V breaker for the PV system's connection to the electrical grid.

### **Requirements for Rebate (Buy-Down Incentive) payment:**

1. On or before April 4, 2003, the homeowner or the contractor must submit an application and a detailed description of the proposed solar electric system to NCAT. The proposed solar electric system description must describe the system components, manufacturers and the output capacity; the mounting technique and array configuration; a seasonal sun path/shading analysis; and an itemized list of the costs. Additionally, the retailer and the installer must be named. **The proposed system design is in addition to the application.**
2. On April 11, 2003, a random drawing of qualified systems will be done. All applicants will be notified of their acceptance into the rebate program or not. If the site is chosen for the program, NCAT will inform the homeowner and will send forms to be signed and returned to NCAT to formally participate in the program. If the site is not chosen for the program, NCAT will inform the homeowner and unless told otherwise, will retain the application and system design package for possible participation in the future.
3. The homeowner or the installation contractor must contact NCAT stating that the system is installed according to NCAT's specifications and is ready for NCAT's inspection. This

assumes that the system has been signed off by the state or local electrical inspector; that Dave Ryan at NWE (497-2322) has been contacted for the net meter's installation; and that the net metering agreement has been signed and sent into NWE. August 29, 2003, is the tentative deadline to have the systems installed.

4. The PV system will be inspected by NCAT staff for compliance with the system's hardware specifications, proper installation, and acceptable electrical output. The homeowner must be present during the site inspection; the system retailer/contractor may be present also.
5. Upon passing the NCAT site inspection, the rebate check (\$4.00/peak DC Watt of installed capacity, up to 2000 Watts) will be sent to the homeowner within 21 working days.