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

Disclosure: Paul Gipe has worked with Aerovironment, ANZSES, APROMA, ASES, AusWEA, AWEA, BWEA, BWE, CanWEA, CAW, CEERT, DGW, DSF, EECA, ES&T, GEO, GPI Atlantic, IREQ, KWEA, MADE, Microsoft, ManSEA, MSU, NRCan, NRG Systems, NASA, NREL, NZWEA, ORWWG, OSEA, PG&E, SeaWest, SEI, TREC, USDOE, WAWWG, WE Energies, the Folkecenter, the Izaak Walton League, the Minnesota Project, the Sierra Club, and Zond Systems, and written for magazines in the USA, Canada, France, Denmark, and Germany.
Advanced Renewable Tariffs
New Policy Option for North America
by
Paul Gipe
Renewable Energy Has Come of Age

Paul Gipe, wind-works.org
2008 World Wind Capacity

Megawatts (Thousands)

- Europe
- North America
- Asia

Year

Paul Gipe, wind-works.org
2008 World Wind Capacity

28,000 MW 67,000 MW

26,000 MW

Paul Gipe, wind-works.org
We Know What Works . . . and What Doesn’t

© Vortec

Paul Gipe, wind-works.org
Why Now?

- **Wind Works**
  - Greater Reliability

- **Productivity Improved**
  - More Efficient
  - Taller Towers

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

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

- Climate Change Not Only Issue
- Transportation (Liquid) Fuels
  Very Little Public Transit
- Domestic Supplies Declining
Profound Issues Confront North America’s Energy Future

• Natural Gas Production
  Has Peaked
  Critical for Heating

• Gore Upped the Ante (100%)
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
North American RE Market Growth

• Exciting, Yes
• Significant, Yes
• Not Nearly Enough by Any Standard
US Electricity Generation
~4,000 TWh/yr

- Nuclear: 801 TWh/yr
- Hydro: 289 TWh/yr
- Other: 81 TWh/yr
- Fossil-Fired: 2850 TWh/yr
Scale Needed: North America

- ~2,500,000 MW
- ~120x Today!

Paul Gipe, wind-works.org
Ponnequin, Colorado
Swept Area per Household

Wind Turbine Area (m²)/Household (~6.4 m/s)

- Texas
- Ontario
- California
- Germany

Paul Gipe, wind-works.org
2008 US Major Wind Markets

Texas
Iowa
California
Minnesota
Washington

Total MW Thousands

Paul Gipe, wind-works.org
2008 Canadian Major Wind Markets

Paul Gipe, wind-works.org
US-Canada Wind Market Comparison

MW/Year (Thousands)

Canada
USA

Year

Paul Gipe, wind-works.org
Wind Penetration in the USA

- Minnesota
- Iowa
- Colorado
- North Dakota
- New Mexico
- California

% Wind Penetration of Electricity
Why the European Success?

#1 Community Involvement
Germany & Denmark

#2 Advanced Renewable Tariffs
18 EU Countries use Electricity Feed Laws

Paul Gipe, wind-works.org
Public Acceptance Critical

• Acceptance Necessary
  For Continued Political Support

• As Renewables Grow
  Entrenched Players Threatened

• Organized Opposition Grows
  Coal & Nuclear Industry

Paul Gipe, wind-works.org
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

WindShare Meeting,
Toronto, Canada

Paul Gipe, wind-works.org
Increasing Acceptance #1

“Your Own Pigs Don’t Stink”

Paul Gipe, wind-works.org

Jutland, Denmark
Building Acceptance

• Must Share Opportunity
• Public Must Participate
• For Renewables To Reach Their Potential
What is Community Power?

- **Local**
  Responsible to the Community
- **Locally Owned**
  Cooperatives, First Nations, Farmers, Homeowners
- **Commercial-Scale Generation**
Community Power

- Greater Acceptance
- More Power More Quickly
- More People Involved Locally
- More Money Locally
- More Jobs Locally

Paul Gipe, wind-works.org
Danish Co-ops
(Vindmøllelaug or Fællesmølle)

- 1/4 Capacity Nationwide
- ~ $1.7 Billion
- 100,000 Households Own Shares
- 5% of Population

Thyborøn-Harboøre Vindmøllelaug

Anton Bro

Paul Gipe, wind-works.org
Middelgrunden Co-op København

- 20 x 2 MW Off-shore
- 1/2 Owned by Co-op
- 1/2 Owned by Utility
- 8,500 Investors
- €570 per Share
- Visible from Christiansborg Palace

Paul Gipe, wind-works.org
## Co-Op & Farmer-Owned Wind

<table>
<thead>
<tr>
<th>Country</th>
<th>Farmer</th>
<th>Co-op</th>
<th>Corporate</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Netherlands</td>
<td>60%</td>
<td>5%</td>
<td>35%</td>
</tr>
<tr>
<td>Germany</td>
<td>10%</td>
<td>40%</td>
<td>50%</td>
</tr>
<tr>
<td>Denmark</td>
<td>64%</td>
<td>24%</td>
<td>12%</td>
</tr>
<tr>
<td>Great Britain</td>
<td>1%</td>
<td>1%</td>
<td>98%</td>
</tr>
<tr>
<td>Spain</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Dave Toke, University of Birmingham, 2005, 2008

Paul Gipe, wind-works.org
Community Wind--The Third Way

Is North America Being Left Behind?

• No
  Time to Get It Right
• It’s Not Easy Here
  Frustrating? Yes!
• Only the Beginning
  Minnesota
  Ontario

Paul Gipe, wind-works.org

Chateau de Lastours, France
Distributed Wind Energy in North America

- Niche Market?
- Major Potential?
- Upper Midwest
  Minnesota & Iowa
- Southern Plains
  Texas--Yes, Texas!
- Canada
  Ontario--Slow Start
- John Deere

Paul Gipe, wind-works.org
Community Wind is About People and Opportunity

Paul Gipe, wind-works.org
What Do Farmers Need?

- Higher Tariffs
- Priority Connection
- Priority Purchase
- Simpler Permitting

German Farmers are “Privileged”

- Anglophone Val-Éo Model
- Stronger Distribution System

Ontario’s System Antiquated

Paul Gipe, wind-works.org
Potential per Farm

- 2MW Turbine, 80 m Ø, 80 m Tower
- ~$4 million Installed
- ~3.5 million kWh/Year (~6 m/s)
- ~$350,000/yr @ $0.10/kWh
- Simple Payback: 11 Years
- After Payback: ~$350,000/yr

Paul Gipe, wind-works.org

Skibsted Fjord, Denmark
# Minnesota Distributed Wind

<table>
<thead>
<tr>
<th>Category</th>
<th>MW</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Developer</td>
<td>104</td>
<td>12%</td>
</tr>
<tr>
<td>Farmer Owned</td>
<td>74</td>
<td>8%</td>
</tr>
<tr>
<td>Locally Owned</td>
<td>72</td>
<td>8%</td>
</tr>
<tr>
<td>Municipal Utility</td>
<td>19</td>
<td>2%</td>
</tr>
<tr>
<td>Rural Electric Cooperative</td>
<td>6</td>
<td>1%</td>
</tr>
<tr>
<td>College/University</td>
<td>5</td>
<td>1%</td>
</tr>
<tr>
<td>School</td>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>281</td>
<td><strong>31%</strong></td>
</tr>
</tbody>
</table>

Source: Windustry.org, March 2007

Paul Gipe, wind-works.org
## 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>Coastal Germany</td>
<td>5-8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interior Germany</td>
<td>3-5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cielo Wind Power, NM</td>
<td>6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cappeln Germany</td>
<td>4%</td>
<td>5.9%</td>
<td>5.7%</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>1.5-2.5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
Paderborn Co-op
Royalty Sharing Among Farmers

Landowners

Land & Lease Agreement

Land. Assoc.

Planning Agreement

Ltd. Co.

Wind Plants

WP 1

WP 2

WP 3

WP 4

Lease Agreement on Wind Plant Location
PEI Royalty Revenue Sharing

- 10% of Royalties
- 20% of Royalties
- 70% of Royalties
Community Wind in North America

- Minnesota C-BED
- Hull, MA
- WindShare, Toronto
- Elkhorn Wind (80 MW)
  33% of “Payments” in Nebraska
- Bear Mountain Wind (120 MW)
  British Columbia
  Small Equity Interest by Peace River Co-op

Paul Gipe, wind-works.org
Hull, Massachusetts

- 95% approval
- V47
- V80, 1.8 MW
- Future: 4 offshore turbines

Andrew Stern, Hullwind.org
Community Wind in the USA

- 300 MW 2006 (MN)
- 300 MW in Development
- Local Banks Syndicate Loans
- Democratizes Energy

Paul Gipe, wind-works.org
Montfort, Wisconsin
Minnesota’s Community-Based Energy Development (C-BED)

- 100 MW Signed Contracts
- 300 MW “On the Table”
- 900 Applications
- PUC Approves Each Contract
- No Capacity Limit
- Governor 800 MW C-Bed by 2010

Paul Gipe, wind-works.org
Minnesota’s Community-Based Energy Development (C-BED)

- Intended for Locally-Owned Wind
- Depends upon Aggressive Tax Design
- Depends upon High Wind Speeds
- Revenue Stream Very Low in Later Years

Paul Gipe, wind-works.org
WindShare
Toronto, Canada

- First Urban Turbine in N.A.
- Co-Owned
  WindShare Co-op
  450 Members
  Toronto Hydro
- Prominent Location
- Highly Visible
- Highly Popular

Paul Gipe, wind-works.org
WindShare
Toronto, Canada
Advanced Renewable Tariffs

• What Are They?
  Payment for Generation (Feed-in Tariffs)
  Political Price, Not Political Quota

• How Do They Work?
  Price Differentiation
  Paying for Solar, Paying for Wind

• Where?
  Germany, France,
  Spain . . .
  . . . 18 EU countries

Paul Gipe, wind-works.org
Differentiated Tariffs for Wind

- **Distributed Benefits**
  
  Only Accrue From Distributed Generation
  
  Differentiated Tariffs = Distributed Wind

- **Reduces Pressure on Windiest Sites**
  
  Profitability Still Higher at Windy Sites

- **Reduces NIMBYism**
  
  By Enabling Greater Participation

Paul Gipe, wind-works.org

San Gorgonio Pass, California
Differentiated Tariffs for Wind

• Increases Program Flexibility
  Lessens Pressure to Get Prices Right the First Time
• Reduces Development Risk
  Determining Final Price After 5 Years of Operation
• Spreads Opportunity to All
  Not Just to Elite Few
• Provides Fair Profits at Modest Wind Sites
• Limits "Excessive Profits" at Windy Sites
Market Mechanisms Status

• Renewable Tariffs Developing Momentum
Renewable Tariffs in North America . . Unthinkable?

• Yes--Just 4 years ago
• Today? No
• Now Possible
• Growing Trend
  in both USA & Canada

Paul Gipe, wind-works.org

Gaspé, Quebec
The Mood Has Changed

• Ontario Moved First

Paul Gipe, wind-works.org
Montfort, Wisconsin
Ontario’s Standard Offer Program
The Most Progressive Renewable Energy Policy in North America in Two Decades

Paul Gipe, wind-works.org
Why?

• All Renewables
  First in North America
• Open To All Players
  First in North America
• Differentiated Tariffs
  Two (Solar & Everything Else)
  First in North America
• Simplified Contracts

Paul Gipe, wind-works.org
Ontario’s Standard Offer Program

• <44kV, <10 MW
• Wind, Solar, Hydro, Biomass
• Inclusive--Open to All
• No Program Cap
Ontario’s Standard Offer Program

- Wind, Hydro, & Biomass: $0.11/kWh
- Solar PV: $0.42/kWh
- Inflation Adjustment: 20%
  Except for Solar PV (Punitive?)
- 20-Year Contracts
The “Ontario Model”

• Adapted European Models to Ontario
  Examined German, French, Spanish Systems
• Focused on Wind & Solar
  Hydro & Biomass Placeholders
• OSEA Criteria
  Enabling Community Ownership
  (Farmers, Homeowners, First Nations, Small Businesses)
• Adapted French Wind Tariffs

Paul Gipe, wind-works.org
Why German & French System?

• Enables Community Participation
  More People Can Benefit

• Broader Geographic Distribution
  More People Can Benefit

Paul Gipe, wind-works.org
French Wind Tariffs
Resource Productivity Method

• Fair Profits at Medium Wind Sites
• Not “Undue” Profits at Windy Sites
• Price Adjusted for Inflation 60%
• Profitability Index Method (Chabot)
Ontario “Gets It”

First Modern System of Advanced Renewable Tariffs in North America

Paul Gipe, wind-works.org
Ontario’s Green Energy & Green Economy Act

• Multi-faceted (Affects 5 Acts)
• Efficiency & Conservation
• Renewable Energy
  Consistent Enforcement of Siting Guidelines
  Procure Through Feed-in Tariffs
• Hearings Underway Soon
• Passage Expected in Late May

Paul Gipe, wind-works.org
Ontario’s Green Energy Act

• Changes Public Policy on Electricity
  Includes Industrial & Environmental Policy

• Gives Renewables Priority
  In Utility Procurement & System Design

• Targets Industrial Development

• Targets Job Creation
  Goal: 50,000 Jobs in 3 Years
  Nano Solar “Interested”
  Everbrite 1/2 Billion Plant: 1,200 jobs

Paul Gipe, wind-works.org
Ontario Power Authority’s Proposed Feed-in Tariffs

- Differentiated by Size & Technology
- Differentiated by Application
- Tariffs Based on Cost of Generation
  Plus Reasonable Profit
- No Program Cap (Bring It On!)
- No Project Size Cap
  Exception: Groundmounted Solar PV < 10 MW

Paul Gipe, wind-works.org
Ontario Power Authority’s Proposed Feed-in Tariffs

• Stakeholder Engagement Underway

• Detailed Rules Proposed
  Based on Experience with RESOP

• Addition of Renewables
  Determines Grid Upgrades & Expansion

• Rules in Place ~June 2009

Paul Gipe, wind-works.org
Ontario Solar PV Tariffs 2009

- Rooftop <10 kW:
  - CAD/kWh: 0.802
  - USD/kWh: 0.623
- Rooftop <100 kW:
  - CAD/kWh: 0.713
  - USD/kWh: 0.554
- Rooftop <500 kW:
  - CAD/kWh: 0.635
  - USD/kWh: 0.494
- Rooftop >500 kW:
  - CAD/kWh: 0.539
  - USD/kWh: 0.419
- Groundmounted <10 MW:
  - CAD/kWh: 0.443
  - USD/kWh: 0.344

Paul Gipe, wind-works.org
## ARTs Feature Comparison

<table>
<thead>
<tr>
<th>Feature</th>
<th>Germany</th>
<th>France</th>
<th>Spain</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTs</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cost-Based Tariffs</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Program Limits</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Term</td>
<td>20</td>
<td>15-20</td>
<td>25+</td>
</tr>
<tr>
<td>Inflation</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Solar Tiers</td>
<td>5</td>
<td>5</td>
<td>3</td>
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<tr>
<td>Wind Offshore</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Wind Tiered Tariffs</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Wind Tiers</td>
<td>Continuous</td>
<td>Continuous</td>
<td>n/a</td>
</tr>
<tr>
<td>Community Power</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
Grassroots Movement Has Begun

- Explosion of Interest
- Groups Active Across Canada
- Local Groups Now Active Across US
  Most Within the Past 12 Months!
- Public Out in Front
  Demands Aggressive Action
- Tipping Point Reached?

Paul Gipe, wind-works.org
“Change” in the Air?

• Obama Elected
  Was Once Unthinkable
• CEC Recommends Feed-in Tariffs
  California May Move Quickly in 2009
• California Cities Now Considering
  Palm Desert, ... Los Angeles?
• Gainesville, Florida Municipal Utility
  First True Solar PV Tariff in USA (March)

Paul Gipe, wind-works.org
Renewable Tariffs Are In Play

- New Brunswick
- Michigan, Illinois, Indiana!
- Minnesota & Maine
- Florida!
- California--Feed-in Fever
Michigan’s Renewable Energy Sources Act

- Reduce Price Volatility
- Reduce Long-Term Prices
  Pay Little More Now
  Avoid Paying More Later
- Reduce CO₂ Gases
- Create New Jobs

Paul Gipe, wind-works.org
Challenges in North America

• Piecemeal Policy Approach
  Too Slow
  Existing Policy Momentum
  RPS for Wind, Subsidies for Solar

• “Cheap Energy Contract”
  Cheaper Today
  --More Expensive Tomorrow
Barriers to Renewable Tariffs in North America

- **Philosophical: Cost vs Value**
  Cost of Generation Plus Fair Profit
- **Sticker Shock**
  Imbedded Costs of Heritage (Old) Resources
  Natural Gas: Future Cost?
  Nuclear: Cost Estimates & Reality
- **Unfamiliarity**
- **Tax Subsidies Distort Market in USA**
  Complicate Program Design

Paul Gipe, wind-works.org
Strategy--Operating in Parallel

- Run Alongside Existing Programs
  With RPS & Solar Subsidies (ITC)
- Don’t Disrupt Existing Markets
  We Need All RE As Quick As Possible
- Build Track Record
- Use Renewable Tariffs
  for Meeting RPS Targets

Paul Gipe, wind-works.org
Strategy--Hybrids

• Domestic Content Requirement?
  Washington State

• Distributed Generation Only?
  Voltage Caps?

• Project Size Caps?
  20 MW (California)-50 MW (Spain)

• Community Ownership
  Minnesota, New Brunswick

Paul Gipe, wind-works.org  Bowling Green, Ohio
Move From
A Culture of Consumption
to
A Culture of Conservation

--Ontario Premier Dalton McGuinty

Paul Gipe, wind-works.org

Montfort, Wisconsin
Feed-in Tariffs

“Turn farms, homes, and businesses into entrepreneurs”

--Terry Tamminen, Former Chief Policy Advisor to Governor Arnold Schwarzenegger

Paul Gipe, wind-works.org

Goderich, Ontario
Move From
A Nation of Consumers
to
A Nation of Producers

Paul Gipe, wind-works.org
Lackawanna, New York
“Nothing is as powerful as an idea whose time has come.”
-- Victor Hugo

*Loose translation of “On résiste à l'invasion des armées; on ne résiste pas à l'invasion des idées.

Paul Gipe, wind-works.org
California Lt. Governor Garamendi

“We know what works. Seems to me we use what works.”*

Geothermal Plant, Mammoth Hot Springs, California
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 . . .
... And A Lot More Solar

Hinesburg, Vermont

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

Paul Gipe, wind-works.org

Vestas V110, Denmark
Renewable Tariffs--
New Policy Option
for North America

www.wind-works.org

Manawatu Gorge, New Zealand