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

Noordoost polder, the Netherlands

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

Megawatts (Thousands)

Year

Europe
North America
Asia

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

28,000 MW

67,000 MW

26,000 MW

Paul Gipe, wind-works.org
### High Penetration is Possible

<table>
<thead>
<tr>
<th>Country</th>
<th>Percent Wind</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>1.5%</td>
</tr>
<tr>
<td>Germany</td>
<td>7%</td>
</tr>
<tr>
<td>Spain</td>
<td>11%</td>
</tr>
<tr>
<td>Denmark</td>
<td>23%</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
Freiburg -- Germany’s Solar City
World Solar PV Capacity 2008
~13,000 MW

Germany 41%
Spain 25%
Japan 17%
USA 9%
Rest of World 8%

Solar PV Growing Rapidly

- 6,000+ MW/yr
- $20+ Billion/yr
- Major Markets
  - Germany -- 1,500+ MW/yr
  - Spain -- 500+ MW/yr (2,600 MW in 2008)
  - Japan -- 250 MW/yr
  - USA -- 300 MW/yr
    - California -- 175 MW/yr

Paul Gipe, wind-works.org

Rancho Seco, California
Renewable Tariffs
The Philosophical Context

Paul Gipe, wind-works.org
Geothermal: Colline Metallifere, Italy
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
Complacency is Not a Policy

Inaction is Not an Option

Paul Gipe, wind-works.org
Do We Want Renewables?

- Peak Oil, Peak Gas
- Climate Catastrophe
  Europe, 2003: 52,000 Dead
- Public Support High
  at Level Not Seen in 20 Years
- Desire for New Jobs

Paul Gipe, wind-works.org
Pincher Creek, Alberta: Shell Gas Plant
If Yes, Then What Works Best?

• Who Gets to Build
  Elite Few or All Who Want?

• How To Pay For Them
  RECs/ROCs/Green Tags
  Subsidies (PTC, EcoEnergy)
  Advanced Renewable Tariffs
    --Feed-in Tariffs
If We Use a Market Model, Then

• You Get What You Pay For
• If You Want It You Must Pay For It
• Difference Between Cost & Price
  Margin Determines Rate of Growth
• “Cost of Generation” Tariffs Deliver
  More Generation More Quickly and More Jobs

Paul Gipe, wind-works.org
Goderich, Ontario
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
Höhe Westerwald, Germany

Advanced Renewable Tariffs
Setting the Stage

Paul Gipe, wind-works.org
**Aggressive Targets Require Aggressive Measures**

**German Renewable Energy Targets**

<table>
<thead>
<tr>
<th>Year</th>
<th>Electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>12.5%</td>
</tr>
<tr>
<td>2020</td>
<td>30%</td>
</tr>
<tr>
<td>2030</td>
<td>45%</td>
</tr>
<tr>
<td>2050</td>
<td>80%</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
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
  from Coal & Nuclear Industry

Paul Gipe, wind-works.org
Building Acceptance

• Must Share Opportunity
• Public Must Participate by Creating Equal Opportunity for All
• For Renewables To Reach Their Potential

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

“Your Own Pigs Don’t Stink”
# Co-Op & Farmer-Owned Wind

## Source:
- Dave Toke, University of Birmingham, 2005, 2008
- Paul Gipe, wind-works.org

<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
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
Myths to Dispel

• Renewables are Free or Cheap
  They Are Affordable & They Are Worth It
• Feed-in Tariffs Too Expensive
• Feed-in Tariffs Not Market Mechanism

Paul Gipe, wind-works.org

Husum, Germany
### Political Price-Political Quantity Market Mechanisms

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Law</td>
<td>Political</td>
<td>Market</td>
</tr>
<tr>
<td>Quota/RPS/Tendering</td>
<td>Market</td>
<td>Political</td>
</tr>
</tbody>
</table>

Both are Market Mechanisms

Paul Gipe, wind-works.org
Over Cost of French ARTs Declining

Cécile Bordier, Caisse des Dépôts, Dec. 2008

Overcosts, 2008: ~0 due to increase in electricity costs. Bernard Chabot, Nov. 2008.
Ernst & Young
Germany and Britain
Cost of Renewables (2006)

• Germany: 4x more energy generated
• Germany: @ 1/5 less relative cost of GB Renewable Obligation Certificates

Paul Gipe, wind-works.org
Renewable Tariffs & Solar Photovoltaics in Germany

Renewable Tariffs Launched

Year

Advanced Renewable Tariffs Launched

100,000 Rooftops

1,000-Rooftops (2,500 x 3kW)

MW Total (Thousands)

Paul Gipe, wind-works.org
Solar PV in Germany 2008

• 150,000 New Systems
• €6 Billion
• Total of 600,000 Systems
• ~1,500 MW in 2008!
• Total 5,000 MW
• ~2% Supply in Bavaria
• ~1% Supply in Germany

Paul Gipe, wind-works.org
German Homeowners

- ~800 MW on Home Rooftops/yr
- ~3,000 MW+ Total
- ~2.5 TWh/yr
- ~€2 Billion/yr Revenue
- Anyone with a Roof Can Do Solar in Germany!

Paul Gipe, wind-works.org
German Farms--Solar PV Crop

- ~700 MW on Barn Rooftops in 2008
- ~2,000 MW Total in 2008 (€9 Billion)
- ~2 TWh/yr (€1 Billion)
German Granny Flat
What’s Wrong with This Picture?

Paul Gipe, wind-works.org
Near Freiburg, Germany
German Churches . . .
. . . Protecting Creation

Paul Gipe, wind-works.org
Germany’s Renewable Tariffs
The Results (2008)

- Renewables 15.3% of Supply
- Renewables 9.6% of Primary Energy
- 90,000 Employed in Wind Industry
- 50,000 Employed in PV Industry
- 8,000 Employed in Biogas Industry
- 280,000 Employed in Renewables
- €32 (~$50) Billion Turnover

Paul Gipe, wind-works.org
Cost of German EEG (2007) ~$50/yr/household

- Generation 58%
- EEG 5%
- Eco Tax 11%
- VAT 14%
- CHP Act 2%
- Concession 10%

Paul Gipe, wind-works.org
Renewable Tariff Design

- Simple, Comprehensible, & Transparent
- Priority Access & Purchase
- Prices Sufficient for Development
- Lengths Sufficient for Profitability
- Fair But Not Undue Profit
- Price Differentiation

Paul Gipe, wind-works.org

Altamont Pass, California
Renewable Tariff Design
Price Differentiation

• For Different Technologies
• For Different Applications
• For Different Sizes
• For Different Resource Intensities
  For Wind (Germany & France)
  For Solar (France)

Paul Gipe, wind-works.org
## Renewable Tariffs Contract Length

<table>
<thead>
<tr>
<th>Country</th>
<th>Wind</th>
<th>Solar</th>
<th>Hydro</th>
<th>Biomass</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>Germany</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Ontario</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Portugal</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Spain (2007)*</td>
<td>&gt;15</td>
<td>&gt;25</td>
<td>&gt;25</td>
<td>&gt;20</td>
</tr>
</tbody>
</table>

Longer Contracts Reduce Initial Price.

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

Paul Gipe, wind-works.org
Renewable Tariffs in North America . . Unthinkable?

• Yes--Just 5 years ago
  “You’re Absolutely Nuts!”

• Today? No

• Now Possible

• Growing Trend
  in USA, Canada
  & Developing World
  China, Mongolia
  South Africa

Paul Gipe, wind-works.org

Gaspé, Quebec
Renewable Tariffs . . . Developing Momentum

Paul Gipe, wind-works.org
Ontario Moved First

First Modern System of Advanced Renewable Tariffs in North America

Paul Gipe, wind-works.org

Montfort, Wisconsin
Ontario “Gets It”

- Closing Coal Plants
- Delaying Nuclear Build
- Putting Renewables First
Ontario’s Green Energy & Green Economy Act

- Multi-faceted
  Affects Several Acts
- Efficiency & Conservation
- Renewable Energy
  Procure Through Feed-in Tariffs
- Passed May 14, 2009

Paul Gipe, wind-works.org
Ontario’s Green Energy Act
The Most Progressive Renewable Energy Policy in North America in Two Three Decades

Paul Gipe, wind-works.org
Goderich, Ontario
Ontario’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!)

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

• No Project Cap, Excepting
  Groundmounted Solar PV: 10 MW
  Hydro: 50 MW

• Right to Connect
  with Limitations

• Obligation to Purchase
  with Limitations

• Most Renewables

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

- First Offshore Wind Tariffs in NA
- First Aboriginal Bonus in NA
  First NA Policy for First Nations
- First Differentiated Solar PV Tariffs
  5 Tranches or Classes
- Best Wind, Solar, & Biogas Tariffs in NA

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

- No Subsidies or Grants
- Costs Borne by Consumers
  Not Taxpayers--More Egalitarian
- Community Wind Bonus
  Third Jurisdiction in North America

Paul Gipe, wind-works.org
Success in Ontario Due To

• Push for Renewable Policy
  Not a Solar PV Policy
  Not a Wind Policy

• Collaborative Strategy
  Green Energy Act Alliance: Green NGOs
  Trade Groups: CanSIA, CanWEA, OWA
  My Thanks to
  SunPower for Crucial Support
Grassroots Movement

• Explosion of Interest
• Groups Active
  Across US & Canada
• Public Out in Front
  Demands Aggressive Action
• Tipping Point Reached?

San Gorgonio Pass, California
Paul Gipe, wind-works.org
“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.”
“Change” in the Air?

• Obama Elected--Once Unthinkable
• CEC Recommends Feed-in Tariffs
• Vermont Launching Program
• Gainesville, Florida Muni
  First True Solar PV Tariff in USA

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

- Nova Scotia, New Brunswick
- Washington State, Michigan
- Minnesota, Oregon, Indiana!
- California--Feed-in Fever
- US House
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 Culture of Consumption
to
A Culture of Conservation

--Ontario Premier Dalton McGuinty
Move From
A Nation of Consumers
to
A Nation of Producers

Paul Gipe, wind-works.org
Lackawanna, New York
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
And A Lot More Solar

Paul Gipe, wind-works.org

Hinesburg, Vermont
Renewable Tariffs--New Policy Option for North America

www.wind-works.org

Manawatu Gorge, New Zealand