SMALL WIND OFF-GRID
EQUIPMENT QUALIFICATIONS AND INSTALLTION GUIDANCE
APS RENEWABLE ENERGY INCENTIVE PROGRAM

Systems receiving incentives under this program must be installed according to manufacturers' recommendations and generally accepted industry standards. Requirements not specified in this program, but which are applicable under this program, include, but are not limited to, the following:

- The project must comply with all applicable local, state, and federal regulations.
- Installations must meet applicable governmental statutes, codes, ordinances, and accepted engineering and installation practices.
- Systems must be permitted with and pass inspection by the Authority Having Jurisdiction (AHJ) over construction projects in the Participant's locale, or, if the site is not governed by an AHJ, the Participant must provide a certification in lieu of AHJ clearance.
- If the inverter of the DE system is interconnected or in any way connected to the APS grid – a "Grid-Tied System" – the system must meet all applicable APS Interconnection Requirements.
- APS may request copies of any documents to assure compliance with government, institutional, or DE program requirements that are either explicitly or implicitly described by this program.
- APS may request/require construction/as-built drawings of the system.

All major components of the DE system must be new and must not have been previously placed in service in any other location or for any other application. A DE system purchased more than 180 days before the date that APS receives the reservation request will not be considered "new" under this program. APS may consider exceptions to this timeframe when justified by the Participant in writing. The DE system must also comply with the technology specific criteria detailed below. When some technology-specific criteria reference third party standards, the requirements of those standards are fully applicable when referenced as part of technology specific criteria.

The following standards or standard development bodies are referenced as part of the technology specific criteria:

- The Active Solar Heating Systems Design Manual developed by the American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. ("ASHRAE") in cooperation with the Solar Energy Industries Association ("SEIA") and the ACES Research and Management Foundation (the "Design Manual").
- Arizona state boiler regulations (A.A.C. R4-13-406).

- Select technology specific qualification requirements developed by the California Energy Commission ("CEC").
- Solar Rating and Certification Corporation ("SRCC"). The SRCC criteria and ratings can be viewed at www.solar-rating.org.
- The Underwriters Laboratory ("UL").

Where the equipment qualifications detailed below are required for program participation, the technology specific installation guidance is provided to program participants to convey information on installation and operation practices that are most likely to achieve the DE system's designed output. The requirements described herein are not intended as engineering recommendations, services, or technical advice. Engineering recommendations, design, and performance data will be provided to the Participant by their supplier, installer, or professional advisor. Although installation guidance is not currently mandated for a project to receive an incentive, it does reflect both industry and utility concurrence on those practices that are important for a technology to best achieve the designed output. APS reserves the right to modify equipment qualifications and/or installation guidance if APS becomes aware that such qualifications or guidance results in unsafe conditions, provides inappropriate results for our customer, or is inconsistent with program objectives.

A small wind generator is a system with a nameplate rating of 1 (one) MW or less. The technology criteria described below are intended for small wind generators with a nameplate rating of 100kW or less. Systems larger than 100 kW will be required to submit a detailed package describing site selection, expected energy production, and an engineered system design and installation as part of an ES&D report.

Equipment Qualifications

The technology criteria described below are intended for wind generators with a nameplate rating of 100kW or less.

- Eligible small wind systems must be certified and nameplate rated by the CEC or other qualified third party selected by APS to provide certification and a nameplate rating. See www.consumerenergycenter.org/erprebate/equipment.html for a list of certified generators. For grid-tied or off-grid wind generators where an inverter is used, the CEC listed nameplate rating of the wind generator will be multiplied by the CEC approved weighted efficiency percentage listed for the inverter in the "List of Eligible Inverters" at www.consumerenegycenter.org/cgi-bin/eligible_inverters.cgi to calculate the wind turbine nameplate rating for use in determining the UFI payment.
- Grid-tied inverters used as part of the system shall be listed to Underwriters Laboratory standard UL 1741.
- The tower used in the installation must be designed by a registered professional engineer and installed by individuals familiar with local geotechnical conditions.
- The wind generator and system must include a five year warranty and an operation and maintenance plan for the full operational life of the system.

In addition to the requirements for small wind generators outlined above, systems nameplate rating larger than 100 kW will be required to submit an ES&D Report.

Installation Guidance

Location: a wind turbine hub should be at least 20 feet above any surrounding object and at least 28 feet above the ground within a 250-foot radius. Wind generators should be installed in locations with an elevation at or above the general elevation of the surrounding terrain.

Lot size: should be at minimum one-half acre. Municipalities and public facilities, such as schools and libraries, may not need to meet the minimum lot size requirements.

The installed system should be demonstrated to obtain at least a 15% annual capacity factor. The following are readily available methods for helping to demonstrate the potential for a 15% capacity factor, but other methods may be used. The installation location should have a demonstrated average annual wind speed of at least 9 MPH as measured at a height of no more than 50 feet above the ground. Average annual wind speed can be demonstrated by wind speed records from an airport, weather station or university within 20 miles of the proposed wind generator location, or by a 50 meter wind power density classification of Class 2 "Marginal" or higher on the "State of Arizona Average Annual Wind Resource" map, dated July 16, 2005 or later, as published by Sustainable Energy Solutions of Northern Arizona University. Northern Arizona University provides detailed wind resource maps as well as other resource services. For more information contact Northern Arizona University at http://wind.nau.edu/maps/.