

# Community Development

## Building & Safety Program Business Practices

**Task:** **Accessory Wind Energy Systems** used specially for installing grid-tied and non-grid (AC/DC) battery backup electric systems.

**General Information:** The installation of small wind generating systems is not specifically addressed in the International Building Codes or in the 2005 National Electric Code (the current rewrite of the 2008 NEC, Article 690, still says nothing specifically about the electrical production from wind turbines). Section 705 discusses Power Production Sources and has some applicable portions.

The City of Flagstaff, Land Development Code, was amended through **COF Ordinance 2009-03** (adopted on 22 January 2009 and effective on Monday 23, February 2009) within the City limits. Coconino County already has a development standard, Section 14-8 (implemented in July-August 2008), which allows for both residential and commercial installations (attached). The new ordinance specifies that only a building permit is required for wind turbines in Commercial and Industrial areas and all of the specification requirements to obtain a building permit is also provided.

The Building & Safety Program wants to make the permitting for accessory wind energy systems easy for the builder and to expedite processing; the following information must be provided when you submit for a building permit:

1. A detailed site plan that indicates the existing setbacks, all structures on the property, adjacent over-head utility lines (cable, phone and/or electrical), all existing public or private utility easements.
2. The location of the mono-pole must be provided along with the proposed maintenance "drop zone".
3. The applicant must show compliance with the amendments to the Land Development Code for height, size and location. A scaled cross section with the tallest building on the site plan and the proposed wind turbine.
4. Engineering calculations that are specific to the proposed wind turbine mono-pole and turbine connections are required (substituting a "mix and match" series of charts from a manufacture are not deemed sufficient). The manufacturers specifications sheets for the mono-pole and loading requirements will be supplemental to the engineering calculations. The specific details of the foundation, amount of steel to be installed and any mounting brackets must be provided for field inspection.
5. A one and three line electrical diagram will be provided for grid and non-grid interconnected systems. The size of battery storage areas and ventilation will be provided. All listed equipment (inverters, meters, breakers, size and location of main service panel, grounding) will be provided.

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6. **A licensed electrician must be the primary on the building permit** (this is required for gird-tied systems by APS). For foundation work, *if* special inspections are required, *then* the approved special inspection form will be completed by the applicant and approved by the Building Official prior to pouring any concrete. A licensed general contractor is recommended for this type of commercial installation; however, the Arizona State Registrar will allow a contractor with a “K” license to perform the necessary work as well.
7. If a small accessory wind energy system is proposed and the unit(s) will be roof or on the side of the structure (vertical turbines) mounted , then the weight information on the system and framing instructions must be provided. This includes mounting instructions for conventional or trussed roofing (specifically looking for any limitations on spans and point loads).
8. In an effort to be compatible with Arizona House Bill 2615, the Building Official will use the standards proposed for Solar PV system permit standards. The building permit for the turbine will be based upon the electrical requirements. The building permit will be separated out for foundation and structural modifications to the existing structure(s). The turbine electrical portion of the permit should therefore be less than \$200. Foundation requirements and structural modifications will be calculated based upon information provided by the applicant for the cost of the foundation.
9. These permits will **not** be issued “over-the-counter”, but must be reviewed by a plans examiner. If additional information is required because of complexity of the system, system exceeds 400 amps which therefore requires an Electrical engineer, the services of an Arizona Design Professional may be required.
10. The applicant must provide the information on the roof design (span, size, and spacing of structural elements and the information on loading from the manufacturer of the system to be used).
11. For commercial applications (including apartments, condos and hotels/motels), the permit will be reviewed by the Project Management Section for compliance with design guideline criteria. Again, staff encourages installations that complement the structure.
12. If you have any questions, please contact the Project Review Section at 101 West Cherry Ave, old APS building or call at 928-779-7685 extension 4243 for assistance.

### **Definitions:**

**ACCESSORY WIND ENERGY SYSTEM:** A system designed as providing a secondary source of electrical power to an existing or new buildings or facilities, wherein the power

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generated is used primarily for on-site consumption. The system consists of a wind turbine and associated controls and may include a tower.

**COMMERCIAL WIND GENERATORS:** Any device or series of wind generators capable of generating more than 10 Kw will require a conditional use permit and development review board approval.

**GRID-TIED GENERATOR:** This is a wind turbine or system which has an inverter and electrical interconnect agreement between the producer (property owner) and the utility provider (i.e., Tucson Electric, Salt River Project, Arizona Public Service)

**HUB HEIGHT:** The distance measured from the existing ground level (grade) to the center of the wind turbine hub (blade height may make the actual height taller).

**INVERTER:** An approved device that converts direct current (DC) power to alternating current (AC).

**MONOPOLES:** A pole constructed of composite materials, steel or wood that has no guy wires or exterior sub-structure elements. Considered to be free-standing. Applicants using a monopole must provide design criteria from the manufacture for plan review approval.

**TOTAL HEIGHT:** The distance measured from the existing ground level (grade) to the tip of the wind turbine blade or any portion of the generating device that extends above the Hub Height.

**WIND FARM:** A combination of two or more wind turbines interconnected to provide large amounts of electrical energy:

**SMALL WIND GENERATORS:** A device primarily used for generating direct current (DC) power for the purposes of charging batteries or providing back-up emergency power. Systems are limited to 3000 watts and below.

**MEDIUM WIND GENERATORS:** A device that is used for either generating direct current (DC) power and/or alternating current (AC) power. These units may be grid-tied to the utility company with the proper inter-connect agreements signed and approved. These units are between 3000 watts and 10.0 Kw systems. Depending upon the size of the system (400 amps in accordance with City Code amendments), the requirement of an Arizona design profession (registrant) maybe required.

**LARGE WIND GENERATORS:** A device that is used for generating alternating current (AC) power for commercial use. These units are normally grid-tied to the utility company and may provide primary power, not only to a particular business, but also feed the power grid. Large wind generators will be larger than 10.5 Kw system, up to 200 Kw systems. These may also be part of a commercial "wind farm". These systems must be designed by an Arizona design professional (registrant) and commercially permitted.

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**WIND TURBINE or GENERATOR:** A wind turbine is a device which converts the kinetic energy of the wind into a useable form of electrical energy.

**UTILITY DISCONNECT SWITCH:** A physical switching device that is required by the utility company that can be locked out. Must check with APS for specifications.

**Requirements:** To. This process may take between 1-2 weeks.

**Process:** The application for applying for a building permit to install an accessory wind energy system for the purpose of providing supplemental power to the primary building. These permits are normally processed within 10-15 working days. [If done in conjunction with an on-going review of a new building permit, then the longer review time for commercial review will be in effect – see Commercial Plan Review Task 2008)

- a) Applicant completes the application obtained from the front counter for a building permit. This will be a BCBM permit for commercial and industrial zoned areas.
- b) A one-line drawing of the site plan, showing the location of the wind turbine on the site (must be to scale to check for setbacks) is provided with the application.
- c) The application is checked for completeness by the front counter. (All items listed under General Requirements above will be in the submittal)
- d) The application is routed to an Associate Planner (Project Management Planner) to check zoning and Land Development Code set backs.
- e) The Project Management Planner approves the application and annotates any conditions of approval in the permit tracking system.
- f) The plans and application are sent to the building plan examiner for a 72-hour initial review prior to routing.
- g) If the project is ready to review, then the application is returned to the front counter for final processing and routing. If the project fails the 72-hour review, a form letter and the complete application is returned.
- h) The routing will include fire department, building, public works, utilities, storm water and engineering.
- i) The building plans examiner will calculate and check fees associated with the permit. The review will be a detailed technical review of the National Electric Code and International Building Codes. Once all reviews are completed and forwarded to the Commercial Plans Examiner, the comments are recorded and the permit is prepared for issuance. Paperwork is forwarded to the front counter for final processing. The front counter then calls the applicant with the information on status of permit (ready to issue, denied, additional information required, etc.) and the cost for issuing the permit.
- j) When the applicant arrives to pick up the permit, the front counter will complete the final processing of fees, create a receipt for the applicant, and secure a copy of the receipt once the fees have been paid.
- k) The permit is then printed (two copies). The applicant signs one copy (which is retained by the front counter) and takes the second copy with the approved site plan.

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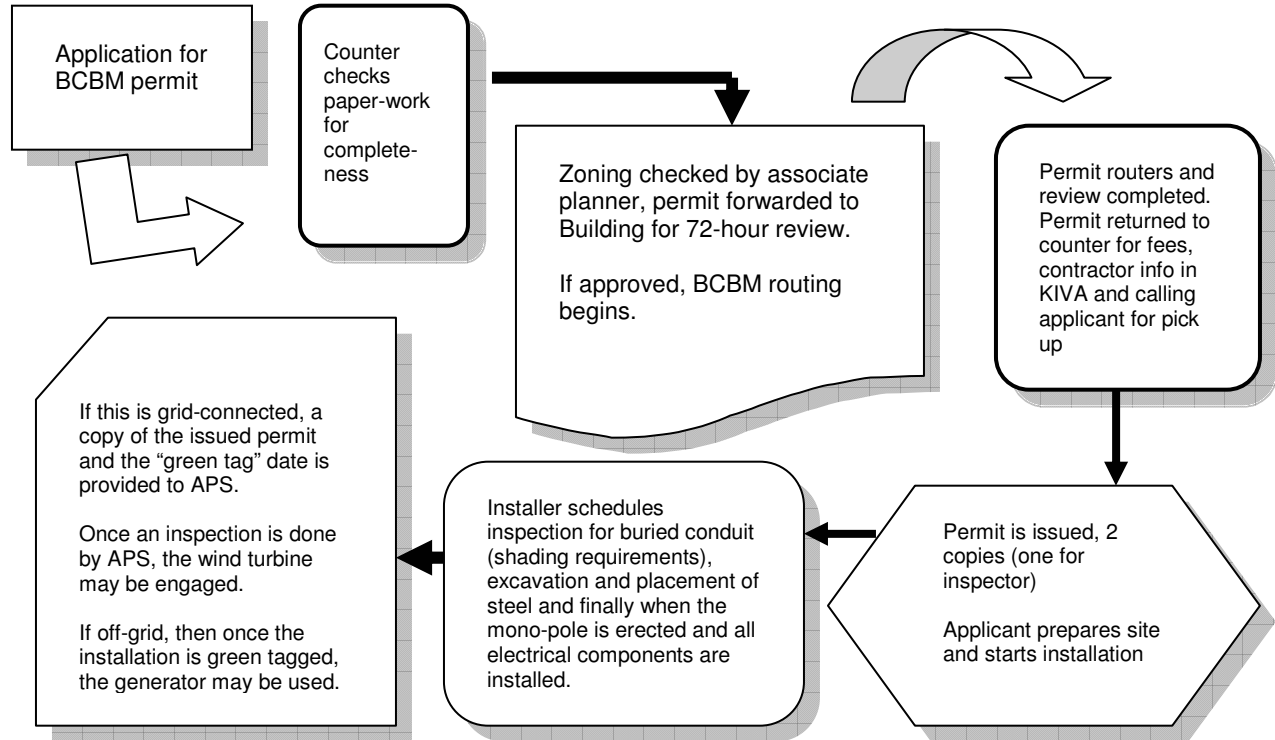
- l) The front counter also provides the applicant with the name of the assigned inspector and the list of phone numbers so that the applicant can schedule the installation inspection.
- m) This type of permit will have a minimum of two inspections. One is done to inspect the foundation and steel prior to pouring the concrete and the second is to review the installation for completeness prior to energizing the system. There may be a third inspection for the installation of underground conduit for the electrical connections – although it is recommended that this is done with the foundation inspection.
- n) Once the installation is completed and a “green tag” has been provided to the contractor or owner-builder, it is the responsibility of the contractor or owner-builder to contact the utility provider before engaging the wind turbine to the grid.
- o) Off-line installations (battery, D.C. systems which are not inter-connected to the utility company) may be operated as soon as the system is “green tagged” by the building inspector.
- p) A copy of the interconnect agreement must be provided to the field inspector prior to issuing a “green tag”.
- q) The inspector will complete the installation approval in the permit tracking system and close out the permit.
- r) Final paperwork is forwarded to the Building and Safety administrative specialist for “scanning” to the permanent files and boxing the original for permanent storage.
- s) The permit has been completed and will be shown as “DONE” in the tracking system.

**NOTE:** If the system will be grid-tied and interconnection of the wind turbine also includes a third power source (such as an automatic back-up generator set), then the services of an electrical engineer to provide the switching schematics will be required.

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**Diagram:** The following is the flow diagram for permitting an accessory energy structure:



**Process author/owner:** Building & Safety Program manager (Ed Larsen)