Submission to the Ontario Power Authority

2015 Price Review Submission

September 19th, 2014

Canadian Solar Industries Association (CanSIA)
www.cansia.ca

1. Background

CanSIA is a national trade association that represents solar energy companies throughout Canada. The majority of these companies operate in the Province of Ontario. Since 1992, CanSIA has worked to develop a strong, efficient, ethical and professional Canadian solar energy industry with capacity to provide innovative solar energy solutions and to play a major role in the global transition to a sustainable, clean-energy future. As has been evident in the past, the willingness of the Ontario Power Authority (OPA) to elicit and incorporate the feedback of industry stakeholders has shown marked benefit in the quality and design of procurement programs for Ontario's power sector and particularly the development of renewable procurement in the Province.
As Ontario continues to further its commitments to renewable energy, CanSIA is pleased to provide meaningful feedback to the OPA, providing accurate and timely information for consideration in the FIT Price Review Consultation. CanSIA wishes to further emphasize the willingness of the association to work with the OPA to identify opportunities for efficient procurement design and potential impacts to both industry stakeholders and everyday ratepayers in Ontario.

CanSIA's Price review submission is comprised of the following sections:

- Procurement policy affecting the cost of solar
- Opportunities for reducing the Feed in Tariff and the cost of Solar
- Questionnaire responses
    - System Cost Data
    - Tariff Recommendations
- Appendix of cost components

2. Procurement Policy

In 2013 the Government committed to stable and consistent procurement targets for each of the next 4 years, providing structure and predictability to the growth and development of Ontario's solar industry. At this time the Minister also directed a regular and transparent price review and schedule to support these targets and provide further certainty for industry.

This came after many years of inconsistent FIT applications windows and price schedules. It was evident that the annual price schedule's critical and inherent link to the annual procurement target, removed unnecessary risk and provided the certainty and predictability required for investment in Ontario's clean energy economy.

It was apparent that to facilitate investment in the FIT program, a viable business model with known pricing should be provided for the regular procurement targets. The strength provided to the program and sector by a regular review, and publication of the annual price schedule in advance of a procurement target's application window, could provide certainty on the investment required for FIT projects.

Where uncertainty has continued to affect industry and investors is the uncertainty around contract offer date (according to FIT rules) that can render a price schedule terminating on December 31st ineligible to a particular offer.

Stakeholders were under the impression from the Posted Procurement schedule that the FIT 4 application period would open in July of this year and that contracts would also be offered this year under the 2014 Price Schedule (January 1st, 2014).

The regular reviews of FIT tariffs can only support FIT policy and the solar sector if it is reflective of the real market conditions, real continued and consistent additions of contracted and installed capacity that coincide with the shared vision and strategic planning of both the procurement agency and industry stakeholders. Deviations from strategic procurement policies and targets provide significant uncertainty impacting investor confidence and project development costs alike.

CanSIA advocates that a regular procurement schedule be adopted, that provides clarity around the opening of an application window, the timing for contract offers and the posting of the FIT Price Schedule.

CanSIA strongly recommends that to alleviate this risk of uncertainty around contract offer date and relevant Price Schedule, and to ensure that tariff reductions are consistent with progressive build-out of stated procurement targets, that price schedules be set applicable to distinct procurement targets (150 MW), and that reductions in FIT rates be based on the amount of procurement in the form of offered contracts.

There has been concern from within industry that the reductions in tariffs resulting from the (August 26th, 2013, January 1st, 2014) price schedule would pose significant challenges for maintaining business operations in Ontario. The August 2013 price schedule resulted in severe cuts to the FIT tariff rates that have not been reflected in costs currently experienced in the Ontario market.

CanSIA provided its most recent Price Review Consultation submission in October 2013 after significant reductions were made in the August 26th Price Schedule that introduced non domestic content pricing. Since the previous price review, there have been no significant changes in the costs of doing business in Ontario. The tariffs set in the August 26th schedule and retained in the November 1st, 2013 posting of the 2014 Price Schedule (Effective January 1st, 2014) were understood by solar stakeholders to apply to the 2014 Procurement Target of 150 MW for which an application window was scheduled to have opened in July 2014. The contract offers for these applications were also scheduled to begin in December of 2014 and to be eligible for the 2014 Price Schedule.

The procurement schedule also indicated that the 2015 Price Schedule was to be posted on November 30th, 2014 (effective January 1st, 2015).

While industry anticipates a future where Solar Energy can deliver electricity at a cost below conventional resources, CanSIA emphasizes that at present there are significant barriers affecting progress towards this goal and that supportive policy with respect to strategic long term planning, and that consistent, transparent and procurement based price digression are imperative to such efforts and outcomes.

Industry is only able to support transparent and predictable reductions to FIT rates as part of long term business planning and objectives whereby policy framework and market stability is provided and runs parallel with the achievement of procurement milestones.

CanSIA strongly recommends that no reductions be made to the tariff rates to reflect the fact that there have been no reductions in the costs to develop a solar project in Ontario.

Tariff reductions must come as a consequence of having achieved determined levels of installed capacity. Effective tariff reductions can result only as costs are reduced by experience and reflective of market conditions.

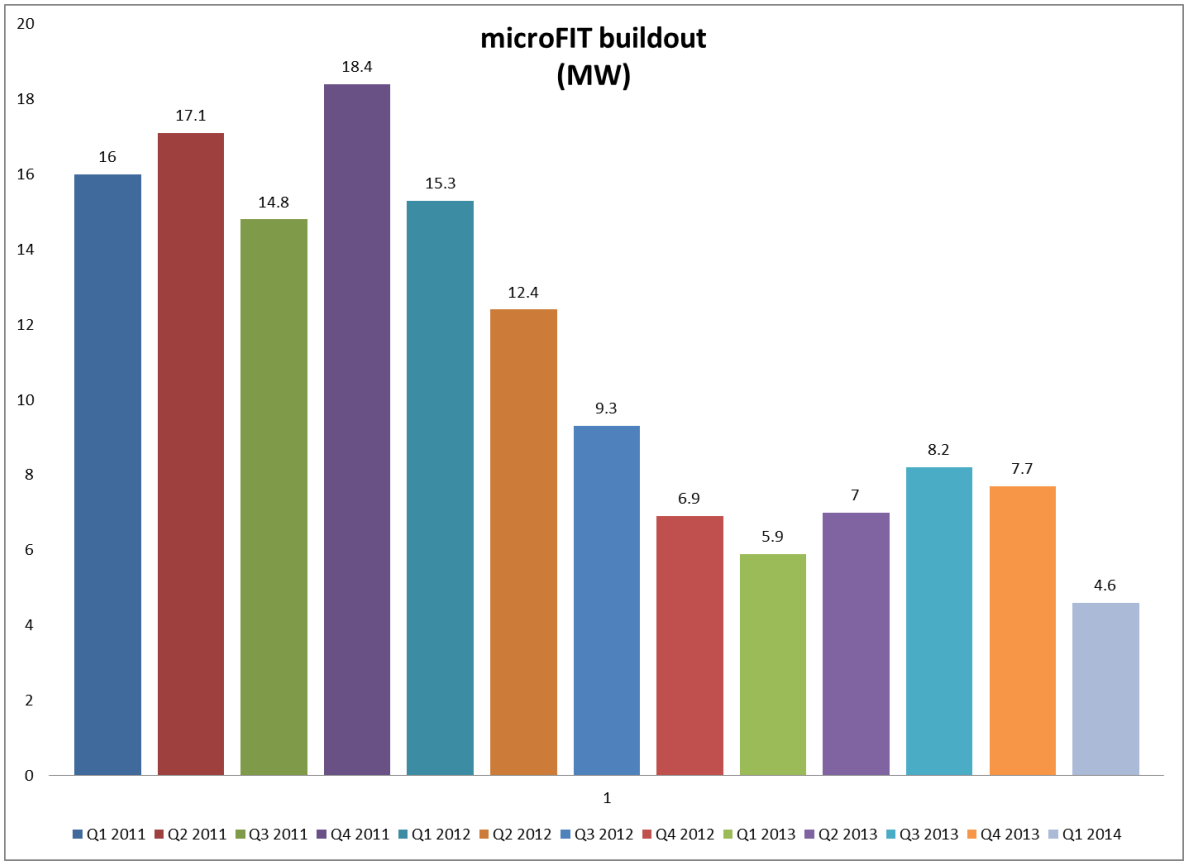
While it has been stated that this Price Schedule will apply to the FIT 3 Extension, given past uncertainty it is unclear if this 2015 Price Schedule will also apply to the projects that are applied for in 2015.

CanSIA requests clarity from the OPA that this price schedule will apply to the whole of the 2015 (200 MW) FIT Procurement target.

3. Opportunities for reducing the Feed in Tariff and the Cost of Solar

MicroFIT

The microFIT sector due to a number of factors outlined below has experienced regular declines in connected capacity since the end 2011 and is presently an underutilized opportunity for Ontarians to engage and harness the capacity of a strong overall solar sector competitive with jurisdictions across North America and abroad. Some simple policy changes provide adequate opportunity to remove some of the barriers that currently stand in the way of a vibrant microFIT sector and clean generation options for Ontario. In just over one year, from January 1st 2011 to March 31st 2012, 81 MW of microFIT project capacity was installed in Ontario. In the subsequent two years only 62 MW of microFIT projects were connected.



The microFIT program continues to have potential to impact society broadly putting clean generation technology in the hands of families, local groups, non-profits and small businesses. To facilitate the revitalization and enhance the ability of Ontario's microFIT sector to meet the capacity targets identified in the long term energy plan, CanSIA has developed the following policy recommendations to strengthen Ontario's microFIT market.

The following are milestones to be achieved that will facilitate the reduction of the cost of solar and achieve progress in the responsible digression of microFIT Pricing.

1) Expand the eligible participant list to include private businesses,
2) Increase the project size limit to 30 kW
3) Re-instate in-series connections with the LDC (as in microFIT Rules version 1.1)
4) Remove (DC/AC) overbuild restriction
5) Promote the microFIT program as with Save on Energy programs
6) Harmonize OPA/LDC Process
7) Standardize Connection Fees
8) Work with the CanSIA Solar DG Task Force and LDCs to increase the allowable level of solar loading on a feeder beyond 7 %

FIT

While circumstances around the microFIT program evidence a profoundly undersubscribed program, issues affecting the FIT program indicate a vastly oversubscribed program. With this oversubscription the FIT program entails its own unique challenges.

The cost of FIT projects can be subject to exceptional variability from one jurisdiction to another depending significantly on a range of costs and methodologies for fees associated with building permits as well as the particulars of interconnection costs. For this reason it is necessary to provide a range of system FIT costs based on high and low end scenarios.

Factors affecting connection costs can include

- distance to connection point
- transformers; upgrades
- Structure of connection cost agreements
- SCADA requirements

Building permits can be calculated at one end as a flat fee, in some jurisdictions at $500 per elevation or at the other extreme as 10 % of the total project cost in other jurisdictions in the same way housing developers are charged for permitting.

Due to the oversubscription of FIT and the priority point structure, accessibility to a property owner wanting to invest in solar for his own interest is burdened with complex requirements to obtain partnerships, and the simplicity, energy value and siting ease of distributed generation is subject to excessive administrative, municipal and legal costs that inflate the cost of developing solar projects in the province.

Simplify the FIT program by reducing complexity. This will reduce risk and lower the financing costs associated with projects.

Revamp the partnering model which does not provide sufficient revenue to establish effective lease agreements.

Provide incentives for financing partners for projects less than 500 kW.

Provide alternatives to a partner withdrawing from participation, rather than full termination. This creates high risk and higher costs.

4. Questionnaire Responses

Economic and financial considerations

1. *What are the costs of capital (both debt and equity) required to develop a renewable energy generation project in Ontario and how do these costs vary with technology and project size?*
    a. *Describe anticipated economic and financing trends that may substantially affect these costs.*

PV projects, based on 20-year power purchase agreements with entities of solid creditworthiness, are generally able to attract project debt financing starting at $5– 10 million, representing up to 80% of total capital. These arrangements are typically available through banks as well as life insurance companies and pension funds. Banks generally provide financings of up to 8 years with an amortization of up to 16 years. Pension funds and life insurance companies tend to provide longer term financing, typically close to the term of the power purchase agreement; up to 18 years.
Currently, the borrower's cost of capital is typically between 6-6.5 % for long term financing. This rate can be less for shorter terms. Since projects under $5 million are generally subject to the same due diligence and financing costs as larger projects, usually rendering the project uneconomical, there are much fewer options from institutional lenders. Considering that project financings originated as a means to finance large infrastructure projects over $100 million allowing lenders to be easily remunerated for their efforts, projects below $5-10 million tend to lack the required economies of scale. Some opportunities, however, are developing from a small number of other parties willing to invest in the equity of a project while providing the required project debt financing. Crowdfunding is another emerging opportunity outside of institutional lenders for projects under $5 million.

While some lenders are prepared to provide term financing (as of commercial operation date) and construction financing (from shovel readiness to commercial operation date), many lenders prefer to focus on term financing only and leave the intricacies of construction financing to others. Construction financing can be structured in various ways. Its interest rate tends to be in the 5% range but it varies according to the structure chosen.

Options for financings with small residential systems include mortgage backed options providing up to 100% of purchase price depending on collateral used and up to 20 year amortization of the loan. Such financings allow recourse to collateral over and above the project itself which permit a higher degree of leverage. For microFIT Bank Debt Rates are currently at 7.5% to 9.99% for well qualified homeowners with a 78% rejection rate under the bank's home improvement program unsecured line of credit program with an average loan application of approximately $26,000. Homeowners expect an unlevered equity return of approximately 13% - 15% (net of degradation, O&M and Insurance Costs) assuming a $0 terminal value at the end of the contract. Generally speaking, homeowners lose interest very quickly if the simple payback on the system is greater than a maximum of 7 years. Most customers use cash or line of credit financing. There has been a slow decrease in financial institutions offering "green" financing products

2. *Do the current FIT prices allow a renewable energy developer operating in Ontario to earn a reasonable rate of return? If no, please describe recommended adjustments and provide supporting evidence.*

Rooftop FIT

The current FIT tariff rate does not allow a reasonable rate of return when the solar owner has to lease a rooftop. It appears most rooftop solar projects a solar owner leases a roof from a landlord. A project with roof leasing costs has a substantially lower rate of return than a building owner who owns the solar on their own roof. For a typical 120 kW DC system requiring approx.; 20,000 ft² of roof under FIT 1 lease rates were around 8% of total revenue.

FIT 1 - 120 kW (DC) 1185 = 142,220 kWh @ .713 = $101,388 8% = $8,100 lease rate
FIT 2 - 120 kW (DC) 1185 = 142,220 kWh @ .548 = $77,936 8% = $6,235 lease rate
FIT 3 - 120 kW (DC) 1185 = 142,220 kWh @ .345 = $49,066 8% = $3,925 lease rate

microFIT

With the current microFIT rates and market pricing for a turnkey solar system it is difficult to get homeowners onboard. The key to decreasing the cost of the system at this stage is to take a look at the soft costs associated with PV, as the fixed equipment cost in Ontario is fairly competitive. CanSIA members are also susceptible to the CAD$ that has been weakening against the USD. Soft costs can be decreased by streamlining approval process from the OPA, LDC's and the City for building permits. Other factors that will be beneficial in helping decrease the cost overtime are as follows:

1. An increase in the microFIT tranche size increase from 10 kWp to 30 kWp.
2. Expand the eligible participant schedule
3. Harmonize OPA and LDC procedures
4. Standardize microFIT connection fees

a. *What is considered a range of "acceptable" rates of return on equity for a renewable generation contract in Ontario's current financial market? Provide explanations where possible.*

The FIT program has been subject to many starts and stops and discontinuity and has profoundly affected the fluidity of customer acquisition and confidence in the FIT program. The sporadic and at times unpredictable nature of the provinces' primary solar procurement program demonstrates opportunity for improvement in the areas of stability and support to industry in developing and obtaining goals of long term strategic planning and price digression.

Rooftop FIT

Most projects are only feasible with a minimum of an 11% rate of return based on the risks involved with a 20 year rooftop system. Some of these risks are outlined below:

- Weather. Revenue projections are based on historical weather patterns. Short and long term variation, including irradiance and average ambient temperature can deviate from historical solar irradiance models and anticipated performance used to project revenue
- Equipment. Will performance and degradation meet projections or be worse. Peripheral equipment such as cabling, connectors, combiners may not last 20 years and result in more significant O&M costs than predicted
- Rooftop. Some roofs will require repairs and replacement within the 20 year period requiring 1 or many disconnects and reconnects of equipment resulting in disruptions to generation and revenue
- Building. There is potential for the building hosting the project to suffer a catastrophic failure such as fire, where production can be lost for a significant period of time. Potentially, the building may not be rebuilt resulting in loss of the project site and system.

The internal rate of return for Rooftop Solar PV should be in the 9% to 11% range, when the debt/equity ratio is 60%/40%. Some local utilities in Ontario target IRR of 8% for their regulated business, but require over 10% IRR for non-regulated businesses, to account for the higher risks associated in non-regulated businesses such as solar.

3. *Historically, the FIT Program has targeted a 9 – 11% rate of return. What impact (e.g., financing availability, investor appetite, applicant type, participation projects) would a reduction of this target have?*

If the FIT program targets a rate of return below 9%, then there would be less financing available, less investor appetite, less chance of OPA achieving its Long Term Energy Plan targets and a possible trend towards reduced quality, reliability and safety of solar generators as less reputable developers may be tempted to cut corners. The IRR target of 9% to 11% is still reasonable, and should not be lowered, given the higher risks associated with solar, and when compared with the 8% IRR rates found in Ontario's regulated electricity markets.

4. *What pricing would you recommend for 2015, in $/kWh, for each technology and size tranche and why? Provide/attach justifications.*

CanSIA recommends no change to the January 1st, 2014 Price Schedule

FIT/microFIT PRICE SCHEDULE (January 1, 2014)

Renewable Fuel	Project Size Tranche*	Price (¢/kWh)	Escalation Percentage**
Solar (PV) (Rooftop)	≤ 10 kW	39.6	0%
	> 10 kW ≤ 100 kW	34.5	0%
	> 100 kW ≤ 500 kW	32.9	0%
Solar (PV) (Non-Rooftop)	≤ 10 kW	29.1	0%
	> 10 kW ≤ 500 kW	28.8	0%
On-Shore Wind	≤ 500 kW	11.5	20%
Waterpower	≤ 500 kW	14.8	20%
Renewable Biomass	≤ 500 kW	15.6	50%
On-Farm Biogas	≤ 100 kW	26.5	50%
	> 100 kW ≤ 250 kW	21.0	50%
Biogas	≤ 500 kW	16.4	50%
Landfill Gas	≤ 500 kW	7.7	50%

* The FIT Program is available to Small FIT Projects; that is, Projects generally ≤ 500 kW.

**Escalation Percentage based on the Consumer Price Index will be applied to eligible Renewable Fuels as calculated in the FIT Contract. The Base Date is January 1 of the year in which the Project achieves Commercial Operation, unless the Project achieves Commercial Operation in October, November, or December, in which case the Base Date is January 1 of the following year.

FIT PRICE ADDERS

	Aboriginal Participation Project		Community Participation Project		Municipal or Public Sector Entity Participation Project	
Participation Level (Equity)	> 50%	≥ 15% ≤ 50%	> 50%	≥ 15% ≤ 50%	> 50%	≥ 15% ≤ 50%
Price Adder (¢/kWh)	1.5	0.75	1.0	0.5	1.0	0.5

Note: The above table applies to all FIT Project sizes and all Renewable Fuels except Solar (PV) (Rooftop).

Project development costs

5. *The OPA is seeking submissions that include specific cost data with respect to capital costs, operational costs, capacity factors, project financing information (e.g., cost of project and construction financing, debt terms, Debt Service Coverage Ratio requirements) and other costs and factors which influence the levelized cost of electricity for the various technologies and size tranches in the FIT Program. Please include any data tables or excel spreadsheets, as necessary.*

MicroFIT system cost data		10 kW-roof	5 kW roof
1) PV Modules - (DC)	$/kW	889.625	1007.08
2) Inverters - (AC)	$/kW	667.725	702.35
3) Racking/Mounting - (DC)	$/kW	285.55	306.425
4) Balance of System - (DC)	$/kW	895.7333	834.075
Total EPC Cost	**$/kW**	**2738.633**	**2849.93**
5) Interconnection	$/kW	185.75	365.375
* 6) REA/Other non-electrical permits	$/kW	0	0
7) Financing/Legal/Other soft costs	$/kW	121.25	399.538
Total Other Capital	**$/kW**	**307**	**764.913**
8) O&M	$/kW	270	246.667
9) Insurance/Ongoing financing	$/kW	141	172.5
Total Ongoing	**$/kW**	**411**	**419.167**
Total $/kW		**3642.38**	**4034**
Total $/W		**$3.64**	**$4.03**
2013 NON Domestic Content Submission		*$3.57*	*$4.10*

Rooftop FIT - System Cost Data		< 100 kW	< 250 kW	< 500 kW
1) PV Modules - (DC)	$/kW	820	820	820
2) Inverters - (AC)	$/kW	340	250	200
3) Racking/Mounting - (DC)	$/kW	300	300	300
4) Balance of System - (DC)	$/kW	1100	1000	950
Total EPC Cost	**$/kW**	**2560**	**2370**	**2270**
5) Interconnection	$/kw	$7000-90,000 per project		
6) REA/Other non-electrical permits	$/kW	$500-10,000 per project		
7) Financing/Legal/Other soft costs	$/kW	300	250	200
Total Other Capital	**$/kW**			
8) O&M	$/kW	60	45	42
9) Insurance/Ongoing financing	$/kW	160	140	140
Total Ongoing	**$/kW**	**220**	**185**	**182**
System Cost $/kW (DC) not inc. 5) and 6)	1-4, 7,8,9	3080	2805	2652
System cost - not inc. 5) and 6)		308000	701250	1326000
Low end interconnection cost	L- Utility	7000		
High end interconnection cost	H- Utility	90000		
Low end permitting cost	L -Permit	500		
High end permitting cost	H- Permit	10000		
Total System Cost - LOW	low	315500	708750	1333500
System Cost ($/kW)	per kW	**3155**	**2835**	**2667**
System Cost ($/w)	per W	**3.155**	**2.835**	**2.667**
Total System Cost - HIGH	High	408000	801250	1426000
System Cost ($/kW)	per kW	**4080**	**3205**	**2852**
System Cost ($/w)	per W	**4.08**	**3.205**	**2.852**
2013 Non Domestic Content Submission		3.35	2.806	2.806

6. *Are there, and if so, please describe, any recent technology or process improvements that have affected costs or may affect costs in the future?*

Trends that may improve future capital costs include: (i) a transition from 600VDC systems 1000VDC systems for commercial roof-top, (ii) more manufacturers offering 3-phase string inverters at higher power levels and lower price points, and (iii) ongoing reductions in module prices. Trends that may increase future capital costs include: (i) some LDCs requiring "future-proof" SCADA systems that can report power quality, (ii) arc fault protection, (iii) the possible future introduction of new building code provisions that reduce the available roof area, by requiring fire-fighter venting provisions, set-backs, clearances, sky-light safety covers and DC shut-off devices on Rooftop Solar PV.

7. *In terms of project interconnection costs, what variance, if any, has been typically observed for actual costs incurred versus estimates (both initial developer design estimates and those provided by the LDC/applicable transmitter during early project development)?*

Interconnection costs which can tend to be quite substantial can make up to 20% of the cost in a high end $90 00 connection cost scenario. There is no consistent pattern with accuracy of quotations. In addition the expectation of what one LDC will require in terms of protection and control with what is often cited as maintaining the reliability of the grid can vary drastically from one jurisdiction to another.

8. *Identify the project development costs anticipated to have the greatest potential for reductions/improvements in the near-term (e.g., 6 – 12 months) and long-term (e.g., +1 – 5 years)?*

- Near Term
    - It is hoped that the Distribution System Code and/or the OEB Guidelines will be changed in 2015 to allow series grid connection for distributed Solar Generation. Connecting solar to the grid in series (versus parallel) supports a cost reduction roadmap that simultaneously enables Net Metering and (long-term) grid parity
    - It is hoped that the Distribution System Code and/or the OEB Guidelines in will be changed in 2015 to mandate that only systems over 250kWac will be required to have SCADA systems installed and that such SCADA systems use a standard method of remote transfer trip that doesn't duplicate features already embedded in CSA-approved inverter products (such as anti-islanding capability and inverter shut-off relays)
    - It is hoped that the Distribution System Code and/or the OEB Guidelines will be changed in 2015 to mandate that only systems over 250kWac will be required to have SCADA systems installed and that such SCADA systems use a standard method of remote transfer trip that doesn't duplicate features already embedded in CSA-approved inverter products (such as anti-islanding capability and inverter shut-off relays)
    - Deployment of increasing numbers of 1000VDC systems in 2015 should help reduce system costs, as more electrical components rated for 1000VDC enter the market in Ontario
    - It is hoped that the priority points system that favors aboriginal, community and municipality projects will be eliminated in 2015, to enable a significant reduction in soft transaction costs. The legal fees, consultant fees and management costs associated with priority points is very high, and the priority points system may not attract the most experienced developers who understand how to design and build safe and reliable generators

- Long Term
    - It is hoped that the Distribution System Code and/or the OEB Guidelines in the next 1 to 5 years are changed to standardize the method for assessing short circuit capacity and feeder capacity. This will allow for a more predictable and faster process for connection approval across all LDCs, and will reduce soft costs associated with non-standardized CIA assessments
    - It is hoped that the Distribution System Code and/or the OEB Guidelines and/or ESA Code will be changed within the next 1 to 5 years, to mandate a minimum set of standard commissioning requirements to improve the safety and reduce the cost of solar PV in Ontario. Such commissioning procedures as Insulation Resistance Testing, IR Thermal Scans and verification of the torque of fasteners (fasteners used to make electrical connections – such as in combiner boxes, disconnect switches, re-combiners, inverters and meter bases – as well as fasteners used to make mechanical connections – such as on mounting systems) should be specified and standardized, to improve safety and to reduce cost through learning-curve optimization

Ongoing project costs and performance

9. *How have ongoing operations and maintenance costs for existing facilities tracked relative to estimates assumed during initial project design? Have costs been higher/lower than expected?*

Operations and maintenance can vary significantly with respect to project type, rooftop, groundmount, tracking etc. as well as across a range of investment and procurement options for O and M services. The effective cost balance and value added of routine and preventative maintenance is also variable.

10. *Have any recent technology or process improvements had an impact on generally accepted performance assumptions (e.g., average capacity factors, equipment replacement, maintenance outages) for renewable energy projects? How has ongoing performance of renewable generation projects tracked relative to estimates?*

Newer technologies such as DC optimizers were marketed as a pathway to improved yields and IRR, despite the increase in capital cost that these technologies introduce. Our analysis suggests that DC optimizers do not improve yields and IRR. Also, although such technologies as micro-inverters improve yield, they also increase cost, which may be IRR neutral. We expect that using more string inverters will improve the performance of Rooftop Solar PV projects, compared with central inverters.

Prioritization costs and other considerations

11. *In relation to the items below, please identify and describe, any:*
    a. *Administrative (e.g., legal, financial, etc.) costs associated with arranging partnership structures necessary to obtain priority points through the FIT program;*
    b. *Costs associated with obtaining other FIT priority points;*
    c. *Unique implications or advantages (e.g., taxation) of operating a project in a partnership structure.*

    Please see appendix A re: cost components for each cost category

Additional questions

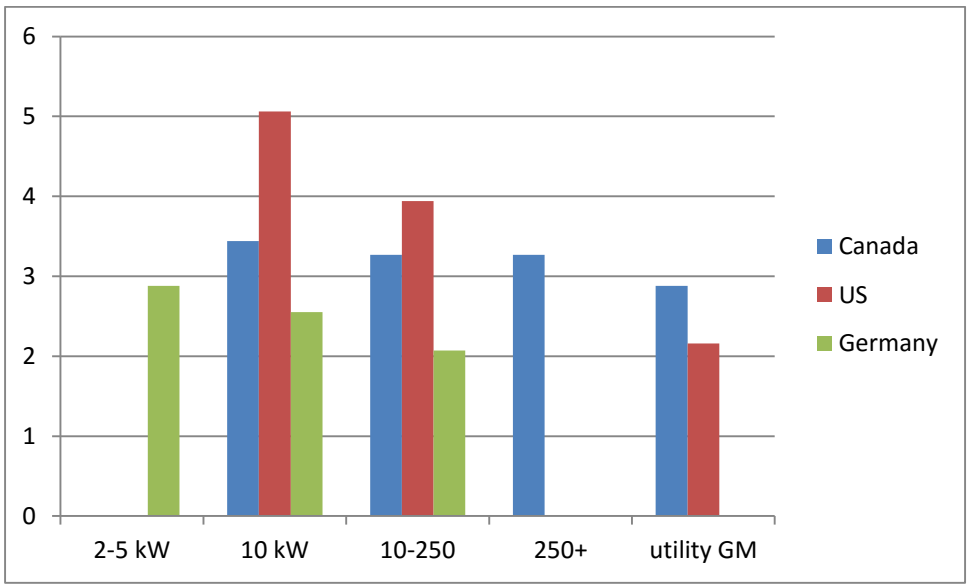
12. *What are the main reasons, if any, for differentials between Ontario pricing and global averages for renewable energy projects? Will these differentials remain constant or are changes/reductions foreseen? Please comment, if possible, on each of project development, equipment, construction and O&M.*

Ontario pricing are competitive globally when comparing them to US, EU and Japan. In some cases Ontario pricing is cheaper than that in parts of US. It is expected and we have experienced equipment pricing in Ontario will increase as a result of Canadian dollar getting weaker against the US$. To counter this, streamlining processes, tweaking the microFIT rules to allow for third party ownership and larger system sizes, will help gain economies of scale and possibly balance this negative.

Reasons, for higher prices in Ontario for renewable energy projects include (in no particular order):

(i) Priority Points System increases complexity and development costs
(ii) Requirement for SCADA on systems less than 250kW increases CAPEX
(iii) Domestic Content Requirements increases CAPEX
(iv) The SCADA threshold should be standardized across all LDCs for solar so that SCADA is only required on systems over 250kW (same as Hydro ONE threshold). Currently, some LDCs require SCADA on solar PV systems over 10kW, while others require SCADA on systems as small as 50kW or 100kW. Installing SCADA on small solar PV systems provides little value and impacts cost.
(v) Standardize the SCADA requirement so that battery back-up for is not required. Battery back-up for SCADA should not be required by LDCs, since Inverters shut-down when grid power is not present. Many LDCs do not require battery back-up for SCADA on solar PV systems, while some other LDCs do require battery back-up for SCADA.

13. *In relation to solar PV, the U.S. Department of Energy SunShot initiative has recently issued a number of reports commenting on the price differentials between residential rooftop solar systems in Germany and the U.S. To what degree do Ontario system costs (from a homeowner's perspective) align with or differ from both German and U.S. costs? List the main barriers, if any, to matching German costs in the Ontario Market.*



Values shown in CDN $

Source data: IEA PVPS 2013 National Survey Reports 1 CDN = 0.91 US 1 Euro = 1.42 CDN

The following barriers exist in matching German costs in the Ontario Market for residential solar:

(i) One-Day Installations
(ii) Racking System Design (integrated and some on-ground pre-assembly)
(iii) Construction Process Optimization
(iv) Parallel grid connection (rather than Serial grid connection)
(v) Conduit redesign
(vi) Pre-Installation Activities (travel, on-site preparation, off-site preparation)

a. *Are these barriers unique to microFIT or applicable to FIT as well?*

These barriers are also relevant to FIT.

Local content considerations

14. *What effect will the removal of the remaining domestic content provisions from the FIT Program have on the soft-cost categories (e.g. labour, financing, legal, O&M) in terms of solar PV and on-shore wind projects? Please provide supporting information/evidence, including international-based vs. Ontario-based costs, where possible.*

It is likely that the removal of these service related requirements will have marginal effects on the soft cost categories of systems installed in Ontario.

3) Closing

CanSIA is pleased to provide these recommendations and to work closely with the Ontario Power Authority throughout regular and consistent stakeholder engagement activities. CanSIA strives to be a strong and credible partner to government as it engages in these critical policy making activities and looks forward to the opportunity to discuss these recommendations.

Yours sincerely,

John Gorman
President, CanSIA

Appendix A - cost component explanations

Category	Components
1) Modules	Modules
2) Inverters & Extended Warranty	Inverters & Extended Warranty
3) Racking & Mounting Systems (Fixed or Tracking)	Racking & Mounting Systems (Fixed or Tracking)
4) Balance of System and Construction	Combiner Boxes
	Junction Boxes
	Cabinets
	Wire Management
	Disconnects
	Weather Station
	Check Meter Installation
	Material Shipping Costs
	Site Safety
	Mechanical Installation
	Hoisting Equipment
	DC Electrical Installation
	AC Electrical Installation
	Inverter Pad and Fencing
	Conduits from roof to electrical room and to inverter
	Standby generator
	Commissioning
	On-site facilities (trailers/toilettes)
5) Interconnection (LDC and ESA)	Connection Impact Assessment
	Connection Cost Agreement
	System Upgrades
	Plan Review
	SCADA requirements
	metering
	ESA Inspection; permits
6) REA other non-electrical permits	NHA
	Archaeology
	Water
	other
	FIT Projects - Municipal Building Permit is included here
7) Financing Legal and Other Soft Costs -	Technical Services for system design (structural/electrical)
(inc. Design, Engineering and Consulting Services)	Engineering rooftop support and size verification

	Independent Engineer Review
	Access rights
	Lease negotiations
	EPC Agreement
	Aboriginal/Community Partners
	Connection Agreement
	Domestic Content verification
	Construction and Project Financing
	Building Permits for microFIT only
	Municipal Support Resolution
	Construction Financing
	FIT Application submission
	Application for NTP
	Site Assessment
	Application for COD
	Construction Insurance
	Accounting / bookkeeping costs
	Lease payments
	OPA Audit costs
	WSIB
8) Operations and Maintenance	**general maintenance of facility**
	Mechanical inspection
	Electrical inspection (including combiner boxes)
	Inverter inspection
	Inverter heating
	Account charges
	Metering Hardware costs
	Energy Monitoring/Monitoring Systems
	Replacement of Inverter
	DOES NOT INCLUDE ROOF REPLACEMENT
9) Insurance and Ongoing financing	**Insurance of Solar facility**
	ongoing financing