

Applying Interconnection and Net Metering to Small Wind

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Case Study - Home

- Boulder County, Colorado, 5500 ft
- Net-metering for utility bill reduction
- Whisper 3000 wind turbine, 3 kW, 14.8-ft rotor, 23-ft tower
- 8.6-kW PV array
- 54 VDC battery bank
- Trace SW5548 inverters
240 VAC, 11 kW total
- All-electric home with
heat pump & two
electric cars



Case Study - Farm

- Southwestern Kansas
- Utility bill reduction
- Bergey Windpower Excel turbine, 10 kW, 23-ft rotor, 100-ft tower
- Electricity production ~21,000 kWh/year
- Utility bill savings ~\$2,800/year
- Installed in early 1983, ~\$20,000
- Received federal tax credit
- Maintenance costs, \$50/year



Case Study – Public School



This AOC 15/50 wind turbine on a farm in Clarion, Iowa saves the Clarion-Goldfield Community School about \$9,000 per year on electricity purchases and provides a part of the school's science curriculum.

Case Study - Manufacturing Plant

- Ontario, Net York
- Fuhrländer wind turbine, 250 kW, 97-ft rotor, 13-ft tower
- Utility bill reduction
- Installed December, 2002



Case Study – Distributed Wind Power

- Springview, Nebraska
- Zond wind turbines, 750 kW
2 ea.
- Utility bill reduction
- Connected to 12.5 kV
distribution line, Nebraska
Public Power District
- M. Hasenkamp:
“No power quality problems,
no customer complaints”



Interconnection

- Utility-Scale Wind Turbines
 - Distributed Wind Generation Study for Northeast Colorado:
www.colorado.gov/oemc/programs/renewable/windenergy/study/default.htm
 - Utility Wind Interest Group: application guides and analysis tools:
<http://www.uwig.org/distwind/default.htm>
- Small Wind Turbines
 - Manufacturers are beginning to offer UL compliant inverters
 - Simplified application process recommended

Zoning for Small Wind Turbines

- Short towers, up to 35 ft, usually can be installed with only a building permit
 - Based on firefighting limitations in the early 1900s
- Taller towers may require a “special use review” by the zoning commissioners
 - Hearing process can cost thousands of dollars and may take several months
- Zoning approval may be difficult or impossible to get for urban and suburban locations
- Zoning is usually easier to obtain in rural areas

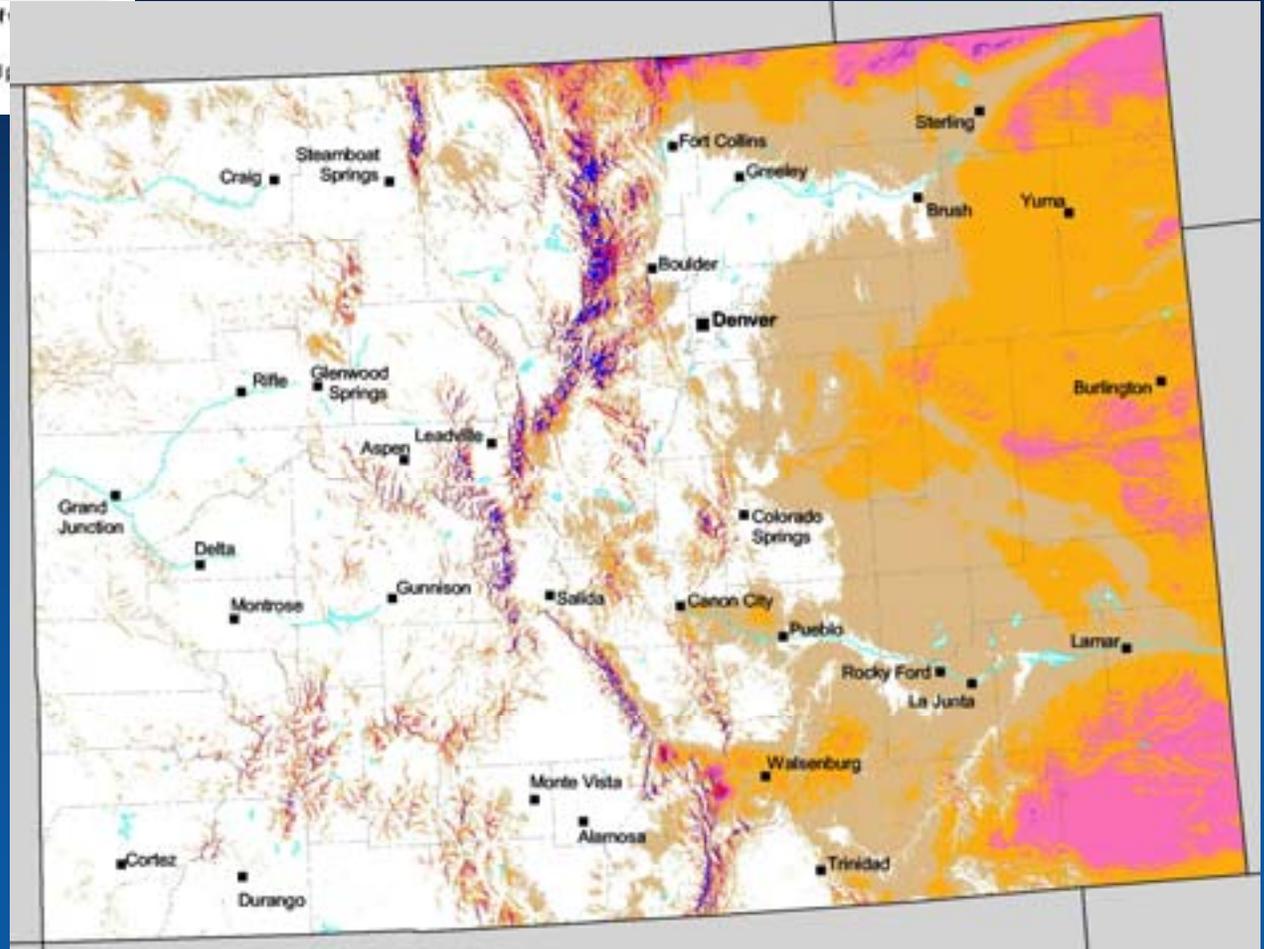
Colorado Wind Resource Map

Small Wind Turbine Productivity Estimates*

Wind Power Class	Productivity per m ² of swept area** (kWh/year)	Wind Power Density at 33 ft (10 m) (W/m ²)	Wind Speed at 33 ft (10 m)	
			(mph)	(m/s)
1	< 350	<100	< 9.8	< 4.4
2	350 - 500	100 - 150	9.8 - 11.5	4.4 - 5.1
3	500 - 610	150 - 200	11.5 - 12.5	5.1 - 5.6
4	610 - 690	200 - 250	12.5 - 13.4	5.6 - 6.0
5	690 - 770	250 - 300	13.4 - 14.3	6.0 - 6.4
6	770 - 880	300 - 400	14.3 - 15.7	6.4 - 7.0
7	880 - 1170	400 - 1000	15.7 - 21.1	7.0 - 9.4

* Estimates are based on different models and sizes of turbines assuming a tower height of 80 ft (24 m).

** For systems of different sizes, multiply the estimated productivity by the total swept area of the turbine.



Colorado Utilities Offering Net Metering

- Investor Owned Utilities:
Xcel, Aquila
- Municipal Utilities:
Ft. Collins, Colorado Springs, Longmont Power
- Rural Cooperatives:
Aspen, Gunnison County, Delta Montrose, Holy Cross,
Empire, Grand Valley, La Plata, San Miguel

→ No eastern plains coops offer net metering!

Coops and Net Metering

- Pinched Finances
 - Reduced rural population and load
 - Reduced ability to pay for facility fixed costs
- Price Signals Are Confusing
 - Tariffs are kWh-based → raises expectations with consumers
 - Coop operating costs may be 50% fixed costs

Coops and Net Metering

- Load Match
- Culture of Fairness
- Net Metering
 - It's about the money!
- Member Need and Preferences
- Untapped Resource for Rural Economic Development

Coops and Net Metering

- Options
 1. Avoided cost interconnections
 2. Net metering
 3. Dedicated green power generation
 4. Co-op support services for wind power: sales or leasing, financing installation, maintenance, green tag aggregation
 5. Renewable energy interconnection funds
- New ideas needed!
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Carpe Ventem

www.windpoweringamerica.gov