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, An Environmental Trust, APROMA, ASES, AusWEA, AWEA, David Blittersdorf, Jan & David Blittersdorf Foundation, BWEA, BWE, CanWEA, Canadian Co-operative Assoc., CAW, CEERT, Deutsche Bank, DGW, DSF, EECA, ES&T, GEO, GPI Atlantic, IREQ, KWEA, MADE, Microsoft, ManSEA, MSU, NRCan, NRG Systems, NASA, NREL, NZWEA, ORWWG, OSEA, Pembina, PG&E, SeaWest, SEI, TREC, USDOE, WAWWG, WE Energies, the Folkecenter, the Izaak Walton League, the Minnesota Project, the Sierra Club, World Future Council, and Zond Systems, and written for magazines in the USA, Canada, France, Denmark, and Germany.
Designing Advanced Renewable Tariffs for a Rural Revolution

by

Paul Gipe
Net Metering

- Little Net Benefit Overall (in MW)
- “Feel Good” for Participants
- With Renewable Tariffs, Who Needs It
- Europeans: Net Metering?

Was ist das?
Qu'est-ce que c'est?

Carleton College V82, Northfield, Minnesota
Paul Gipe, wind-works.org
Net Metering TWh Contribution

- Solar PV: ~20% Worldwide
- Wind: ~0% Worldwide
- Wind & Solar: ~1% Worldwide!
- Conclusion: Insignificant

Cowley Ridge, Alberta
Paul Gipe, wind-works.org
Feed-in Tariffs Deliver Results

• >50% of Wind Worldwide
• >75% of Solar PV Worldwide
• >90% of Farm Biogas Worldwide

Ydby, Denmark
Paul Gipe, wind-works.org
Grading North American FITs
10 Criteria

• Program Caps
• Project Size Caps
• Contract Term
• Technologies Included
• Tariffs Based on Cost of Generation
• Tariffs Differentiated by Technology
• Tariffs Differentiated within Technology
• Wind Tariffs Differentiated by Resource
• Inflation Indexing
• Bonus Payments or Adders

Paul Gipe, wind-works.org
Grading North American FITs
Tariffs Based on

- Cost of Generation Plus Profit
- Value of Electricity Produced
- Avoided Cost (MPR in California)

Paul Gipe, wind-works.org
<table>
<thead>
<tr>
<th></th>
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<th>Grade</th>
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<tbody>
<tr>
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<td>A</td>
</tr>
<tr>
<td>France</td>
<td>90</td>
<td>A</td>
</tr>
<tr>
<td>Spain (Fixed Tariff)</td>
<td>80</td>
<td>A-</td>
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Grading North American FITs
The Gold Standard

Paul Gipe, wind-works.org
Fuchskauten, Germany
## Grading North American FITs

### Historical FITs

<table>
<thead>
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<th>Score</th>
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<tbody>
<tr>
<td>Ontario SOC (2006-2008)</td>
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Paul Gipe, wind-works.org
### Grading North American FITs

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<td>Multiple Technologies</td>
<td>10</td>
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<tr>
<td>Cost-Based Tariffs</td>
<td>10</td>
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</tr>
<tr>
<td>Technology Differentiation</td>
<td>10</td>
<td>10</td>
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</tr>
<tr>
<td>Technology Banding</td>
<td>20</td>
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<td>Resource Differentiation</td>
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<tr>
<td>Bonus or Adders</td>
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## Grading North American FITs
### Ontario & Vermont

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<th>Vermont</th>
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<td>Program Caps</td>
<td>10</td>
<td>2</td>
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<tr>
<td>Project Size Caps</td>
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<td>2</td>
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<tr>
<td>Contract Term</td>
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<td>10</td>
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<tr>
<td>Multiple Technologies</td>
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<td>8</td>
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<tr>
<td>Cost-Based Tariffs</td>
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<tr>
<td>Technology Differentiation</td>
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<td>10</td>
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<tr>
<td>Technology Banding</td>
<td>20</td>
<td>12</td>
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<tr>
<td>Resource Differentiation</td>
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<td>0</td>
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<tr>
<td>Inflation Indexing</td>
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<td>0</td>
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<td>Bonus or Adders</td>
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</table>

Paul Gipe, wind-works.org
### Grading North American FITs

<table>
<thead>
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<th>Score</th>
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<tr>
<td>Ontario (2009)</td>
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<tr>
<td>Vermont</td>
<td>54</td>
<td>D</td>
</tr>
<tr>
<td>Maine</td>
<td>43</td>
<td>F</td>
</tr>
<tr>
<td>Wisconsin IOUs</td>
<td>36</td>
<td>F</td>
</tr>
<tr>
<td>California</td>
<td>28</td>
<td>F</td>
</tr>
<tr>
<td>Oregon</td>
<td>16</td>
<td>F</td>
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Paul Gipe, wind-works.org
Grading North American FITs
Proposed FITs

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<th>State/Proposal</th>
<th>Score</th>
<th>Grade</th>
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<td>A-</td>
</tr>
<tr>
<td>Indiana HB1190</td>
<td>82</td>
<td>A-</td>
</tr>
<tr>
<td>California AB 1106</td>
<td>54</td>
<td>D</td>
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Paul Gipe, wind-works.org
# Making the Grade: What’s Needed

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Best Practice</th>
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<tr>
<td>Program Caps</td>
<td>None or &gt;20%</td>
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<tr>
<td>Project Size Caps</td>
<td>None or 20 MW</td>
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<tr>
<td>Contract Term</td>
<td>&gt;20 years</td>
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<tr>
<td>Multiple Technologies</td>
<td>Wind, Solar PV, Solar DHW, Geothermal, CSP</td>
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<tr>
<td>Cost-Based Tariffs</td>
<td>For All Classes</td>
</tr>
<tr>
<td>Technology Differentiation</td>
<td>Tariffs for Each Class</td>
</tr>
<tr>
<td>Technology Banding</td>
<td>By Application &amp; Size</td>
</tr>
<tr>
<td>Resource Differentiation</td>
<td>Wind &amp; Solar PV</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org

Middelgrunden, Denmark
Making the Grade: What ‘s Needed

• Open to All for All

Homeowners, Farmers, Business & Industry, Communities, Native Americans
Regardles of Tax Status
Tariffs with & without Tax Credits
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 . . .
  . . . 20 EU countries

Paul Gipe, wind-works.org
Renewable Tariff Design

• Simple, Comprehensible, & Transparent
• Priority Access & Purchase
• Lengths Sufficient for Profitability
• Prices Sufficient to Pay for Generation

Fair But Not Undue Profit
Through Price Differentiation

Altamont Pass, California
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>
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</thead>
<tbody>
<tr>
<td>Austria</td>
<td></td>
<td>15 MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>California*</td>
<td>20%</td>
<td>3,000 MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>15,000 MW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>20%</td>
<td>500 MW</td>
<td>2,000 MW</td>
<td>2,000 MW</td>
</tr>
<tr>
<td>Germany</td>
<td>No Limit</td>
<td></td>
<td>No Limit</td>
<td>No Limit</td>
</tr>
<tr>
<td>Italy</td>
<td>20%</td>
<td>500 MW</td>
<td>No Limit</td>
<td>No Limit</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>20,000 MW</td>
<td>1,300 MW</td>
<td>2,400 MW</td>
<td>3,200 MW</td>
</tr>
<tr>
<td>Spain</td>
<td>20,000 MW</td>
<td>400 MW</td>
<td>2,400 MW</td>
<td>3,200 MW</td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Country</th>
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<th>Solar</th>
<th>Hydro</th>
<th>Biomass</th>
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</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
## Renewable Tariffs Inflation Adjustment

<table>
<thead>
<tr>
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<th>Inflation Adjustment</th>
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</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>50-75</td>
</tr>
<tr>
<td>Greece</td>
<td>100%</td>
</tr>
<tr>
<td>Ireland</td>
<td>100%</td>
</tr>
</tbody>
</table>

Higher Inflation Adjustment Reduces Initial Price.

Paul Gipe, wind-works.org
Renewable Tariff Design
Price Differentiation

• For Different Technologies
• For Different Applications
• For Different Sizes
• For Different Resource Intensities
  For Wind (Germany, France, & China!)
  For Solar (France, Oregon)

Paul Gipe, wind-works.org
# Tariffs by Size & Application

## German Solar PV 2011

### Rooftop

<table>
<thead>
<tr>
<th>Power Range</th>
<th>CAD/kWh</th>
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<tbody>
<tr>
<td>&lt;30 kW</td>
<td>0.394</td>
</tr>
<tr>
<td>&gt;30 kW &lt;100 kW</td>
<td>0.375</td>
</tr>
<tr>
<td>&gt;100 kW &lt;1,000 kW</td>
<td>0.354</td>
</tr>
<tr>
<td>&gt;1,000 kW</td>
<td>0.295</td>
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</table>

### Ground-Mounted

<table>
<thead>
<tr>
<th>Area</th>
<th>CAD/kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion and Sealed Areas</td>
<td>0.289</td>
</tr>
<tr>
<td>Commercial Zones</td>
<td>0.302</td>
</tr>
<tr>
<td>Groundmounted Crop Land</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
Uganda FIT Program
Linear Hydro Tariffs by Size

Paul Gipe, wind-works.org
Renewable Tariff Design
Price Regulation

- Most Efficient
- Least Costly
- Simpler
- Is Compatible with Market Economies

From Bernard Chabot, ADEME

Paul Gipe, wind-works.org
Renewable Tariff Design
Price Regulation

• Provides Dispersed Wind Development
• Provides Predictable Results
• Provides Rapid Results
• Provides Opportunity for All Players
• Provides Opportunity Geographically

From Bernard Chabot, ADEME

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
French Wind Tariffs
Resource Productivity Method

- Fair Profits at Medium Wind Sites
- Not “Undue” Profits at Windy Sites
- Profitability Index Method (Chabot)

Not Discounted Cash Flow Model

Paul Gipe, wind-works.org

Igny, Lorraine, France
German Wind Tariffs
Reference Yield Method

Euro Cents/kWh

Year

Paul Gipe, wind-works.org
French Wind Tariffs Pre-2006
Average Price vs Initial Price

Paul Gipe, wind-works.org
Tiered Tariffs: V80 Example

- V80 Sweeps ~5,000 m²
- 7 m/s site (~1,000 kWh/m²/y)
- Generation: ~5 x10⁶ kWh/y
- 5 Years
- Delete High & Low Years
- Average 3 Remaining Years
- 15 x10⁶ kWh/3 = 5 x10⁶ kWh
- 5 x10⁶ kWh/ 5,000 m² = 1,000 kWh/m²
- Use Yield to Find Tariff T2
French Wind Tariffs by Specific Yield

$CAD/kWh

Base

Medium

High

Specific Yield (kWh/m²/yr)

Paul Gipe, wind-works.org

Chateau de Lastours, France
### Chabot PI Method

#### Enter Data in These Cells.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>t</td>
<td>5.00 %</td>
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<tr>
<td>n</td>
<td>20 years</td>
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<tr>
<td>CRF(t,n)</td>
<td>0.08024</td>
</tr>
<tr>
<td>Kom</td>
<td>4 %</td>
</tr>
<tr>
<td>lup</td>
<td>675 $/m^2</td>
</tr>
<tr>
<td>Ps</td>
<td>W/m^2</td>
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<tr>
<td>inflation</td>
<td>3.0 %/year</td>
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#### First step: linear variation of PI

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<td>Eas min</td>
<td>650 $/kWh/m^2</td>
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<tr>
<td>Eas int</td>
<td>900 $/kWh/m^2</td>
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</table>

<table>
<thead>
<tr>
<th>Eas min</th>
<th>PI ref</th>
<th>$/kWh</th>
<th>$/kWh</th>
<th>$/kWh</th>
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<tbody>
<tr>
<td>500</td>
<td>-0.27</td>
<td>0.133</td>
<td>0.133</td>
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<td>550</td>
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<th>PI ref</th>
<th>$/kWh</th>
<th>$/kWh</th>
<th>$/kWh</th>
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<td>900</td>
<td>0.25</td>
<td>0.133</td>
<td>0.090</td>
<td>0.105</td>
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Ontario GEAA
Proposed Wind Tariffs

Tariff T1

Tariff T2

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

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

Paul Gipe, wind-works.org
Feed-in Tariffs for Renewable Heat

- Germany, France, Spain, Switzerland with CHP
- Ontario, Slovenia without CHP
- Great Britain
  Scheduled April, 2011

Vorupør Kraftvarmeværk, Denmark

Paul Gipe, wind-works.org
### British Solar Thermal (DHW) Tariffs

<table>
<thead>
<tr>
<th></th>
<th>Years</th>
<th>€/kWh</th>
<th>CAD/kWh</th>
<th>USD/kWh</th>
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<tbody>
<tr>
<td>&lt;20 kW</td>
<td>20</td>
<td>0.211</td>
<td>0.288</td>
<td>0.288</td>
</tr>
<tr>
<td>&lt;100 kW</td>
<td>20</td>
<td>0.199</td>
<td>0.272</td>
<td>0.272</td>
</tr>
</tbody>
</table>

Proposed for April 2011.

Paul Gipe, wind-works.org
# British Tariffs for Renewable Heat

## Biomethane Pipeline Injection

Proposed for April 2011.

Paul Gipe, wind-works.org

<table>
<thead>
<tr>
<th>Biomethane injection</th>
<th>Years</th>
<th>€/kWh</th>
<th>CAD/kWh</th>
<th>USD/kWh</th>
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<tbody>
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<td>0.047</td>
<td>0.064</td>
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</table>

Eifel Mountains, Germany
## British Ground Source Heat Pump Tariffs

<table>
<thead>
<tr>
<th>Years</th>
<th>€/kWh</th>
<th>CAD/kWh</th>
<th>USD/kWh</th>
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</thead>
<tbody>
<tr>
<td>&lt;45 kW</td>
<td>23</td>
<td>0.082</td>
<td>0.112</td>
</tr>
<tr>
<td>&lt;350 kW</td>
<td>20</td>
<td>0.064</td>
<td>0.088</td>
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<tr>
<td>&gt;350 kW</td>
<td>20</td>
<td>0.018</td>
<td>0.024</td>
</tr>
</tbody>
</table>

Proposed for April 2011.

“Geothermal” in Canadian English.

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 Job Creation
  50,000 Jobs in Three Years

Paul Gipe, wind-works.org
Ontario’s 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

Sarnia, Ontario
Ontario’s 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
  6 Tranches or Classes
• Most Differentiated Biogas Tariffs
  5 Tranches or Classes
• Best Wind, Solar, & Biogas Tariffs in NA
  Competitive Internationally

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

• No Subsidies or Grants
• Costs Borne by Ratepayers
  Not Taxpayers--More Egalitarian
• Community Wind Bonus
  Farmers Qualify ($0.01 CAD/kWh)
• Aboriginal Bonus ($0.015/kWh)

Paul Gipe, wind-works.org
Ontario Solar PV Tariffs 2010

- Rooftop <10 kW: $0.802 CAD/kWh, $0.782 USD/kWh
- Groundmounted <10 kW: $0.642 CAD/kWh, $0.626 USD/kWh
- Rooftop <250 kW: $0.713 CAD/kWh, $0.695 USD/kWh
- Rooftop <500 kW: $0.635 CAD/kWh, $0.619 USD/kWh
- Rooftop >500 kW: $0.539 CAD/kWh, $0.526 USD/kWh
- Groundmounted <10 MW: $0.443 CAD/kWh, $0.432 USD/kWh

Paul Gipe, wind-works.org
Ontario Biogas Tariffs 2010

<table>
<thead>
<tr>
<th>Capacity Range</th>
<th>CAD/kWh</th>
<th>USD/kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100 kW</td>
<td>0.195</td>
<td>0.188</td>
</tr>
<tr>
<td>&lt;250 kW</td>
<td>0.185</td>
<td>0.179</td>
</tr>
<tr>
<td>&lt;500 kW</td>
<td>0.16</td>
<td>0.155</td>
</tr>
<tr>
<td>&lt;10 MW</td>
<td>0.147</td>
<td>0.142</td>
</tr>
<tr>
<td>&gt;10 MW</td>
<td>0.104</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
Ontario Hydro Tariffs 2009
Term: 40 Years

Hydro <10 MW
- $CAD/kWh: 0.131
- $USD/kWh: 0.113

Hydro <50 MW
- $CAD/kWh: 0.122
- $USD/kWh: 0.105

Paul Gipe, wind-works.org
Prices Paid for Offshore Wind Energy

Germany
France
Ontario

$CAD/kWh

Paul Gipe, wind-works.org
Middelgrunden, Denmark
Prices Paid for Wind Energy

$CAD/kWh

Germany
France
Spain
Ontario
Vermont
Nova Scotia
Uganda

Paul Gipe, wind-works.org
Potential per Ontario Farm

- 2MW Turbine, 80 m Ø, 80 m Tower
- ~$5 million CAD Installed
- ~4 million kWh/Year (~6.5 m/s)
- ~$500,000 CAD/yr @ $0.145/kWh
- Simple Payback: ~10 Years
- After Payback: ~$500,000 CAD/yr

Skibsted Fjord, Denmark

Paul Gipe, wind-works.org
Solar PV
Ontario Barn Roof

- 30 kW; ~$275,000
- 30,000 kWh/yr
- $21,000/yr
- Simple Payback ~13 years
Ontario Success Due To

- **Push for Renewable Policy**
  Not a Solar PV or a Wind Policy
- **Push for Conservation & Efficiency**
  Reduces Program Costs to Ratepayers
  (Danes Pay Less for Electricity Than Ontarians)
- **Collaborative Strategy**
  Green Energy Act Alliance: Green NGOs, Ag, & Labor
  Trade Groups: CanSIA, CanWEA, OWA
- **Public Consultation**

Paul Gipe, wind-works.org
Ontario Tariff Status

- MicroFIT Revision August 2010
  Split into Two Tranches
  Rooftop PV & Ground
- 2011 Program Review

Toronto, Ontario
Paul Gipe, wind-works.org
Ontario’s FIT Program
World Class
“Made in Canada”

Ferndale, Ontario

Paul Gipe, wind-works.org
Means to Control or Limit Costs
German Renewable Generation

TWh Generated per Year

- ARTs (EEG)
- Feed Law (StrEG)

Year

Advanced Renewable Tariffs Launched
Feed-in Tariff (StrEG)

Paul Gipe, wind-works.org
Cost of German EEG (2008) ~$50/yr/household

BMU: EEG Costs <5%, ~€0.01/kWh, 2008.

Paul Gipe, wind-works.org
Surcharge on German electricity cost per kWh
German PV Degression Corridors 2011
Target Growth 3,500 MW

Degression Implemented Mid-Year 2011
This is on top of the 9% at start of the year.

Paul Gipe, wind-works.org
German PV Degression Corridors 2012
Target Growth 3,500 MW

for every 1,000 MW

Basic Year Start

Degression Implemented Start of 2012

Paul Gipe, wind-works.org
Uganda FIT Program

### Uganda Renewable Energy Feed-in Tariff (REFIT) for 2011-2012

<table>
<thead>
<tr>
<th>Technology</th>
<th>Tariffs</th>
<th>Cumulative Capacity Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MW</td>
<td>2011</td>
</tr>
<tr>
<td>Wind</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>Solar PV</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Geothermal</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Landfill gas</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Biogas</td>
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</tr>
<tr>
<td>Biomass</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Bagasse</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Hydro &gt;500 kW&lt;1 MW</td>
<td>20</td>
<td>1.5</td>
</tr>
<tr>
<td>Hydro &gt;1 MW&lt;8 MW</td>
<td>Linear tariff</td>
<td>15</td>
</tr>
<tr>
<td>Hydro &gt;9 MW&lt;20 MW</td>
<td>Linear tariff</td>
<td>45</td>
</tr>
</tbody>
</table>

**Project size cap:** <20 MW.

Inflation adjustment based on O&M costs of tariff.

Administered by Uganda's Electric Regulatory Authority (ERA).

Tariffs based on the cost of generation plus profit.

http://www.era.or.ug/Pdf/Approved_Uganda%20REFIT%20Guidelines%20V4%20%282%29.pdf

Paul Gipe, wind-works.org
# Uganda FIT Program

## Cumulative MW Limit by Year

<table>
<thead>
<tr>
<th>Source</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tbody>
<tr>
<td>Wind</td>
<td>50</td>
<td>75</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>Solar PV</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>7.5</td>
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<td>90</td>
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<td>Hydro &gt;9 MW&lt;20 MW</td>
<td>45</td>
<td>90</td>
<td>135</td>
<td>180</td>
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</tbody>
</table>

Paul Gipe, wind-works.org
How to Use Feed Law Web Pages

Wind-Works.org


- Primers on Feed-in Tariffs and Advanced Renewable Tariffs
- Renewable Tariffs by Country
- Renewable Tariff Design
- Model Advanced Renewable Tariff Legislation
- Renewable Tariffs (General Articles)
- Tables of Feed-In Tariffs Worldwide
- Feed-in Tariffs: The Economic Case
- Reviews of Books on Feed-in Tariffs
- Links to More on Feed-in Tariffs
- North American Experts on Feed-in Tariffs

By Country
- Algeria
- Australia
- Austria
- Canada
- Alberta
- British Columbia
- Ontario
- Manitoba
- New Brunswick
- Nova Scotia
- Prince Edward Island
- Saskatchewan
- Others

Paul Gipe, wind-works.org
Welcome to Wind-Works
An on-line archive of articles and commentary on wind and solar energy, community power, Feed-in Tariffs, and Advanced Renewable Tariffs.

Join the Alliance for Renewable Energy and support a grass roots movement that's bringing feed laws and feed-in tariffs back home to North America.

Sign Up, if you would like to be added to my email distribution list on feed-in tariff developments worldwide.--Paul Gipe

July 30, 2010
What's New on Feed-in Tariffs

- Deutsche Bank: FiTs Adjust while Delivering Scale in 2010--Feed-in tariffs (FiTs) continue to be the driving force behind many renewable energy deployments globally, and are an effective policy tool for catalyzing the large investment flows needed to achieve 2020 emissions reduction targets and clean energy mandates...
- Colorado Towns explore renewable options--Already, 75 percent of the electricity distributed by the municipal utility department in Aspen comes from...
How to Use Feed Law Web Pages

Renewable Tariffs and Standard Offer Contracts in the USA

Since the fall of 2007 several states have introduced bills into their state legislatures that, if enacted, would create Renewable Energy Sources Acts like those in Europe.

In addition, a bill has been introduced at the federal level in the House.

A number of states have introduced programs patterned after Renewable Feed Laws in Europe. However, there are significant differences between true Renewable Tariffs and many of the Production-Based Incentive programs in the USA. For a brief discussion see Performance-Based Incentives or Renewable Tariffs for Photovoltaics in the USA.

- USA
- Model Advanced Renewable Tariff Legislation
- Arkansas
- California
- Colorado
- Florida
- Hawaii
- Illinois
- Indiana
- Maine
- Maryland
- Michigan
- Minnesota

Paul Gipe, wind-works.org
How to Use Feed Law Web Pages

Paul Gipe, wind-works.org
Advanced Renewable Tariffs are an Eminently Flexible Mechanism That Enables Community Power

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

Paul Gipe, wind-works.org
Key Themes of Electricity Rebels

- We Want Renewable Energy
- We Can Do It Ourselves
- We Bring Our Own Risk Capital and Invest in Our Own Region
- We Accept the Change in the Landscape that Results

Hans-Detlef Fedderson on the Bürgerwind Movement.
Paul Gipe, wind-works.org
Key Elements of Successful Electricity Rebels

• Transparency
• Cooperation & Compromise
• Creative Problem Solving
• “Together, We’re Strong”

Hans-Detlef Fedderson on the Bürgerwind Movement.

Paul Gipe, wind-works.org

Friedrich-Wilhelm-Lübke-Koog, Germany
Electricity Rebels--the Rallying Cry

“Wind is a Local Resource. It is Our Resource. And We Want to Make Money from it.” --Wolfgang Paulsen (Stromrebelle)
Renewable Energy
The Revolution Has Begun!

www.wind-works.org

Manawatu Gorge, New Zealand