CanSIA
CANADIAN SOLAR INDUSTRIES ASSOCIATION | L'ASSOCIATION DES INDUSTRIES SOLAIRES DU CANADA

150 Isabella St., Suite 605, Ottawa, ON, CANADA K1S 1V7
• T 613-736-9077 • TF 1-866-522-6742 • F 613-736-8938
www.cansia.ca

May 27, 2016

COPY FILED VIA EMAIL AND COURIER

Board Secretary,
Ontario Energy Board
P.O. Box 2319
2300 Yonge Street, Suite 2700
Toronto, Ontario M4P 1E4
Dear Board Secretary

Attn: Kirsten Walli, Board Secretary

Re: Rate Design for Commercial and Industrial Customers

(Board File No. EB-2015-0043)

Please find attached the Canadian Solar Industries Association's comments on the Staff Discussion Paper: Rate Design for Commercial and Industrial Electricity Customers: Aligning the Interests of Customers and Distributors.

Yours truly,

Ben Weir

Director of Policy and Regulatory Affairs
Canadian Solar Industries Association

CC: John Gorman, President & CEO, Canadian Solar Industries Association
Wes Johnston, Vice President, Canadian Solar Industries Association

Table of Contents

Table of Figures

Background

The Canadian Solar Industries Association (CanSIA) is a national trade association that represents the solar energy industry throughout Canada. CanSIA's vision for Canada's solar electricity industry is for solar electricity to be a mainstream energy source and an integral part of Canada's diversified electricity mix by 2020. CanSIA also intends for the solar electricity industry to be sustainable, with no direct subsidies, and operating in a supportive and stable policy and regulatory environment within a similar time frame. CanSIA is pleased to respond to the Ontario Energy Board's (OEB) Staff Report, *Rate Design for Commercial and Industrial Electricity Customers: Aligning the Interests of Customers and Distributors* (the Report).

Ontario's electricity sector is evolving in a way that could challenge the business model of traditional electricity stakeholders. Distributor revenue decoupling from electricity sales and the OEB's Renewed Regulatory Framework (RRF) fundamentally change the investment incentives and risks facing Local Distribution Companies (LDC). LDCs are also expected to deliver the province's Conservation First framework and to connect increasing amounts of distributed generation. These changes challenge the traditional business models of LDCs and challenge stakeholders to find new paths forward.[1]

The OEB's Renewed Regulatory Framework (RRF) encourages LDCs to seek value for customers when planning their distribution system investments. Focusing on delivering value for customers rather than recovering costs has shifted the focus of LDC distribution planning to facilitate customer choice. LDCs are expected to enable new Conservation and Demand Management (CDM) activities, distributed generation, smart grid initiatives and energy management services. This focus is intended to cut costs for ratepayers, reduce community friction, lower demand and reduce the need for infrastructure investment throughout the power system. As third parties begin offering new technologies and services to consumers, LDCs will be required to approach distribution planning very differently than in the past. Facilitating customer choice in services such as distributed solar generation (DSG) creates the ability for customers to respond to market signals and support distribution system needs.

CanSIA believes that the trend of increased connection of generation to distribution systems, and distribution systems becoming two-way energy flow systems, will continue in the future.[2] Consumers will have increasingly strong economic incentives to self-supply a portion or all of their energy needs from renewables and distributed energy resources (DER). Underlying electricity rate structures must also evolve to facilitate this transition.

[1] Mark Muro and Devashree Saha, Rooftop Solar: Net Metering is a Net Benefit, Brookings Institution, http://www.brookings.edu/research/papers/2016/05/23-rooftop-solar-net-metering-muro-saha.
[2] Gavin Bade, The Future of Rate Design: Why the Utility Industry may Shift Away from Fixed Charges, Utility Dive, http://www.utilitydive.com/news/the-future-of-rate-design-why-the-utility-industry-may-shift-away-from-fix/409504/.

Value of Distributed Solar Generation

Ontario is undergoing significant economic changes due to internal and external trends that will reshape the province and its electricity market. DSG is a unique energy resource that can help Ontario move towards a prosperous low-carbon future and support a robust domestic solar industry. These trends will require new technical capabilities and policy and regulatory changes for the electricity sector to ensure the continued delivery of safe, reliable, clean and cost-effective electricity to consumers in Ontario.

Distributed Solar Generation (DSG) provides the following system value and benefits to Ontario[3]:

- Located behind the meter, it is an effective Conservation and Demand Management measure.
- Regional planning and distribution system planning benefit from having DSG as a grid-responsive and flexible resource option to meet power system needs.
- It provides consumers with choice over the type of power they utilize and control over how to utilize it while simultaneously allowing LDCs and other non-solar customers to receive benefits from the system.
- It provides consumers an investment option to hedge against the risk of rising electricity rates and increases resiliency.
- It is a supply mix diversification option that reduces peaking natural gas combustion in support of Ontario's climate change objectives.
- It leverages strong public support for DSG to engage Ontarians in the electricity sector and its evolution.

Support for OEB Objectives of Rate Re-Design

The OEB has specified a number of objectives for the rate re-design process including:

- Enabling customers to leverage new technologies, including self-generation using renewable resources;
- Helping customers manage their bills through conservation;
- Helping customers better understand the value of electricity service;
- Designing rates that link to cost drivers more closely, particularly rates that vary by time of day; and
- Facilitating consumer choice by ensuring that the new rate designs support innovation and enable access to energy options.

CanSIA supports all of the OEB's stated objectives. The objectives align well with the value that DSG and other DERs can provide to customers. It is critical, however, that the new rate designs do not reduce signals of the benefits of energy efficiency or behind the meter generation. Elements of dynamic pricing should be considered in all rate design options to help ensure that customers contributions to peak demand are charged appropriately, and, to conform to the principle of cost causality. Fixed charges, in addition to inappropriately comprised minimum service charges, do not accomplish these goals and should be avoided.

[3] See Appendix A of this submission for more detail with regards to these benefits.

Comments on Rate Design Options

Fully Fixed Charges

In seeking alignment of rate design options with the OEB's stated objectives, it is noted that fully fixed charges:

- Do not incent/reward conservation at peak (or at anytime).
- Do not enable customers to leverage self-generation technologies using renewable resources or support innovation/enable access to energy options.
- Do not vary by time of day.
- Do not allow customers to take actions to reduce their distribution costs.
- Does not send strong economic signals to the distributor as to the required level of distribution investment its customers will need in the future (or where).

The Board has emphasized the importance of a distribution rate design that focuses on aligning customer and distributor interests. A fully fixed charge favours revenue certainty of the distributor over the customer's ability to reduce their costs and utilize technologies or energy management strategies that could shrink overall distribution costs in the future. Fully fixed charges also significantly undermine the economics of net metered solar, severely hurting a consumer's ability to utilize net metering. As an example, Using the distribution volumetric rate for Hydro One urban density general service >50 kW customers of 2.5 ¢/kWh[4], the transition to a fully fixed rate would represent an annual loss of approximately $14,000 for a 500 kW net metered customer in Ontario (assumes a yield of 1,161 kWh / kW). This shift would directly negatively impact a consumer's ability to use solar as well as undercut the proliferating evidence that DSG provides distribution level benefits to all consumers, not just those that have installed solar.[5]

While a fully fixed charge may be the simplest to understand for consumers, simplicity should not be the most important factor for distribution rate design for commercial and industrial customers who have a greater willingness/ability to manage their energy consumption for the purposes of responding to price signals. While fixed charges have been increasingly considered by US regulators and distributors (26 open dockets in 18 states as of Q3 2015), more thoughtful rate design processes have begun to take their place which recognize the time based value of electricity and seek to create price signals that recognize that value through some aspect of volumetric pricing.[6]

CanSIA is strongly opposed to a fully fixed charge for general service <50 kW customers.

[4] Ontario Energy Board, Rate Order EB-2015-0079 Hydro One Networks Inc. Schedule A, Pg. 7, http://www.hydroone.com/RegulatoryAffairs/Documents/EB-2015-0079/Rate_Order_HONI_Dx%20_20160114.pdf.
[5] Mark Muro and Devashree Saha, Rooftop Solar: Net Metering is a Net Benefit, Brookings Institution, http://www.brookings.edu/research/papers/2016/05/23-rooftop-solar-net-metering-muro-saha.
[6] Gavin Bade, The Future of Rate Design: Why the Utility Industry may Shift Away from Fixed Charges, Utility Dive, http://www.utilitydive.com/news/the-future-of-rate-design-why-the-utility-industry-may-shift-away-from-fix/409504/.

Time of Use Energy Charges

In seeking alignment of rate design options with the OEB's stated objectives, it is noted that time of use charges:

- Enable customers to leverage new technologies, including self-generation using renewable resources.
- Help customers manage their bills through conservation.
- Help customers understand the value of electricity service.
- Link rates to cost drivers for recommended customer classes more closely.
- Facilitates consumer choice by supporting innovation and enabling access to energy options.
- Charges more to customers who are contributing more to the distributors peak capacity needs.

Time based rates such as this can reduce customer's peak consumption and their total energy consumption without compromising customer acceptance. Time of use rates can also contribute to peak load reductions of 0-50% and reduction in total energy consumption 0-10%.[7] This option would also ensure that those customers that are contributing more to a distributor's peak are charged more. Utilizing a time of use energy charge also supports the OEB's objective of maintaining revenue neutrality, as noted in the OEB's Staff Report.

The ratio for peak to off-peak price (POPP) should be set sufficiently high in order to encourage reductions of peak customer demand. The size of this ratio is one of the strongest predictors of success in shifting peak demand.[8]

While not explicitly included in the OEB's proposed rate design options, the incorporation of a critical peak price (such as is explored in the OEB's RPP Roadmap) represents an even greater POPP ratio and leads to even greater peak demand reductions. Higher POPP ratios may also encourage overall energy use reductions, as well.

The monthly customer service charge should be small and only represent the costs of being connected to the grid. Achieving rate recovery for distribution system investments should be possible for general service <50kW customers using time of use energy charges. This would provide the greatest latitude for customers to shape their own consumption patterns in line with the costs of energy usage at peak times. Rates that are not dependent on usage at all (such as the above mentioned fully fixed charge) eliminate the ability for customers to consider solar and other DERs.

CanSIA strongly supports time of use energy charges for general service <50 kW customers.

Energy Usage Block Charges

In seeking alignment of rate design options with the OEB's stated objectives, it is noted that energy usage blocks:

- Enable customers to leverage new technologies, including self-generation using renewable resources.
- Help customers manage their bills through conservation.
- Help customers understand the value of electricity service.
- Link rates to cost drivers for recommended customer classes more closely.

[7] Aman Chitkara, Dan Cross-Call, Becky Li, and James Sherwood, A Review of Alternative Rate Designs, Rocky Mountain Institute, Pg. 6, http://www.rmi.org/alternative_rate_designs.
[8] Ibid.

- Facilitate consumer choice by supporting innovation and enabling access to energy options.

Similarly to time of use energy charges, energy usage blocks reduce customer's peak consumption and their total energy consumption. This option would also ensure that those customers that are contributing more to a distributor's peak capacity needs are charged more and would provide customers with clear signals as to the benefit of reducing on-peak consumption. These signals would allow customers to identify cost savings through the use of DSG and other DERs.

It is noted that it customers would require timely access to accurate usage data in order to implement this rate design appropriately. Without such access, energy usage blocks would not deliver on the aforementioned benefits.

CanSIA supports energy usage block charges as a secondary option for general service <50 kW customers after time of use energy charges. CanSIA also believes, however, that further detail on the size of energy usage blocks would be required in advance of implementation as the size of the blocks would directly impact the ability for DSG and other DERs to provide value to a customer based on the capacity of the system installed and its ability to shift a customer's usage into a lower priced block. The OEB should also consider whether energy usage blocks would be a mandatory vs. a voluntary option for general service <50 kW customers. CanSIA believes, that if implemented, energy usage blocks should be a voluntary option for these customers as it would require a high degree of active participation by the customer which may be unfeasible for certain entities.

Minimum Bill Charges

In seeking alignment of rate design options with the OEB's stated objectives, it is noted that while a minimum bill charge, if layered atop either time of use energy charges or energy usage blocks, could accomplish the OEB's objectives of enabling customers to leverage new technologies, manage their bills through conservation and facilitate customer choice by supporting innovation/enabling access to energy options, it would not likely accomplish any of those goals as well as a time of use energy charges or energy usage blocks on their own, however, as these designs do not incorporate a monthly minimum charge (beyond the monthly customer service charge) and so more strongly encourage customers to shift their consumption to off-peak times.

There is also risk that distributors will include a majority of their costs in the minimum bill calculation which will reduce the incentive of the variability rate and not fairly reflect the benefits of net metering to the distribution system. Due to the risk of distributors including the majority of their costs, along with the minimum bill being less likely to accomplish the aforementioned OEB objectives, CanSIA does not support the minimum bill charge for any customer class.

Three Part Demand Rate

In seeking alignment of rate design options with the OEB's stated objectives, it is noted that a three part demand rate:

- Enables customers to leverage new technologies, including self-generation using renewable resources.
- Helps customers manage their bills through conservation.
- Helps customers understand the value of electricity service.

- Links rates to cost drivers for recommended customer classes more closely.
- Facilitates consumer choice by supporting innovation and enabling access to energy options.

Net metering would have a positive impact by reducing the on-peak customer demand. If a customer's daily demand aligns with typical solar generation output (i.e., high during on-peak, low during off-peak), the customer would realize non-coincident peak demand reduction as well in instances where a customer's peak fell within the non-coincident peak period and still aligned with the generation profile of the DSG system.

Option 5b considers a narrower peak period that aligns with the typical time period for peak demand in each distribution system. Adjustments to the time period adjustments can be made annually or at each rate filing. This approach would increase the incentive to reduce peak demand on the distributor's system.

The ratio for peak to off-peak price (POPP) should be set sufficiently high in order to encourage reductions of peak customer demand. The size of this ratio is one of the strongest predictors of success in shifting peak demand.[9]

While not explicitly included in the OEB's proposed rate design options, the incorporation of a critical peak price (such as is explored in the OEB's RPP Roadmap) represents an even greater POPP ratio and leads to even greater peak demand reductions. Higher POPP ratios may also encourage overall energy use reductions, as well.

CanSIA generally supports the three part demand rate, however, more information is required on how this rate design would be implemented and how the distributor specific peak periods would be set.

Time of Use Demand Rate

In seeking alignment of rate design options with the OEB's stated objectives, it is noted that a time of use demand rate:

- Enables customers to leverage new technologies, including self-generation using renewable resources.
- Helps customers manage their bills through conservation.
- Helps customers understand the value of electricity service.
- Links rates to cost drivers for recommended customer classes more closely.
- Facilitates consumer choice by supporting innovation and enabling access to energy options.

Net metering could reduce on-peak consumption resulting in cost savings for customers and reduction of stress on the distribution system. A lower off-peak rate would reflect the indirect impacts on the distribution system.

CanSIA generally supports the time of use demand rate, however, more information is required on how this rate design would be implemented and how the distributor specific peak periods would be set.

[9] Aman Chitkara, Dan Cross-Call, Becky Li, and James Sherwood, A Review of Alternative Rate Designs, Rocky Mountain Institute, Pg. 25, http://www.rmi.org/alternative_rate_designs.

Ranking Rate Design Options

Figure 1: CanSIA Ranking of Rate Design Options

Rate Class/Rate Option	Fully Fixed	Time of Use Energy	Energy Usage Blocks	Minimum Bill
GS<50 kW	Not supported	1	2	Not supported

Rate Class/Rate Option	Minimum Bill	Three Part Demand: Broad Peak	Three Part Demand: Narrow Peak	Time of Use Demand: Peak/Off-Peak	Time of Use Demand: Off-Peak Free
GS>50 kW	Not supported	4	2	3	1
Intermediate	NA	4	2	3	1
Large	NA	4	2	3	1

Credits for Distributed Energy Resources

The OEB has requested specific comments on the potential for incorporating credits into the regulatory framework for DERs that provide benefits to the distribution system. These benefits to the distribution system would depend on the source, location, availability and controllability of the DERs. Examples of potential benefits that could be credited would be voltage regulation, frequency response, load control and avoidance of distribution system capacity investments. The credits could be offered through distributor-control of the DER or third party control. The allocation of credits could be provided through the distributor's planning process by identifying a system need or during operation by providing credits for controllability to address an ongoing system need.[10] While the basis of compensation for net metered solar should continue to be based on retail rates, valuing other potential services and benefits could be used to incent the installation of resources with particular characteristics in those areas where it was most valuable. This option, known as a locational adder, was considered during the Ministry of Energy's recent consultation process for a successor net metering program.[11]

In seeking alignment of rate design options with the OEB's stated objectives, it is noted that DER credits:

- Enable customers to leverage new technologies, including self-generation using renewable resources.
- Do not necessarily help customers manage their bills through conservation as customers may be incented to focus efforts on increasing exported generation. In a net metering context, however, customer conservation

[10] Ontario Energy Board, Staff Discussion Paper EB-2015-0043 Rate Design for Commercial and Industrial Electricity Customers: Aligning the Interests of Customers and Distributors, March 31, 2016, Pg. 34.
[11] Ontario Ministry of Energy, Net Metering and Self-Consumption Overview, Pg. 19, https://www.dropbox.com/s/h50mkb51qxbre0a/2015-08-27%20Ontario%20Net%20Metering%20Self%20Consumption%20Background%20Webinar%20Deck.pdf?dl=0.

is also incented as the customer could increase revenues from exported generation by reducing on-site demand.

- Helps customers understand the value of electricity service.
- Links rates to cost drivers for recommended customer classes more closely.
- Facilitate consumer choice by supporting innovation and enabling access to energy options.

CanSIA has long advocated that DER provides a wide variety of benefits to the distribution system that should be fairly compensated for the value offered. By the end of 2015, regulators in at least 10 states had conducted or commissioned studies to develop methodologies to value distributed generation and net metering. There is a degree of consensus amongst these studies that net metering benefits all utility customers.[12] It is also noted, however, that most of these studies were undertaken at a point where net metered solar had reached high levels of penetration. In Ontario, due to the success of the FIT and microFIT Programs, there is comparatively low levels of net metered solar connected to distribution systems.

This could be operationalized either through the distribution system planning process or through the use of regional planning area price adders. The IESO and LDCs would determine which areas of the province would benefit from increased uptake of net metering generation and provide a capital contribution incentive in those areas. The capital contribution incentive for regional planning areas could be scaled so that areas of higher need receive a higher rate compared to areas of lesser need. The administration of the program could be tied with CDM activities overseen by the LDCs.

Recognizing DER value to the distribution system and incorporating an assessment of that value in the planning process and operational approach of distributors is an important component of future distribution rates for commercial and industrial customers.

CanSIA strongly supports DER Credits if used as an additional incentive for DERs. For clarity, the basis of compensation for net metered solar should continue to be based on retail rates. DER Credits should be used to incent the installation of resources with particular characteristics in those areas where it was is valuable.

Conclusion

Rate design for all customers should focus on sending the right price signals so they can make investments in DSG and other DERs and adjust their behaviour in ways that benefits the system as a whole. This should involve incorporating time based rates with sufficient difference between on peak and off peak, as well as maintaining volumetric aspects in order to allow customers to utilize conservation and DERs to greater affect. Fixing too large a portion of the bill undercuts customer choice and their ability to respond to price signals in meaningful ways. CanSIA strongly opposes any rate design that favours fixed rates to the extent that customers are unmotivated or unable to modify behaviour and have an impact on their electricity bill, and, that fundamentally undervalue the benefits of net metered solar and DERs to the distribution system.

[12] The 50 States of Solar, NC Clean Energy Technology Centre, February 2016, Pg. 19. https://nccleantech.ncsu.edu/wp-content/uploads/50sosQ4-FINAL.pdf.

The regulatory structure needs to evolve over time to incent LDCs to meet customer's evolving needs and desires, including the ability to manage their usage and make use of DSG and other DERs. Regulatory restructuring processes, such as New York's REV, have important lessons for Ontario in this regard and the recent Track 2 Order, released on May 19, 2016 should be examined closely by the OEB. This order sets out the framework for moving utilities off of fixed charges and old methods of recovering revenue and instead refocussing utilities on becoming distribution service providers that recover larger portions of their revenue from services they can offer to DER providers.

All of which is respectfully submitted.

Sincerely,

Ben Weir

Director of Policy and Regulatory Affairs
Canadian Solar Industries Association

CC: John Gorman, President & CEO, Canadian Solar Industries Association
Wes Johnston, Vice President, Canadian Solar Industries Association

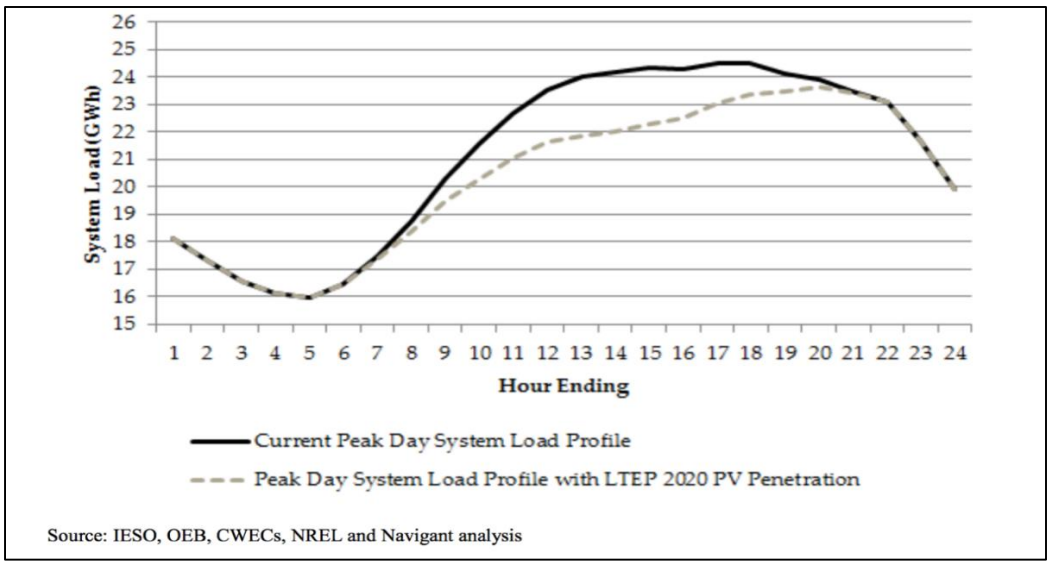
Appendix A

The Unique Attributes of Distributed Solar Generation

DSG is a unique renewable energy resource with a diverse set of attributes. Compared to large centralized generation resources such as hydro-electric and nuclear, DSG can be scaled to precisely address power system needs while respecting grid connection constraints. DSG can be located anywhere with access to sufficient sunlight which makes siting DSG highly flexible compared other generation with fuel delivery needs. DSG does not require specific geographic features for development and can be sited in varying locations throughout the province ranging from dense residential housing to commercial rooftops and even low-value land that is not suitable for agriculture.

The output of DSG aligns well with Ontario's electricity demand, with more production during peak hours than off-peak.

Figure 2: Comparison of Load Profile with and without DSG[13]



Advances in energy storage, demand response and smart grids are expected to have a significant impact on electricity systems in the near future, and the dynamic controls available to DSG systems have the potential to work well with these technologies to shave peak and provide demand management services, provided adopters are compensated appropriately for the provision of those services. A recent study conducted by the Sacramento Municipal Utility District (SMUD) and Black & Veatch also determined that increasing adoption of storage, energy intelligence software, solar and EVs will not just shift peak but likely flatten load.[14]

[13] RPP Roadmap Report of the Board 2015.

[14] Sacramento Municipal Utility District, Examining Future Grid Impacts through Integrated DER Analysis, https://www.solarelectricpower.org/discover-resources/publications-and-media.aspx.

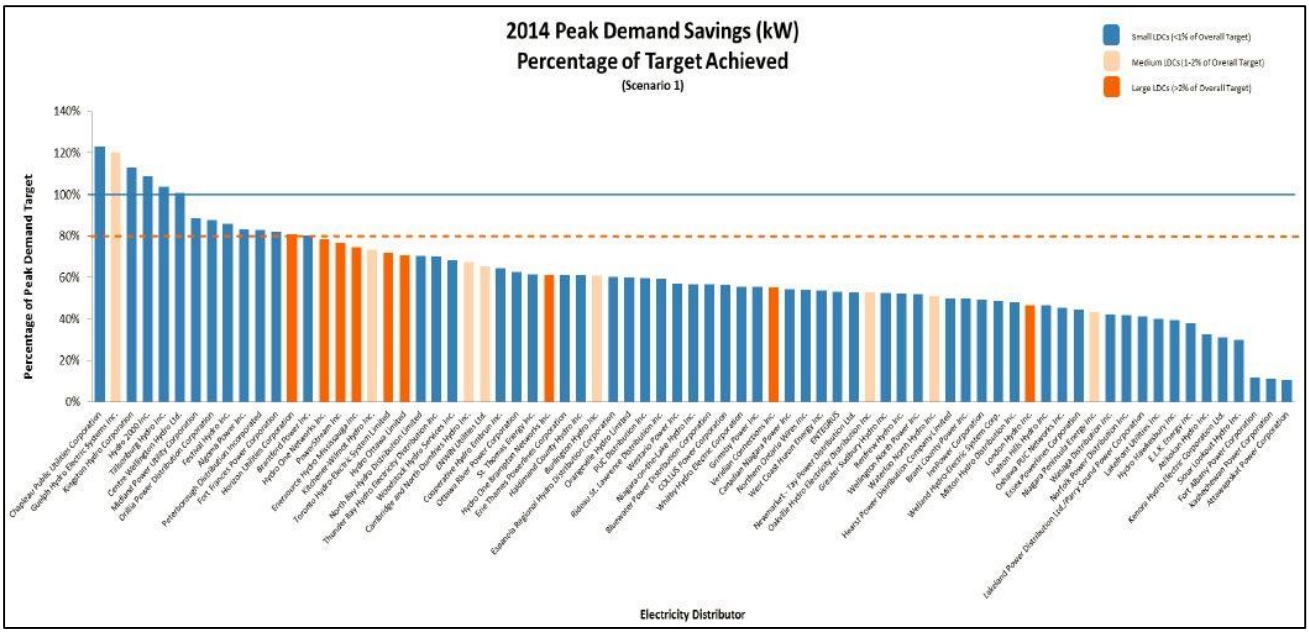
Benefits of Distributed Generation Solar to the Ontario Electricity Market

The valuable attributes of DSG can aid in Ontario's electricity system renewal, maximize rate-payer value and meet a wide variety of policy goals. Power system planners and operators can benefit from the technical capabilities of DSG in meeting power system needs at both the regional and bulk system level. CanSIA has identified five priority areas where the attributes of DSG can be valuable to the Ontario electricity system, rate-payers and government policy objectives over the next decade.

Conservation and Demand Management

Behind-the-meter and virtual net metering DSG installations can support the province's Conservation First policy and help LDCs to meet CDM targets. Behind-the-meter DSG can effectively lower the electricity demand of consumers throughout the day, especially during peak periods. The 2014 Distributor Scorecard published by the OEB shows that only 6 of 72 LDCs (8%) have met their Net Annual Peak Demand Savings target, and only 41 of 72 LDCs (57%) have met their Net Annual Energy Savings target. DSG can be an effective option for LDCs to meet their CDM targets while at the same time aligning the interests of LDCs and customer-driven DSG.

Figure 3: CDM Achievement by LDC 2011-2014[15]



DSG and net metered generation can help to drive interest in CDM participation by Ontario's electricity consumers. Customers receiving excess generation payments (i.e. payments for surplus power export to the grid) will be incentivized to conserve and manage their demand to increase revenue from grid export. Through a robust net metering regulation and associated electricity customer rate design regulations, the majority of revenue for a behind-

[15] OEB – CDM Report 2011-2014

the-meter DSG project can be realized from on-site avoided electricity savings. In order to realize this goal, however, electricity rate structures need to recognize the value that DSG can provide for customers and LDCs.

Provided DSG systems value is recognized by electricity rate structures, DSG could contribute significantly towards energy consumption reduction within LDC's service territories. For example, with an outlay of 1,000 MW over the course of 5 years, behind-the-meter DSG could contribute an additional energy savings of 220,000 MWh per year for each of 5 years, totaling savings of 1,100,000 MWh in year 5 and continuing for least 20 years. This installation level would meet approximately 18.9% of the province-wide 2015 – 2020 CDM targets for systems installed in 2018 – 2020 (if counted towards that framework).

Economic Development and Job Creation

Using the NREL Jobs and Economic Development Impact (JEDI) model, the economic impacts of 1,000 MW of DSG installations were examined. It was found that the 200 MW installed in each of the 5 years between 2018 – 2020 would create roughly 14,500 person-years of employment and $2.5 billion of economic activity over their lifetime.

Figure 4: Economic Development Impacts of 1000 MW of DSG

During Project Construction Years	Total Cumulative Job Years	Total Earnings - $Million (2015)	Total Output - $Million (2015)
Project Development and Onsite Labor Impacts			
Construction and Installation Labor	2,359	$349.95	$349.95
Construction and Installation Related Services	1,843	$133.97	$211.57
Subtotal	**4,201**	**$483.92**	**$561.52**
Module and Supply Chain Impacts			
Manufacturing Impacts	785	$56.37	$181.19
Trade (Wholesale and Retail)	2,506	$166.94	$481.05
Finance, Insurance and Real Estate	0	$0.00	$0.00
Professional Services	374	$22.86	$63.61
Other Services	681	$100.54	$213.66
Other Sectors	2,402	$120.48	$351.64
Subtotal	**6,748**	**$467.18**	**$1,291.15**
Induced Impacts	**2,562**	**$143.18**	**$503.16**
Total Impacts	**13,511**	**$1,094.29**	**$2,355.83**

During Operating Years (Cumulative)	Total Cumulative Job Years	Total Earnings - $Million (2015)	Total Output - $Million (2015)
Onsite Labor Impacts			
PV Project Labor Only	597	$82.24	$82.24
Local Revenue and Supply Chain Impacts	278	$18.39	$46.91
Induced Impacts	139	$7.77	$27.31
Total Impacts	**1,014**	**$108.40**	**$156.46**

Job Years refers to full time equivalent (FTE) employment for 1 year (1 FTE = 2080 hours).
Earnings refers to wages and salaries of workers, as well as benefits such as health insurance, retirement etc.
Output refers to economics activity or the value of production in the state or region being analyzed (Ontario).

Regional Planning and Distribution System Planning

Regional planning and distribution system planning is meant to ensure that the Ontario power system is developed in a reliable and cost-effective manner that maximizes rate-payer value. These activities identify areas of the province that have system needs requiring coordination between the system planner (IESO), transmitter (Hydro One) and LDCs. In the case of regional system planning, detailed consultation with communities is required in order for their input to be included in regional plans and subsequent siting of electricity infrastructure. Options to address regional planning needs must balance technical requirements of the power system with community concerns and municipal priorities. The ability of DSG to be sited beside or on existing load customer sites reduces the overall local impact, and thus DSG is often more acceptable to communities than traditional solutions.

DSG can partner well with new and emerging technologies such as energy storage to meet evolving power system needs. It can reduce the need for new transmission and distribution investments, reduce energy consumption, reduce the risk of stranded assets of LDCs, improve grid resiliency.[16] DSG can also address multiple power system needs at the bulk, regional and local level.

DSG is a low-risk supply mix diversification option for Ontario. As a passive renewable resource, it has no fuel supply cost and minimum maintenance costs. DSG produces energy during periods of high system demand and the distributed siting pattern adds flexibility and resiliency, reducing the risk that a loss of any one facility will be harmful to the stability and reliability of the power system. Over time, investments in DSG may be able to reduce the reliability requirement of the centrally operated grid by decreasing the risk of shortfall during the loss of two or more bulk system facilities. Reducing reserve requirements has significant savings potential for all rate-payers.

Regional planning and distribution system planning should clarify cost thresholds and timelines for certain levels of distributed generation investment to meet regional and local needs. Regional and distribution planning should quantify all benefits of integrating distributed generation, including support of smart grid initiatives and new data for

[16] Lindsey Hallock and Rob Sargent, Shining Rewards: The Value of Rooftop Solar Power for Consumers and Society, Environment America and The Frontier Group, Pg. 11.
http://www.environmentamerica.org/sites/environment/files/reports/EA_shiningrewards_print.pdf.

planners seeking more fine-grained insight into the power system. Additional commentary on how DER credits could be utilized to facilitate this process is included below.

Consumer Choice and Preference

As more consumers become engaged with and informed about their electricity consumption options, a diverse set of delivery options will find appeal throughout the spectrum of customer types. Consumers' own cost/benefit analysis of electricity services should be aided by assistance and input from key stakeholders. Electric utilities, regulators, service providers and government policy advisors will need to ensure that a mix of options are available for consumers to balance needs and risks.

The OEB's RRF aims to shift the investment incentives and associated risks faced by LDCs through its revenue decoupling and move to fixed charges for distributor's revenue. LDCs will be repositioned as managers of the distribution network, facilitating new customer-centric value propositions. DSG is complimentary to the changes initiated by the RRF and consequently is expected to have minimal impact on LDCs as a whole due to revenue decoupling. Since DSG is a resource with a fixed upfront cost, consumers and LDCs can utilize DSG to provide a cap or hedge on electricity rates. Consumer choice should continue to be prioritized in future power system planning and rate structure decisions, planning initiatives, codes and regulations for behind-the-meter DSG which should support customer choice in a simple and fair manner.

Climate Change and Avoiding GHGs

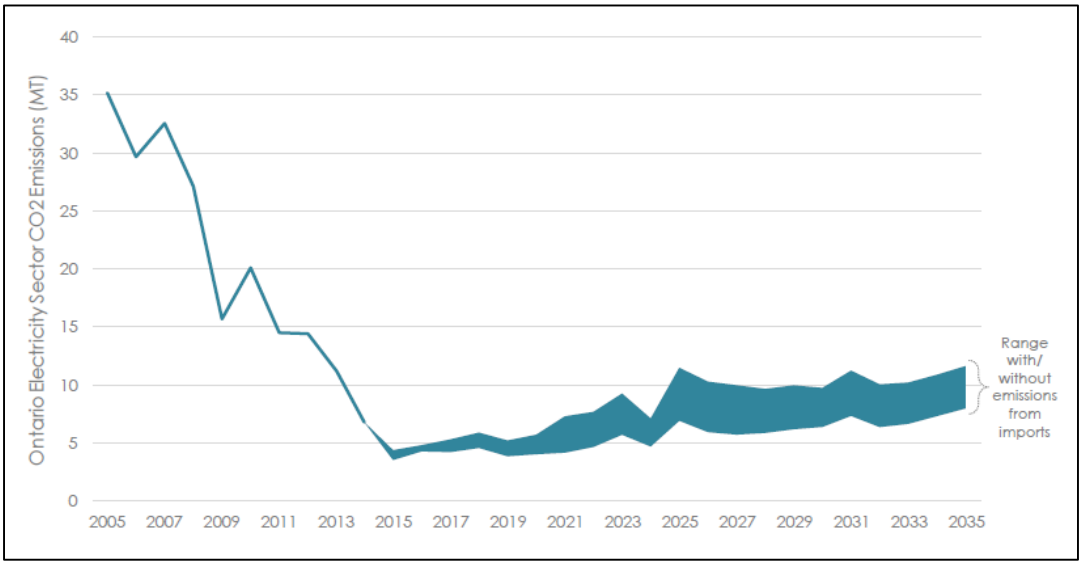
Climate change policy is entering a new phase on the provincial, federal and global stage that will have a direct impact on the Ontario and Canadian economy. At the provincial level, the Ontario government will be reducing Greenhouse Gas Emissions (GHG) by implementing a Cap and Trade program in 2017. Placing a price on carbon will change the consumption and spending patterns of all Ontarians. As climate change policy begins to drive the electrification of different sectors of the Ontario economy, the value of DSG to regional and electricity system planners will only increase as increased reliance on existing natural gas assets, or the construction of new natural gas assets, becomes more expensive as the cost of fuel increases with the cost of carbon. Allowing DSG to reduce environmental regulation compliance costs.[17] Replacing a kWh of natural gas fired generation in Ontario with a kWh of solar would avoid approximately 0.43 kg of CO2e. [18]

Uncertainty exists across the electricity sector in regards to how emissions will change over the initial compliance period of the Cap and Trade program. For example, the current Long Term Energy Plan (LTEP) forecasts meeting a prescribed target for conservation of 7 TWh by 2020. Meeting those targets (or not meeting them) has implications for energy production in the province and thus the GHG profile of the electricity sector. Local Distribution Companies (LDCs) have already begun signaling possible difficulties in meeting conservation targets using the usual energy efficiency measures available to them. For this reason some LDCs have funded behind the meter natural gas generation as a method of conservation. Meeting the conservation targets with behind the meter natural gas

[17] Lindsey Hallock and Rob Sargent, Shining Rewards: The Value of Rooftop Solar Power for Consumers and Society, Environment America and The Frontier Group, Pg. 11. http://www.environmentamerica.org/sites/environment/files/reports/EA_shiningrewards_print.pdf.
[18] Power Advisory LLC, Value of Avoided Greenhouse Gas Emissions by Solar Generation, May 2016.

generation will increase GHG emissions. Ontario may also require additional renewable resources such as DSG to supply emissions free electricity to meet any increase in demand from the electrification of other economic sectors and to avoid IESO forecasted increases to GHG emissions from the electricity sector as a result of increased reliance on natural gas generation during periods of nuclear refurbishment. Figure 4, below, illustrates those forecasted emissions increases.

Figure 5: IESO Forecasted Electricity Sector Emissions[19]



As the cost of carbon increases, providing these benefits with resources other than renewables will become increasingly costly. Setting in place an electricity rate structure that allows consumers the ability to install their own DSG provides them the ability to manage their own costs by avoiding ongoing fuel risks. The ability of DSG to act as a hedge against rising electricity rates for consumers – or as a price cap – is an important benefit for future supply mix plans and individual consumer choices.

Public Support

Solar generation is very popular among Ontarians and continues to be broadly supported throughout the province. In May 2015, the Gandalf Group, on behalf of CanSIA, undertook market research that found job creation and the economy to be the most important issues identified. Ontarians support significant reductions in air pollution, and support measures that would maintain these reductions or go even further. The study found very little opposition to increased use of solar to meet future needs and a preference for solar on rooftops compared to fields. Solar generation was considered the most popular source of energy, after energy efficiency. Another set of polling

[19] Independent Electricity System Operator, Preliminary Outlook and Discussion: Ontario Supply/Demand Balance to 2035, March 23, 2016, Pg. 23, http://www.ieso.ca/Documents/consult/sac/SAC-20160323-Ontario-Planning-Outlook.pdf.

conducted by Environmental Defence in 2016 found that 80% of respondents would like to see Ontario generate more power from renewable resources.[20]

Figure 6: Ontarians' Views on Solar Energy[21]

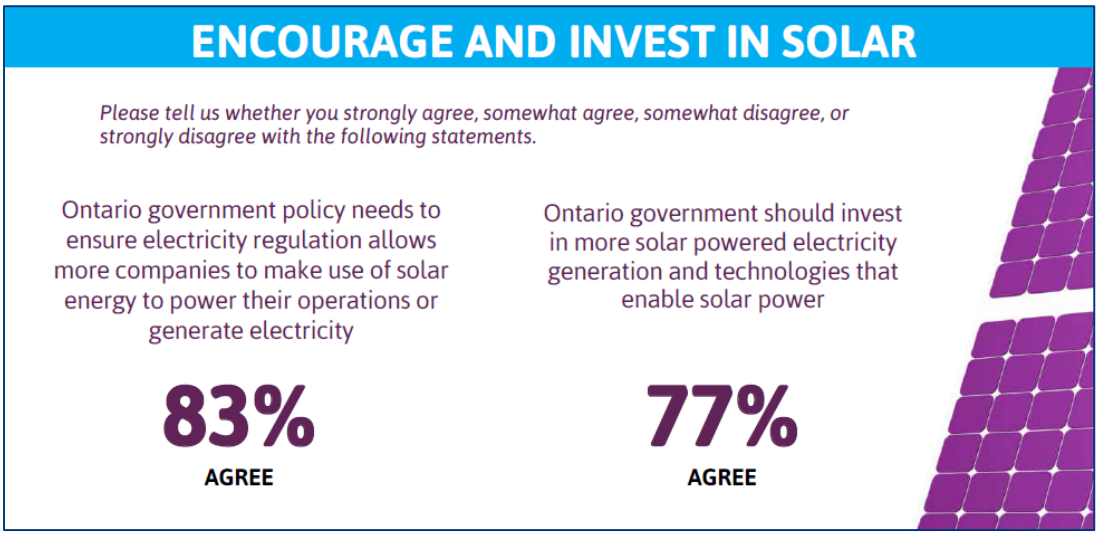
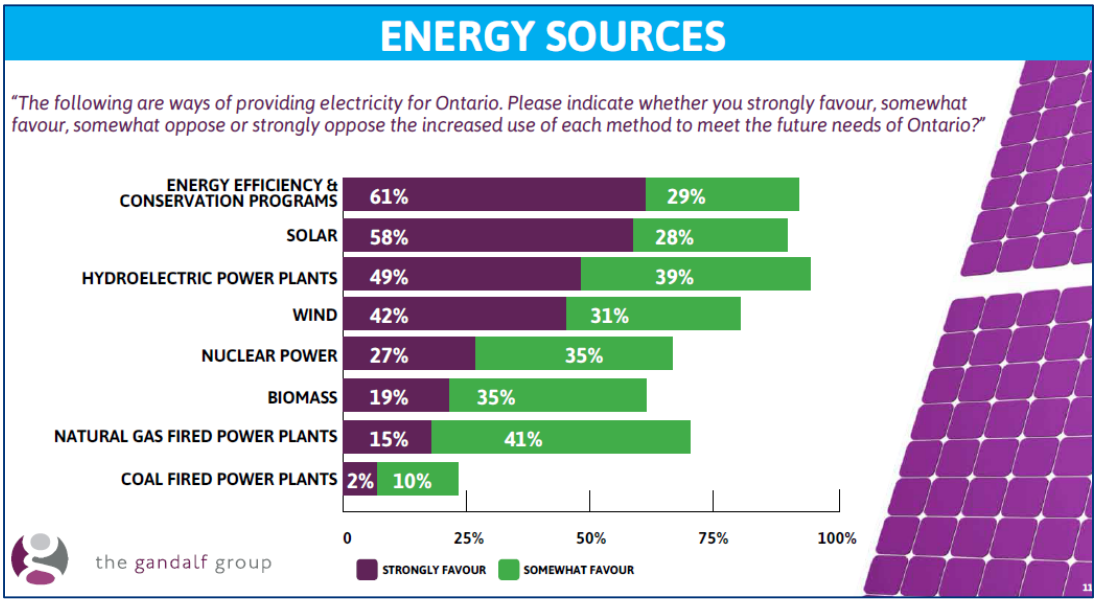


Figure 7: Ontarians' Views on Solar Energy, Technologies and Policies



[20] Environmental Defence, Getting FIT: How Ontario Became a Green Energy Leader and Why it Needs to Stay the Course, May 19, Pg. 5, http://environmentaldefence.ca/report/getting-fit/.
[21] Gandalf Group, May 26, 2015.