



Wind Power for Communities

September 24, 2009

Columbia Gorge Discovery Center
The Dalles, OR



www.westerncommunityenergy.com



Wind Power for Communities | *NWSEED*; 9/23/09

Overview

- Western Community Energy
- “Small” vs. “Community” Wind
- 65 kW Case Study
- Lessons Learned
- The Future?

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WESTERN
Community Energy
Complete • Local • Wind

Complete

- Design/Build
- Financial Services
- Operation and Maintenance

Local

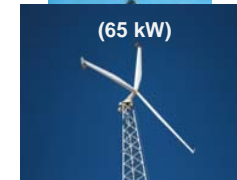
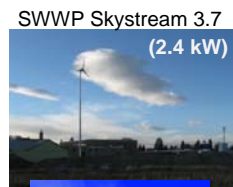
- Community Ownership
- Distributed Generation

Wind

- "Wind for Schools"
- Commercial
- Utility Scale



"Small Wind" Turbines



Proven WT11500

Jacobs 31-20

Entegrety EW50



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"Community Wind" Turbines

Entegritty EW50

(65 kW)



Northwind N-100

(100 kW)



GWP-30

(225 kW)



RRB PS-600

(600 kW)



- 500 kW
- 750 kW
- 900 kW
- MW +

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Entegritty EW50 (65 kW) Entegritty WIND SYSTEMS INC.

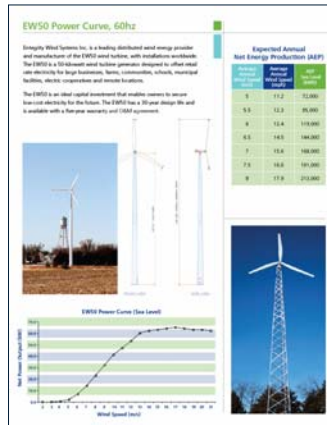


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EW50-- Turbine Details

- Generator Size: **65 kW**
- Total Height: **125 or 145 feet**
- Tower: **100 or 120 feet**
- Rotor Diam.: **50 feet**
- Cost: **~\$250,000**
- Cost/kW: **~\$3,850/kW**
- Production: **75,000 kWh/yr.**
 - 13% CF at 12 mph



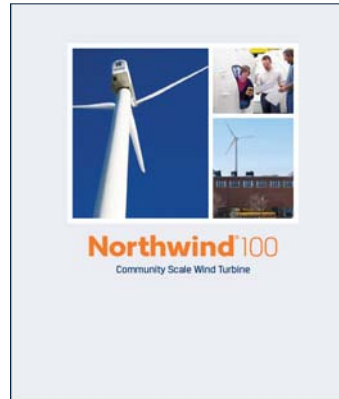
Northern Power N100 (100 kW)





N100 -- Turbine Details

- Generator Size: **100 kW**
- Total Height: **156 feet**
- Tower: **121 feet**
- Rotor Diam.: **69 feet**
- Cost: **~\$500,000**
- Cost/kW: **~\$5,000/kW**
- Production: **140,000 kWh/yr.**
 - **16% CF at 12 mph**



GWP-30 (225 kW) -- design





RRB PS-600 Details

- Generator Size: **600 kW**
- Total Height: **239 or 290 feet**
- Tower: **162 or 213 feet**
- Rotor Diam.: **154 feet**
- Cost: **~\$1,800,000**
- Cost/kW: **~\$3,000/kW**
- Production: **1,150,000 kWh/yr.**
 - **20% CF**

VESTAS
RRB PS-600
www.freebreeze.com

SPECIFICATIONS

GENERAL	ELECTRICAL
Hub Height	47 m
Number of Blades	3
Rated Power	600 kW
Rotor Speed	10-16 rpm
Rated Rotor Speed	12 rpm
Tip to Tip Rotor Span	154 m
Rated Rotor Speed	12 rpm
Power Regulation	pitch controlled
Wind Project	active power by pitch

POWER CURVE

free breeze
energy systems, LLC



Case Study – EW50 (65 kW)





- Project Cost: \$193,750 (- \$56,250 Energy Trust Incentive)
- Energy Rate: \$0.069/kWh (↑ 5% per year)
- Energy Production: 70,000 kWh/yr. (~11.5 mph average)
- Tax Rate: Federal = 34%; State = 9%
- O&M ~\$2,000/yr. years 6 – 20
- All tax credits; and "Bonus Depreciation" utilized

EW50 Tax and Energy Savings and Expenses							
Year	1	2	3	4	5	6-10	11-20
Energy Savings	\$5,081	\$5,335	\$5,602	\$5,882	\$6,176	\$ 35,833	\$104,101
Federal/State Tax Savings	\$162,165	\$25,190	\$25,157	\$25,467	\$25,478	\$6,175	\$13,715
Insurance	(\$1,000)	(\$1,025)	(\$1,051)	(\$1,077)	(\$1,104)	\$5,947	\$14,341
O&M	-	-	-	-	-	\$ 11,452	\$29,563
Annual Net Benefits	\$162,544	\$29,981	\$30,213	\$29,992	\$30,256	\$25,271	\$90,095
Cumulative Net Benefits	\$162,544	\$192,525	\$222,783	\$252,730	\$288,405	\$313,988	\$398,353

Breakeven



Construction





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Lessons Learned



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Permitting

- Takes Time
 - 2 - 4 months (up to 2 years)
 - Educating local citizens and planners
- Takes Money
 - Paperwork, fees, meetings, hearings
 - Avian studies, habitat mitigation
- Unknowns
 - ODFW (avian and sensitive species)
 - Local zoning
 - "Inventing" the code

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Engineering and Design

- Interconnection
 - Familiarity with utilities (“talk the talk”)
 - Takes time (2- 12+ months)
 - Experienced engineering is valuable
- New equipment options
 - New manufacturers
 - Dynamic pricing and markets
- Unknowns
 - Local utility grid conditions
 - Geotechnical



Legal

- Ownership options available
 - Tax equity partnerships (“flips”)
 - Equipment lease
- Transaction costs add up
 - Interpreting rules
 - Drafting documents
- Unknowns
 - New laws and rules
 - Waiting game



Finance

- Incentives are very helpful
 - Energy Trust of OR (PacifiCorp & PGE)
 - Can you use federal and state tax credits?
- Many Stakeholders
- Complex accounting
 - Everything effects everything
- Capital can be constrained
 - Is your turbine “financeable”?
- Unknowns
 - Preliminary certification
 - Rules and financial markets change



Construction

- Manage Budgets
 - GC or subcontract?
 - Accurate quotes
 - Local when possible (equipment?)
- Legal
 - Licensed, bonded and insured
- Schedule
 - Deadlines (i.e. ITC and “Bonus” Depr.)
- Unknowns
 - Construction is the very last thing



Operations and Maintenance

- Warranty
 - 5 year preferred
- Remote Monitoring
 - Might be required for financing
- Experience
 - Training from manufacturer
 - Safety
- Unknowns
 - Turbine reliability/history important



The Future?





The Future?

On-site and Distributed Generation (>2MW)

- Becoming competitive (“grid parity”)

More equipment options

- Reduced costs?

Always unknowns (especially in politics)...

...but knowledge gaps are closing.

This we know...

...you’ve got to thread the needle.



On-site Power





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Distributed Generation



(simulation)

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Distributed Generation



(simulation)

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Thank you – Questions?

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