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

Paul Gipe, wind-works.org
North Americans are 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
There’s No Time to Lose
Why the European Success?

• #1 Community Involvement
  Germany & Denmark

• #2 Advanced Renewable Tariffs
  16 EU Countries use Electricity Feed Laws
German Renewable Generation

TWh Generated per Year

Year

0 25 50 75

Renewable Tariffs Launched

Feed-in Tariff (StrEG)

ARTs (EEG)

Feed Law (StrEG)

Paul Gipe, wind-works.org
Germany’s Renewable Tariffs
The Results (2006)

- Renewables 11.5% of Supply
- Renewables 5.3% of Primary Energy
- 70,000 Employed in Wind Industry
- 40,000 Employed in PV Industry
- 8,000 Employed in Biogas Industry
- 214,000 Employed in Renewables
- €22 (~$30) Billion Turnover

Paul Gipe, wind-works.org
Germany’s Renewable Tariffs
The Results (2006)

- 300,000 PV Installations
- 2,000 Biomass Plants
- 550 MW Farm Biogas, 10 TWh/yr
- 6,000 Hydro Plants
- 18,000 Wind Turbines
- Total of ~350,000 Generators!

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

Setting the Stage

Paul Gipe, wind-works.org
Myths to Dispel

• Renewables are Free
• Renewables are Cheap
  Wind in Particular
• Renewables Can’t Be Added Quickly & In Large Amounts
• Net Metering Can Make a Difference

Paul Gipe, wind-works.org
Husum, Germany
Renewable Tariffs
The Philosophical Context

Geothermal: Colline Metallifere, Italy

Paul Gipe, wind-works.org
What Are Our Goals?

• **Primary**
  High Penetration of Renewables Quickly

• **Secondary**
  Equitably Distributed Ownership
  Rural Development
  Sustainable Manufacturing
  Distributed Generation
  Improve Resiliency, Reduce Losses, Reduce Variability

Paul Gipe, wind-works.org

Wieringemeer polder, the Netherlands
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
  in Manufacturing

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

• Who Gets Contracts
  Elite Few or All Who Want Them?

• How To Pay For Premiums
  RECs/ROCs/Green Tags
  Subsidies (PTC, WPPI)
  Advanced Renewable 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
  The Margin Determines Rate of Growth
• High or “Premium” Prices Deliver
  More Generation
  More Quickly
  More Manufacturing . . . And Jobs

Paul Gipe, wind-works.org
## Political Price-Political Quantity Markets

<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
Market Mechanism Status

- **Premium Prices (Renewable Tariffs)**
  Typically Non-Anglophone Countries
  Aggressive Targets

- **Quotas (RPS & Tendering)**
  Typically Anglophone Countries
  Timid Targets Seldom Met
Evolution of Market Mechanisms

- ARTs Developing Momentum
- RPS/Quota May Have Peaked

Exemplars Weakening
California?
Italy?
Britain?

Paul Gipe, wind-works.org
Paying for German EEG

• Wind, Hydro, Biomass
  Less than External Costs Avoided

• Solar PV
  More than External Costs Avoided

• Total EEG Expenditures
  Less than External Costs Avoided
  BMU (German Ministry of the Environment) &
  UBA (German Environmental Agency)
Renewable Tariffs in North America . . Unthinkable?

- Yes--Just 3 years ago
- Today? No
- Now Possible

Paul Gipe, wind-works.org
Renewable Tariffs: Trend Growing in North America?

Paul Gipe, wind-works.org

Husum, Germany
Advanced Renewable Tariffs
North American Endorsements

• Ontario
  Liberal Party, 2004
  Green Party, 2006

• Canada’s Federal NDP 2006

• USA--Al Gore March 21, 2007

• NGOs
  NFU, GLU, BCWEA, CanWEA, CanSIA
  Sierra Club (USA), DSF (Canada)
  RENEW Wisconsin (USA)
Advanced Renewable Tariffs
Momentum in North America

- WE Energies (PV)
- California (PV >100 kW)
- Ontario
- Hawaii (PV @ $0.70/kWh)?
- Michigan? Massachusetts?
Advanced Renewable Tariffs

• What Are They?
  Feed Laws or Minimum Price Systems
  Political Price, Not Political Quota
  Simple or No Contracts

• How Do They Work?
  Simple, Comprehensible, Transparent, Little Administration

• Where?

Paul Gipe, wind-works.org
## Renewable Energy Tariffs Status

<table>
<thead>
<tr>
<th>Standard</th>
<th>Non-Standard</th>
<th>Pending</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Czech Republic</td>
<td>Hungary</td>
<td>Hawaii?</td>
</tr>
<tr>
<td>Brazil</td>
<td>Ireland</td>
<td></td>
<td>Japan?</td>
</tr>
<tr>
<td>France</td>
<td>Minnesota C-BED</td>
<td></td>
<td>Michigan?</td>
</tr>
<tr>
<td>Germany</td>
<td>PEI, Canada</td>
<td></td>
<td>Quebec?</td>
</tr>
<tr>
<td>Greece</td>
<td>Washington State</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy (PV)</td>
<td>Turkey (Wind)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
Renewable Tariff Design

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

Paul Gipe, wind-works.org

Altamont Pass, California
## Renewable Energy 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>Austria</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<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>
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<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*</td>
<td>&gt;15</td>
<td>&gt;25</td>
<td>&gt;25</td>
<td>&gt;20</td>
</tr>
<tr>
<td>Turkey</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington State</td>
<td></td>
<td>9</td>
<td></td>
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</tbody>
</table>

Paul Gipe, wind-works.org
# Renewable Energy Tariffs Program Limits

<table>
<thead>
<tr>
<th>Country</th>
<th>Wind</th>
<th>Solar</th>
<th>Hydro</th>
<th>Biomass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td></td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>California*</td>
<td>20%</td>
<td>3,000</td>
<td></td>
<td>2,000</td>
</tr>
<tr>
<td>Denmark</td>
<td></td>
<td></td>
<td></td>
<td>2,000</td>
</tr>
<tr>
<td>France</td>
<td>17,000</td>
<td>500</td>
<td>2,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Germany</td>
<td>No Limit</td>
<td>No Limit</td>
<td>No Limit</td>
<td>No Limit</td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td>1,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td>No Limit</td>
<td>No Limit</td>
<td>No Limit</td>
<td>No Limit</td>
</tr>
<tr>
<td>South Korea</td>
<td></td>
<td>1,300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>20,000</td>
<td>400</td>
<td>2,400</td>
<td>3,200</td>
</tr>
</tbody>
</table>

*Incentive program. Not a tariff.
# Renewable Tariffs Inflation Adjustment

<table>
<thead>
<tr>
<th>Country</th>
<th>Inflation Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>0%</td>
</tr>
<tr>
<td>Ontario RFP</td>
<td>15%</td>
</tr>
<tr>
<td>Ontario SOC</td>
<td>20%</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>26%</td>
</tr>
<tr>
<td>France</td>
<td>60%</td>
</tr>
<tr>
<td>Spain</td>
<td>100%</td>
</tr>
<tr>
<td>Greece</td>
<td>100%</td>
</tr>
<tr>
<td>Ireland</td>
<td>100%</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
Renewable Tariff Design

- Price Differentiation
  - For Different Technologies
  - For Different Applications
  - For Different Sizes
  - For Different Regions
  - For Different RE Intensities

Paul Gipe, wind-works.org
Germany
Application Differentiation for Solar PV

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

- **Distributed Benefits**
  Only Accrue From Distributed Generation
  Mega Wind = Centralized Generation

- **Differentiated Tariffs = Distributed Wind**

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

- **Reduces NIMBYism**
  By Enabling Greater Participation
  By Reducing Pressure on Wind Ghettos

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

• **Increases Program Flexibility**
  Lessens Pressure to Get Prices Right the First Time

• **Reduces Development Risk**
  Developers Often Over Estimate Production
  Determining Final (T2) 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**

Paul Gipe, wind-works.org
German Wind Tariffs
Reference Yield Method

Paul Gipe, wind-works.org
French Wind Tariffs
Profitability Index Method

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


Dr. David Suzuki

Paul Gipe, wind-works.org
Advanced Renewable Tariffs for Ontario

- Wind, Solar, Hydro, Biomass
- <44kV, <10 MW
- Inclusive--Open to All
- No Program Cap

Paul Gipe, wind-works.org Manawatu Gorge, New Zealand
Ontario’s SOC/ARTs

- Wind, Hydro, & Biomass: $0.11/kWh
- Hydro & Biomass $0.0352/kWh on peak
- Solar PV: $0.42/kWh
- Inflation Adjustment: 20%, Except Solar PV (Punitive?)
- Term: 20 years
Prices Paid for Wind Energy in Europe

Paul Gipe, wind-works.org
Prices Paid for Biomass in Europe

Paul Gipe, wind-works.org
Prices Paid for Solar PV in Europe

Euro Cents/kWh

Feed Law-Germany
Feed Law-France
Feed Law-Spain
Feed Law-Italy
Quota-Britain
Feed Law-Austria
Feed Law-Ontario

Paul Gipe, wind-works.org
Ontario SOC/ARTs Results (November-May 2007)

- Residential PV: 150 kW?
- Commercial PV: 60 MW?
- ~20 MW Hydro
- 230 MW Wind
- ~50 MW Installed in 2007?
- ~100 MW/month in Contracts
- Rush for Connections

Paul Gipe, wind-works.org
Ontario’s SOCs: What’s Wrong?

- **Tariffs Too Low**
  - PV: 1/2 of What’s Needed
  - Wind: Only Windy Sites
  - Biomass: $0.17 CAD/kWh MoAF

- **Inflation Adjustment Too Low**
  - 20% vs 50%: -2.5% ROI
  - Excluding Solar Punitive?

Paul Gipe, wind-works.org

Noordoost polder, the Netherlands
### Advanced Renewable Tariffs
OSEA’s Proposed Prices

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Initial Price ($CAD/kWh)</th>
<th>Average Price (Teq) ($CAD/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind 1-5 (T1)</td>
<td>0.133</td>
<td></td>
</tr>
<tr>
<td>High Wind (T2)</td>
<td>0.069</td>
<td>0.091</td>
</tr>
<tr>
<td>Medium Wind (T2)</td>
<td>0.09</td>
<td>0.105</td>
</tr>
<tr>
<td>Base Wind (T2)</td>
<td>0.133</td>
<td>0.133</td>
</tr>
<tr>
<td>Solar PV</td>
<td>0.83</td>
<td>0.83</td>
</tr>
<tr>
<td>Solar PV (Soft Loans)</td>
<td>0.67</td>
<td>0.67</td>
</tr>
<tr>
<td>Biomass</td>
<td>0.133</td>
<td>0.133</td>
</tr>
<tr>
<td>Small Hydro</td>
<td>0.133</td>
<td>0.133</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
Ontario’s SOCs: What’s Wrong?

- **Wind Tariff Differentiation**
  Not Enough at Less Windy Sites
  Too Much at Windy Sites

- **Fundamental Philosophical Shift**
  Cost vs Value Debate Continues
  Minister of Energy--Yes
  OPA--Absolutely, Positively No!

- **Antiquated Grid**
  7 month Hydro One Backlog!

Paul Gipe, wind-works.org
Ontario’s SOCs: What’s Wrong?

- OSEA Lost the Language Battle
- Language Frames the Debate
  Difficult to Reclaim Once Lost
- Language--Not an Insignificant Issue
  Feed Law --> Renewable Tariffs --> ARTs
  ARTs are not SOCS
  SOCS = Standard Contracts
  ARTs Not Standard--Differ by Technology
- Stick with Feed Law or ARTs
  Production-Based Incentives

Paul Gipe, wind-works.org
Renewable Tariff Design
Periodic Review

- A “Wise & Prudent” Policy
- Ensures Prices are Right
- Ensures that the Program is “Robust Enough”

Hamburg Landfill, Germany

Paul Gipe, wind-works.org
Ontario Can Do Better!

Bill Kemp, PowerBase

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

“. . . Find the right mechanism to spread the use of wind across the province.”

“. . . We will bring the barriers down.

“We did it because it was the right thing to do.

Minister of Energy Dwight Duncan,
April 12, 2007

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

- 2 Year Review (OSEA has Begun)
- Revisit
  - Prices
  - Increase Differentiation
  - Differentiated Tariffs for Wind
  - Inflation Indexing (60%)
- Add Offshore Wind
- Add Solar Thermal
Ontario’s Standard Offer Program
What’s Next?

- Lift Voltage Cap
- Lift Project Size Cap
  50 MW?
- Priority Access
  Farmers, First Nations, Co-ops?
- Priority Purchase
  Renewables before Nuclear & Fossil Fuels

Paul Gipe, wind-works.org
Replicating The “Ontario” Model

Paul Gipe, wind-works.org

- **Official**
  - BC
  - Saskatchewan

- **Unofficial**
  - Manitoba
  - Québec
  - Nova Scotia
  - Michigan?

Plus Energy House, Freiburg, Germany
Advanced Renewable Tariffs

• Deliver More Capacity--
  --More Quickly
  --More Equitably

Paul Gipe, wind-works.org
Advanced Renewable Tariffs
A Question of Equity

- Feed Laws are Fair
- Nearly All Can Play
  Farmers, Ranchers, First Nations, & Co-ops

Paul Gipe, wind-works.org

Buffalo Ridge, MN
No Time for Half Measures

No Time to Lose

Gaspé, Quebec

Paul Gipe, wind-works.org
Renewables:
When You Look Closely . . .
. . . Worth Every Cent

Paul Gipe, wind-works.org
Renewable Energy . . . For Today and for Tomorrow
Technology for Life*

*from N.F.S. Grundtvig
Renewable Tariffs--New Policy Option for North America

www.wind-works.org

Manawatu Gorge, New Zealand