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

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

Paul Gipe, wind-works.org
2007 World Wind Capacity

Megawatts (Thousands)

Year

Europe
North America
Asia

Paul Gipe, wind-works.org
Freiburg -- Germany’s Solar City
Solar Photovoltaic Development

Total Installed MW ( Thousands )

Year

USA
Japan
Germany

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

Paul Gipe, wind-works.org
Buffalo Ridge, Minnesota
Some Fun With Numbers

Paul Gipe; wind-works.org
US Electricity Generation
~4,000 TWh/yr

- Nuclear: 801 TWh/yr
- Hydro: 289 TWh/yr
- Other: 81 TWh/yr
- Fossil-Fired: 2,850 TWh/yr
## Scale Needed: North America

<table>
<thead>
<tr>
<th>Thermal Generation</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>75,000</td>
</tr>
<tr>
<td>USA</td>
<td>1,500,000</td>
</tr>
<tr>
<td>Total</td>
<td>1,600,000</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org

Buffalo Ridge, Minnesota
Electric Vehicle Charging

Paul Gipe, wind-works.org
## Scale Needed: North America

<table>
<thead>
<tr>
<th>Passenger Vehicle Miles</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>50,000</td>
</tr>
<tr>
<td>USA</td>
<td>750,000</td>
</tr>
<tr>
<td>Total</td>
<td>800,000</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org

Bowling Green, Ohio
Scale Needed: North America

• ~2,500,000 MW
• ~120x Today!
Can It Be Done in North America?

- 2,500,000 MW / 200,000 MW/yr
- ~12.5 yrs
- <20 years Heavy Truck Production
  Thermal Generation
  Passenger Vehicle Miles
- Yes, It Can Be Done
- But Not At Current Pace

Paul Gipe, wind-works.org
USA & Canada 100% Renewable?

Yes! It Can Be Done!

But Not With Current Policies

Paul Gipe, wind-works.org
Cowley Ridge, Alberta
North America
Better Than Germany?

- More Land
- More Wind
- More Hydro
  For Backup & For Storage
- Fewer People

Paul Gipe, wind-works.org
North America Better Than Germany?

• Biomass: Forests and Wood Wastes?
• Solar PV: Much Better than in Germany
• Geothermal: More Than We Thought
• North America Has it All

Paul Gipe, wind-works.org

Buffalo Ridge, Minnesota
North America is Capable of Huge National Undertakings

- TVA, BPA, WPA
- Ontario Hydro, Hydro Quebec
- Civil Rights, Anti-Smoking

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
Solar PV Growing Rapidly

- 2007: 8,000 MW Worldwide
- 2,500+ MW/yr
- $20+ Billion
- Major Markets
  - Germany--1,000+ MW/yr
  - Spain--400 MW/yr
  - Japan--250 MW/yr
  - California--100 MW/yr

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

MW Total (Thousands)

Year

Renewable Tariffs Launched
100,000 Rooftops
1,000-Rooftops (2,500 x 3kW)

Paul Gipe, wind-works.org
World PV Capacity 2007
~8,000 MW

Germany 53%
Japan 28%
USA 11%
Rest of World 7%

Paul Gipe, wind-works.org
Solar PV in Germany 2007

- 150,000 New Systems
- €6 Billion
- Total of 450,000 Systems
- ~1,100 MW in 2007!
- Total 4,000 MW
- ~2% Supply in Bavaria
- ~1% Supply in Germany

Paul Gipe, wind-works.org
German Homeowners

- 500 MW on Home Rooftops/yr
- 2,000 MW+ Total
- 2 TWh/yr
- ~ €1 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 2007
- ~1,500 MW Total in 2007 (€9 Billion)
- ~1.5 TWh/yr (€700 Million)
Germany’s Renewable Tariffs
The Results (2007)

- Renewables 14% of Supply
- Renewables 8.5% of Primary Energy
- 70,000 Employed in Wind Industry
- 40,000 Employed in PV Industry
- 8,000 Employed in Biogas Industry
- 250,000 Employed in Renewables
- €32 (~$50) Billion Turnover

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
Renewable Tariff Design

• Simple, Comprehensible, & Transparent
• Priority Access & Purchase
• Prices Sufficient for Development
• Lengths Sufficient for Profitability
• Fair But Not Undue Profit
• Price Differentiation
## 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
## Renewable Tariffs Inflation Adjustment

<table>
<thead>
<tr>
<th>Location</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>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 Regions
- For Different Resource Intensities

Paul Gipe, wind-works.org
French Solar PV Tariffs

*Plus 50% tax credit on hardware.

**Regional Tariff Term: 6 years.

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

2009

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

Paul Gipe, wind-works.org

Germany

France

$USD/kWh

2009
Prices Paid for Biomass in Europe

Paul Gipe, wind-works.org

2009
Renewable Tariff Design
Price Regulation

- Provides Predictable Results
- Provides Rapid Results
- Provides Opportunity for All Players
  . . . And For All Technologies
- Provides Opportunity Geographically
- Provides Dispersed Wind Development

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
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

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)
French Wind Tariffs Pre-2006
Average Price vs Initial Price

Euro Cents/kWh

Year

23% CF
30% CF
41% CF

Paul Gipe, wind-works.org
French Wind Tariffs 2006

Year

0
0.05
0.1
0.15

$CAD/kWh

27% CF (900 kWh/m²)
32% CF (1,100 kWh/m²)
41% CF (1,400 kWh/m²)

Exchange Rate November 2008.

Paul Gipe, wind-works.org
Renewable Tariffs

The Philosophical Context

Paul Gipe, wind-works.org

Geothermal: Colline Metallifere, Italy
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 Contracts (PPAs)
  Elite Few or All Who Want Them?

• How To Pay For Them
  RECs/ROCs/Green Tags
  Subsidies (PTC, EcoEnergy)
  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
  Margin Determines Rate of Growth
• High or “Premium” Prices Deliver
  More Generation More Quickly and More Jobs

Paul Gipe, wind-works.org
Goderich, Ontario
Market Mechanism Status

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

• Renewable Tariffs
  Typically Non-Anglophone Countries
  Aggressive Targets
Aggressive Targets Require Aggressive Measures

German Renewable Energy Targets

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2020</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>12.5%</td>
<td>27%</td>
<td>45%</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
Myths to Dispel

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

Paul Gipe, wind-works.org
**Political Price-Political Quantity**

*Market Mechanisms*

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

*Both are Market Mechanisms*

Paul Gipe, wind-works.org
EU Policy Mechanisms

Figure 4:
Price ranges (average to maximum support) for direct support of wind onshore in EU-15 Member States (average tariffs are indicative) compared to the long-term marginal generation costs (minimum to average costs). Support schemes are normalised to 15 years.

Comparisons between tradable quotas and feed-in tariff price supports suggest that feed-in mechanisms achieve larger deployment at lower costs.

... analysis suggests that competition is greater...
### IEA: Quota & Feed-in Tariff Cost of European Wind (2005)

<table>
<thead>
<tr>
<th></th>
<th>USD/kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quotas &amp; TGC</td>
<td>0.13-0.17</td>
</tr>
<tr>
<td>Feed-in Tariffs</td>
<td>0.09-0.011</td>
</tr>
</tbody>
</table>

Quotas & TGC: $0.04-$0.06/kWh more costly.

Paul Gipe, wind-works.org
Ernst & Young Germany and Britain Cost of Renewables (2006)

- Germany: 4x more energy generated
- Germany: @ 1/5 relative cost of GB Renewable Obligation Certificates
<table>
<thead>
<tr>
<th></th>
<th>France</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWh 2006</td>
<td>10.5</td>
<td>12.9</td>
</tr>
<tr>
<td>Overcost (Million Euros)</td>
<td>124</td>
<td>611</td>
</tr>
<tr>
<td>CO2 Mitigation (Euros/t)</td>
<td>39.5</td>
<td>86</td>
</tr>
<tr>
<td>Overcost (Euros/kWh)</td>
<td>0.012</td>
<td>0.047</td>
</tr>
<tr>
<td>Relative Cost</td>
<td>0.25</td>
<td></td>
</tr>
</tbody>
</table>

Cécile Bordier, Caisse des Dépôts, Dec. 2008
Over Cost of French ARTs Declining

Figure 9 – Amount of energy from renewable sources and costs linked to the feed-in tariffs

Source: Energy Regulation Commission, 2008, author’s calculations.

Cécile Bordier, Caisse des Dépôts, Dec. 2008

Overcosts, 2008: ~0 due to increase in electricity costs. Bernard Chabot, Nov. 2008.
Cost of German EEG (2007)
~$50/yr/household

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

Paul Gipe, wind-works.org
Often Overlooked
The Value of Predictability

• Renewable Tariffs are Bankable
  More Important Today Than Ever!

• Renewable Tariffs Provide Stable & Predictable Income Streams
Barriers to Renewable Tariffs

• **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**
  Complicate Program Design

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 4 years ago
  “You’re Absolutely Nuts!”
• Today? No
• Now Possible
• Growing Trend
  in both USA & Canada

Paul Gipe, wind-works.org
Gaspé, Quebec
Market Mechanisms Status

- Renewable Tariffs Developing Momentum
The Mood Has Changed

• Ontario Moved First
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
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
  Used Specific Yield Not Capacity Factor
  Used Chabot PIM to Determine 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
Schauinsland, Badem-Württemberg, Germany
## 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
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

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

• Under Review (Green Energy Act)
• Revisiting
  Prices
  Price Differentiation
  Differentiated Tariffs for Wind
  Inflation Indexing (60%)
• Add Offshore Wind?
• Add Solar Thermal?
  $0.14-$0.25/kWh

Paul Gipe, wind-works.org
Ontario Solar Tariff
North American Comparison

$ CAD/kWh Over 20 Years

- California Buy-Down
- California Solar PBI
- Washington State
- New Jersey RPS
- Wisconsin
- Ontario Solar Tariff

Paul Gipe, wind-works.org
Solar PV Tariffs Worldwide

*Limited duration with net-metering.

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

<table>
<thead>
<tr>
<th></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>
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<tr>
<td>Cost-Based Tariffs</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<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>
</tr>
<tr>
<td>Wind Offshore</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<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

- British Columbia, New Brunswick
- Michigan, Illinois, Indiana!
- Minnesota & Rhode Island
- California--Feed-in Fever
- US House & US Senate
Michigan’s Renewable Energy Sources Act

- Reduce Price Volatility
- Reduce Long-Term Prices
  Pay Little More Now
  Avoid Paying More Later
- Reduce CO$_2$ Gases
- Create New Jobs
Midwest Wind Tariffs 2009

Does Not Include Federal Production Tax Credit.

Paul Gipe, wind-works.org
## Midwest Solar PV Tariffs

<table>
<thead>
<tr>
<th>Project Size</th>
<th>$/kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30 kW</td>
<td>0.50</td>
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<tr>
<td>&gt;30 kW&lt;100 kW</td>
<td>0.45</td>
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<tr>
<td>&gt;100 kW&lt;1,000 kW</td>
<td>0.40</td>
</tr>
<tr>
<td>&gt;1,000 kW</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Includes Federal Investment Tax Credit.

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
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 . . .

Matane, Quebec

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

Paul Gipe, wind-works.org

Hinesburg, Vermont
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