Preparing for Prime Time: What Small Wind Needs to Make Its Mark

by Paul Gipe
Small Wind--A Checkered Past

- Poor Performance
- Poor Reliability
- Costly
- Noisy
- Magnet for Hustlers & Charlatans
- Unsafe

Paul Gipe, wind-works.org
Better Performance

• 1/2 That of Large Turbines
  At Best
• Seldom Meet Projections
• Short Towers
  Big Problem

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Higher Reliability

- Cheap = Short Life
- Seldom Last Long Enough
- Many Remain Derelict For Years
H40 4-Year Life

- Blade Failure
- Yaw Failure
- Insulation Failure

Paul Gipe, wind-works.org
Less Costly

- SkyStream
- $18,000 Installed
- Yield: 375 kWh/m²/yr (6+ m/s)
- SPBT 12 years
- COE: $0.50/kWh

Paul Gipe, wind-works.org
Magnet for Hustlers & Charlatans

• Ease of Entry
• Preying on Ignorance
• Pyramid Schemes
• Drag Devices
• Ducted Devices
• Fantasy Wind
• Roof Top Wind

Magwind, Whitby Ontario

Paul Gipe, wind-works.org
Roof Top Mounting?

- Turbulence
- Poor Performance
  ~0 Net Energy!
  1.5 kW ~300-700 kWh/yr London
- Noise & Vibration
- Safety
- Simply a Bad Idea

Possibly Dublin, circa 1990s

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Roof Top Mounting?

• No, Don’t Do This!
Roof Top Mounting?

• Tied Off

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Roof Top Mounting

• Tied Off

Similar installation along main rail line near Bonn. AlGauier?
Roof Top Mounting?

• Tied Off

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Safer

3 Deaths <30 kW
in 30 Years

12 Deaths <100 kW
in 30 Years

Pat Acker, 28, Bushland, TX, 1982

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Small Wind Turbine
Tower Safety

• Tilt-up Towers
  for Micros & Minis
  Always Preferable

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Small Wind Turbine Tower Safety

- All Other Towers
  - Person Lifts
  - Fall Arrest Systems
  - Work Platforms
  - Anchors
  - Rotor Locking Pins
  - Tower Training

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Small Wind Turbine Tower Safety

- Minimal or No Work on Tower
- No Fall-Arrest System
- No Work Platform
- No Anchors
- No Training

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Canyon, Texas, 1979
Small Wind Turbine Fall Safety

- Work Platform
- Anchors
- Full Harness
- Lanyard

Folkecenter, Denmark, 1997

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Small Wind--What’s Needed

• Standards

• Testing
  with Published Results!

• Informed Consumers

• Facing Reality
  Small Wind’s Limits

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Chateau Lastours, France
Small Turbine Testing Standards

- AWEA Proposed 1979
- Adopted 1988
  . . . Sort of
- No Standard In Force
  . . . After 30 Years!
- Standards Imminent?

Pinson Cycloturbine, 1979

Paul Gipe, wind-works.org
Wulf Field Tehachapi, California

Turbines Tested

Paul Gipe, wind-works.org
Wulf Field Tehachapi, California
Test Results Published

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Air X Power Curve Measurements

400 W = 175 W (40%)
Air Breeze Power Curve
200 W = 160 W (75%)
Small Turbine Noise Measurements

- Meters Costly
- Somewhat Complex
- Difficult for Amateurs
Air 403 Noise Measurements

Air 403 Noise at Wulf Test Field

- y-axis: dBA (Leq)
- x-axis: Wind Speed (mph)
- Graph showing the relationship between noise level and wind speed
Calculated Emission Source Strength
Selected Small Wind Turbines

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NREL Noise Measurements

Excel S (7 m)
Informed Consumers

• Demand Better Products
  Less Susceptible to Hustlers & Charlatans
  Less Susceptible to Aggressive Marketing

• Know What They’re Buying

• Know What to Expect
  Published Test Results

• Know What is Being Delivered
  Metering a Must

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Facing Reality

- Many SWTs Not Ready for Prime Time
- Much Work Must be Done
- Performance Will Lag Large Turbines
- Micros & Minis Only for Battery Charging

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Small Turbines Must Become as Reliable and as Productive as Today’s Big Turbines

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