

# ***Distributed Generation Interconnect Issues for Government Wind Projects***

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# ***DG Interconnect Issues to Design Through***

- Look at Public Utility Commission and other State rules
- Will this project tie in behind the meter, be net metering, PURPA or other, will it ever export power?
- Utility interconnect process and interactions; get into the queue early if it will be required.
- Will you have departing load, transmission access, firming/integration services or other utility charges?
- Need to provide good design info relatively early in the process; cable sizing, impedances and sometimes charging capacitances, transformer sizing, proposed interconnect equipment and relays, metering arrangements, provide one-lines and proposed wind turbine electrical parameters to utility, etc.
- Look closely at existing rate structures and power/energy use, plan project accordingly for economics and PUC rules, and to avoid negative changes to existing rate schedules.

## ***Provide Good Electrical Engineering Design***

- What voltage will you be connecting at? What is the state of the existing system and cables?
- Perform basic load flow modeling, short circuit analysis, coordination survey and look at existing system loading and typical voltages for comparison.
- Design for reasonable cost while still providing proper equipment and personnel protection.
- Metering equipment and arrangements can sometimes be more of a challenge than anticipated.
- Perform soil sampling for input into cable sizing and grounding design.
- Grounding design and testing is very important, as well as cable testing requirements. Resistance to ground needs to be less than 2 to 10 ohms depending on the manufacturer and situation.
- Performance-based specifications and drawings; control system design and integration crucial for more complex systems.

## Other DG Issues

- Communications design for turbines, SCADA, metering, etc. Consider long term O&M and monitoring arrangements.
- Will you use fiberoptic, phone line (regular or DSL), Ethernet converters, wireless, cell, satellite, microwave, RS-232 or 485, etc.
- What are the manufacturer's and utilities options, what kind of security issues will you face on a government system?
- Will extra voltage support and/or ride-through systems be required (mostly for larger systems or high penetration island systems)? (Synchronous condenser, extra options on wind turbine(s), switched cap banks or SVAR or DVAR at substation, transformer tap changers, etc.)
- Other power quality issues (harmonics, distribution grids that have higher numbers of fault events, etc.).
- How is this project going to be managed, designed, procured/contracted, reviewed, construction managed and commissioned/tested?

# FE Warren AFB Wind Project, WY



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## Monitoring Wind Turbines During Energy Test



# Wind Farm at Ascension

After Phase 2



# Ascension Generator Plant and Synchronous Condenser



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INL Wind Program information [www.inl.gov/wind](http://www.inl.gov/wind)

## ***Other Information Sources***

U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy

[www.eere.energy.gov/windandhydro](http://www.eere.energy.gov/windandhydro)

Idaho Office of Energy Resources

[www.energy.idaho.gov](http://www.energy.idaho.gov)

American Wind Energy Association

[www.awea.org](http://www.awea.org)