Local Possibilities?

Paul Gipe, wind-works.org
Diablo Canyon?
LCOE Large Distributed Turbines

2016 DOE Distributed Wind Report

Paul Gipe, wind-works.org
LCOE Small Distributed Turbines

2016 DOE Distributed Wind Report

Paul Gipe, wind-works.org

Endurance
Foundation Windpower

- MW-Scale Distributed Wind
- ~80 MW, Most in California
- State Prisons, Packing Plants, etc
- Leases
- Wind Resource Critical
United Wind

• Typically Small Turbines (<100 kW)
• Will Lease MW-Size Turbines
• Packages Groups of Turbines
• 60 pcs Eocycle 25 kW
• 3 pcs Northwind 100

Paul Gipe, wind-works.org
Northern Power Systems NPS 100

- 24-27 m Diameter; 100 kW
- Designed for Remote Locations
- Direct Drive—No Gearbox
- Tilt-Up Tower
- Ballasted Foundation
- $350,000 installed
- Several hundred Units Worldwide
- ~20 @ Schools, Colleges & Universities

Girvan, Scotland

Paul Gipe, wind-works.org
Northwind 100

- 24 m = 450 m²
- 27 m = 575 m²
- 27 m ~25% Larger
- 100 kW
- Qualifies for the 30% ITC
NPS 100 AEP 24 m & 27 m

24 m

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<thead>
<tr>
<th>Average annual wind speed (m/s)</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14.5</th>
<th>16</th>
<th>17</th>
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<tr>
<td>(mph)</td>
<td>5.0</td>
<td>5.5</td>
<td>6.0</td>
<td>6.5</td>
<td>7</td>
<td>7.5</td>
</tr>
<tr>
<td>Annual energy output (MWh/yr)</td>
<td>196</td>
<td>240</td>
<td>284</td>
<td>325</td>
<td>364</td>
<td>399</td>
</tr>
</tbody>
</table>

• 27 m with Hub Extenders
• ~10% More AEP
• Class III Sites

Paul Gipe, wind-works.org
7 x NSP 100 San Nicolas Island

4,500 feet

Paul Gipe, wind-works.org
NPS 100 Appalachian State University

- Flagship of On-Campus RE
- $5/Student-Semester Fee
  Began 2004
  Ongoing
- Donor Matching Funds
- 2009 Installation
- ~100,000 kWh/yr @ 4.2 m/s Site
- Approaching 1 million kWh

Paul Gipe, wind-works.org
Large Wind ITC

- 18% Tax Credit (2018)
- 12% Tax Credit (2019)
- Must “start” in 2019

Definition of start has been Clarified

Paul Gipe, wind-works.org
Energy Investment Tax Credit (ITC)  
Small Wind

- 30% Federal Tax Credit
- Wind & Solar
- Can Include Storage
- Wind Turbines <100 kW
- Wind Turbines Must be Certified

Paul Gipe, wind-works.org
California Self-Generation Incentive

- 1-3 MW
  - <1 MW 100%, 2\textsuperscript{nd} MW 50%, 3\textsuperscript{rd} MW 25%
- $1,000/kW for Wind
  - 50% Up Front, 50% Based on Generation for First Five Years
- Cap: 3 MW; $5 million or 60% of Cost
  - Whichever is Less
- Cap: Wind <200% of Peak Demand
- 10% of Funds for RE
- 75% of Funds for Storage
- $166 million Annually

Paul Gipe, wind-works.org
California Net Metering

- <1 MW
- Offsets Consumption Annually
- Excess Generation = Spot Market Price (~$0.03/kWh), or
- Excess Generation Given to Utility
- Generator Keeps RECs ($0.015/kWh)

Paul Gipe, wind-works.org
California Net Metering

- $150 Net Metering Fee
- Generator Must Pay Systems Benefits Charge ($0.02-$0.03)/kWh
- Generator Must Go on Time-of-Use Rate
Bill Credit Transfer Program

• <5 MW & <than Annual Consumption
• Limited to Public Entities
  Universities, Cities, Towns, Special Districts
• Must be Owned, Operated by or on the Property of Public Entity
• ~30 MW of 100 MW Cap Remains
• Must be on Time-of-Use Meters

Paul Gipe, wind-works.org
Contacts

- **Foundation Windpower**
  Bob Lewis, (415) 515 3404

- **United Wind**
  Russel Tencer, (888) 313-3353

- **Northern Power Systems**
  Trevor Atkinson, (802) 461-2847

- **Eocycle**
  Paul Dawson, (514) 353-1551

- **Bergey Windpower**
  Mike Bergey, (405) 364-4212

- **Distributed Wind Energy Association**
  Jennifer Jenkins, (928) 380-6012

Paul Gipe, wind-works.org
Sources

• California Self-Generation Incentive (DSIRE)
  http://programs.dsireusa.org/system/program/detail/552

• Self-Generation Incentive (PG&E)

• Net Metering (DSIRE)
  http://programs.dsireusa.org/system/program/detail/276

• Net Metering and your bill (PG&E)

Paul Gipe, wind-works.org
Where We’re Headed Longer Term?

• New Turbines
• New Policies
  Yes, Even Feed-in Tariffs
• New Thinking
  Cheap Energy at All Costs is Not a Solution
  . . . It’s Part of the Problem

2000, Vergnet, Chateau las Tours, France

Paul Gipe, wind-works.org
Profound Issues Confront North America’s Energy Future

• Climate Change Only One Issue
• Transportation (Liquid) Fuels
  Near Total Dependency
  Very Little Public Transit

Pincher Creek, Alberta: Shell Gas Plant

Paul Gipe, wind-works.org
North American Renewable Energy Market Growth

- Exciting, Yes
- Significant, Yes
- Not Nearly Enough by Any Standard

Paul Gipe, wind-works.org

Buffalo Ridge, Minnesota
North Americans Have Been Dabbling Around the Edges of Renewable Energy Policy

Little Recognition of the Crisis Facing the Continent

Paul Gipe, wind-works.org
Planetary Emergency Demands
All Hands On Deck

• The Current Denialism Will Die
  . . . Eventually

Paul Gipe, wind-works.org 2012, Renfrewshire, Scotland
“Nothing is as powerful as an idea whose time has come.”
-- Victor Hugo*

*"Il n'est rien au monde d'aussi puissant qu'une idée dont l'heure est venue." Victor Hugo
North America Needs Massive Reconstruction of Its Infrastructure

Renewable Energy Development Can Reindustrialize the North American Economy

Paul Gipe, wind-works.org

Noordoostpolder, The Netherlands
"Americans can always be counted on to do the right thing . . . after they have exhausted all other possibilities."

--Winston Churchill
Time for North Americans to Take the Road to the Future

Freiburg, Germany

Paul Gipe, wind-works.org
No Time for Half-Measures

No Time to Lose

Paul Gipe, wind-works.org
We Need A Lot More Wind . . .

Paul Gipe, wind-works.org

Matane, Quebec
A Lot More Geothermal

Paul Gipe, wind-works.org
Geothermal: Colline Metallifere, Italy
A Lot More Solar

Paul Gipe, wind-works.org

Hinesburg, Vermont
More Renewable Energy

a Technology for Life*

*from N.F.S. Grundtvig, Danish Theologian

Paul Gipe, wind-works.org
A Challenge Worthy of Great Nations

Paul Gipe, wind-works.org

Vestas V110, Denmark
Renewables . . .

When You Look Closely . . .

. . . Worth Every Cent

Paul Gipe, wind-works.org
The Revolution Has Begun

Adam Twine, Westmill Wind Cooperative, Oxfordshire, England
Paul Gipe, wind-works.org