

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

“The Most Progressive Renewable Energy Policy in North America in Two Decades”

Paul Gipe, wind-works.org

Ignny, Lorraine, France

We Can Do Better!

Bill Kemp, PowerBase

Paul Gipe, wind-works.org



Paul Gipe, wind-works.org

Advanced Renewable Tariffs for Ontario

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



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**

Advanced Renewable Tariffs Ontario Pilot Program

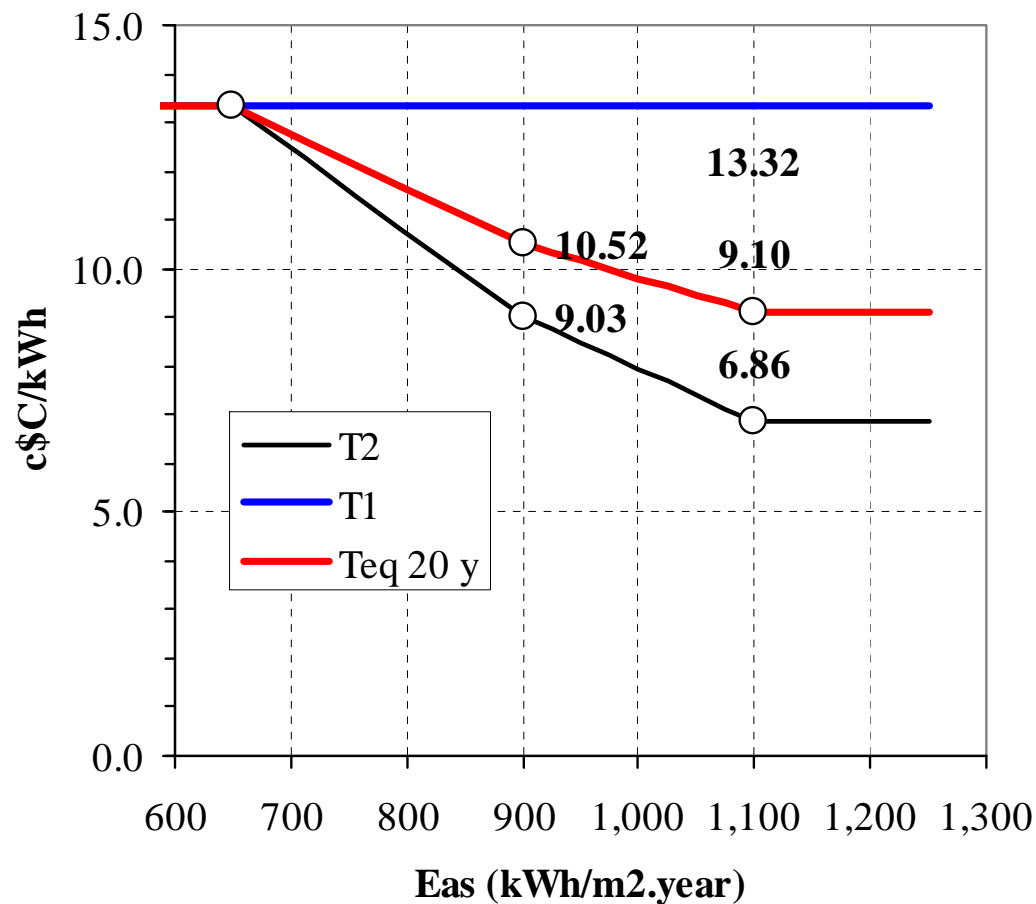
| | Initial Price (\$CAD/kWh) | Average Price (Teq) (\$CAD/kWh) |
|-----------------------|------------------------------|------------------------------------|
| Wind 1-5 (T1) | 0.133 | |
| High Wind (T2) | 0.069 | <u>0.091</u> |
| Medium Wind (T2) | 0.09 | 0.105 |
| Base Wind (T2) | 0.133 | 0.133 |
| Solar PV | 0.83 | 0.83 |
| Solar PV (Soft Loans) | 0.67 | 0.67 |
| Biomass | 0.133 | 0.133 |
| Small Hydro | 0.133 | 0.133 |

OSEA T2 Wind Tariff Years 6-20

Tariffs versus energy yield per kWh/m²

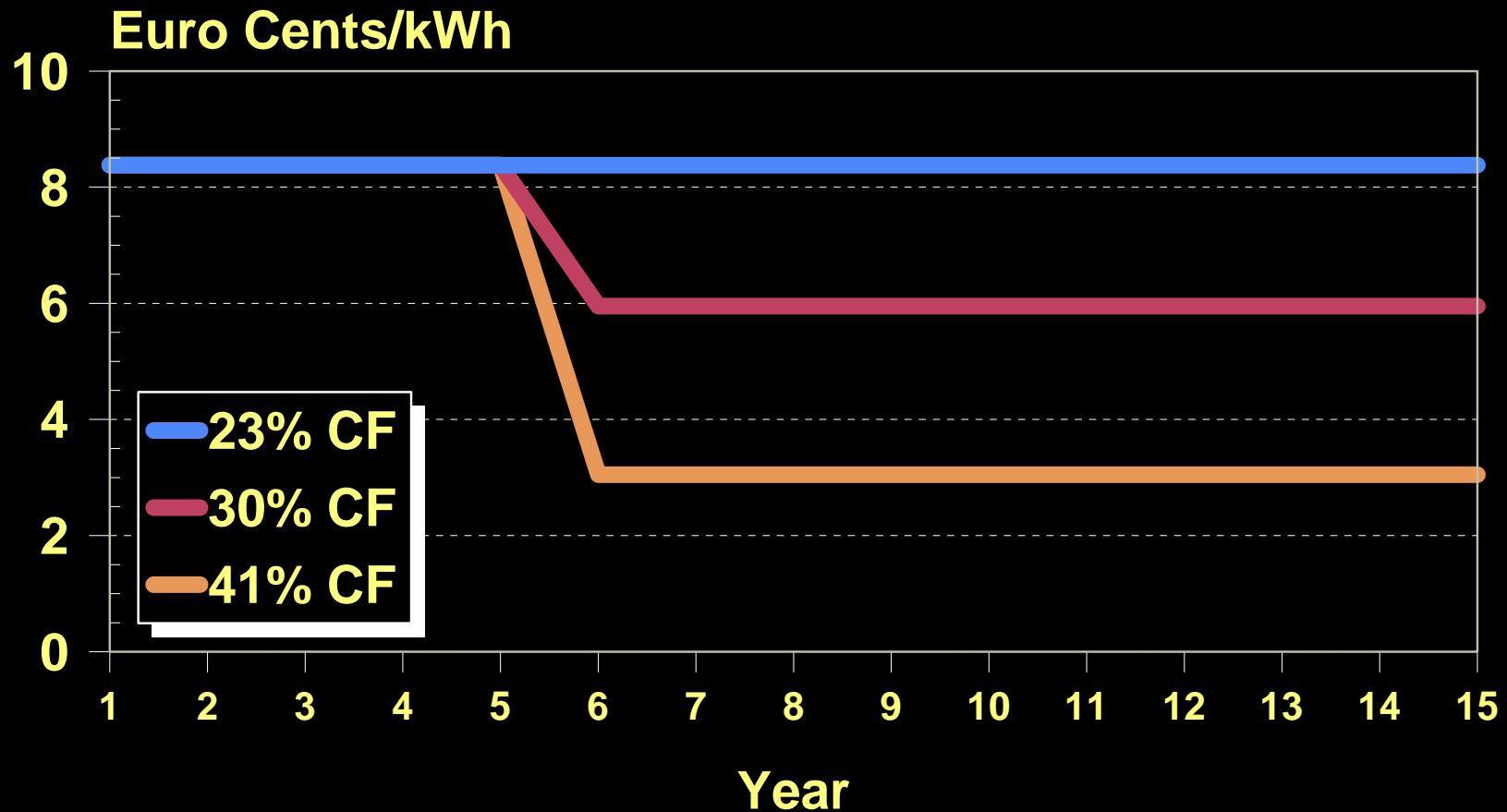
$t = 5\%$ (real), $n = 20$ years, $K_{om} = 4\%$,

$I_u = 675/\text{kWh}/\text{m}^2/\text{yr}$

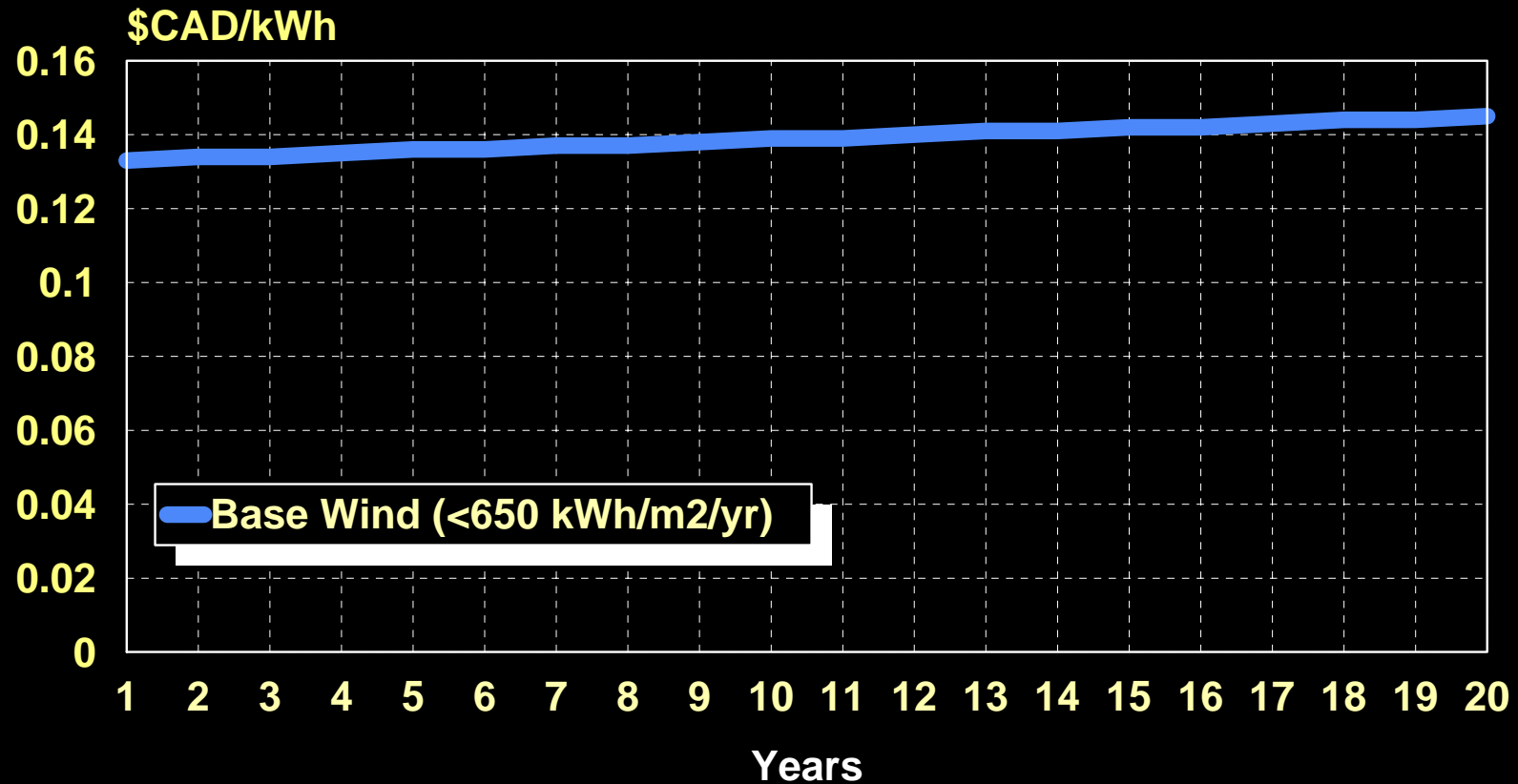


French Wind Tariffs

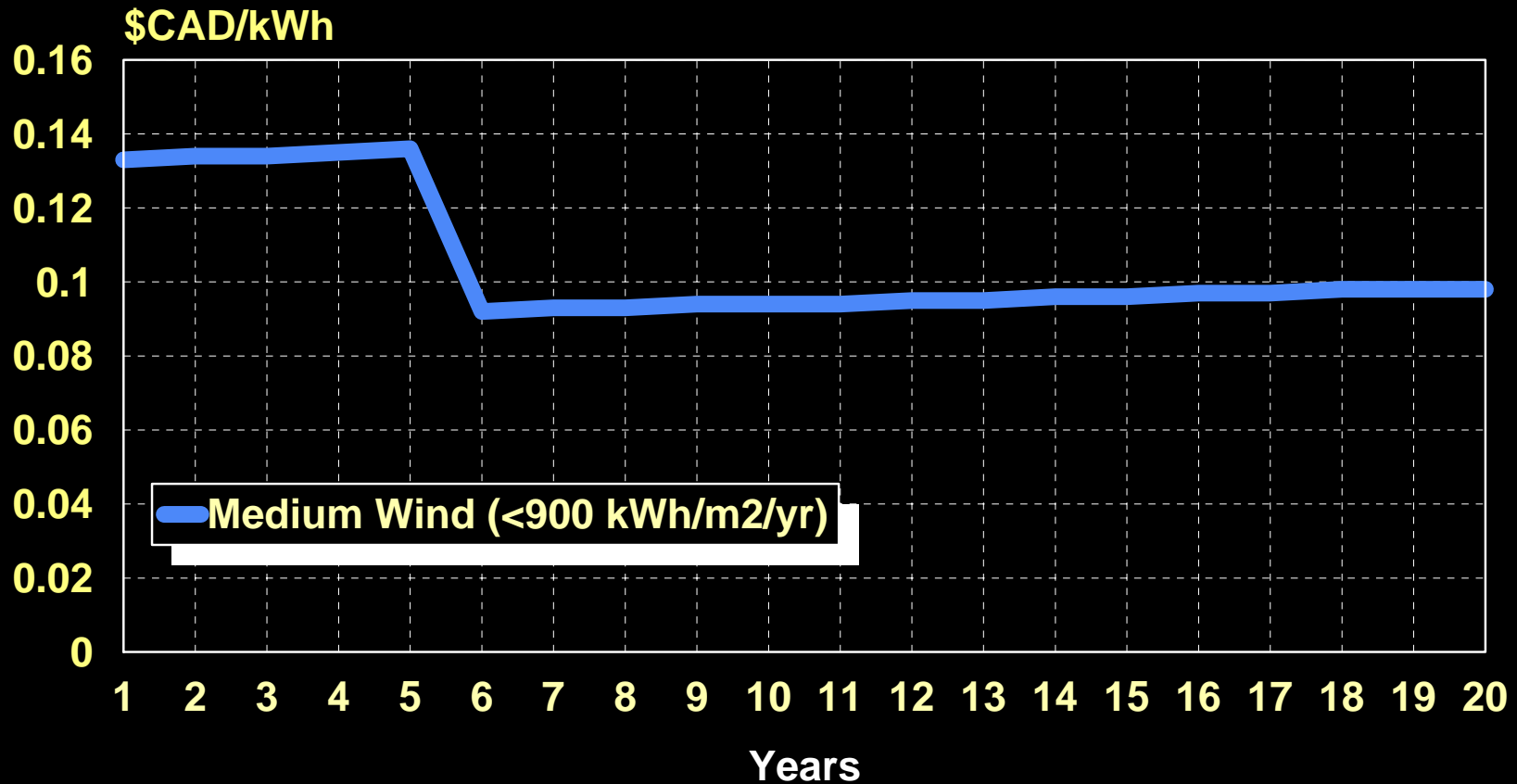
Profitability Index Method



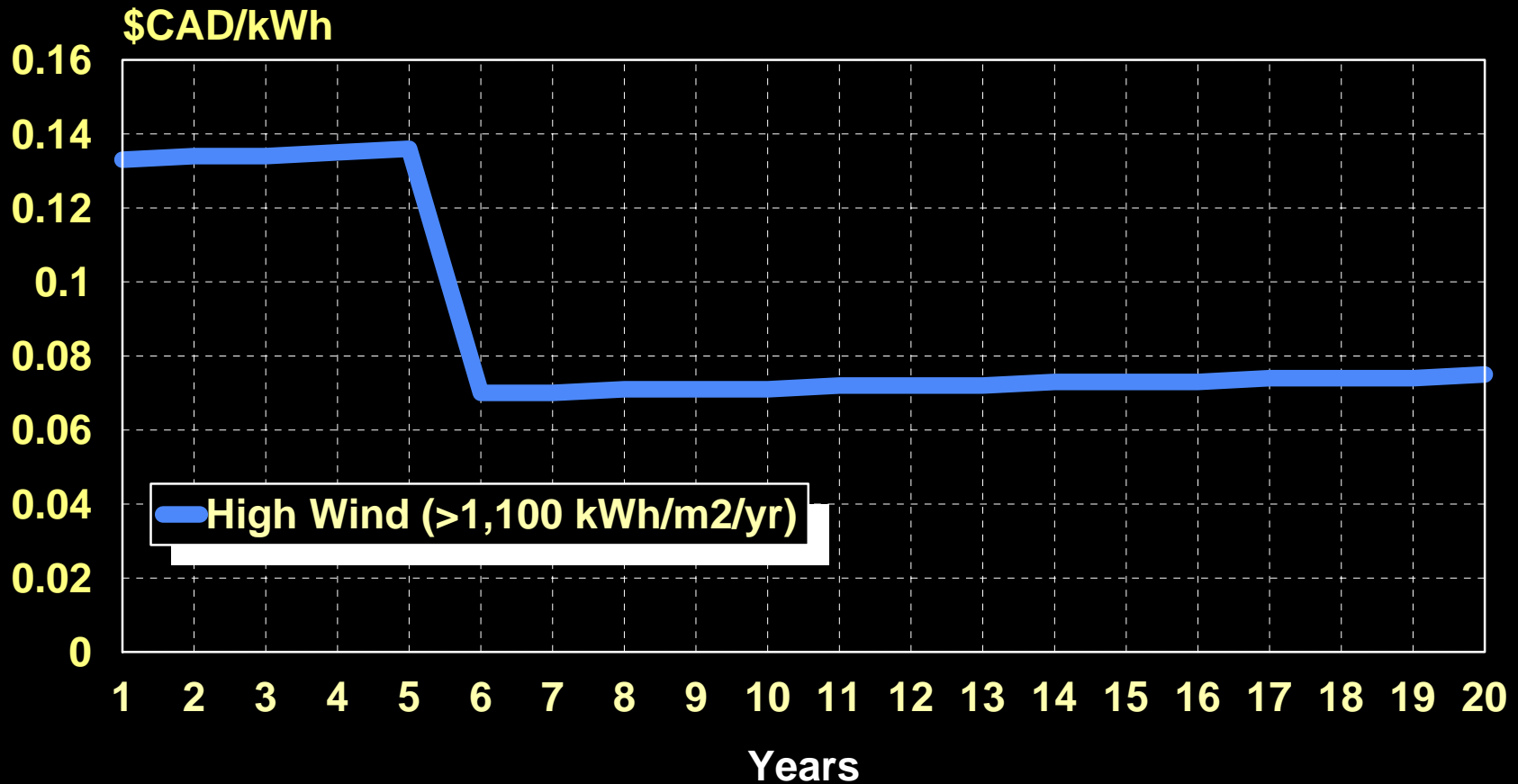
Standard Offer Contract Base Wind Case



Standard Offer Contract Medium Wind Case



Standard Offer Contract High Wind Case



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.

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**

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:

$$\begin{aligned}\text{Base Price} &= R + S + T \\ &= R + 0.10R + 0.07R \\ &= 1.17R \\ &= 11.0 \text{ ¢/kWh}\end{aligned}$$

Where,

R = Estimate of the marginal accepted Renewables II RFP project price = 9.4 ¢/kWh

S = 10% Scale bonus = 0.10R = 0.94 ¢/kWh

T = 7% Avoided transmission losses credit = 0.07R = 0.66 ¢/kWh

Thus the Base Price is 11.0 ¢/kWh.

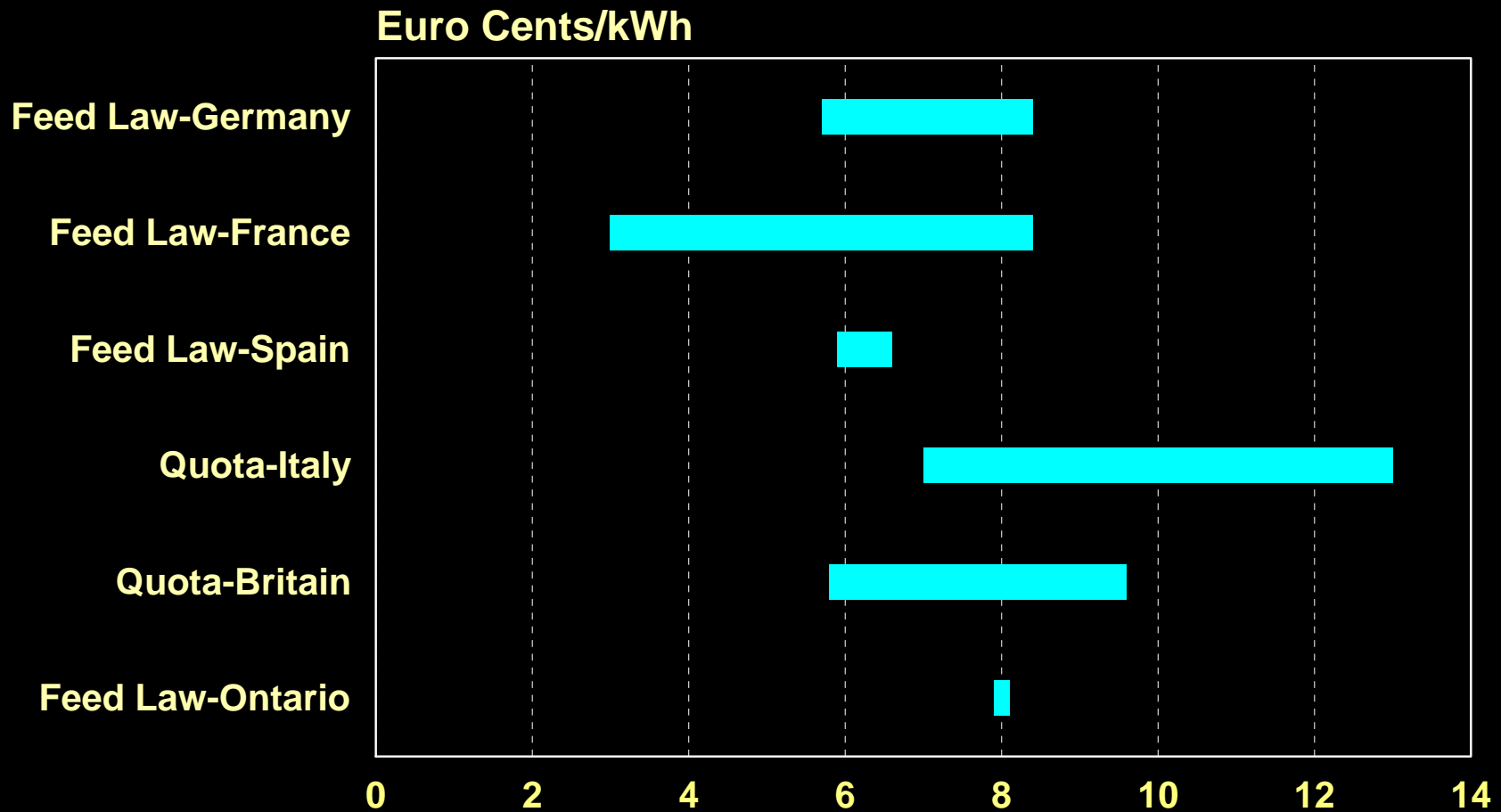
Ontario Power Authority SOC Pricing--OSEA's Version

- **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**

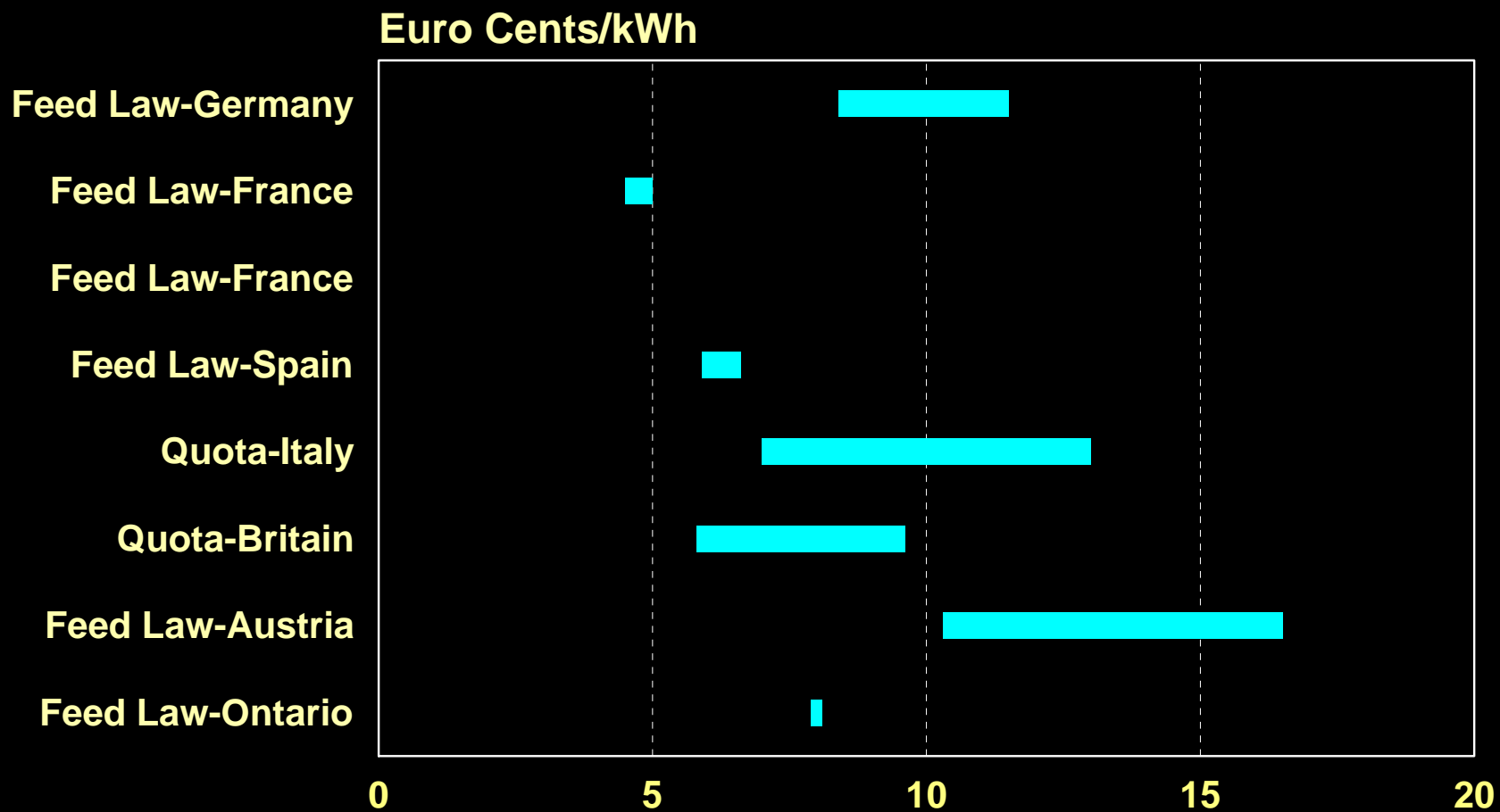
Ontario Power Authority SOC Peak Period Pricing

- **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

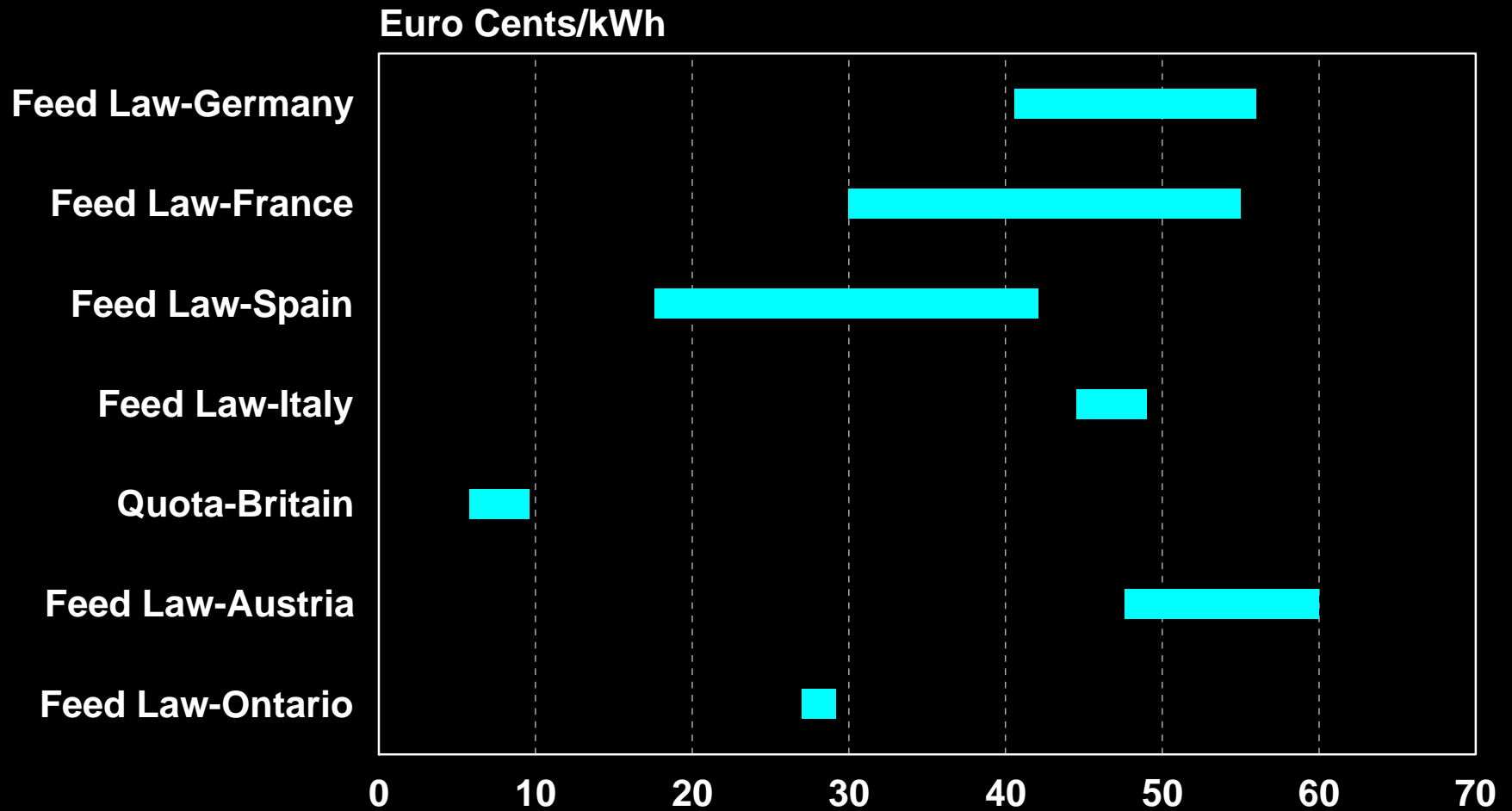
Prices Paid for Wind Energy in Europe



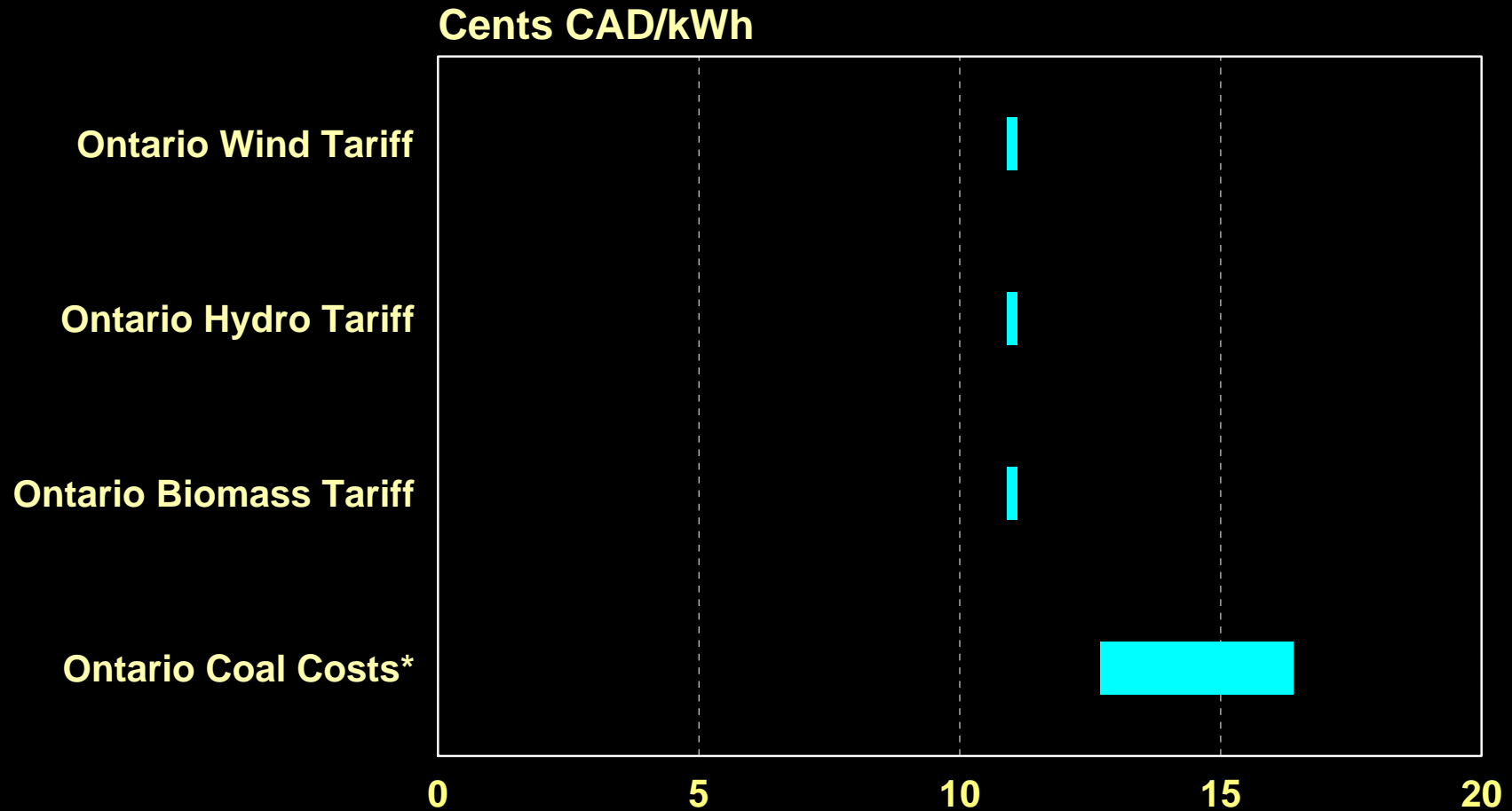
Prices Paid for Biomass in Europe



Prices Paid for Solar PV in Europe



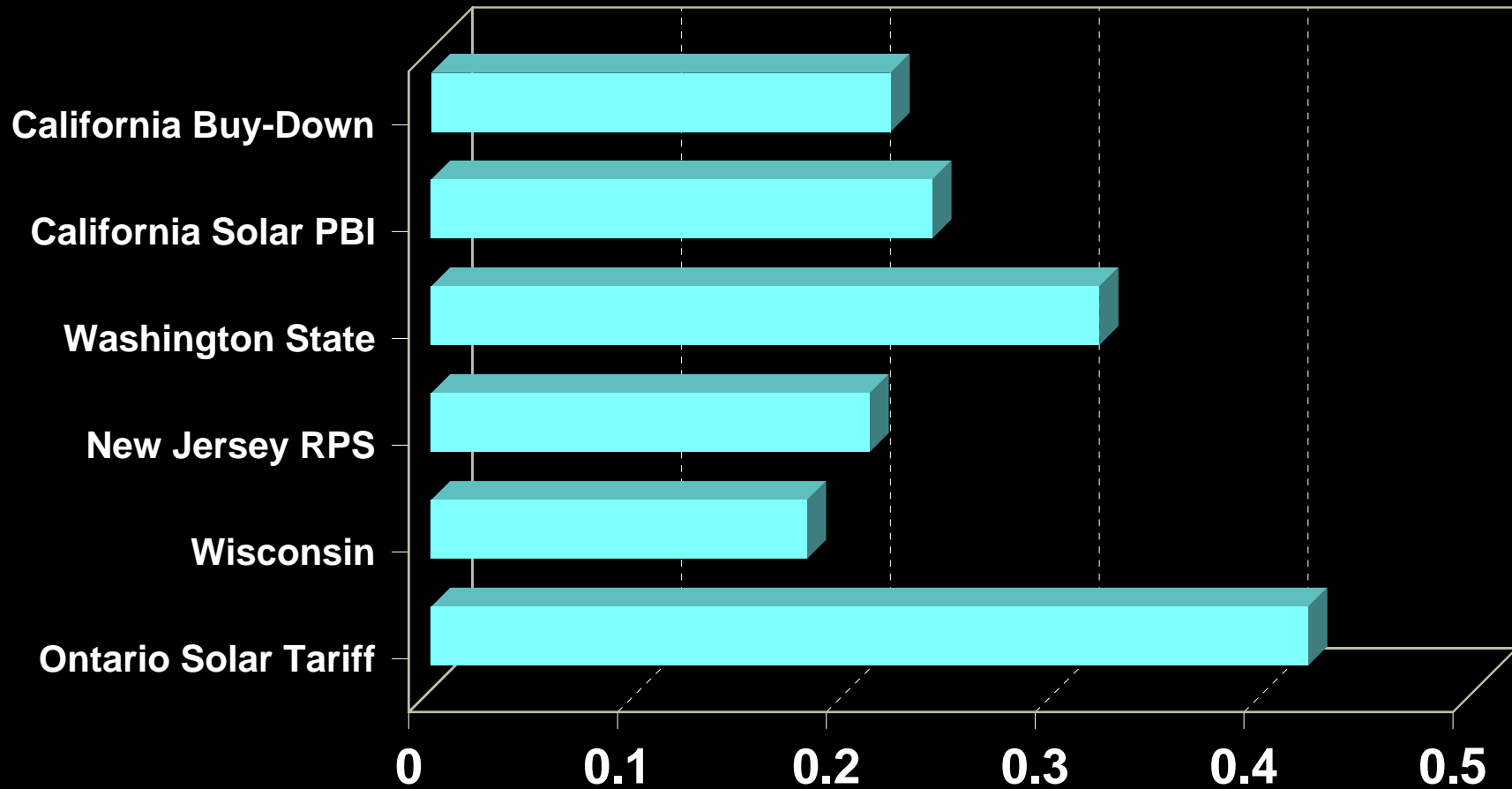
Ontario Renewable Tariffs Comparison



*Cost Benefit Analysis: Replacing Ontario's Coal-Fired Electricity Generation, 2005.

Ontario Solar Tariff North American Comparison

\$ CAD/kWh Over 20 Years



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**

Hamburg Landfill, Germany

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)**

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!

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**
~~Production Based Incentives~~

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

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**

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**

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

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-Évo Model**

- **Stronger Distribution System**

Ontario’s System Antiquated



Replicating The “Ontario” Model



- **Official**
BC, Saskatchewan,
Manitoba
- **Unofficial**
Quebec, Nova Scotia,
Michigan, USA?

Plus Energy House, Freiburg, Germany

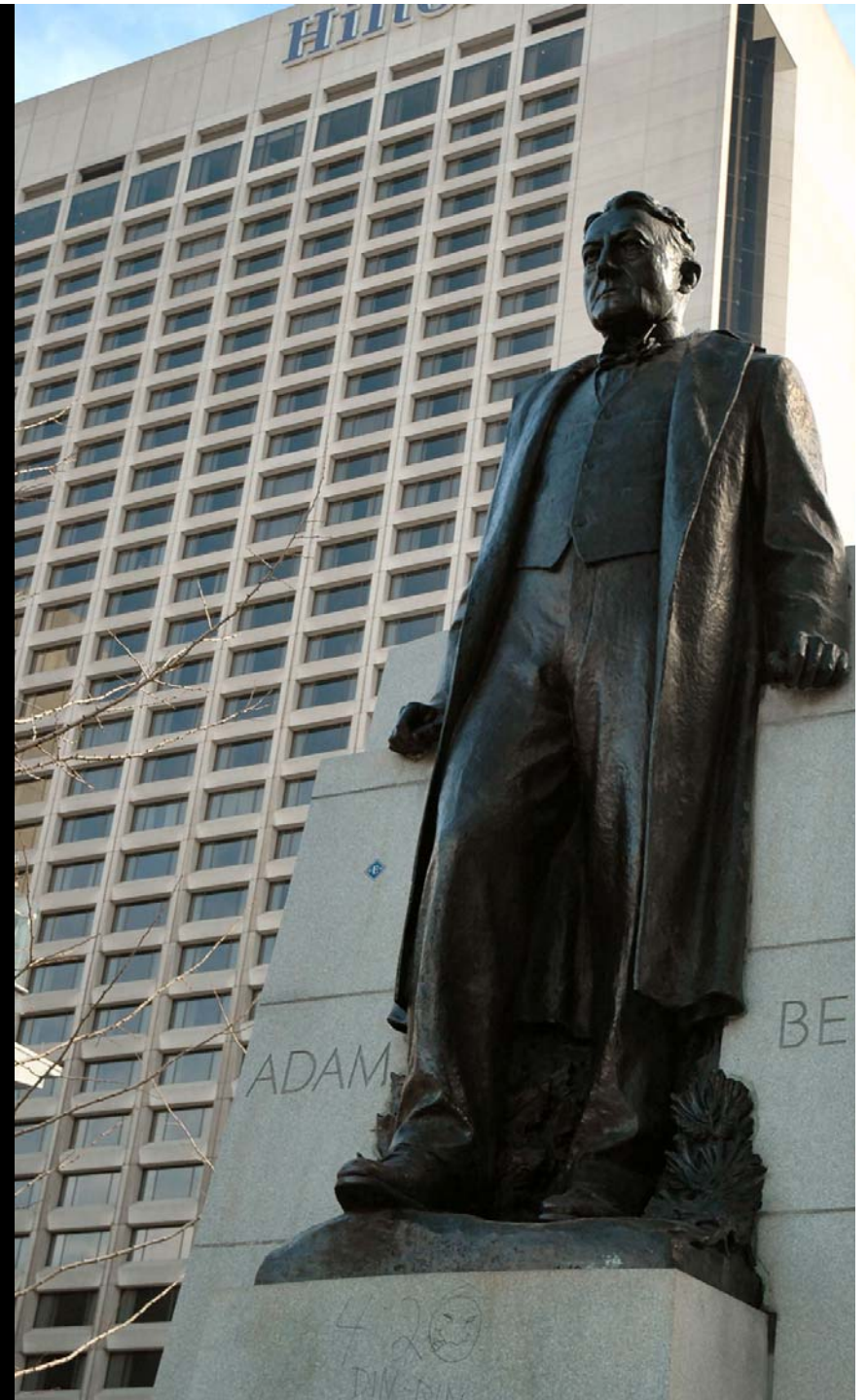
Advanced Renewable Tariffs A Question of Equity

- **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)