Applications
Interconnected Operation
Battery Charging
Lessons Learned

Paul Gipe, wind-works.org
Nomenclature

- Mid-80s HAWT
- Internal Ladder
- w/ Fall Restraint
- Work Platform
- Tip Brakes
- “Rocket” Tower

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Applications-Telecom

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Applications—Off-the-Grid

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Applications--Homes
Electric Vehicle Charging

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Electric Vehicle Charging
Applications--Farms
Small Groups or Clusters
Applications--Wind Power Plants

Paul Gipe & Assoc.
2 MW, Middelgrunden, Denmark
Interconnected Wind Turbines

- 110,000 units worldwide--160 TWh/yr
- 750 TWh cumulative generation
- 8,500 million operating hours
- 75% induction (asynchronous) generators
- 25% AC-DC-AC with inverters
Single Turbine Interconnection
Arrays
Wind Plant Arrays
Rectilinear
Typical California Spacing

3 RD

6 RD

Paul Gipe & Assoc.
Wind Plant Arrays--Rectilinear

160-250 kW: Mojave, California

Paul Gipe, wind-works.org
750 kW: Lake Benton, Minnesota
Wind Plant Arrays
Linear

Dikes, Breakwaters, Canals

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Wind Plant Arrays
Linear

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1 MW: White Deer, Texas
Wind Plant Arrays
Ridgetops

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Wind Plant Arrays
Ridgetops

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Zond Windwall, Tehachapi, CA
Tehachapi Pass, California
Wind Plant Arrays
Clusters

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Cluster
Marlec 910
Lessons
From 30+ Years of Experience

• No Panaceas
• No Cheap Solutions
• No Breakthroughs--No Miracles
• Numbers Matter
• Experience Matters
• Size Matters

Paul Gipe, wind-works.org
Lessons

• Always Check the Numbers
  Vortec: The Numbers Didn’t Add Up

• Always Check the References
  Vortec: References Discredited in the USA

• Always Google
  Vortec: Ducted Turbine Critics on the Web

• Always Go to the Library
  . . . Or to Your Neighborhood Bookstore!
  Lots of Wind Books Now Available

Paul Gipe, wind-works.org
Lessons

• Always Be Wary of “New” Designs
Scams, Frauds, & Flakes
Tell-Tale Signs

- Hype High--Experience Low
- New Design-- “Not Like Those Others”
- “New” Patents
- “Works @ 2 m/s!”
- Drag Devices (Squirrels in a Cage)
- Ducted Turbines!
- Pyramid Schemes
  “Get in on the Ground Floor Now”
- Fancy Web Sites
  Cheaper than Hardware

Paul Gipe, wind-works.org