Disclaimer: The views expressed are those of Paul Gipe and are not necessarily those of the sponsor.

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Paul Gipe, wind-works.org
What Do These Countries Have in Common?

- Mongolia
- South Africa
- Bulgaria
- Bosnia
- Iran
- Germany
- Spain
- Ireland
- China
- Slovenia
- Thailand
- Croatia
- Serbia
- France
- Portugal
- Uganda

Partial List of Countries with Feed-in Tariffs
Paul Gipe, wind-works.org
Feed-in Tariffs--FITs
(Advanced Renewable Tariffs)
by
Paul Gipe
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
European Renewable Policy

- 20/27 States Use FITs
- 3/27 States Use FITs for PV Alone
- In EU Since 1997
  - 85% of all Wind from FITs
  - ~100% of all Solar PV from FITs
  - ~70% of all Biogas from FITs
- FITs Most Cost-Effective Policy
- FITs Principal Way to Meet Targets

Fraunhofer Institute: www.reshaping-res-policy.eu
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 . . .
  . . . 20 EU countries

Paul Gipe, wind-works.org
2009 World Wind Capacity

Megawatts (Thousands)

Year

Europe
North America
Asia

More than 1/2 From Feed-in Tariffs

Paul Gipe, wind-works.org
2009 World Wind Capacity

38,000 MW

77,000 MW

42,000 MW

Paul Gipe, wind-works.org
2010 Solar PV Capacity

- 35,000 MW Worldwide
- 15,000+ MW/yr
- $50+ Billion

Major Markets

- Germany -- 8,000 MW*
- Italy -- 1,500 MW/yr*
- Japan -- 500 MW
- USA -- 800 MW/yr
- California -- 250 MW/yr

*Feed-in Tariff Market
Paul Gipe, wind-works.org

Rancho Seco, California
World Solar PV Capacity 2010
~35,000 MW

More than 3/4 from Feed-in Tariffs

Paul Gipe, wind-works.org
German Biogas Development

USA 2009: ~150 plants, 50 MW.
German Biogas Association from Heinrich Böll Stiftung: ~5,000 plants, ~8TWh/yr.
Paul Gipe, wind-works.org
French Wind & Solar Generation

Solar

Wind

Paul Gipe, wind-works.org
### European Projected Development 2010 with Feed-in Tariffs

<table>
<thead>
<tr>
<th>Country</th>
<th>Wind</th>
<th>Solar PV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>2,500</td>
<td>8,000</td>
</tr>
<tr>
<td>Spain</td>
<td>2,500</td>
<td>50-100</td>
</tr>
<tr>
<td>France</td>
<td>1,000</td>
<td>400</td>
</tr>
<tr>
<td>Italy</td>
<td>Quota</td>
<td>1,500</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
## European 2011 Feed-in Tariffs

<table>
<thead>
<tr>
<th>Country</th>
<th>Wind</th>
<th>Solar PV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>Stable</td>
<td>2011 Cuts in Two Steps: 2,500-3,500 Growth Corridor</td>
</tr>
<tr>
<td>Spain</td>
<td>New Limits on Full Load Hours</td>
<td>Cuts Made 2010</td>
</tr>
<tr>
<td>France</td>
<td>Stable</td>
<td>Raised Tariffs, New Differentiated Tariffs, 3-month Suspension</td>
</tr>
<tr>
<td>Italy</td>
<td>Quota (RPS)</td>
<td>2011 Cuts: New Target; 3,000 MW 2011-13</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
<table>
<thead>
<tr>
<th>FIT Programs in Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finland</td>
</tr>
<tr>
<td>Great Britain</td>
</tr>
<tr>
<td>Malaysia</td>
</tr>
<tr>
<td>Philippines</td>
</tr>
<tr>
<td>Nova Scotia</td>
</tr>
<tr>
<td>Vietnam</td>
</tr>
<tr>
<td>Botswana</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
Europe Dominates 2010 PV Market

• Germany + Italy + Czech Republic
• = 11,000 MW
• ~1/3 of Global Market

Paul Gipe, wind-works.org
Friedrich-Whilhelm-Lübke-Koog, Germany
Solar PV in Germany

- ~8,000 MW in 2010!
- Total 17,000 MW
- ~17 TWh/yr of Generation
- New Target: 3,500 MW/yr!
- ~2% Supply in 2010
- 2020: 50-70,000 MW
  10%-12% of Supply

USA: Total of 2,050 MW in 2010.
Paul Gipe, wind-works.org
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
Over Cost of French Renewable Tariffs

Year:
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009

TWh:
- 0
- 5
- 10
- 15
- 20

Million Euros:
- 0
- 50
- 100
- 150
- 200
- 250
- 300
- 350

Legend:
- Million Euros
- Other
- Waste
- Small Hydro
- Wind

Source: www.cre.fr
Paul Gipe, wind-works.org
RECs (RPS) Markets Most Costly

Wind in EU: RPS More Costly Than Needed
Paul Gipe, wind-works.org
Stromrebellen (Electricity Rebels)

• Democratizing Generation
• Creating Local Investment
• Creating Local Jobs
• Creating Opportunity--and Hope
• Denmark, Germany, and
  France, Minnesota, Ontario and . . . ?

Paul Gipe, wind-works.org

Friedrich-Wilhelm-Lübke-Koog, Germany
Ownership of Renewables in Germany 2009

- Individuals: 42%
- Farmers: 9%
- Developers: 15%
- Utilities: 13%
- Investment Funds: 11%
- Regional Suppliers: 7%
- Others: 2%
- Industries: 1%

www.unendlich-viel-energie.de
Paul Gipe, wind-works.org
Ownership of Renewables in Germany 2009

• 51% Farmers & Individuals
• Own 22,000 MW!
  Wind, Solar, & Biogas
• Total Wind in USA only 35,000 MW
  Owned by Utilities, Subsidiaries, & Developers

Paul Gipe, wind-works.org
Local Entrepreneurs Building Local Projects

• 2.6 MW Locally Owned Solar Plant
• Locally Developed, Locally Built, Locally Owned

Nico Petersen, Solar Park Rodenäs
The Farmers of Nordfriesland

- 0.5% of California
  2,000 km²
- 560 MW of Wind
  Community-Owned
  <1% of Land Area
- 1.3 TWh/yr
  More than Altamont, More than San Gorogonio
  ~Tehachapi Pass
  €100 million ($150 million)/yr

Paul Gipe, wind-works.org
Friedrich-Whilhelm-Lübke-Koog, Germany
2009 Solar PV Market in Germany
80% Rooftop (Distributed Generation)

- Rooftop Residential: 12%
- Building Integrated: 1%
- Rooftop Industrial: 14%
- Groundmounted: 19%
- Rooftop Small Business: 54%

Bundesverband Solarwirtschaft (BSW)
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

Groundbreaking in North America
### 2010 North American PV Market

**Ontario Moves into Second**

<table>
<thead>
<tr>
<th>Rank</th>
<th>State</th>
<th>MW 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>California</td>
<td>250</td>
</tr>
<tr>
<td>2</td>
<td>Ontario</td>
<td>168</td>
</tr>
<tr>
<td>3</td>
<td>New Jersey</td>
<td>125</td>
</tr>
<tr>
<td>4</td>
<td>Colorado</td>
<td>44</td>
</tr>
</tbody>
</table>

Clear Sky Partners: ~800 MW/yr

Paul Gipe, wind-works.org
### 2010 North American PV Market

Ontario Moves into Third

<table>
<thead>
<tr>
<th>Rank</th>
<th>Total Installed MW 2010</th>
<th>Rank</th>
<th>Total Installed MW 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>California 1000</td>
<td>2</td>
<td>New Jersey 250</td>
</tr>
<tr>
<td>3</td>
<td>Ontario 215</td>
<td>4</td>
<td>Colorado 100</td>
</tr>
</tbody>
</table>

Clear Sky Partners: ~700 MW in 2011; ~3,000 MW by 2015!

Paul Gipe, wind-works.org
Time for North Americans to Take the Road to the Future

Freiburg, Germany

Paul Gipe, wind-works.org
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
Renewable Energy
The Revolution Has Begun!

www.wind-works.org

Manawatu Gorge, New Zealand