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, DGW, EECA, ES&T, GEO, IREQ, KWEA, MADE, Microsoft, ManSEA, NRCan, NRG Systems, NASA, NREL, NZWEA, OSEA, ORWWG, OSEA, PG&E, SeaWest, SEI/REIO, the Folkecenter, the Izaak Walton League, the Minnesota Project, the Sierra Club, USDOE, WAWWG, and Zond Systems, and written for magazines in the USA, Canada, France, Denmark, and Germany.
Advanced Renewable Tariffs
The Most Effective Method for Developing Renewable Energy
Wind Growing Rapidly

• **Germany**
  2,000 MW in 2004
  20,000 MW by 2006
  30,000 MW by 2012

• **Spain**
  2,100 MW in 2004

• **France**

• **USA**: 500-2,000 MW/yr

• **Growth**: 20%-40%/yr
Installed Wind Capacity Where Canada Stands

- Germany
- Spain
- USA
- Denmark
- California
- Texas
- Canada

Megawatts (Thousands)
Solar PV Growing Rapidly

- 2004: 2,300 MW Worldwide
- 600+ MW/yr
- $7 Billion CAD/yr
- Major Markets
  - Germany
  - Japan
  - California
Installed Solar PV Capacity 2004
Where Canada Stands

Cumulative MW

- Japan
- Germany
- USA
- Spain
- Canada

0 200 400 600 800 1000 1200
Why the European Success?

- #1 Public Involvement
  Germany & Denmark
- #2 Advanced Renewable Tariffs
  16 EU Countries use Electricity Feed Laws
Public Involvement Through Community Power

- More Acceptance
- More Power More Quickly
- More People Involved Locally
- More Money Locally
- More Jobs Locally
What is Community Power?

- Local
  Rooted in and Responsible to the Community
- Locally Owned
  Cooperative, First Nation, Farmer-Owned
- Commercial-Scale Generation
- Small Projects Making a Big Difference
Increasing Acceptance #1

“Your Own Pigs Don’t Stink”

Jutland, Denmark
Why Community Power?

- Participation = Greater Acceptance
- Distributed = Greater Resiliency
- Clean & Green (Mostly)
- Human Scale
- Enables Local Ownership
- New Cash Crop For Farmers
Market Mechanism Status

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

- **Quotas (RPS with RECs & ROCs)**
  Typically Anglophone Countries

- **Tendering**
  Ireland, France & Britain (Failed)
  RPS in Most USA States
  Most Canadian Provinces

Haverigg, Cumbria, Britain
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?
### Renewable Energy Tariffs Status

<table>
<thead>
<tr>
<th>Existing</th>
<th>Regulations Pending</th>
<th>Proposed</th>
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<tbody>
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<td>Austria</td>
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<tr>
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<tr>
<td>The Netherlands</td>
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</tr>
<tr>
<td>China</td>
<td></td>
<td>India</td>
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<tr>
<td>Ireland</td>
<td></td>
<td>California (PV)</td>
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<tr>
<td>PEI, Canada</td>
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<td>Italy (PV)</td>
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<td>Washington State</td>
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<td>Ontario</td>
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<td>Turkey (Wind)</td>
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<td>Czech Republic</td>
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</tr>
<tr>
<td>Minnesota C-BED</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Renewable Tariffs & Solar Photovoltaics in Germany

• 2004
  20,000 New Systems--100% Growth
  CAD$3 Billion Private Investment
  Total of 110,000 Systems
  Cumulative 700 MW
  Twice as Much as Wind in Canada!

• Costs Dropped 25% Since 1999
Photovoltaic Development

Renewable Tariffs Launched

MW Installed per Year

- Canada
- USA
- Germany
- Japan

Year

'90 '91 '92 '93 '94 '95 '96 '97 '98 '99 '00 '01 '02 '03 '04

0 50 100 150 200 250 300 350

Renewable Tariffs Launched

OSEA
German Renewable Generation

TWh Generated per Year

- ARTs (EEG)
- Feed Law (StrEG)

Year

90 91 92 93 94 95 96 97 98 99 '00 '01 '02 '03 '04 '05
Germany’s Renewable Tariffs
The Results

- 110,000 PV Installations
- 2,000 Biomass Plants
- 6,000 Hydro Plants
- 16,500 Wind Turbines
- Total of 135,000 Generators!
Germany’s Renewable Tariffs
The Results

• Renewables from EEG 9% of Supply
• Renewables Generating 40 TWh/yr
• 45,000 Employed in Wind Industry
• 15,000 Employed in PV Industry
• 135,000 Employed in Renewables
• 110,000 Jobs in Wind by 2010
What Has Worked in Europe

• What Works
  Advanced Renewable Tariffs (ARTs)
  Also Known as Electricity Feed Laws

• Proof is in the Market
  ARTs Markets = Many Players
  Quota Markets = Few Players
  RFP Markets = No Manufacturers
Renewable Tariffs
The Philosophical Context

Geothermal: Colline Metallifere, Italy
1. Do We Want Renewables?

- Peak Oil, Peak Gas
  Marginal Costs Higher Than Embedded Costs
- Nuclear Problematic
- Kyoto & Climate Catastrophe
  France & Italy, 2003; 25,000 Dead
- Public Support High
  Large Crowds in Ontario
- Desire for New Manufacturing Jobs
2. If Yes, Then What Works Best?

• **How To Assign Contracts (PPAs)**
  - Negotiated
  - Tendered
  - Standard Offers (Open)

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

• **How To Pay For Them**
  - RECs/ROCs/Green Tags
  - Capital or Production Subsidies
  - PTC or WPPI
  - Advanced Renewable Tariffs
3. If Using a Market Model, Then

• You Get What You Pay For
• If You Want It You Must Pay For It
• Difference Between Cost & Price
  Profit Margin Determines Rate of Growth
• High or “Premium” Prices Deliver
  More Generation
  More Quickly
  More Manufacturing . . . And More Jobs
Political Price-Political Amount Markets

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

 Thousands

- Wind Capacity
- Jobs

2004 Data

OSEA
Tendering or RFP Markets

• Heavy Administrative Burden
• Stop-Start/Boom-Bust
• Little Diversity
• Longer Lead Times
• Few or No Manufacturers
• High Failure Rates
  Britain 70%, France 90%
• Non-Transparent
Advanced Renewable Tariffs

- Create Dynamic Markets
- Ensure Price Stability
- Encourage Manufacturing
- Offer Opportunity to Many Players
  - Farmers
  - Communities
  - Coops
  - First Nations
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

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

• Yes, 2 years ago
• Today? No
• Now Possible
• Growing Trend
  in both USA & Canada
Advanced Renewable Tariffs in North America

• Momentum Building
  PEI
  Washington State (Signed)
  Minnesota C-BED (Passed)
  Oregon PUC Decision
  California (Introduced)
  Ontario (<10 MW Draft)

• Desire for Manufacturing Jobs
• Awareness that ARTs Deliver Results
Advanced Renewable Tariffs
Endorsements

- Ontario Liberal Party
- National Farmers Union
  Ontario & Canada
- Great Lakes United (NGO)
- BCWEA, CanWEA, CanSIA
- Sierra Club (USA)
Advanced Renewable Tariff Design

- Simple, Comprehensible, & Transparent
- Allow Simplified Interconnection
- Prices Sufficient to Drive Development
- Lengths Sufficient for Profitability
- Prices Differentiated by Technology, Size, or Resource
<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Percent of Retail Tariff</th>
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<tbody>
<tr>
<td>Hydro &amp; Biomass &lt; 500 kW</td>
<td>75%</td>
</tr>
<tr>
<td>Hydro &amp; Biomass &gt;500 kW</td>
<td>65%</td>
</tr>
<tr>
<td>Wind &amp; PV</td>
<td>90%</td>
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</tbody>
</table>

*Unlimited duration.
German Wind Tariffs
Reference Yield Method

Year

Euro Cents/kWh

10

8

6

4

2

0

150%
100%
60%

Year

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Wind Energy Prices Paid in Europe

- Highest Prices Not Always from Renewable Tariffs
  Britain, Italy (ROC Markets)
- Spain’s Renewable Tariff Low
  Relative to RPS Markets in Britain & Italy
## Renewable Energy Tariffs Contract Length

<table>
<thead>
<tr>
<th>Country</th>
<th>Wind</th>
<th>Solar PV</th>
<th>Hydro</th>
<th>Biomass</th>
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<tbody>
<tr>
<td>Germany</td>
<td>20</td>
<td>20</td>
<td>20</td>
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## Renewable Energy Tariffs Program Limits

<table>
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<tr>
<th>Country</th>
<th>Wind</th>
<th>Solar PV</th>
<th>Hydro</th>
<th>Biomass</th>
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</thead>
<tbody>
<tr>
<td>Germany</td>
<td>No Limits</td>
<td>No Limits</td>
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<tr>
<td>Spain</td>
<td>13,000 MW</td>
<td>150 MW</td>
<td>2,400 MW</td>
<td>3,200 MW</td>
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<tr>
<td>Denmark</td>
<td>20%</td>
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<td>France</td>
<td>1,500 MW</td>
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<td>1,100 MW</td>
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## Renewable Energy Tariffs
### Inflation Adjustment

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<tr>
<th>Country</th>
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<tr>
<td>Germany</td>
<td>0%</td>
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<tr>
<td>Ontario RFP</td>
<td>15%</td>
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<tr>
<td>France</td>
<td>60%</td>
</tr>
<tr>
<td>OSEA Proposed</td>
<td>15% (100%)</td>
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<tr>
<td>California FSO4</td>
<td>Ramped for Inflation</td>
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</table>
## Renewable Energy Tariffs
### OSEA’s Ontario Proposal

<table>
<thead>
<tr>
<th>Source</th>
<th>Price</th>
<th>Net Present Value</th>
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<tbody>
<tr>
<td>Wind 1-5 (T1)</td>
<td>0.133</td>
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<tr>
<td>High Wind (T2)</td>
<td>0.069</td>
<td>0.047</td>
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<tr>
<td>Medium Wind (T2)</td>
<td>0.09</td>
<td>0.054</td>
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<tr>
<td>Base Wind (T2)</td>
<td>0.133</td>
<td>0.066</td>
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<tr>
<td>Solar PV</td>
<td>0.83</td>
<td>0.414</td>
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<td>Biomass</td>
<td>0.133</td>
<td>0.066</td>
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<tr>
<td>Small Hydro</td>
<td>0.133</td>
<td>0.066</td>
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</table>
OSEA’s Proposed Tariff
Base Wind Case

Years

$CAD/kWh

Base Wind (<650 kWh/m²/yr)
NPV
Potential Economic Benefits of Renewable Tariffs

Kirkby Moor, Britain
## Wind Energy Tariffs
---A Job Creation Engine

<table>
<thead>
<tr>
<th>Europe</th>
<th>Direct</th>
<th>Indirect</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Germany</td>
<td>7,500</td>
<td>37,500</td>
<td>45,000</td>
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<tr>
<td>Denmark</td>
<td>8,600</td>
<td>4,300</td>
<td>13,000</td>
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<tr>
<td>Spain</td>
<td>7,000</td>
<td>15,000</td>
<td>22,000</td>
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<tr>
<td>Total</td>
<td>80,000</td>
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<td></td>
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</tbody>
</table>

Enercon, Aurich, Germany
External Costs of Generation Excluding Climate Change

$CAD/kWh

Oil
Coal
Natural Gas
Wind

EU financed international study: ExternE
Climate Change
External Costs Avoided

€/kWh

External
Total

32$/tC/YOLL
32$/tC/VSL
590$/tC/YOLL
590$/tC/VSL
32$/tC/YOLL
32$/tC/VSL
590$/tC/YOLL
590$/tC/VSL

Olav Hohmeyer, University of Flensburg
Premium Cost of OSEA’s Ontario ARTs Proposal in Year 20

Total Price $0.120/kWh

Wind & Solar Cost $0.001/kWh

1,000 MW Wind; 90 MW PV
Renewable Tariffs are About People— and Opportunity
Advanced Renewable Tariffs
A Question of Equity

• Feed Laws are Fair
• Nearly All Can Play

Farmers, Ranchers, & Co-ops
Advanced Renewable Tariffs
The Method for Meeting Targets

- ARTs Compatible with RPS Targets
  Though ARTs Work Best w/o Caps
- ARTs Deliver More--More Quickly
Renewables: When You Look Closely . . . . . . . Worth Every Cent
Renewable Energy
For Today and for Tomorrow
Technology for Life*

*from N.F.S. Grundtvig