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.

Paul Gipe, wind-works.org
Advanced Renewable Tariffs
New Policy Option for North America

Paul Gipe, wind-works.org
North American Energy Policy

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

Paul Gipe, wind-works.org

Skibsted Fjord, Denmark
The Troika of Meeting Demand

• Conservation
  #1 Use Less
• Improve Efficiency
  #2 Do More with Less
• Renewable Energy
  #3 Invest in the Future

Fuchskautte
Höhe Westerwald, Germany
## Typical Household Consumption

<table>
<thead>
<tr>
<th>Country</th>
<th>kWh/yr/home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas</td>
<td>14,000</td>
</tr>
<tr>
<td>New Zealand</td>
<td>8,000</td>
</tr>
<tr>
<td>California</td>
<td>6,500</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>3,000</td>
</tr>
</tbody>
</table>

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

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

Texas
Ontario
California
Germany

Paul Gipe, wind-works.org
Wind Energy Has Come of Age

Paul Gipe, wind-works.org
Montefalcone, Italy
Why Now?

• **Wind Works**
  Greater Reliability

• **Productivity Improved**
  More Efficient
  Taller Towers

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

Paul Gipe, wind-works.org
Northern Ireland

40 m, 500 kW

80 m, 1.8 MW

Kincardine, Ontario

Paul Gipe, wind-works.org
We Know What Works . . .and What Doesn’t
World Wind Capacity 2006
~70,000 MW

Europe 66%
Asia 16%
North America 17%
Africa 0%
South America 1%

Paul Gipe, wind-works.org
2006 World Wind Capacity

12,000 MW 48,000 MW

12,000 MW

Paul Gipe, wind-works.org
Wind Energy is a Real Business
US$35 Billion in 2006

- Project Development: 65%
- Electricity Sales: 32%
- O&M: 3%

Paul Gipe, wind-works.org
Wind Growing Rapidly 2002-2006

- Germany: ~2,400 MW/yr
  - 20,000 MW by 2006
  - 30,000 MW by 2012
- Spain: ~1,700 MW/yr
- USA: ~1,500 MW/yr
- Growth: 20%-40%/yr

Paul Gipe, wind-works.org
Why Wind?

• Reduces Use of Fossil & Nuclear Fuels
• Most Cost-Effective of New Renewables
• Relatively Benign

Paul Gipe, wind-works.org
Wind is Modular

- Quickly Installed
- When Needed
- As Needed
- Where Needed
- By Anyone

Tehachapi, California

Paul Gipe, wind-works.org
Wind is Flexible

- **Scale**
  Big or Small Projects
- **Location**
  Near or Far
- **Time**
  Short Lead Times
- **Ownership**
  Local or Absentee

Paul Gipe, wind-works.org
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
- ... and Can be Removed

Paul Gipe, wind-works.org
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 & Bat Kills: Collisions, Electrocutions

Paul Gipe, wind-works.org
Birds & Bats

- Serious Problem
  - Tarifa?
  - Altamont Pass (900-1,300 Raptors/yr)
- A Concern Elsewhere
- No Quick Fixes--No Panaceas
  - Stripes & Whistles Don’t Work
Birds & Bats

- Before & After Studies of Big Projects
- Studies Necessary for Small Projects?
Public Safety

• No Passerby Killed or Injured

• Ice Throw
  Max. 100 m
  1.5 X Height
  Post Warnings

• Blade Throw

• Suicides
  Attractive Nuisance

Paul Gipe, wind-works.org
Solar PV Growing Rapidly

- **2006**: 5,600 MW Worldwide
- **1,600 MW/yr**
- **$20+ Billion**
- **Major Markets**
  - Germany--750+ MW/yr
  - Japan--350 MW/yr
  - Spain--25 MW/yr?
  - California--50 MW/yr

Paul Gipe, wind-works.org

Rancho Seco, California
Solar PV in Germany 2006

- 100,000 New Systems
- €4 Billion
- Total of 300,000 Systems
- 750-1,100 MW in 2006!
- Total 2,500 MW
- Costs Dropped 25%
- 300 MW by Farmers!

On Barn Roofs, 35 kW each

Paul Gipe, wind-works.org
World Total PV Capacity 2006
~1/2 World’s PV Capacity in Germany

- Germany: 45% (2500)
- Japan: 34% (1867)
- USA: 11% (610)
- Rest of World: 10% (550)

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

Year

MW Total

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

100,000 Rooftops

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

- 300 MW on Barn Roof Tops in 2006
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
German Renewables
More than Electricity

- Hot Water
- Space Heating
- the Hotel Victoria Has it All . . . from Solar Energy

Paul Gipe, wind-works.org

Freiburg, Germany
Germany’s Renewable Tariffs
The Results (2006)

- Renewables 11.5% of Supply
- Renewables Generating 70 TWh/yr
- 70,000 Employed in Wind Industry
- 35,000 Employed in PV Industry
- 8,000 Employed in Biogas Industry
- 170,000 Employed in Renewables
- €16.4 Billion Turnover
Germany’s Renewable Tariffs
The Results (2006)

• Renewables ~70 TWh/yr
• 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!
Germany’s Renewable Tariffs
The Results (2006)

- **Wind**
  - Hardware: $5 Billion
  - Electricity: $3 Billion

- **Solar PV**
  - Hardware: $6 Billion
  - Electricity: $1 Billion

- **Solar Thermal**
  - Hardware: $2 Billion
  - Heat: $0.75 Billion

Paul Gipe, wind-works.org
Cost of German EEG

- Generation: 60%
- EEG: 3%
- Eco Tax: 11%
- VAT: 14%
- CHP Act: 2%
- Concession: 10%

Paul Gipe, wind-works.org
## German Renewable Targets

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2020</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy</strong></td>
<td>4.2%</td>
<td>10%</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Electricity</strong></td>
<td>12.5%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td><strong>Transport Fuels</strong></td>
<td>5.8%</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

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

Setting the Stage

Paul Gipe; wind-works.org
Why the European Success?

• #1 Community Involvement
  Germany & Denmark

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

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 Transmission Losses
  Firm-Up Wind’s Variability

Paul Gipe, wind-works.org

Pincher Creek, Alberta: Shell Gas Plant
Renewable Tariffs
The Philosophical Context

Geothermal: Colline Metallifere, Italy
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
  in Manufacturing

Paul Gipe, wind-works.org
If Yes, Then What Works Best?

• Who Gets Contracts (PPAs)
  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
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
Market Mechanism Status

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

- **Quotas (RPS & Tendering)**
  Typically Anglophone Countries
  Timid Targets Seldom Met

Paul Gipe, wind-works.org

Haverigg, Cumbria, Britain
What Has Worked in Europe

• What Works
  Advanced Renewable Tariffs (ARTs)

• What Has Not Worked
  Direct Subsidies & Tax Credits
  Quota, or RFP (Bidding) Systems

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

Paul Gipe, wind-works.org
Bidding or Quota Markets

- Heavy Administrative Burden
- Stop-Start/Boom-Bust
e.g. Quebec 100 MW, then 0
- Little Diversity
  No Room for Community Projects
  No Room for Farmer-Owned Projects
- Longer Lead Times
  Lengthy EAs
- Few or No Manufacturers

Paul Gipe, wind-works.org
<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
Political Price-Political Amount Markets

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

Wind Capacity vs Jobs

0 10 20 30 40 50

Thousands

2004 Data

Paul Gipe, wind-works.org
Advanced Renewable Tariffs

- Deliver More Capacity--
  --More Quickly
  --More Equitably
Advanced Renewable Tariffs

• What Are They?
  Feed Laws or Minimum Price Systems
  Political Price, Not Political Quota
  Simple 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>Japan?</td>
</tr>
<tr>
<td>Brazil</td>
<td>Ireland</td>
<td></td>
<td>Quebec?</td>
</tr>
<tr>
<td>France</td>
<td>Minnesota C-BED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>PEI, Canada</td>
<td></td>
<td></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 Tariffs Terminology

- Renewable Energy Feed-In Tariffs (REFITs)
  Stromeinspeisungsgesetz (StrG)
- Electricity Feed Laws or Feed Laws (RETs)
- Advanced Renewable Tariffs (ARTs)
  Erneuerbare Energien Gesetz (EEG)
- Fixed-Price Contracts
- Minimum Price Standards (MPS)*
- Standard Offer Contracts


Paul Gipe, wind-works.org
ARTs 2005 Status in Europe
More than 1/2 World’s Wind Capacity

Feed Law-D: 32%
Feed Law-ES: 17%
Feed-Law-DK: 5%
Quota-US: 16%
Quota-India: 3%
Rest of World: 27%

18,437
15,565
10,027
9,149
3,109
1,713

Paul Gipe, wind-works.org
ARTs Status in Europe
~2/5 World’s PV Capacity
in Germany in 2005

Feed Law-D
44%

USA
13%

Japan
22%

Rest of World
21%

660
330
310
200

Paul Gipe, wind-works.org
German Market Example
Markets Work Best When

- Many Transactions
- Transactions Transparent
- Free Flow of Information
- Many Suppliers
- Many Buyers

Paul Gipe, wind-works.org
German Market Example

- Thousands of Transaction per Year
- Many Magazines & Public Reports
  - Turbine Prices Public
  - Performance Public
- 4 Major Suppliers, 4+ Minor Suppliers
- Farmers, Co-ops, & Wind Cos

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

Paul Gipe, wind-works.org

Husum, Germany
Willingness to Pay Premium . . . Unthinkable?

- PEI Gasoline Price Regulation
- NS Premier Hamm Proposes Gasoline Price Regulation
- Local Content (Quebec)
- Why?
  - Social Economy-Jobs
  - Rural Development

Paul Gipe, wind-works.org

Halifax Herald, May 20, 2005
Renewable Tariffs in North America . . Unthinkable?

- Yes--Just 3 years ago
- Today? No
- Now Possible
- Growing Trend in both USA & Canada

Paul Gipe, wind-works.org

WindShare, Toronto
California’s Original Wind Tariff Interim Standard Offer Contract #4

- 1983: ISO4
- Commercial Wind Industry Begins
- 1985: ISO4 Suspended
- 1984-1990: ~1,500 MW of Wind Installed
- Wind Produces ~1% of Supply
Evolution of Market Mechanisms

• ARTs Developing Momentum
• RPS/Quota May Have Peaked
Exemplars Weakening

California?
Britain?

Paul Gipe, wind-works.org
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)

Paul Gipe, wind-works.org
Ferndale, Ontario
Advanced Renewable Tariffs
Momentum in North America

• Prince Edward Island (Canada)
• Washington State
• Minnesota C-BED
• California (PV)
• Ontario
## Renewable Energy Tariffs

### Contract Length

<table>
<thead>
<tr>
<th>Country</th>
<th>Wind</th>
<th>Photovoltaics</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>Brazil</td>
<td>20</td>
<td></td>
<td>20</td>
<td>20</td>
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<tr>
<td>California</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California SO4 (old)*</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
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<tr>
<td>Czech Republic</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>15</td>
<td>20</td>
<td>20</td>
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<tr>
<td>Germany</td>
<td>20</td>
<td>20</td>
<td>15-30</td>
<td>20</td>
</tr>
<tr>
<td>Italy</td>
<td>29</td>
<td></td>
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<td>Minnesota</td>
<td>20</td>
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<td>Ontario</td>
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<td>20</td>
</tr>
<tr>
<td>Portugal</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td></td>
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<tr>
<td>Spain***</td>
<td>&gt;15</td>
<td>&gt;25</td>
<td>&gt;25</td>
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<tr>
<td>Turkey</td>
<td>7</td>
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<tr>
<td>Washington State</td>
<td>9</td>
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</table>

Paul Gipe, wind-works.org
<table>
<thead>
<tr>
<th>Country</th>
<th>Wind</th>
<th>Solar</th>
<th>Small Hydro</th>
<th>Biomass</th>
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<tbody>
<tr>
<td>Austria</td>
<td>15 MW</td>
<td></td>
<td></td>
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<tr>
<td>Brazil</td>
<td>1,100 MW</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>California**</td>
<td>3,000 MW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>17,000 MW</td>
<td>500 MW</td>
<td>2,000 MW</td>
<td>2,000 MW</td>
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<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>500 MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minnesota</td>
<td>No Limit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
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<td>No Limit</td>
<td>No Limit</td>
<td>No Limit</td>
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<tr>
<td>South Korea</td>
<td></td>
<td>1,300 MW</td>
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<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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</table>

Paul Gipe, wind-works.org
<table>
<thead>
<tr>
<th>Location</th>
<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>100%</td>
</tr>
<tr>
<td>California FSO4</td>
<td>Ramped for Inflation</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
Evolution of Market Mechanisms

- Capital Subsidies
  Payment/kW of Capacity

- Feed Laws
  % of Retail Price

- RPS w/ Tradable ROCs/RECs
  Abandoned in Denmark and the Netherlands

- Performance-Based Incentives (PBI)
  Not True Tariffs (California)

- Advanced Renewable Tariffs
  Germany, France . . .
Capital Subsidies

- Failed Overall
  - Led to High Generator Ratings
  - Led to Other Abuses
- Subject To Political Budgeting
  - Taxes & General Fund
- Unsustainable w/o Subsidy Source

Paul Gipe, wind-works.org
Barriers to Renewable Tariffs

• Philosophical: Cost vs Value
  Cost of Generation
  Value of Generation

• Sticker Shock
  Avg. Imbedded Costs & Heritage Resources
  NG: Future Pricing
  Nuclear: Cost Estimates & Reality
  Mega Wind Projects @ Windy Sites

• Unfamiliarity

• US Tax Subsidies (PTC) Distort Market

• Hard to Write a Press Release!

Paul Gipe, wind-works.org
Renewable Tariff Design

- Simple, Comprehensible, & Transparent
- Simplified Interconnection
- Prices Sufficient to Drive Development
- Lengths Sufficient for Profitability
- Prices Differentiated by Technology
- Prices Differentiated by Resource

Paul Gipe, wind-works.org

Altamont Pass, California
Renewable Tariff Design

- Price Sufficient to Drive Development
- Fair But Not Undue Profit
- Sufficiently Differentiated
  - For Different Technologies
  - For Different Applications
  - For Different Sizes
  - For Different Regions
  - For Different RE Intensities

Paul Gipe, wind-works.org
Greece
Geographic Differentiation for Solar PV

- Mainland <100 kW
- Islands <100 kW
- Ontario Solar PV

Euro Cents/kWh

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

- Freestanding
- Rooftop <30 kW
- Facade Cladding <30 kW
- Ontario Solar PV

Euro Cents/kWh

Paul Gipe, wind-works.org
Germany
Size Differentiation for Biogas

Euro Cents/kWh

<150 kW
<500 kW
<5 MW
<20 MW
Ontario Biogas

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

Year

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Euro Cents/kWh

1 2 3 4 5 6 7 8 9 10

150%
100%
60%

1 2 3 4
German EEG Wind Tariffs Vary by Resource Intensity

Years of premium tariff using Reference Yield method.

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

Paul Gipe, wind-works.org
French Renewable Tariffs

- <12 MW Renewable Tariff
  Historical-Political Reasons for 12 MW
- >12 MW Negotiated PPA
- Fair Profits at Medium Wind Sites
  6 m/s at Hub Height
- Not “Undue” Profits at High Wind Sites
  8.5 m/s at Hub Height

Paul Gipe, wind-works.org
French 2006 Wind Tariffs Vary by Resource Intensity

Linear interpolation between full-load hours.

Paul Gipe, wind-works.org
France National Tariff
Plus Regional Incentive for PV

- Plus 50% tax credit on hardware.

Paul Gipe, wind-works.org

Base Tariff (20yrs)*
BI Tariff (20 yrs)
Rhone-Alps (6 yrs)**
Base + Rhone-Alps (20 yrs)
BI + Rhone Alps (20 yrs)
Ontario Solar PV

*Residential Applications: 50% tax credit on hardware.
**Incentive payment/kWh, not a tariff.

Euro Cents/kWh

Paul Gipe, wind-works.org
France Solar PV + Rhone-Alps
Best Case

Euro Cents/kWh for 20 years

- Base Tariff
- Building Integrated
- Residential Tax Credit
- Rhone-Alps Incentive

Rhone-Alps Best Case

78.3

~$1.125 CAD/kWh

Paul Gipe, wind-works.org
## French Advanced Renewable Tariffs 2006 Summary

<table>
<thead>
<tr>
<th></th>
<th>Years</th>
<th>Euros/kWh</th>
<th>CAD/kWh</th>
<th>USD/kWh</th>
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<tbody>
<tr>
<td>Wind on shore</td>
<td>15</td>
<td>0.082</td>
<td>0.118</td>
<td>0.104</td>
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<tr>
<td>Wind off shore</td>
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<td>0.13</td>
<td>0.187</td>
<td>0.164</td>
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<td>Solar PV*</td>
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<td>0.3</td>
<td>0.431</td>
<td>0.379</td>
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<td>Integrated Solar PV</td>
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<td>Solar PV Rhone-Alps</td>
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<td>0.6</td>
<td>0.862</td>
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<tr>
<td>Biogas &lt;150 kW</td>
<td>15</td>
<td>0.103</td>
<td>0.148</td>
<td>0.13</td>
</tr>
</tbody>
</table>

*Plus 50% tax credit on hardware for residential use up to ~ 3 kW.*
Emerging ARTs Markets 2007

- Ontario
  Mostly Wind

- Canada
  Manitoba,
    Saskatchewan,
    British Columbia

- USA
  Michigan,
  Wisconsin?

Cros de Georand, France
Washington State Tariff

- Solar PV, Small Wind, & Biogas
- Contract Length: 9 years
- $0.66 CAD/kWh + $0.06 CAD/kWh = $0.072/kWh
- Must be Built in State
- Max $2,600 CAD/Customer/yr
- Max 25 kW (net-metered)
- Wind
  ~$0.15 CAD/kWh + $0.06 CAD/kWh

Paul Gipe, wind-works.org
Washington State Tariff Limitations

- Limited Contract Length
- Limited Size (25 kW)
- Limit on Total Program Size
- Based on “Early Adopters”
- Assumes Renewable Costs will Fall Dramatically
- Costs of Conventional Sources will Rise

Paul Gipe, wind-works.org
PEI Energy Act

- MPS System
  ~$0.0775 CAD/kWh
  20 year Contracts
  No Restrictions
  Program Review 5 yrs
  $0.02/kWh of Tariff
  Adjusted with Inflation

Paul Gipe, wind-works.org
California Solar PV Performance-Based Incentive

- 3,000 MW Target
- Incentive, Not a True Tariff
- Behind the Meter (Net Metering)
- All Must Have Meters
- >100 kW: $0.52 CAD/kWh for 5 yrs
- >30 kW after 2010
- <30 kW “Estimated” PBI

Paul Gipe, wind-works.org
California Performance-Based Incentive

- Equivalent to Capital Subsidy Program
- Timid Alternative to Capital Subsidy
- Defeat of Schwarzenegger’s SB1
- Renewable Tariffs for Commercial PV
Minnesota’s C-BED (Community-Based Energy Development)

- NPV Payment Stream
- Negotiated Discount Rate
- Negotiated Tariffs
- To Provide NPV of $0.031 CAD/kWh
- Term: 20 yrs
- 15% Renewable by 2010

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

- 100 MW Signed Contracts
- 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)

- Typical Size: 4-20 MW
- Transmission Voltages (66 kV+)
  But Not Required Can Be Distributed
- Utility Requires Escrow Fund
  For Second Portion of Contract Period

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

- Intended for Locally-Owned Wind
- Depends upon Aggressive Tax Design
- Higher Costs Could Hurt Effectiveness
- O&M Too Low?
- Revenue Stream Very Low in Later Years
How To Get There

- **Need New Champions**
  Washington/Ottawa of Little or No Help
- **Need NGOs To Switch Horses**
  Drop Net Metering, RPS
- **Need Political Champion**
  Governor’s or Premier’s Office
  Political Party Leaders

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


Paul Gipe, wind-works.org

Igny, Lorraine, France
Renewable Tariffs--New Policy Option for North America

www.wind-works.org

Manawatu Gorge, New Zealand