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.
Ontario’s Standard Offer Program


Paul Gipe, wind-works.org

Igny, Lorraine, France
We Can Do Better!

Bill Kemp, PowerBase
Advanced Renewable Tariffs for Ontario

- 20 Year Contracts
- <44kV, <10 MW
- Wind, Solar, Hydro, Biomass
- Inclusive--Open to All
- No Program Cap

Paul Gipe, wind-works.org
Ontario’s SOC/ARTs

- Project Size Limit: 10 MW
- Contracts Open to All?
- Simplified Interconnection?
- No Cap or Limit on the Program
- All after January 1, 2000 Included
- Program Review Every Two Years
- Contracts November 2006

Paul Gipe, wind-works.org
# Advanced Renewable Tariffs
## Ontario Pilot Program

<table>
<thead>
<tr>
<th>Source</th>
<th>Initial Price ($CAD/kWh)</th>
<th>Average Price (Teq) ($CAD/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind 1-5 (T1)</td>
<td>0.133</td>
<td></td>
</tr>
<tr>
<td>High Wind (T2)</td>
<td>0.069</td>
<td>0.091</td>
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<tr>
<td>Medium Wind (T2)</td>
<td>0.09</td>
<td>0.105</td>
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<tr>
<td>Base Wind (T2)</td>
<td>0.133</td>
<td>0.133</td>
</tr>
<tr>
<td>Solar PV</td>
<td>0.83</td>
<td>0.83</td>
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<tr>
<td>Solar PV (Soft Loans)</td>
<td>0.67</td>
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<tr>
<td>Biomass</td>
<td>0.133</td>
<td>0.133</td>
</tr>
<tr>
<td>Small Hydro</td>
<td>0.133</td>
<td>0.133</td>
</tr>
</tbody>
</table>

Paul Gipe, wind-works.org
OSEA T2 Wind Tariff
Years 6-20

Tariffs versus energy yield per kWh/m²

\( t = 5\% \text{ (real), } n = 20 \text{ years, } \text{Kom} = 4\%, \text{ } \text{Iu} = 675/\text{kWh/m²/yr} \)

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

Paul Gipe, wind-works.org
Standard Offer Contract
Base Wind Case

Paul Gipe, wind-works.org
Standard Offer Contract
Medium Wind Case

$\text{CAD/kWh}

Medium Wind (<900 kWh/m^2/yr)

Paul Gipe, wind-works.org
Standard Offer Contract
High Wind Case

$CAD/kWh

Paul Gipe, wind-works.org
Ontario’s SOC/ARTs

• Wind, Hydro, & Biomass: $0.11/kWh

• Hydro & Biomass
  $0.0352/kWh on peak

• Solar PV: $0.42/kWh

• Inflation Adjustment: 20%,
  Except Solar PV (Punitive?)

• Term: 20 years
Ontario Power Authority
Cost vs Value

- “Market-Based” Loaded Word
- Adders
  Distributed Generation
  Lost Economies of Scale

Recommendation 3.1 The OPA recommends that the price paid for renewable generation under the standard offer program be market-based and include adders for the value of distributed generation and lost economies of scale.

Paul Gipe, wind-works.org
Ontario Power Authority
SOC Pricing--Solar PV

- High Estimated Price: $0.45-0.85/kWh
- “Very Little Price Discovery in Ontario”
- Price Based on CanSIA “Estimate”

The necessary price for solar PV will be quite high – estimates range from 42 to 85 cents per kWh. The OSEA Report set it at five times the initial price for wind or other renewable resources. There is very little price discovery for solar PV in Ontario, however it is expected that system costs result in electricity prices at the high end of the range. One way to obtain more accurate information is to include solar PV in the standard offer program at a price that is estimated based on available information from the industry and other jurisdictions where standard offer contracts are available for solar PV projects. Prices from such a process are likely to be significantly higher than the prices to be paid to other...
OSEA-CanSIA Solar PV Pricing

- Chabot: $0.83/kWh
- Chabot: $0.67/kWh w/ Soft Loans
- CanSIA Price for the Public
  $0.22/kWh Distributed Generation Benefits
  Plus $0.20/kWh Peak Period Price
  = $0.42/kWh
- CanSIA
  OSEA Price Too High = Too Much Growth!
  1/2 OSEA Price = $0.42/kWh

Paul Gipe, wind-works.org
Ontario Power Authority
SOC Pricing--Their Version

Recommendation 3.4 The OPA recommends that the price for renewable resources offered under the standard offer program be based on the following formula:

\[
\text{Base Price} = R + S + T
\]

\[
= R + 0.10R + 0.07R
\]

\[
= 1.17R
\]

\[
= 11.0 \, \text{¢/kWh}
\]

Where,

\[
R = \text{Estimate of the marginal accepted Renewables II RFP project price} = 9.4 \, \text{¢/kWh}
\]

\[
S = 10\% \, \text{Scale bonus} = 0.10R = 0.94 \, \text{¢/kWh}
\]

\[
T = 7\% \, \text{Avoided transmission losses credit} = 0.07R = 0.66 \, \text{¢/kWh}
\]

Thus the Base Price is 11.0 ¢/kWh.

Paul Gipe, wind-works.org
Ontario Power Authority
SOC Pricing--OSEA’s Version

• Struggle Between OPA & MoE over Control of Pricing
• OPA Met with Senior Staff in Premier’s Office
• Premier’s Office Determined “Optics” and Politically Acceptable Price
• OPA Then Wrote Justification

Paul Gipe, wind-works.org
Ontario Power Authority
SOC Peak Period Pricing

- Demonstrate Generation Control
  ie, Not Intermittent
- 35% of Base Price
- Base Price
  $0.0864/kWh + 15% + 90% Confidence
  RFP II ~ $0.094/kWh
  Transmission Credit $0.0066/kWh
  35% of Base Price
- Therefore, $0.0352/kWh, Phew!!!
- Non Transparent Process
  RFP Bids Not Open to Public Scrutiny

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

Euro Cents/kWh

- Feed Law-Germany
- Feed Law-France
- Feed Law-France
- Feed Law-Spain
- Quota-Italy
- Quota-Britain
- Feed Law-Austria
- Feed Law-Ontario

Paul Gipe, wind-works.org
Prices Paid for Solar PV in Europe

Euro Cents/kWh

Feed Law-Germany
Feed Law-France
Feed Law-Spain
Feed Law-Italy
Quota-Britain
Feed Law-Austria
Feed Law-Ontario

Paul Gipe, wind-works.org
Ontario Renewable Tariffs Comparison

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
Ontario SOC/ARTs Results (November-March 2007)

- Residential PV Sales: 250 kW?
- Commercial PV Sales: 40 MW?
- ~20 MW Hydro
- 170 MW Wind
- ~50 MW Installed in 2007?
- ~100 MW/mo in Contracts
- Rush for Connections

Paul Gipe, wind-works.org
Renewable Tariff Design
Periodic Review

- A “Wise & Prudent” Policy
- Ensures Prices are Right
- Ensures that the Program is “Robust Enough”
Ontario’s SOCs: What’s Wrong?

• Tariffs Too Low
  PV: 50% of What’s Needed
  Wind: Only Windy Sites (6.4 m/s)
  Biomass: $0.17 CAD/kWh MoAF

• Inflation Adjustment Too Low
  20% vs 50%: -2.5% ROI
  Excluding Solar Punitive?

• WPPI 50% Claw Back (1/2 cent)

Paul Gipe, wind-works.org
Ontario’s SOCs: What’s Wrong?

- **Wind Tariff Differentiation**
  Not Enough at Less Windy Sites
  Too Much at Windy Sites

- **Fundamental Philosophical Shift**
  Cost vs Value Debate Continues
  Minister of Energy--Yes
  OPA--Absolutely, Positively No!

- **Antiquated Grid**
  7 month Hydro One Backlog!

Paul Gipe, wind-works.org
Ontario’s SOCs: What’s Wrong?

- OSEA Lost the Language Battle
- Language Frames the Debate
  Difficult to Reclaim Once Lost
- Language--Not an Insignificant Issue
  Feed Law --> Renewable Tariffs --> ARTs
  ARTs are not SOCS
  SOCS = Standard Contracts
  ARTs Not Standard--Differ by Technology
- Stick with Feed Law or ARTs

Paul Gipe, wind-works.org
Differentiated Tariffs for Wind

• Distributed Benefits
  Only Accrue From Distributed Generation
  Mega Wind = Centralized Generation

• Differentiated Tariffs Distribute Wind Development

• Reduces Pressure on Windiest Sites
  Profitability Still Higher at Windy Sites

• Reduces NIMBYism
  By Enabling Greater Participation
  By Reducing Pressure on Wind Ghettos

Paul Gipe, wind-works.org
Differentiated Tariffs for Wind

- Increases Program Flexibility
  Lessens Pressure to Get Prices Right the First Time
- Reduces Development Risk
  Developers Often Over Estimate Production
  Determining Final (T2) 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
Ontario’s Standard Offer Program
What’s Next?

• 2 Year Review
• Revisit
  Prices
  Increase Differentiation
  Differentiated Tariffs for Wind
  Inflation Indexing (60%)
• Add Offshore Wind
• Add Solar Thermal
Ontario’s Standard Offer Program
What’s Next?

“. . . Find the right mechanism to spread the use of wind across the province.”

“. . . We will bring the barriers down.

“We did it because it was the right thing to do.”

Minister of Energy Dwight Duncan,
April 12, 2007

Paul Gipe, wind-works.org
What’s Next?
Solar DHW & Solar Space Heating

• Germany
  Proposed Wärme Gesetz
  Costs Spread Across Heating Oil & Gas

• Monitoring Technology Exists
Ontario’s Standard Offer Program
What’s Next?

- Lift Voltage Cap
  Transmission Voltages
- Lift Project Size Cap
  50 MW?
- Priority Access
  Farmers, First Nations, Co-ops?
- Priority Purchase
  Renewables before Nuclear & Coal

Paul Gipe, wind-works.org
What Do Farmers Need?

• Higher Tariffs
  OPA: $0.11/kWh
  Works for Windy Areas
  OSEA: $0.13/kWh in 2004!

• Priority Connection

• Priority Purchase

• Simpler Permitting
  German Farmers are “Privileged”

• Anglophone Val-Éo Model

• Stronger Distribution System
  Ontario’s System Antiquated

Paul Gipe, wind-works.org
Replicating The “Ontario” Model

• Official
  BC, Saskatchewhan, Manitoba

• Unofficial
  Quebec, Nova Scotia, Michigan, USA?

Plus Energy House, Freiburg, Germany
Advanced Renewable Tariffs
A Question of Equity

• Feed Laws are Fair
• Nearly All Can Play
  Farmers, Ranchers, First Nations, & Co-ops
Adam Beck Would be Proud
Ontario’s Renewable Revolution Has Begun

Paul Gipe, wind-works.org
Paying for German EEG

- **Wind, Hydro, Biomass**
  Less than External Costs Avoided
- **Solar PV**
  More than External Costs Avoided
- **Total EEG Expenditures**
  Less than External Costs Avoided
  BMU (German Ministry of the Environment) & UBA (German Environmental Agency)

Paul Gipe, wind-works.org