

Green Energy Act Alliance

GEAA Feed in Tariff Analysis: Part 1

By Paul Gipe

April 8, 2009

The Green Energy Act Alliance is extremely pleased with the Ontario Power Authority's (OPA) proposed feed-in tariffs. The tariffs are precedent setting in North America not only for the number of different technologies listed, including offshore wind, but also for the prices offered. Moreover, the proposed program has all the essential elements of a successful feed-in tariff policy: no program caps, no project caps (with the exception of ground-mounted solar), and tariffs based on the cost of generation plus a reasonable profit.

However, we do have several suggestions that we believe will make the proposed feed-in tariff program one of the best in the world and place Ontario on a par with world leaders in renewable energy development, such as Germany.

This document is Part I of our response to OPA's proposed feed-in tariff policy.

General Comments

The proposed solar energy tariffs, if implemented, will be the highest in North America. For rooftop solar they will be comparable to those offered in Germany and France. On the other hand, Ontario's proposed tariffs for ground-mounted systems will be less than those in Germany, a country with a comparable solar resource.

OPA's press release suggested that the tariff for rooftop solar PV could result in 100,000 solar installations capable of generating one percent of Ontario's electricity supply. One percent of Ontario's supply is 1.5 TWh or nearly one-third the 2008 solar generation in Germany, currently the world's leader in solar energy.

Similarly, the tariffs for biogas plants will be among the highest, if not the highest in North America. Some Wisconsin utilities offer equivalent tariffs but the contracts are for only ten years. In contrast to Wisconsin, OPA's proposed tariffs include 20-year contracts.

In contrast to the OPA's original Standard Offer Contract program, where there was only one tariff, there are effectively three proposed tariffs in OPA's new feed-in tariff program: onshore, offshore, and onshore community wind. OPA does not differentiate the tariffs further, a serious weakness of the program.

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The wind tariffs proposed are less robust than expected. The tariffs for onshore wind are nearly identical to those proposed by the Ontario Sustainable Energy Association in early 2005. Since that time, the installed cost of wind turbines has increased substantially as has all other associated costs.

The proposed wind tariffs are comparable to those in France (~\$0.135/kWh), but substantially less than those in Germany (~\$0.152/kWh). France has a much better wind resource than that in southern Ontario. The wind resources in Germany are more directly comparable to those in southern Ontario. And unlike in Germany and France, the proposed Ontario wind tariffs are not differentiated by resource intensity.

OPA's proposed tariff for offshore wind is a first in North America. However, it is less than that in Germany and France. The maximum offshore tariff in France and Germany is \$0.21/kWh.

There is insufficient differentiation in both the biogas and hydro tariffs to accommodate the size of the technology most likely to be used by small project developers in Ontario.

The proposed rules also overlook the benefits of not moving all the existing RESOP contracts to the new program.

Summary of Recommendations

- Introduce wind tariffs differentiated by resource intensity with a base tariff of \$0.153/kWh.
- Include 60% to 80% inflation protection of tariffs.
- Include all technologies in Time Differentiated Bonus.
- Define rooftop PV to include small ground-mounted and architectural systems.
- Introduce a new "brownfield" solar PV class and tariff of \$0.65/kWh.
- Increase community-based hydro class from 2 MW to 5 MW.
- Increase community-based hydro tariff to \$0.15/kWh.
- Lower the hydro Time Differentiated Bonus from 35% to 20%.
- Grandfather all existing contracted and completed RESOP contracts, especially all rooftop solar PV.
- Exclude all RFP III CIAs from the legacy reserve.
- Improve transparency and accountability of economic modeling.

Wind Tariff Differentiation by Resource Intensity

While we applaud OPA's proposal for three different wind tariffs, we suggest that the tariffs should be further differentiated by wind resource intensity or productivity. Tariff differentiation by resource intensity

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- Limits unnecessary or excessive profits at the windiest sites, those most likely to be developed first,
- Enables broader geographic participation in the program by spreading opportunity to less windy areas,
- Reduces development pressure on the windiest sites, and the “social friction” that results,
- Provides program flexibility, especially in a province with brittle and limited grid capacity,
- Reduces risks to both banks and developers that revenues will cover debt repayment, and
- Would obviate the need for a special community-based tariff.

The Green Energy Act and OPA’s proposed feed-in tariffs have looked to Europe for guidance on how best to create a “made in Ontario” feed-in tariff policy. Germany has made striking progress with their differentiated wind tariffs and the rapid growth of wind energy in several diverse regions of France is also attributed to their use of differentiated tariffs. It would be unwise for Ontario to ignore the successful lessons from Germany, France, and elsewhere.

Wind energy tariffs vary by resource intensity in four countries: Germany, France, Portugal, and now Switzerland. The tariffs vary by the productivity of the wind turbine. This is a surrogate for wind resource intensity.

The objective of wind tariff differentiation is multifold: to limit unnecessary profits at windy sites, to lessen development pressure on the windiest sites by enabling development in other, less windy sites, provide greater siting flexibility, and reduce development risks to banks and developers.

Programs in both France and Germany have been successful in spreading or distributing development across the landscape in each country. While development still favors the windiest regions, development is not solely concentrated in the windiest regions. Nearly 60% of German wind development is in the interior of the country and has successfully moved away from the coastline as a result of the German policy.

Many of the issues confronting Ontario are similar to those once confronted by Germany. There is growing social friction over the concentration of wind turbines in certain windy parts of southern Ontario. Germany encountered the same opposition along the Baltic Coast and the German system of differentiated tariffs was the result. Germany’s intent was to spread development geographically as much as possible.

The use of a similar policy in Ontario would reduce the social friction (sometimes critically referred to as NIMBYism) associated with the concentration of development near the shores of Lake Huron and Lake Erie.

While the goal of the Green Energy Act is to rapidly develop significant amounts of wind energy, among other renewables, there is no need to overpay for that development. Our analysis indicates that even with ample margins sufficient to spur rapid development, OPA’s proposed tariff will overpay at the province’s

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windiest sites while underpaying at many other sites. Critics of wind energy, and especially those opposed to the Green Energy Act, will quickly seize on the possibility of overpaying for wind development in the windiest areas.

Differentiated tariffs would give OPA the flexibility needed to limit over payment at the windiest sites, while ensuring payments sufficient for development at less windy sites.

Higher payments at less windy sites would enable development for the bulk of the wind potential in southern Ontario, which is far more geographically dispersed than that of the windiest sites. Further, there would be no need for a special tariff for community wind, if there was a sufficient tariff where most farms, First Nations, and community groups are located.

Germany and France each use a different mechanism for determining site productivity and, subsequently, the appropriate tariff. However, both use a trial period after which the productivity is determined. Until mid 2006, both countries used a five-year test period. (France extended its trial period from five to ten years.) During this period, all wind turbines are paid the same tariff. After five years, the average productivity is calculated and this value determines the tariff that will be paid during the years remaining under the contract. Thus, the maximum tariff is fixed to provide a targeted profitability at the targeted sites, but the final tariff paid for more productive sites declines on a sliding scale as a function of productivity.

Switzerland adopted the German differentiated wind tariff system in 2008. Portugal adopted the French system of differentiating wind tariffs by capacity factor in 2005.

Portugal, while a small country geographically, has a population equivalent to that of Ontario. Portugal's differentiated wind tariffs have encouraged dynamic growth. The country has a total of 2,900 MW of wind capacity in operation, roughly similar to that in Great Britain and France, both much larger countries. The success of Portugal's wind industry is largely due to its system of differentiated tariffs.

Countries that have used differentiated wind tariffs have found implementation of such programs administratively straight-forward and have done so with minimal cost.

The GEAA's proposed wind tariffs are based on the French model. However, the French system has been adapted to the Ontario market by the use of average specific yield instead of the more error-prone measure, capacity factor. GEAA's proposal is for a truly "made in Ontario" system that not only would be the first of its kind in North America, but the first of its kind worldwide.

Revised Wind Tariffs

The following proposed tariffs reflect what we consider realistic assumptions in today's market.

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- Return on Equity desired: 13%
- Interest on Debt: 7%
- Total installed cost: \$825/m²
- Annual reoccurring cost: 4.0%

To minimize cost to ratepayers, we have raised the lower tranche of wind resources from OSEA’s original proposal in 2007 of 550 kWh/m²/year to 650 kWh/m²/year, or from average wind speeds of about 5 m/s to 5.5 m/s at hub height. We have also raised the targeted profitability index to 0.35 at annual specific yields of 900 kWh/m²/year and up to 0.55 at yields of 1,100 kWh/m²/year.¹

Proposed Revised Ontario Wind Tariffs			
Yield kWh/m ² /y	Aproximate Average Annual Wind Speed at Hub Height m/s	T _{eq} \$/kWh	T ₂ \$/kWh
650	~5.5	\$0.153	\$0.153
700	~5.7	\$0.149	\$0.146
800	~6.0	\$0.142	\$0.136
900	~6.4	\$0.136	\$0.127
1,000	~6.7	\$0.130	\$0.118
1,100	~7.0	\$0.124	\$0.108
1,200	~7.4	\$0.113	\$0.092

Current wind projects at Kingsbridge and Ripley are delivering 1,100 kWh/m²/yr and this is representative of the best wind sites in Ontario. At these sites, our proposed average equivalent tariff is \$0.124/kWh, nearly \$0.01/kWh less than OPA’s proposed tariffs.

Very good sites in Ontario would receive about \$0.136/kWh or equivalent to OPA’s proposed tariff.

Lower wind sites would receive no more than \$0.153/kWh or only ~\$0.01/kWh more than the OPA’s proposed community wind tariff.

All wind projects would be paid \$0.153/kWh for the first 5 years. Subsequently, beginning in year six through year 20, all projects would be paid the tariff identified as T2 in the chart depending upon their resource intensity.

¹ For an explanation of the profitability index and the calculations used here, see OSEA’s report [Renewables without Limits: Moving Toward Advanced Renewable Tariffs by Updating Ontario’s Groundbreaking Standard Offer Program](#).

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The chart, for illustrative purposes only, shows discrete rows. Tariffs T2 are on a continuum and not limited to the specific figures in the chart. Please consult the original spreadsheet for the calculations used.

We support the inclusion of all projects in this table of tariffs, community and otherwise. We applaud the good intent of the Minister of Energy and the OPA but we recommend sacrificing the “community wind” tariff for a broader range of tariffs that will benefit everyone.

Please note that while we support the inclusion of all projects in the proposed tariffs above and in so doing eliminating a need for a specific community wind tariff, we want to make it absolutely clear that without differentiated wind tariffs as described here, the community wind tariff must remain in place. Further, for the community wind tariff to be effective, the size cap must be lifted to between 20 MW and 50 MW and larger projects be permitted to be constructed in distinct phases.

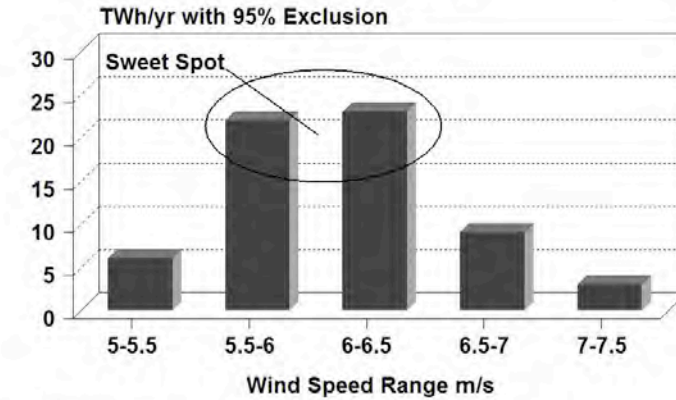
Ontario Wind Resource and Cost to Ratepayers

OPA’s proposed wind tariffs will capture only a portion of the potential wind resources in southern Ontario. Our proposed tariffs differentiated by wind resource intensity will enable the province to use much more of this abundant resource.

The Green Energy Act Alliance retained the wind resource consultant Helimax to estimate Ontario’s wind resources south of the 46th parallel. Helimax calculated the land area that fell within five different wind classes: 5.0-5.5 m/s; 5.5-6.0 m/s; 6.0-6.5 m/s, 6.5-7.0 m/s, and 7.0-7.5 m/s. After excluding 95% of the land area, the remaining 5% would be sufficient to generate 63 TWh per year or more than one-third of Ontario’s current consumption.

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Ontario Wind Potential South of 46th Parallel



Paul Gipe, wind-works.org

Based on our calculations of the cost of generation from today's wind turbines including a reasonable profit, we found that OPA's proposed tariffs would permit profitable development in wind resource classes greater than 6.5 m/s or about 900 kWh/m²/year of average annual yield.

Ontario Wind Potential South of 46th Parallel						
5%						
m/s	Land Area km2	km2	Potential Capacity with 95% Exclusion MW	Annual Specific Yield kWh/m2/yr	Capacity Factor	with 95% exclusion TWh/yr
5-5.5	17,256	863	4,314	500-600	0.15	6
5.5-6	50,276	2,514	12,569	600-800	0.20	22
6-6.5	42,633	2,132	10,658	800-900	0.25	23
6.5-7	13,989	699	3,497	900-1,100	0.30	9
7-7.5	4,027	201	1,007	1,100-1,200	0.35	3
			32,045			63

From data prepared by Helimax for the Green Energy Alliance with 75% exclusion. Further analysis by Paul Gipe.
 Spacing: 5 MW/km² per Helimax; ~7x9 spacing.

OPA's proposed tariff would only capture the windiest sites, less than one-third the wind resource potential of southern Ontario after excluding 95% of the land area. OPA's tariff would exclude the bulk of Ontario's wind resource south of the 45th parallel.

The Green Energy Act Alliance applied our proposed tariffs differentiated by resource intensity to all the wind resources in southern Ontario with the 95% exclusion. Because there are only five wind classes in the Helimax analysis, we averaged our proposed tariffs across the entire wind class. For example, in the

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class 5.0-5.5 m/s, we used the base wind tariff of \$0.153/kWh and for the class 5.5-6.0 m/s, we used an average tariff of \$0.148/kWh.

As expected, our proposed tariffs reduced costs to the ratepayer in the windiest classes by 3% to 13%, while at the same time increasing costs about 10% in the wind class of 5.5-6.0 m/s.

While overall program costs increased under our proposal, the increase is modest, only 3%, or only \$270 million at a hypothetical full build out. This represents the worst-case or most expensive scenario.

It's unlikely with either OPA's proposed tariff or our proposed system of tariffs that the lowest wind speed class would see much if any development. Thus, their costs would not accrue and there would be net savings to ratepayers.

Estimated Cost of Proposed OPA Program and GEAA Proposed Program												
Scenario #1												80
Yield	Aproximate Average Annual Wind Speed at Hub Height	Land Area with 95% exclusion		Rotor Swept Area	Average Yield		OPA Proposed Tariff		GEAA Proposed Tariff		Scenario #1 Difference	
kWh/m2/yr	m/s	km2	m2	m2	kWh/m2/yr	TWh/yr	\$/kWh	\$ million/yr	\$/kWh	\$ million/yr	\$ million/yr	%
500-650	~5.0-5.5	863	862,800,000	10,785,000	575	6	\$0.135	840	\$0.153	950	110	13%
650-800	~5.5-6.0	2,514	2,513,800,000	31,422,500	725	23	\$0.135	3,080	\$0.148	3,360	280	9%
800-900	~6.0-6.5	2,132	2,131,650,000	26,645,625	850	23	\$0.135	3,060	\$0.134	3,030	-30	-1%
900-1,100	~6.5-7.0	699	699,450,000	8,743,125	1,000	9	\$0.135	1,180	\$0.130	1,140	-40	-3%
1,100-1,200	~7.0-7.5	201	201,350,000	2,516,875	1,150	3	\$0.135	390	\$0.119	340	-50	-13%
						Total		8,550		8,820	270	3%
Ontario Wind Potential South of 46th Parallel												
Spacing: 80 m2 land area/rotor area; 7x9 spacing.												
Note: 63 TWh is ~1/3 of Ontario's current consumption.												

Our differentiated tariffs are fairer to all Ontarians than OPA's proposed tariff. They are fairer because they broaden economic opportunity geographically to more of southern Ontario and they are fairer because they don't overpay for wind development at the windiest sites.

Inflation Protection

Specific feed-in tariffs are a function of inflation adjustments. If a tariff is based on the cost of generation plus profit, then the specific tariff can not be determined without knowing the specific provisions for inflation protection. For example, if inflation protection is low or non-existent as in Germany, then the tariff must be relatively higher to attract capital. Conversely, if inflation protection is high, tariffs can be lower than otherwise.

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OPA's proposed tariffs mention inflation protection but do not reveal the specific protection proposed. This calls into question all the tariffs proposed by OPA. As such, the tariffs are not fully transparent until the level of inflation protection is announced.

OSEA had been assured by a senior member of the Ministry of Energy staff in the spring of 2006 immediately prior to the launch of the program that the inflation adjustment would be, at a minimum of 60%. To say that proponents of the RESOP program were "disappointed" doesn't begin to capture the sentiments of everyone involved.

OPA's inflation adjustment in its original RESOP program (20%) was insufficient and was based on a flawed reasoning carried over from other programs. Inflation protection is not for covering the modest increase costs of operations and maintenance over time. Inflation protection is just that, protection of the capital invested in essentially capital intensive technologies. In today's risk-averse capital markets, protecting invested capital against the risk of inflation is more important than ever.

The GEAA's proposed tariffs all assume full inflation protection as has all OSEA's calculations since 2005. We recommend that inflation protection follow the French model: 60% to 80% depending upon technology. Since OPA's proposed tariffs follow many of OSEA's original 2005 recommendations, we suggest that the feed-in tariff program include the original inflation recommendation as well.

Time Differentiated Bonus

We believe that the time differentiated bonus should be extended to all technologies if they can guarantee firm power delivery during peak periods. There should be no blanket exclusion of wind and solar energy from this bonus because of their relatively predictable variability.

If one of the province's policy objectives of the feed-in tariff program is to encourage technological innovation, including all technologies under the time differentiated bonus will spur innovation. We can't today imagine all the possibilities that could exist in the near future. While it is true today that wind and solar are variable resources, we can't anticipate that tomorrow there may be a technological or business innovation that will enable operators to firm up a portion of their generation. The feed-in tariff system should not only enable this, but encourage it.

Solar PV

We are in general agreement with the proposed tariffs for solar PV. The tariffs for rooftop solar PV are similar to our consensus position with the solar industry. The tariff for rooftop PV less than 10 kW in size is equivalent to OSEA's recommendation in 2005 and in 2007.

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Solar PV is most well suited in distributed applications, such as rooftops. However, there are applications where ground-mounted solar PV may be employed without taking any high-value or agricultural land (Class 4 -7) out of production. We suggest creating a separate tariff for ground-mounted, central-station solar PV on permanent brownfield sites, for example landfills, and on non-agricultural land such as or mine tailings areas and degraded forest tracts.

Permanent brownfield sites are those lands where development is prohibited by real or perceived environmental contamination and will never again contribute to urban, agricultural, or forestry use. The Ontario Realty Corporation has many brownfield sites across the province that could be used productively for solar energy in this manner. We suggest using the consensus tariff of \$0.65/kWh for these projects. As in OPA's proposed tariffs, brownfield projects should be limited to 10 MW.

We also note that there are distributed applications of solar PV that are not on rooftops. For example, some homeowners and businesses may not be able to use their rooftops for some reason. Some may prefer the benefits of using a ground-mounted solar tracking system instead of mounting the solar panels on a rooftop. In these cases, consumers should be able to use ground-mounted systems in lieu of a rooftop installation and qualify for the equivalent tariff.

These distributed systems should qualify for the rooftop tariff by redefining rooftop as "distributed applications" or including a broad definition of what is meant by "rooftop". The applicability of this provision could be further limited by size, for example "no greater than 100 kW", and by proximity, for example, "no more than one contract per contract holder within 0.5 km". These provisions should prevent gaming the rooftop category.

There should also be sufficient flexibility in the definitions to allow architectural uses of solar PV under the rooftop tariffs. For example, a shade structure over the sidewalk at the Great Lakes' Science Center in Cleveland is a good example of a purpose-built structure that should qualify for the rooftop tariffs.² In 2007 a similar structure was considered by the Toronto Renewable Energy Cooperative for Toronto's Exhibition Place. However, the project was not profitable under OPA's original RESOP solar tariff, but could be profitable under OPA's proposed rooftop tariff for projects greater than 10 kW but less than 100 kW.

To summarize, OPA's proposed tariffs should be modified to include

- Ground-mounted distributed applications less than 100 kW under the rooftop tariffs
- Sufficient flexibility for architectural treatments.

² See the [Cleveland Science Center Solar Portico](#).

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- New category of ground-mounted systems on brownfield sites or non-agricultural land at a tariff of \$0.65/kWh.

Hydro

Hydro project development was a component of OPA's original RESOP program and the subject of a 2007 Ministerial Directive aimed at promoting hydro projects in northern Ontario. Despite this, only 5% of RESOP contracts awarded were for hydro projects, far less than wind or solar. The Ministerial Directive was never implemented.

Given this lack of success, we recommend that OPA improve procurement of hydro capacity with revised tariffs as well as a further commitment to streamline inter-ministerial approvals.

Specifically, we suggest measures and a tariff which specifically relate to community-scale projects of 5 MW or less.

Small hydro projects have intrinsic and unique operational, environmental and economic development attributes which justify specific tariffs. According to the 2005 Hatch analysis, there are some seventy sites of 10 MW or less with "probable, committed or currently practical" status totalling some 300 MW.

The benefits of small hydro include

- Typically long-lived assets of 60-75 years by using simple, rugged technologies perfected during the last century. This, and the availability of long-term water flow data, ensures that predicted performance is highly reliable. No other renewable technology is as predictable over the long term.
- Run-of-river hydro projects produce emissions-free energy with negligible environmental impacts.
- The vast majority of undeveloped sites are in northern Ontario, and are within traditional First Nation land use areas. Small hydro can be a key economic development asset for First Nations.
- However, there are some additional unique characteristics of small hydro which act as hidden barriers to development and need to be considered in developing effective tariffs and grid access protocols.

Small hydro projects are capital intensive and typically have a capital cost twice that of wind (\$5,000/MW). Although higher capital cost is eventually offset by higher capacity factors (and long-term revenues), the resulting lower initial cash flows often require 40-year amortizations. That financial 'penalty' is overcome and reversed by attractive net revenues during the final decades of the hydro plant operation.

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Small hydro projects produce asymmetrical benefits. The energy production and environmental benefits begin and continue from the day of commissioning, but the financial rewards to developers only begin to accrue after 15 years or more. This is not a problem with utility financed projects, but it is a challenge for private projects developed by First Nations, co-operatives, non-profit community groups, or small private developers.

Thus, OPA's proposed contract period of 20 years does not conform to the hydro asset life, as it generally does for wind, solar PV, or biogas projects. This requires higher tariffs for non-utility generators than that might be required by a public utility that can amortize the project over a longer period.

This problem intensifies as projects decrease in size, since economies-of-scale do not offset fixed development costs such as site approvals. (It typically takes 5 years for any hydro project approval, and these requirements are similar for a 5 MW project as a 50 MW project.)

These factors make it difficult to obtain financing based on a 20-year contract. Although a project may be clearly profitable over its 60-year asset life, it may not be profitable for the first two decades, and this is the critical period both debt and equity financing.

One solution is to extend the OPA contract length from 20 years to 40 years or even 60 years at prescribed tariffs which decline over each period. Spain uses such an approach. The initial tariff is paid for 25 years. Then after 25 years, the tariff falls to a lower value and the contract extended indefinitely.

Another alternative is to raise the proposed rates for the 20-year contract.

There are trade-offs inherent in small hydro development. Producers want to generate as much renewable energy (and revenues) as possible. The IESO places a premium on power supplied on peak. But for environmental reasons (and related public acceptance), run-of-river developments are (with some exceptions) superior to those using dams, headponds and flow fluctuations timed to meet peak demand. (Niagara Falls is Ontario's most famous run-of-river hydroelectric power plant. It has operated flawlessly since 1921.)

This internal conflict increases with the decreasing size of run-of-river projects, because spilled water means foregone revenues. Yet OPA's proposed tariff package (base rate plus peak bonus) will inadvertently compel the smallest projects to design operations skewed toward maximizing the time differentiated bonus, the on-peak tariff. Favouring on-peak generation will have a greater environmental impact on river flows than a run-of-the-river plant might otherwise. Plant design will follow price. Simply put, OPA's current proposal will elicit higher dam structures, more water impoundment, bigger generators at lower capacity factors, and more river level fluctuations.

Since the vast majority of undeveloped small hydro sites are in northern Ontario, the OPA's proposed tariff package would put a First Nation, community, or privately developed project in the position of

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building projects to earn extra revenues at the expense of environmental impacts and potential public opposition to approvals.

In northern Ontario, the distribution network is also extremely limited, and the cost of interconnecting to 115 kV lines is prohibitive. Given the 60-year asset life of small hydro projects, and their potential economic development benefits for First Nations, deep interconnection costs for approved projects under 5 MW should be paid by Hydro One and recovered from ratepayers.

Specifically, we recommend raising the community-based tranche to 5 MW and the tariff to \$0.15/kWh for a 20-year contract. This scale is large enough to produce viable long-term revenues, and is within a maximum capital access range of \$20 to \$25 million for community groups and First Nations. Projects at 5 MW would be roughly comparable (annual revenues, capital costs) to a 10 MW wind project.

We also suggest that decreasing the time differentiated bonus from 35% to 20%. This will increase the financial viability of small run-of-river projects, while at the same time minimizing projects designed to operate primarily during peak periods especially on sensitive, smaller rivers.

Because small hydro projects are even more capital intensive than solar and wind energy, they must be fully protected from inflation. Without inflation protection, especially for the smaller projects, financing may be difficult to obtain. This problem is particularly acute for community groups or First Nations building their first projects. Regardless of project attributes, banks historically apply extra risk factors to unproven proponents. During the current period of tight credit, and risk-averse lending, the lack of inflation protection could prove to be the one extra risk lenders will not accept.

All hydro projects which currently have RESOP contracts or accepted CIAs should be 'grandfathered' and given priority status for pending grid connections. The transmission line 'set asides' for northern Ontario's small hydro projects, as proposed under the OPA Northern Hydro Initiative draft proposal, should also be deemed in effect until broader Ontario-wide transmission 'right to connect' protocols are finalized. This will ensure that projects less than 5 MW can begin the project approval process without further delay.

We also encourage OPA to consider specified tariffs for energy storage technologies which can deliver peak period energy and improve grid resilience and reliability without impoundments. This could add value to run-of-river small hydro projects while minimizing the environmental impact from storage impoundments. Instead of using headpond storage with associated daily river fluctuations, proponents could use newer storage technologies, such as fuel cells or vanadium-redox batteries).

Each new small hydro project can reliably supply green energy for 60 years or more. This longevity is double or triple the asset life of most other renewable technologies, and is a real prize worth pursuing. They can also be a key economic development asset for First Nations, municipal utilities, non-profit community groups and small private developers.

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Despite these attributes, community scale run-of-river small hydro projects are particularly difficult to finance because of their capital intensity and lower revenues due to water spillage. If the OPA does approve the very modest tariff changes proposed here, multiple benefits will accrue to all Ontarians for six decades or more. We urge OPA to consider all these values carefully.

Ontario GEAA Proposed Hydro Tariffs		
	Years	\$CAD/kWh
Hydro		
<50 MW	20	0.129
Community-based <5 MW*	20	0.150
*Conditioned on receiving peak period bonus of 20% or \$0.02/kWh.		

Moving All Standard Offer Contracts to Ontario's New Feed-in Tariff Program

The Green Energy Act Alliance recommends that the Ontario Power Authority move all existing contracts under the Standard Offer Contract (SOC) Program to the new Feed-in Tariff schedule.

There are many reasons for doing so.

- Only 100 MW of projects have been installed under the old program,
- There are 1,300 MW of renewable projects that are stalled because the tariffs under the old program are too low, many are "shovel-ready,"
- The original SOC program was effectively a pilot, and a superior program has been proposed,
- Tariffs for the SOC program were not based on cost but based on "value" and were known to be marginal or "too low" at the time they were implemented,
- Installed rooftop solar PV was particularly hurt by the low tariff under the old program (one-half that recommended at the time),
- It is equitable to reward homeowners and small businesses that invested in rooftop solar in response to the province's call for the development of a conservation culture,
- Owners of residential rooftop solar PV systems are among the province's best ambassadors for the new feed-in tariff program, and
- Residential rooftop pioneers provided a valuable service to the province by demonstrating a popular demand for solar PV.

If the intent of the government policy is to develop as much renewable energy as possible as quickly as possible to stimulate economic development, and we believe it is, then there is every reason to move all

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contracts to the new program. There are many projects ready to be built that are on hold because of the low tariffs in the old program. Many of these could be launched almost immediately if the tariff was raised to that in the new program.

The tariffs in the old program were not based on the cost of generation but on value. As such, the policy was not to build renewables or to stimulate economic activity but to only “allow” generation at a certain cost onto the system.

The new program has a different objective and uses a different means for determining the tariffs. The new program’s objective is to bring on more renewables quickly and to stimulate economic development by doing so. The tariffs, as a result, are based on the cost of generation and thus are more likely to actually result in projects being built. There are 1,300 MW of existing contracts many of which are ready to go if the tariffs are sufficient. The new tariffs are designed to make profitable operation possible. Certainly, contracts for projects not yet built should be moved to the new program.

Though we recommend moving all existing contracts, executed and completed, to the new feed-in tariff program, the estimated cost of such a move below includes only wind and solar PV. These two technologies represent most of the contracted capacity and the yield of these technologies is well known. The yield of the other technologies is not well known and also represents a small portion of the contracted capacity.

Cost of Grandfathering All Wind & Solar PV Contracts								
	Contracted & Installed	Yield	Generation	Tariff	Cost	New Tariffs	Cost	Cost of Grandfathering
	kW	kWh/kW/yr	kWh/yr	\$CAD/kWh	\$CAD/yr	\$CAD/kWh	\$CAD/yr	\$CAD/yr
Wind	745,517	2,000	1,491,033,400	0.11	164,013,674	0.135	201,289,509	37,300,000
Solar	525,448	1,100	577,992,948	0.42	242,757,038	0.44	254,316,897	11,600,000
							Total	48,900,000

Grandfathering Only Uninstalled Wind & Solar PV Contracts

While there is a case for excluding completed wind and other commercial-scale projects that were successfully developed under the SOC program, the savings from moving all SO contracts to the new program are minimal: \$3 million per year. Only 100 MW of projects were built under the SOC program.

Cost of Grandfathering Uninstalled Wind & Solar PV Contracts								
	Contracted & Installed	Yield	Generation	Tariff	Cost	New Tariffs	Cost	Cost of Grandfathering
	kW	kWh/kW/yr	kWh/yr	\$CAD/kWh	\$CAD/yr	\$CAD/kWh	\$CAD/yr	\$CAD/yr
Wind	686,640	2,000	1,373,279,400	0.11	151,060,734	0.135	185,392,719	34,300,000
Solar	524,448	1,100	576,892,948	0.42	242,295,038	0.44	253,832,897	11,500,000
							Total	45,800,000

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Grandfathering Residential Rooftop Solar PV

At a minimum, it would be prudent and fair to move all contracted and completed solar PV micro generators to the feed-in tariff program. This segment pioneered residential and small commercial rooftop solar PV in Ontario. Through their public-spirited investment, these solar owners have paved the way for the rapid growth of rooftop solar PV installations under the new program. They represent the forefront of the “conservation culture” that Premier Dalton McGuinty has called on Ontarians to help build. These typically small investors heeded the Premier’s call and installed rooftop solar at great personal expense and with often great frustration. They should be rewarded.

It might be an appropriate gesture for the provincial government to not only move the residential rooftop contracts to the new program but for the Premier to single them out in a letter calling them “Ontario’s Solar Pioneers” for their contribution to Ontario’s Conservation Culture.

The cost to Ontario ratepayers of moving residential solar PV to the new feed-in tariff program is minimal and is far outweighed by the rewards of the province’s magnanimity.

Cost of Grandfathering Residential Solar PV							
Total Installed	Yield	Generation	Tariff	Cost	New Tariffs	Cost	Cost of Grandfathering
kW	kWh/kW/yr	kWh/yr	\$CAD/kWh	\$CAD/yr	\$CAD/kWh	\$CAD/yr	\$CAD/yr
600	1,100	660,000	0.42	277,200	0.80	528,000	250,800

RFP III CIA Legacy Reserve

There has been discussion at the stakeholder engagement workshops about which projects with Connection Impact Assessments (CIA) can be accommodated in OPA’s Legacy Reserve for connection. While we support inclusion of CIAs developed under the OPA’s original RESOP program, we strongly discourage inclusion of any CIAs obtained as part of RFP III. The Request for Proposal (RFP) process is a distinctly separate procurement process from either RESOP contracts or its proposed derivative, the feed-in tariff program. Those projects that did not win in RFP III bid into the process knowing full well that if they lost the bid, they lost all rights to participate in procurement. The RESOP program was designed to give those who could not bid into earlier RFPs the opportunity to develop projects. RFP, by its nature, excluded many potential feed-in tariff participants from the procurement. Bidders into RFP III should not be given any preference through the Legacy Reserve in preference for those who were excluded from bidding.

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Transparent Economic Modeling

The GEAA had asked that in the interests of transparency and full disclosure that OPA's model and its assumptions be released prior to the April 7th tariff workshop. The OPA indicated that it may release its economic model at the April 7th workshop, but not before. The OPA also indicated that it would release its assumptions at that time.

While the OPA's model was described in general terms at the April 7th workshop, and the assumptions used in several parameters were discussed, the model itself was not released and some assumptions were not revealed. Thus, OPA's tariff setting is not fully transparent.

The GEAA is fully supportive of OPA's effort to complete all discussions and establish a system of feed-in tariffs by June. We believe that this can be done while at the same time ensuring that there is full transparency. We, again, recommend that OPA's model be released as a spreadsheet with all supporting documentation.

The GEAA suggests that using a Discounted Cash Flow model may not be the best choice for tariff setting, especially in the use of after tax cash flows. It appears that the OPA's consultant is familiar with tax dependent transactions in the USA and has assumed that similar transactions are the rule in Canada. This is not the case. Few if any of the projects proposed by GEAA's members can use the Capital Cost Allowance (CCA, or depreciation deduction) that is such a large part of tax-advantaged investments in the USA. If OPA wishes to construct a "made in Canada" program, it should not blindly follow American practice.

We recommend, as we have since 2005, that the OPA use a simplified model that calculates tariffs before tax. This would have avoided the situation at the tariff workshop where participants noted that they could not use the CCA and that it was inappropriate in the Ontario context.

As we have said consistently, if there is a concern about overpaying for wind resources, our preferred model allows the OPA to limit or regulate the profit of wind developers at high wind or "windy" sites.

Further, setting the model's parameters at 30% capacity factor is unrealistic. The average at the best sites in OPA's RES program delivered only 31% capacity factor in 2008. New projects are likely to be less productive.

The estimates for annual reoccurring costs of wind and solar projects are also unrealistic. The estimate of annual reoccurring costs for wind energy are less than half that of operating projects in Germany. OPA's assumption was based on US sources of data. The US market is non-transparent and data on annual reoccurring costs in such a market are unreliable. The GEAA can provide more realistic data to OPA upon request.

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As we have said repeatedly since 2005, the inflation adjustment is not only to account for increases in the cost of operations and maintenance over time, but also to account for the corrosive effect on earnings from inflation on long-lived capital projects. The majority of countries that use feed-in tariffs, with the exception of Germany, acknowledge this and their programs take this into account.

Conclusion

OPA's feed-in tariff program, if implemented as proposed, will become the most progressive renewable energy program in North America. The GEAA applauds the work done by OPA and its staff toward creating a truly made in Ontario feed-in tariff program. We believe that our suggestions can make a good program even better.

We will make additional comments in subsequent documents.

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