

# Washoe County PLAN SUBMITTAL

*WIND TURBINE  
Electrical Generation Systems*

**PERMITS+PLUS**  
**ZONE**



**Washoe County**  
**Permits Plus Zone**  
1001 East Ninth Street  
PO Box 11130  
Reno, NV 89520-0027



# Wind Turbine Electrical Generation Systems

## Submittal Guide and Application Form

The following is an outline and application form for the requirements for a wind turbine electrical system plan submittal. This list is for reference purposes only and may not include all items needed to complete the plan check process.

### Plan Sets

Your submittal will consist of **two** complete sets of plans. Engineered diagrams used for construction require the engineers wet/stamp.

The following **additional** plans are required for other departments:

Ground Mount:        3 Site Plans **or** 4 Site Plans if property has a septic system (see note below)  
Roof Mount:            1 Elevation Plan

**Note:** See attached Health Department guide for septic site plan requirements (Minimum 18" x 24" plan sheet)

### Project Information

Total (maximum) height of tower and blade: \_\_\_\_\_

Please provide contract price of the installation: \_\_\_\_\_

Electrical generation capacity: \_\_\_\_\_ Watts, \_\_\_\_\_ Volts, \_\_\_\_\_ Amps.

### Structural Design Considerations for Tower

The wind Turbine support tower requires engineering designed to the 2006 International Building Code {IBC}, ASCE 7-05. The engineering calculations shall qualify the: structural members, column or frame assembly. For mono pole designs, provide calculations qualifying: welded flanges, weld type, size, pipe diameter, bolting, etc. Provide qualifying calculations for upper support bracket assemblies. Tower design calculations shall show design review of turbine lateral thrust and turbine weight as well as wind loading and seismic loading.

Minimum wind loading: 100 mph 3-sec gust, Exposure 'C'

Snow load: minimum 30 psf ground (Pg), elevations above 5000' have higher snow loads.

Radial ice loading should be considered.

Seismic category to be determined after engineer does their spectral response review. (Usual determination is "D").

Frost depth is 24" minimum for footing design.



Please **fill in all the blanks** and submit with your plan sheets. Indicate {Yes, No, N/A, specific data}

- Is this a vertical axis turbine? \_\_\_\_\_ Yes/No
- Is this a horizontal axis turbine? \_\_\_\_\_ Yes/No
- Provide height of turbine nacelle (Max). \_\_\_\_\_ feet.
- Height of maximum blade travel \_\_\_\_\_ feet.
- The maximum decibel (dB-A) sound level value is: \_\_\_\_\_ db at \_\_\_\_\_ feet.
- Is this a DC output generator? \_\_\_\_\_ Yes/No
- Provide number of DC to AC inverters. \_\_\_\_\_
- Is this a three phase (wild) AC generator output? \_\_\_\_\_ Yes/No
- Does the system incorporate dynamic braking? \_\_\_\_\_ Yes/No
- What form of mechanical braking is utilized? \_\_\_\_\_
- Indicate what page of specification sheets provide the braking details \_\_\_\_\_
- Will you be upgrading the existing electrical service panel box for this installation? \_\_\_\_\_ Yes/No
- Will the system include batteries? \_\_\_\_\_ Yes/No Battery type? \_\_\_\_\_
- Will an equipment shed be used to house electrical panels or batteries? \_\_\_\_\_ Yes/No
- Does the site have solar electric PV generation? \_\_\_\_\_ Yes/No
- Does the site have a gas or diesel power generator? \_\_\_\_\_ Yes/No
- Will the system incorporate a lighting arrestor? \_\_\_\_\_ Yes/No
- Will the system incorporate surge protection? \_\_\_\_\_ Yes/No
- Did you provide a site plan? \_\_\_\_\_ Yes/No
- Did you provide an elevation view plan sheet? \_\_\_\_\_ Yes/No
- Did you provide a tower footing construction plan? \_\_\_\_\_ Yes/No
- Did you provide a tower or metal structure construction plan? \_\_\_\_\_ Yes/No
- Did you provide an electrical single line diagram? \_\_\_\_\_ Yes/No
- Indicate the number of electrical panel boxes utilized \_\_\_\_\_
- Number of DC panels \_\_\_\_\_
- Number of AC panels \_\_\_\_\_
- Charge controller \_\_\_\_\_ Yes/No Rated at \_\_\_\_\_ Amps
- Battery bank? \_\_\_\_\_ Yes/No Number of batteries? \_\_\_\_\_
- Wired for operation at \_\_\_\_\_ Volts \_\_\_\_\_ Amps
- Separate DC disconnect \_\_\_\_\_ Yes/No Rated at \_\_\_\_\_ Amps
- Primary electrical source interconnect transfer switch. \_\_\_\_\_ Yes/No
- Transfer switch rating \_\_\_\_\_ Amps or Volts \_\_\_\_\_ Watts
- AC disconnect \_\_\_\_\_ Yes/No Rated at \_\_\_\_\_ Amps
- Renewable energy credit (REC) meter panel \_\_\_\_\_ Yes/No
- Main service panel rated at \_\_\_\_\_ Amps

*If this installation is not connected to the Power company grid system; provide minimum residential service load calculations as per {2006 IRC 3502}.*

## Grid Tied Systems

You must notify NV Energy or Plumas Sierra Power for their safety notification requirements. Indicate your contact person and contact date. Name: \_\_\_\_\_ Date: \_\_\_\_\_



## Support Tower Placement

Provide on the site plan the location of:

- Tower base.
- Guy wire footing locations.
- DC braking controller location.
- Dump load location.
- DC to AC inverter location.
- Transfer switch location.(2005 NEC 705-40)
- AC disconnect location.
- REC meter location if used.
- Main service meter location.
- Electrical disconnect within 30 feet of tower base (05 NEC 445.18 and WCC 100.100.10)

Clearly show placement of wind turbine tower & guy wire footings with dimensions to structures, property lines, propane tanks, electrical pedestals, overhead power lines, etc.

## Provide Elevation Views

Show location of electrical panels on all structures and/or pedestals.

- Show all electrical panels and main service-disconnect locations.
- Indicate conduit size, type & location.

## Provide Tower Footing Plan Sheet

The **dimensioned concrete footing** plan will show dimensions for main support pier and guy piers, clearly indicate concrete dimensions, rebar placement and size, and anchor bolts. Show details for all connections.

- Is this a fixed base tower with guys? \_\_\_\_\_ Yes/No
- Is this a tilt-up(pivoting base)? \_\_\_\_\_ Yes/No
- Is this a monopole? \_\_\_\_\_ Yes/No
- Is the footing a pier design? \_\_\_\_\_ Yes/No
- Is it a caisson footing? \_\_\_\_\_ Yes/No
- Show metal structure, electrical grounding electrode with connection details.

## Tower or Metal Support Structure Construction Plans

Provide detailed dimensioned plans showing all structural member sizes detailing connections, welds, bolts, etc.



## Tower Fabricator Quality Assurance Certification

The metal structure shall either be fabricated in an approved fabricators shop or will have special inspection specific to this job. Per 2006 IBC 1704.2.2: Provide tower fabrication plant certification. Provide AISC plant certification number, ICC/IAS certification number, City of LA certification number, or other approved third party fabrication plant approval. If the third party certification is not available, provide special inspection specific to this tower project (fabrication plant welding). Special inspection forms available at [www.washoecounty.us](http://www.washoecounty.us) go to departments, go to Building safety, go to handouts, go to special inspection. Have the Engineer fill out each page of the inspection schedule (please initial each page) and sign page 4. Have the inspection agency/inspector sign page 3. Have the owner/contractor sign page (3).

If the Tower utilizes high strength bolts, special inspection will be required for the A325 bolt installation. Complete the special inspection forms if applicable.

## Wind Turbine Electrical Generator Specifications

- Provide wind turbine specification sheets.
- Electrical data.
- Physical dimensions and characteristics.
- Provide manufacturers installation instructions and specifications including wind turbine maintenance schedule.

## Inverters

Provide specifications cut sheet for inverters.

- Indicate if transfer switch is integral to inverter. \_\_\_\_\_ Yes/No
- Indicate if Ground fault protection device is integral to inverter. \_\_\_\_\_ Yes/No
- Provide rated output power of inverter (used to size conductors & panel boxes). \_\_\_\_\_ Watts
- Provide inverter maximum output current. \_\_\_\_\_ Amps
- Provide inverter output voltage. \_\_\_\_\_ Volts
- Is the inverter {IEEE 1547.1} listed? \_\_\_\_\_ Yes/No
- Is it {UL 1741} listed? \_\_\_\_\_ Yes/No
- What approval agency provided the listing? \_\_\_\_\_
- Indicate if inverter is single phase two pole \_\_\_\_\_, Single pole \_\_\_\_\_, or Three Phase \_\_\_\_\_



## AC disconnect

Provide Amperage rating for AC disconnect.

\_\_\_\_\_ Amps

Is the disconnect a visible exposed blade (no dead front) panel box?

\_\_\_\_\_ Yes/No

If the panel box does not have a dead front (power company requires NO dead front), then provide a **note on your plans** stipulating: A tamper-proof wire lock is required on the NV Energy AC disconnect switch panel box cover. An owner installed padlock is also required on this cover. {2005 NEC 110.27, 408.38}

## Main Service Panel (existing or new)

- Provide load rating for panel \_\_\_\_\_
  - Provide busbar rating \_\_\_\_\_
  - Provide main service breaker rating \_\_\_\_\_
  - Provide back-fed circuit breaker amperage rating (Breaker must not be labeled with separate line/load contacts) \_\_\_\_\_
  - Provide AIC (arc interrupt capacity) rating for service panel \_\_\_\_\_
  - Provide available arc fault current supplied by the Power Company \_\_\_\_\_ Amps
  - Will the main service disconnect circuit breaker be reduced in size to allow the connection of the wind turbine electrical source? \_\_\_\_\_ Yes/No
  - Provide calculation showing the sum of ampere ratings of over-current devices in circuits supplying power to the main busbar does not exceed (120% for residential) rating of service panel busbar {2005 NEC 690.64 (B) (2)}
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## Provide an Electrical One-Line Diagram

Show all major field-installed electrical components

- Provide wire insulation identification for each circuit segment (insulation type & conductor size).
- Provide conductor size and amperages for each circuit segment.
- Provide equipment grounding conductor size.
- Provide system grounding conductor sizing (if conductor is not protected, minimum size is #6 copper 05 NEC 250.120 C).
- Exposed wires must be sunlight resistant rated.
- Show your conductor derating calculations (for temperature).
- Show your conductor sizing calculations for voltage drop. (wire length-resistance)
- Show wind turbine source current conductor sizing calculated at 115% amperage design value increase (for continuous duty). These are the conductors traveling from the turbine to the first panel
- Show each circuit segments maximum ampacity value.
- Provide conduit type and sizing.

## Renewal Energy Credit Meter Panel (REC)

Provide specification/cut sheet for meter socket.



# Net Metering Systems

Follow all power company regulations and 2005 NEC. NV Energy standard 'ENG03U'.  
<http://www.nvenergy.com/renewablesenvironment/renewablegenerations/resources.cfm>

## Signage

Provide: Note on plans that wind driven generator equipment shall be installed in accordance with 2005 NEC and posted with applicable warnings, signage & plaques per NEC 110.22, 445.11, 705-10, 705.22, 690-17 & 690-64(b)(5)

- Signage at power source (first panel with source wires from generator) example: [DC disconnect]
- Signage identifying switch/disconnect for alternate power system. (at source). Example: at inverter output [AC disconnect]
- At AC disconnect. Example: [Wind power system, AC Disconnect, 240 volt]
- The dedicated circuit breaker in the main service panel box **MUST** be clearly and durably labeled as a power source.
- Signage at main service disconnect (NEC 702.8) notifying the type and location of the optional standby system.
- Signage shall have minimum lettering size of (3/16"), Arial Font size #16 or equivalent.

**Note: Signs applied by the power company do not fulfill the NEC signage requirements.**

### At service meter:

Interactive System Point of connection
Operating AC Current _____ amps
Operating AC Voltage _____ Volts

### On The tower base panel or source panel box:

Operating Current ____ amps
Operating Voltage _____ Volts
Maximum system voltage _____ Volts
Short-circuit Current (Max) _____ Amps

Signage required at all electrical power sources.  
Signage identifying transfer switch for alternate power system.  
Signage at main service disconnect  
All signage must be permanent and durable. (Consider metal engraved plaques)



REFERENCES:

Codes: 2005 National Electrical Code, (NEC) notably sections; 705,445, 690, 110. 2006 IBC, ASCE 7-05

NV Energy (formerly Sierra Pacific Power)

<http://www.nvenergy.com/renewablesenvironment/renewablegenerations/resources.cfm>

Sierra Pacific power

<http://www.solargenerations.com/>

Washoe County Building Department

[www.washoecounty.us/bldgsafety](http://www.washoecounty.us/bldgsafety) click on handouts.

Washoe County Community Development Department (Planning)

[http://www.co.washoe.nv.us/comdev/publications\\_maps\\_products/comdevcode/comdevcode\\_index.htm](http://www.co.washoe.nv.us/comdev/publications_maps_products/comdevcode/comdevcode_index.htm)

WCC 100 Article 326 (division 3- Pages {93-96}). Or pg 215 of complete doc. Contact Paul or Trevor for current interpretations and changes in ordinance.

Nevada State alternative energy regulations: NRS 278.0208

[www.leg.state.nv.us/NRS/NRS-278.html](http://www.leg.state.nv.us/NRS/NRS-278.html)

New Mexico State University

<http://www.nmsu.edu/~tdi/Photovoltaics/PV-Energy.html>



# Field Inspection Checklist

Indicate a: [Y] for yes,

[N] for no

## SIGNAGE

- \_\_\_\_\_ Verify all signs and labels are in place and are durable (must withstand years of weathering)
- \_\_\_\_\_ Sign on combiner panel box (wind generator output box)
- \_\_\_\_\_ Sign on DC disconnect
- \_\_\_\_\_ Sign on AC disconnect
- \_\_\_\_\_ Label to be adjacent to circuit breaker connecting system to main busbar, in main service panel box.
- \_\_\_\_\_ Sign on main service disconnect (external) providing notification of the type and location of the secondary power source.

## APPROVED PLAN SET ONE-LINE DIAGRAM COMPARISON.

- \_\_\_\_\_ Inverter model number matches plans and specifications. {IEEE 1547.1}{UL 1741}listed
- \_\_\_\_\_ Wind turbine model number matches plans and cut sheets.
- \_\_\_\_\_ Wind turbine and tower are properly grounded with lugs.
- \_\_\_\_\_ Electrical panels, Dynamic braking circuit, transformers, and disconnects are placed consistent with plans.
- \_\_\_\_\_ Check that ground wires and conduits are properly supported.
- \_\_\_\_\_ Verify minimum wire sizes are consistent with plan.
- \_\_\_\_\_ Verify that circuits with voltages of greater than 150 volts to ground are **NOT** accessible to unqualified persons.
- \_\_\_\_\_ Verify footings are spaced and installed as per plan diagram.

