Disclaimer: The views expressed are those of Paul Gipe and are not necessarily those of the sponsor.

Disclosure: Paul Gipe has worked with ANZSES, APROMA, ASES, AusWEA, AWEA, BWEA, BWE, CanWEA, DGW, EECA, ES&T, GEO, IREQ, KWEA, MADE, NASA, NREL, NZWEA, OSEA, USDOE, Aerovironment, the Folkecenter, the Izaak Walton League, Microsoft, ManSEA, ORWWG, OSEA, PG&E, the Minnesota Project, NRG Systems, SeaWest, SEI/REIO, the Sierra Club, WAWWG, and Zond Systems, and written for magazines in the USA, Canada, France, Denmark, and Germany.
World Wind Energy Development & Advanced Renewable Tariffs
Our Electricity Future

Regaining Control by Cutting Demand and Increasing Renewable Energy

Not Quick, Not Cheap, Not Easy But Worth Every Cent
Outline

• Cutting Demand
  The California Experience

• Increasing Renewable Energy
  Growth of Wind Energy Worldwide
  Community Wind
  Advanced Renewable Tariffs
  How Farmers Could Benefit
  Increasing Acceptance
Coping with the Power Crisis
By Cutting Demand

• Conservation
  Using Less

• Improved Efficiency
  Doing More with Less*

• Renewable Energy
  Investing in the Future

*Buckminster Fuller
Living Better on Less

- 10 Million California Households
- 2 x 100 W Bulbs
- 2 x 25 W CF
- 150 W Savings x 10 Million
- \(= 1,500 \text{ MW Savings!}\)
Many More Opportunities

- Task Lighting
- Notebooks = 90% Savings!
The Result in the Nies-Gipe Household

- **2001**
- **2002**
- **5 yr Avg**

KWh/month

Month

Jan
Feb
March
April
May
June
July
Aug
Sept
Oct
Nov
Dec
The Result in California?

- 8-10% Savings
- We Coped with Crisis
- The Lights Stayed On
- Most Savings Permanent
- Homeowners Cut Bills 20%
Overview of Worldwide Wind Development
Wind Energy Has Come of Age
Montefalcone, Italy
Galicia, Spain
Why Wind?

- Reduces Use of Nuclear & Fossil Fuels
- Most Cost-Effective of New Renewables
- Relatively Benign
Wind Energy’s Benefits

- Clean & Green (Mostly)
  No SO\textsubscript{x}, NO\textsubscript{x}, or CO\textsubscript{2}
- Renewable
  Net Positive Energy Balance (4-6 months)
- Domestic: Not Subject to Embargo
- Does Not Consume Water
- Modular = Flexible
Wind Energy’s Impacts

- Aesthetics or Intrusiveness
- Erosion & Scarring from Roads Length, Width, Number and Slope
- Shadow Flicker & Disco Effect
- Climate?
- Noise--They are Audible
- Wildlife
  - Habitat Disruption
  - Bird Kills: Collisions, Electrocutions
Birds & Bats

- Serious Problem
  Tarifa?
  Altamont Pass (150-300 Raptors/yr)
- A Concern Elsewhere
  Before & After Studies of Big Projects
  Studies for Small Projects?
- No Quick Fixes--No Panaceas
  Stripes & Whistles Don’t Work

Paul Gipe & Assoc.
Why Now?

- **Wind Works**
  Greater Reliability

- **Productivity Improved**
  More Efficient
  Taller Towers

- **Costs Declined**
  Economies-of-Scale

![Graph showing sales price and yield over years](chart.png)
We Know What Works

Eole, Cap Chat

Adecon, Pincher Creek
12.5 m, 40 kW

27 m, 225 kW
Wind is Flexible

- **Scale**
  - Big or Small Projects

- **Location**
  - Near or Far

- **Time**
  - Short Lead Times

- **Ownership**
  - Local or Absentee
Wind is Modular

- Quickly Installed
- When Needed
- As Needed
- Where Needed
- By Anyone
World Wind Generating Capacity

Thousand MW

Year

0
10
20
30
40
50

Other
Asia
Europe
North America
Wind Energy is a Real Business
US$19 Billion in 2004

- Electricity Sales: 39%
- Project Development: 57%
- O&M: 4%
2004 World Wind Capacity

7,200 MW  34,700 MW

4,100 MW
Wind Growing Rapidly

- **Germany**
  - 2,100 MW in 2004
  - 20,000 MW by 2006
  - 30,000 MW by 2012

- **Spain**
  - 2,000 MW in 2004

- **France**
  - 14,000 MW Filed

- **USA:** 500-2,000 MW/yr

- **Growth:** 20%-40%/yr
## High Penetration is Possible

<table>
<thead>
<tr>
<th>Country</th>
<th>Percent Wind</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Netherlands</td>
<td>2%</td>
</tr>
<tr>
<td>Spain</td>
<td>6.5%</td>
</tr>
<tr>
<td>Germany</td>
<td>5.3%</td>
</tr>
<tr>
<td>Germany 2012</td>
<td>10%</td>
</tr>
<tr>
<td>Denmark</td>
<td>20%</td>
</tr>
<tr>
<td>Germany 2025</td>
<td>25%</td>
</tr>
</tbody>
</table>
## Wind Works

**Jobs in the Wind Industry**

<table>
<thead>
<tr>
<th>Europe</th>
<th>Direct</th>
<th>Indirect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>7,500</td>
<td>37,500</td>
<td>45,000</td>
</tr>
<tr>
<td>Denmark</td>
<td>8,600</td>
<td>4,300</td>
<td>13,000</td>
</tr>
<tr>
<td>Spain</td>
<td>7,000</td>
<td>15,000</td>
<td>22,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>80,000</strong></td>
</tr>
</tbody>
</table>
North American Wind Capacity
2004 Installed Wind Capacity
Where Pennsylvania Stands

Germany
Spain
USA
Denmark
California
Texas
Pennsylvania

Megawatts (Thousands)
Era of Distributed Generation

- Here Now
- Resilient, Not Brittle
- Short Lead Times
- Near Load, Less Losses
- Opportunity for Many
- Fosters Energy Awareness

Alberta, Canada

Ontario, Canada
Local Wind Adds Resiliency to High Voltage System*

- Near Load
  Boosts HV System
- Small Projects
  Can be Sized to Load
- Less Losses
- Outages Small
  Easily Corrected

Distributed Wind Energy

Alberta, Canada

Montana, USA
Distributed Wind Energy

Hohe Westerwald, Germany
Distributed Wind Energy

Thy, Denmark
Distributed Wind Energy

Ostfriesland, Germany
Why the European Success?

- #1 Public Involvement
  Germany & Denmark

- #2 Advanced Renewable Tariffs
  16 EU Countries use Electricity Feed Laws
Community Wind--The Third Way
Wind Energy As If People Matter

1. Large Wind Power Plants
2. Small Wind Turbines
3. Locally-Owned Commercial Turbines

Wind Coop Meeting, Copenhagen, Denmark
What is Community Power?

• Local
  Rooted in and Responsible to the Community
• Locally Owned
  Cooperative, First Nation, Farmer-Owned
• Commercial-Scale Generation
• Small Projects Making a Big Difference
Why Community Power?

- More Acceptance
- More Power More Quickly
- More People Involved Locally
- More Money Locally
- More Jobs Locally
Increasing Acceptance #1

“Your Own Pigs Don’t Stink”

Jutland, Denmark
Why Community Wind?

• Participation = Greater Acceptance
• Distributed = Greater Resiliency
• Clean & Green (Mostly)
• Human Scale
• Enables Local Ownership
• New Cash Crop For Farmers
Danish Co-ops
(Vindmølleaug or Fællesmølle)

- 1/4 Capacity Nationwide
- ~ $1.5 Billion
- 100,000 Households Own Shares
- 5% of Population

Velling Mærsk-Tændpibe
German Co-ops
(Bürgerbeteiligung)

- 1/3 Total Capacity
- ~$5 Billion
- 300,000 Own Shares
- 2/3 Schleswig-Holstein
- 4/5 Nordfriesland Amt

Hooksiel, Schleswig-Holstein, Germany
Sydthy Kabelaug, Denmark

- 16 km of Buried Cable
- Direct to HV Network
- 26 x V27s (225 kW)
- ~1 Million kWh/unit
- Mostly Pig Farmers
Middelgrunden Co-op København

- 20 x 2 MW Off-shore
- 1/2 Owned by Co-op
- 1/2 Owned by Utility
- 8,500 Investors
- ~$1,000 per Share
- Visible from Folketing
Paderborn Co-op Germany

- 4 Wind Plants
- 17 Companies
- 80 x 1.5 MW
- 110 MW
- $200 Million
- 780 ha (2,000 ac)
- All Companies Local
- All Pay Local Taxes

Enercon E66
Wieringemeer Noord Holland

- 5 x 600 kW
- Co-owned
  1/2 by Two Farmers
  1/4 by Manufacturer
  1/4 by Utility
Toronto WindShare

- First Urban Turbine in N.A.
- Co-Owned
  WindShare Co-op
  Toronto Hydro
- Prominent Location
- Highly Visible
- Highly Popular
So How Do We Get There?

How Do We Develop Community Power?
Goals?

• **Need Ambitious Targets**
  Bold Vision Enlists Public Support
  Germany--50%

• **Aiming Too Low**
  Never the Road to Success

• **Bold Measures**
  Cut Consumption Dramatically (1/3)
  **Implement Advanced Renewable Tariffs**
  New Deal for Pennsylvania Farmers
Pennsylvania is a New Market

- Offers Great Promise
- Potentially Large Market
- Lure to Manufacturers
  Gamesa
- New Markets Grow Fast
  When Conditions are Right
Growth Quickens in New Markets

- “Take-Off” is Shorter
- Benefit from Experience
- Better Turbines
- Bigger Turbines

27 m, 225 kW

80 m, 1.8 MW
Elements of Success in Europe

- Right Price for Fixed Period
- Right of Interconnection
- By-Right Permitted Rural Use

Graph showing Thousand MW Total for Spain and Germany with a noted Renewable Tariffs Launched in 2004.
What Has Worked in Europe

• What Works
  Advanced Renewable Tariffs (ARTs)
  Also Known as Standard Offer Contracts

• Proof is in the Market
  ARTs Markets = Many Players
  Quota Markets = Few Players
  RFP Markets = No Manufacturers
Advanced Renewable Tariffs

- Creates Dynamic Markets
- Ensures Price Stability
- Encourages Manufacturing
- Offers Opportunity to Many Players
  - Farmers (New Cash Crop)
  - Communities
  - Co-ops
  - Wind Companies
Advanced Renewable Tariffs

• What Are They?
  Political Price, Not Political Quota
  Simple Contracts

• How Do They Work?
  Simple & Comprehensible
  Little or No Administration

• Where?
## Renewable Energy Tariffs

<table>
<thead>
<tr>
<th>Existing</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>Turkey (Wind)</td>
</tr>
<tr>
<td>Spain</td>
<td>Czech Republic</td>
</tr>
<tr>
<td>France</td>
<td>India</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>California SB1 (PV)</td>
</tr>
<tr>
<td>Portugal</td>
<td>Italy (PV)</td>
</tr>
<tr>
<td>Austria</td>
<td>PEI, Canada?</td>
</tr>
<tr>
<td>Brazil</td>
<td>Ontario</td>
</tr>
<tr>
<td>Greece</td>
<td>Minnesota C-BED</td>
</tr>
<tr>
<td>China (March 05)</td>
<td>Washington State</td>
</tr>
<tr>
<td>Ireland (April 05)</td>
<td></td>
</tr>
</tbody>
</table>
Advanced Renewable Tariffs
Endorsements

• Ontario Ruling Party
• National Farmers Union
  Ontario
  Canada
• Great Lakes United (NGO)

Ferndale, Ontario
Political Price-Political Amount Markets

- Feed Law, Germany
- Feed Law, Spain
- Quota-RFP, Britain
- Quota-RPS, Italy

Thousand Workers

Wind Capacity
Jobs

OSEA
Renewable Tariffs & Solar Photovoltaics in Germany

Renewable Tariffs Launched

MW Total

Year

Year

Renewable Tariffs Launched

OSEA
Renewable Tariffs & Solar Photovoltaics in Germany

• 2004
  20,000 New Systems
  100% Growth
  US$2.5 Billion Private Investment
  Total of 110,000 Systems
  Total of 700 MW

• Costs Dropped 25% Since 1999
• Second Only to Japan
Germany’s Renewable Tariffs
The Results

- Renewables from EEG 9% of Supply
- Renewables Generating 40 TWh/yr
- 45,000 Employed in Wind Industry
- 15,000 Employed in PV Industry
- 135,000 Employed in Renewables
- 110,000 Jobs in Wind by 2010
Germany’s Renewable Tariffs
The Results

- 110,000 PV Installations
- 2,000 Biomass Plants
- 6,000 Hydro Plants
- 16,500 Wind Turbines
- Total of 135,000 Generators!

DeWind
External Costs of Generation

EU financed international study: ExternE
Community Wind is About People
How Wind Can Benefit Farmers

• Royalties
  Lowest Risk
  Developer Bears Risk
  Lowest Rewards
  % of Gross Revenue

• Ownership
  Risk Born Directly
  Wind Risk
  Technology Risk
  Political Risk
  All Profit Owned by Farmer
## Royalties & Land Rents

<table>
<thead>
<tr>
<th>Location</th>
<th>1-10</th>
<th>10-20</th>
<th>20-30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cielo Wind Power, NM</td>
<td>6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>German Average</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indian Mesa, TX</td>
<td>4%</td>
<td>6%</td>
<td>8%</td>
</tr>
<tr>
<td>Woodward Mesa, TX</td>
<td>4%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>US BLM, CA</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freiburg, Germany</td>
<td>3.8%</td>
<td>5.4%</td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>2.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td>2-2.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Potential per Farm

• 1MW Turbine, 60 m Ø, 80 m Tower
• $1 million Installed
• 1.5-2.0 million kWh/Year
• $150,000/Year Net @ $0.10/kWh
• Simple Payback: 10 Years
• Second 10 Years: $1.5 million
Increasing Acceptance #2

- Minimize Wind’s Footprint
  - Physical--Roads, Foundations, Buildings
  - Environmental & Visual
- Seek Harmony
  - with Neighbors & the Environment
- Wind as a part of the Landscape
- Not a Wind Landscape
  - as in California
Public Opinion Surveys

- “Beauty is in the Eye of the Beholder”
  True, But Most People Agree on “Beauty”
- Broad Support ~ 70%-90%
  On Both Sides of the Atlantic
- In the Abstract!
  Benefits Global
  Impacts Local
Avoid Garish Patterns
No Billboards
No Logo!

Or Subtle Logo Only
In Sum . . . Be a Good Neighbor
Wind Energy is Compatible
With Most Existing Land Uses
... With Rural Residential

Yorkshire, England
. . . With Commercial Uses

Lauwersoog, the Netherlands

Westerwald, Germany
KaiserWilhelmkoog, Germany

. . . With Row Crops

Minnesota, USA
With Grazing
... With Tourism
... With Schools

Forest City, Iowa
...With Some Parks

Depending Upon the Level of Protection

Wellington (Brooklyn), NZ
With Outdoor Recreation
With Cycling

Royd Moor, England

Westerwald, Germany
... With Religious Sites

Montefalcone, Italy

White Deer, Texas
. . . With Walking & Jogging

Dunkerque, France
... With Long Distance Trails

Paul Gipe & Assoc.  Col de la Teixeta, Catalonia (ES)
. . . With Hiking
Wind Turbines

. . . Sell Beer, Bier, Birra, Cerveza

Wie das Land, so das Jever.

Jever, D

Thyolmer, DK
Sell Music CDs

Petra’s “Unseen Power” (Christian Rock)

Paul Gipe & Assoc.
Promote Community

Wellington, NZ
. . . Pave the Sidewalk
And the Way to the Future

Wellington (Brooklyn), NZ
Renewables:

When You Look Closely . . .

. . . Worth Every Cent
Community Renewable Energy
For Today and for Tomorrow
Technology for Life*

*from N.F.S. Grundtvig
Renewables Work!

www.ontario-sea.org