Forum on Renewable Energy Tariffs

Market Mechanism for rapid deployment
Why We Are Here Today
Do We Want Renewables?

- Peak Oil, Peak Gas
  Marginal Costs Higher Than Embedded Costs
- Nuclear Problematic
- Coal, Kyoto, Climate Catastrophe
  France & Italy, 2003; 25,000 Dead
- Public Support High
  Large Crowds of Farmers in Ontario
- Media Finally Paying Attention
If Yes, Then What Works Best?

• **Renewable Portfolio Standards (RPS)?**
  Quotas With Tradable RECs & ROCs
  In USA Requires PTC; Canada, WPPI

• **Tendering or Bidding Systems (RFP)?**
  PPA or Contract with Bid Price

• **Renewable Energy Tariffs?**
  Long-Term Contract (PPA) with Fixed Price
Market Model-The Fundamentals

- 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 Domestic Manufacturing
Renewable Development Goals

• **Primary Goal**
  Produce High Penetration of Renewables
  Build Sustainable Electricity Supply

• **Other Equally Important Goals**
  Equitably Distributed Ownership
  Rural Economic Development
  Sustainable Manufacturing Industry
  Distributed Generation
  Improve Resiliency
  Reduce Transmission Losses
  Firm-Up Variable Generation
Renewable Development Goals

• European experience has shown that renewables reach their fullest potential when there is widespread public acceptance.
• Public acceptance is highest & growth fastest in markets with Renewable Energy Tariffs.
• Primary & secondary goals are met best with Renewable Energy Tariffs
Forum Orientation

- Dr. Scheer, Renewables in Germany
- Hon. Jamie Ballem, Renewables on PEI
- Jim Fulton, Ontario’s Renewable Potential
- Discussion
- Dr. Hvelplund, Renewables and Markets
- Dr. Hohmeyer, External Costs
  How Much are Renewables Worth
- Discussion
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**

*Ole Langniß, Governance Structures for Promoting Renewable Energy Sources, 12/2003.*
Renewable Tariffs Launched

Elements of Success in Europe

- Right Price for Fixed Period
- Right of Interconnection

Year

Thousand MW Total

- Denmark
- Spain
- Germany

Renewable Tariffs Launched

Year
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
Bidding or RFP Systems

• **Cumbersome**
  - Must Have Legal Counsel
  - Maximizes Bureaucracy Not Renewables

• **Complex**
  - 125 Pages Just to Qualify for Bid in Ontario
  - Bid Package Even Larger!

• **Costly**
  - Must Have Large Projects to Cover Fees

• **Non-Transparent**

• **Few or No Manufacturers**
Advanced Renewable Tariffs

- Creates Dynamic Markets
- Ensures Price Stability
- Encourages Manufacturing
- Offers Opportunity to Many Players
  - Farmers
  - Communities
  - Coops
  - First Nations
Advanced Renewable Tariffs

• What Are They?
  Political Price, Not Political Quota
  Simple Contracts

• How Do They Work?
  Simple & Comprehensible
  Little or No Administration

• Where?
# Renewable Energy Tariffs Status Today

<table>
<thead>
<tr>
<th>Existing</th>
<th>Proposed</th>
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<tbody>
<tr>
<td>Germany</td>
<td>Turkey (Wind)</td>
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<tr>
<td>France</td>
<td>Czech Republic</td>
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<tr>
<td>Spain</td>
<td>China</td>
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<td>The Netherlands</td>
<td>California (PV)</td>
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<td>Portugal</td>
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<td>Greece</td>
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<td>Luxembourg</td>
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Political Price-Political Amount Markets

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

![Bar graph showing wind capacity and jobs in different markets with labels and categories.]

- Wind Capacity
- Jobs

Thousands
Germany’s Renewable Tariffs
The Results

• Renewables from EEG 5% of Supply
• 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 ~30 TWh of German Renewables Would do in Ontario Today

Conventional
120TWh/yr

80%

Renewables
30TWh/yr

20%
What ~30 TWh of German Renewables Would do in Ontario with Conservation

- Conventional: 70 TWh/yr
- Renewables: 30 TWh/yr

70% Conventional
30% Renewables
Coping with the Power Crisis
By Increasing Renewables
Why Community Power?

• More Acceptance
• More Power More Quickly
• More People Involved Locally
• More Money Locally
• More Jobs Locally
2003 World Wind Capacity

6,700 MW

30,000 MW

3,200 MW
Wind-Generating Capacity 2003
Where Ontario Stands

Germany
Spain
Denmark
California
Canada
Ontario

Megawatts (Thousands)
Installed Solar PV Capacity 2004
Where Ontario Stands

Germany
USA
Canada
Ontario

0 100 200 300 400 500 600 700
Ontario is a New Market

- Offers Great Promise
- Potentially Large Market
- Lure to Manufacturers
  Not Yet Too Late
- New Markets Grow Fast
  When Conditions are Right
Growth quickens in new markets

- "Take-Off" is shorter
- Benefit from experience
- Better turbines
- Bigger turbines

27 m, 225 kW
80 m, 1.8 MW
# Growth Quickens in New Markets

<table>
<thead>
<tr>
<th>Years to</th>
<th>2,000 MW</th>
<th>4,000 MW</th>
<th>8,000 MW</th>
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<tbody>
<tr>
<td>Denmark</td>
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<td>Spain</td>
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<td>1.5</td>
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<tr>
<td>Ontario</td>
<td>?</td>
<td></td>
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</tbody>
</table>
Community Wind
A Vision to Excite the Imagination

- 2,000 MW in 4 years?
- 4,000 MW in 6 years?
- 8,000 MW by 2012?

10% of Electrical Energy
OSEA’s ARTs Proposal for Wind Energy

Year

Lakeview

Lakeview + Lennox

Lakeview + Lennox + Lambton

Thousand MW

0 2000 4000 6000 8000

2005 2006 2007 2008 2009 2010 2011 2012
Ontario Job Growth from Wind with ARTs

Person-Years of Employment

Year

Service
Manufacturing

2005 2006 2007 2008 2009 2010 2011 2012
Premium Cost for Wind Energy with OSEA’s ARTs in 2012

- Total Price: $0.120/kWh
- OSEA Tariff Cost: $0.004/kWh
- 8,000 MW
- 10% of Supply
Comparable Investments*
$1 Billion CAD

Pickering A1
12 Year Life
65% CF

Ontario Wind
25 Year Life
20% CF

*Pickering A1 Plant Costs Already Sunk
External Costs of Generation

Oil
Coal
Natural Gas
Wind

$\text{CAD/kWh}$

0 0.02 0.04 0.06 0.08 0.1 0.12 0.14

EU financed international study: ExternE
Climate Change External Costs Avoided

Olav Hohmeyer, U. Flensburg

€/kWh

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

Wind
Water
PV
Biomass

Year

Olav Hohmeyer, U. Flensburg
Bruce Contract Negotiations

• MoE Enters Negotiations with Bruce
• Long-Term, Fixed-Price Contract
• Differs Little from Renewable Tariffs
  Long-term, Fixed-Price Contract
• We’re Happy to Begin Negotiations
  Committee of Renewables Advocates
  Wind, Solar PV, Biomass, Low-Impact Hydro
Renewables:
When You Look Closely
They Are Worth Every Cent
Community Renewable Energy
For Today and for Tomorrow
Technology for Life*

*from N.F.S. Grundtvig