

# EVERYTHING YOU WANTED TO KNOW ABOUT SOLAR PV IN CRE *[But were too afraid to ask!]*



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The Compass team provides technical, regulatory and strategic support on the risks and opportunities within North American renewable energy markets.



## Sample Engagements & Experience

- Net Metering Strategy Support
- Net Metering & Battery Storage Feasibility Analysis
- Net Metering & Battery Storage Development Support
- Canadian Battery Storage Market Assessment
- Solar PV development management
- NRCan Canadian Solar PV Sector Profile
- Ministry of Energy Solar and Wind Market Assessments
- Canadian Wide market assessment for a Canadian pension fund
- North American residential solar incentive benchmarking
- Ontario Feed-in Tariff (FIT) Program Design & Development Support
- Renewable Procurement Rules, Contract interpretation and analysis (i.e. RES III & FIT)
- Forecast CONE analysis for solar and wind
- Policy research and support to the Alberta Government

Solar PV will increase the value of real-estate by reducing reliance on grid power, decreasing operating costs, providing tax benefits and increasing face rents over time.

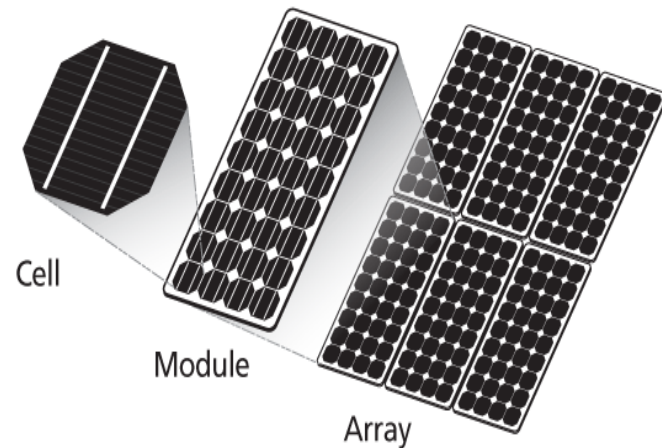
### Why Solar?

- Solar acts as a hedge on uncertain grid costs, giving you and tenants cost control
- Solar has no fuel costs and very low operating costs
- 7 to 10 year payback or 11 to 20 % unlevered IRR depending on available tax benefit.
- Provides resiliency through on-site generation
- Reduce GHG/carbon footprint
- Increase assets under management
- Support sustainability objectives for owner and tenants



Solar PV is a very flexible and modular technology that can be scaled up or down based on available space and energy (load) requirements.

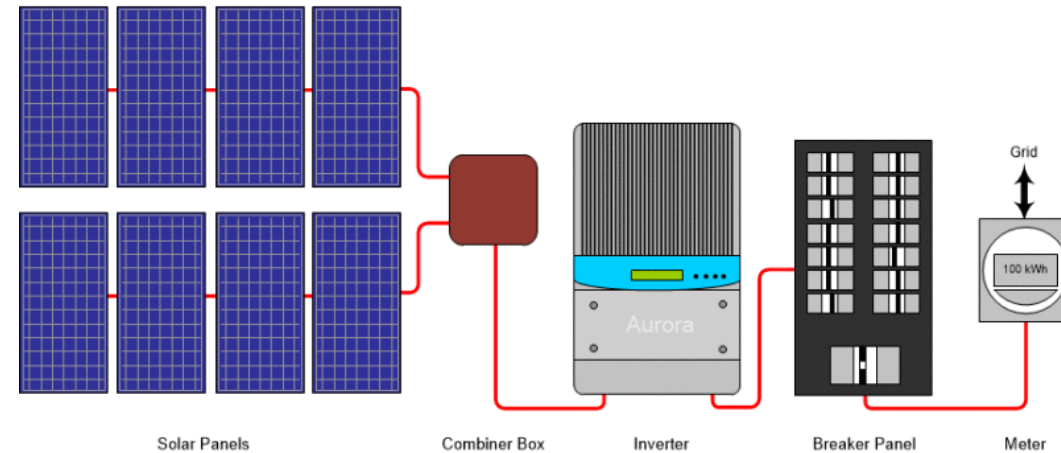
## Overview of Solar Array



Source: Samlex Solar

- Solar cells are combined to create a solar panel.
- Solar panels are combined to form a solar array.

## Overview of Electrical Components

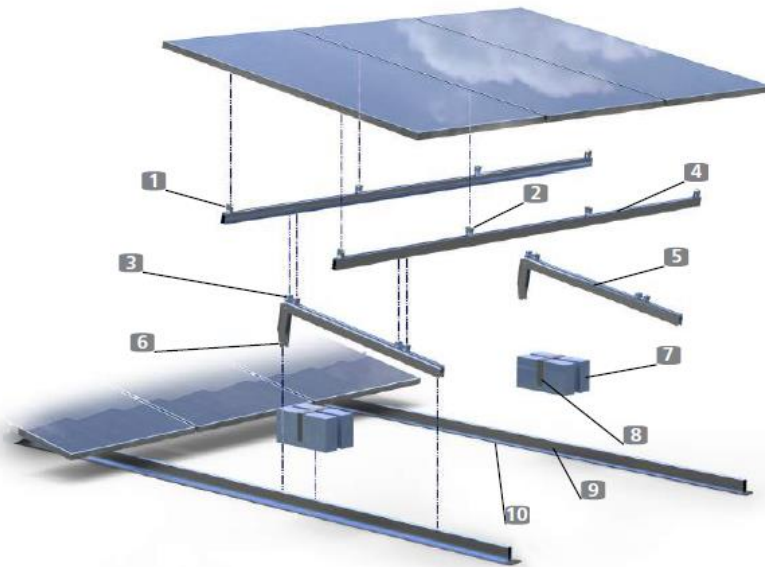


Source: UPI

- Solar panels produce Direct Current (DC) power that needs to be converted to Alternating Current (AC) through an inverter before connecting to a building electrical system.
- The solar system powers the building loads reducing the amount of electricity purchased from the grid (utility).

Solar panels are mechanically connected to steel or aluminum racking which is weighted down on the roof using ballast (non-penetrating). A rubber membrane is used between racking system and roof system.

## Racking System



Source: TerraGen

## Rooftop System



- Flat roofs generally require 4 to 6 psf of structural capacity to support solar.
- Can be mounted on both flat and sloped roofs.

Rooftop space requirements vary based on rooftop features (i.e. RTU, gas lines, etc).

Industrial (+/- 140 sqft / kWdc)



Retail (+/- 200 sqft / kWdc)



Gone are Feed-in Tariffs (FIT), going forward solar is being developed under Net Metering Regulations or Net Billing (AB) arrangements.

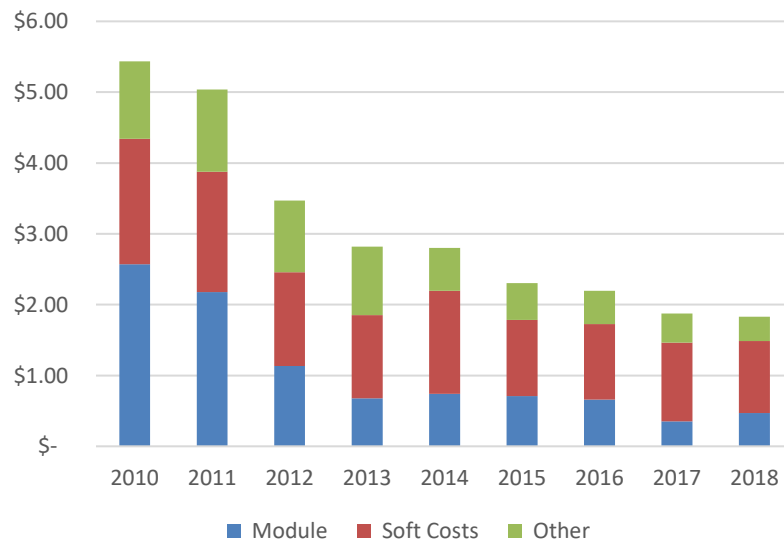
### What is Net Metering?

- Net-metering is a billing arrangement which allows customers to generate renewable energy onsite for their own use, and to receive bill credits for any surplus electricity they send to the grid.
- Credits are carried forward to offset future consumption, up to 12 months.
- Net metering creates energy credits (i.e. kWh), so all charges that are based on kWh can be offset.
- Net metering is a regulation, (O.Reg 541/05) under the *Ontario Energy Board Act, 1998* and is available throughout Ontario.



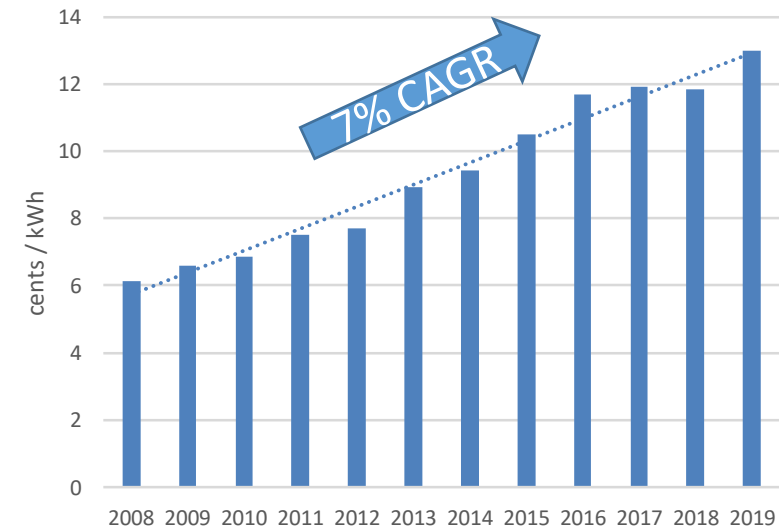
The installed costs of solar PV have declined by more than 65% since 2010, while the commodity costs of electricity in Ontario have more than doubled since 2008.

## Recent Solar Cost Declines (USD)



Source: NREL

## Wholesale Cost of Power - ON

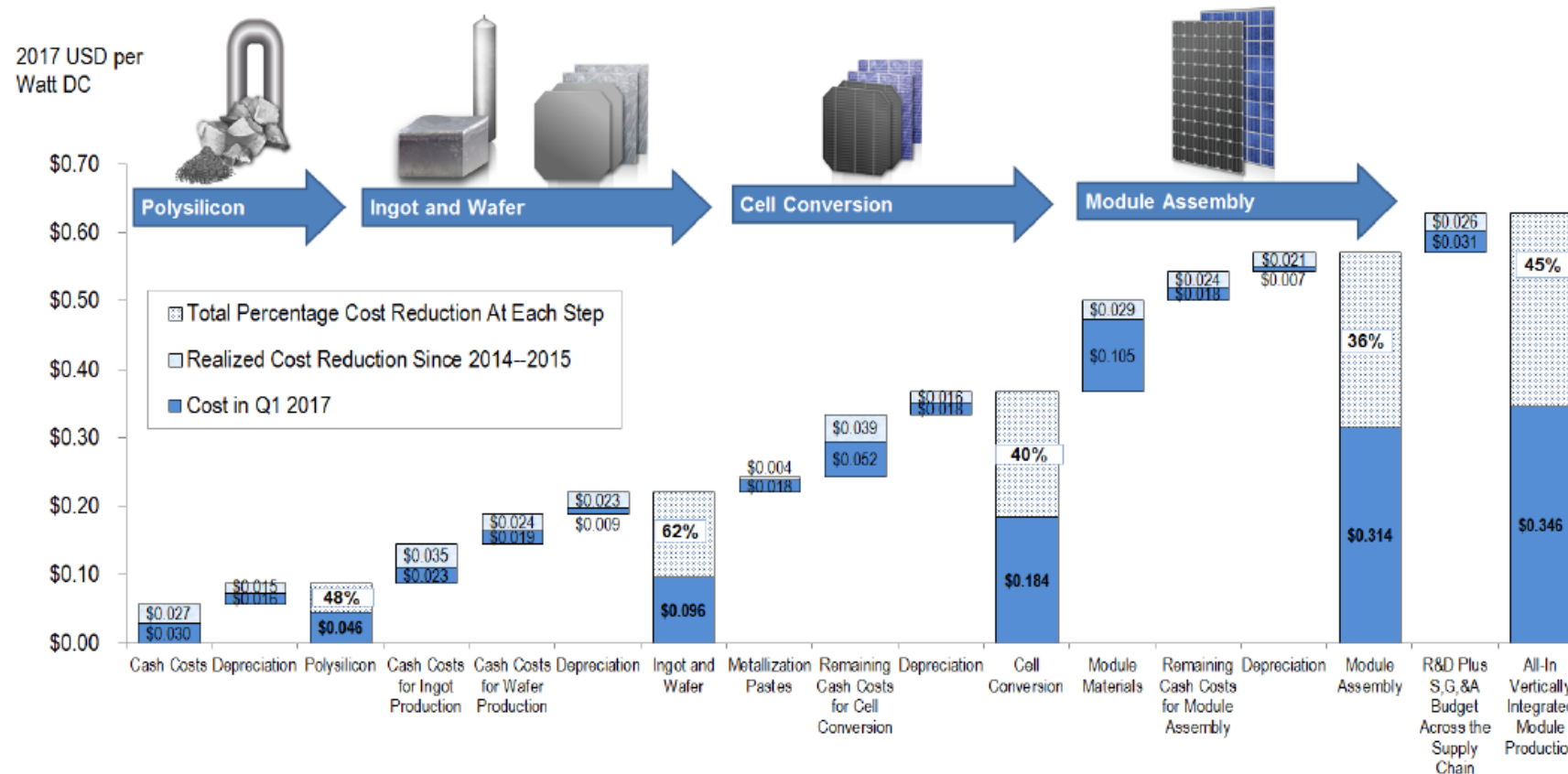


Source: IESO & Compass Analysis

# TECHNOLOGY ADVANCES » PANEL COST REDUCTIONS

From 2014 to 2017, gains in solar efficiency in parallel with manufacturing improvements reduced solar panel manufacturing costs by 45%.

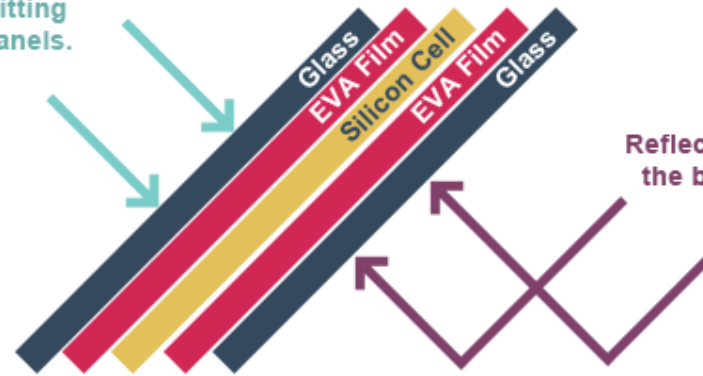
## Solar Panel Cost Reductions



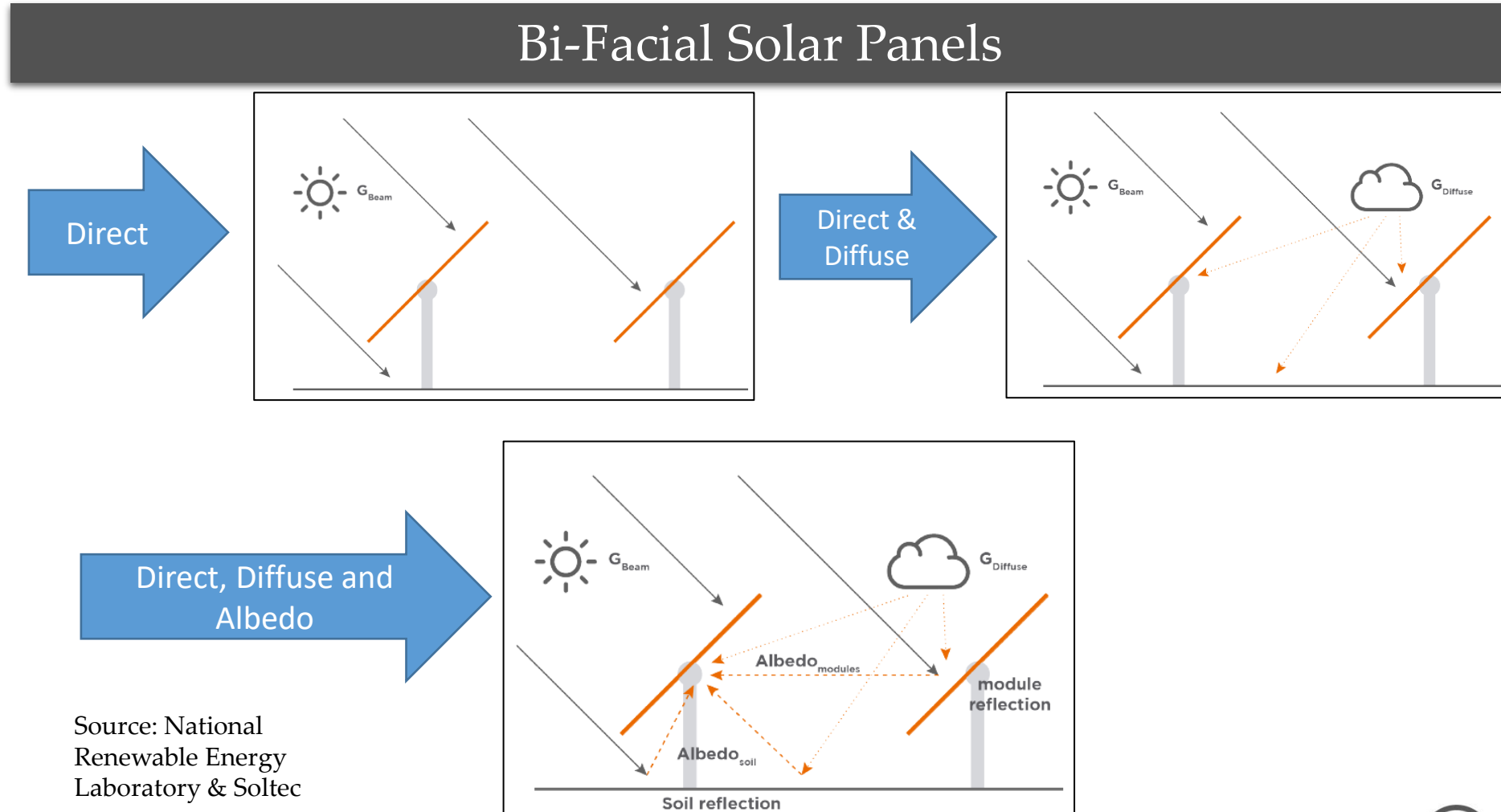
Bi-facial technology allow both the front and the back of cells/panels to convert light into energy, and can increase electricity production from 5 to 30% compared with mono-facial.

## Bi-Facial Solar Panels

Direct sunlight hitting the front of the panels.



Bi-facial panels benefit from rear direct, diffuse and albedo irradiance in addition to front side of the module.



Source: National Renewable Energy Laboratory & Soltec

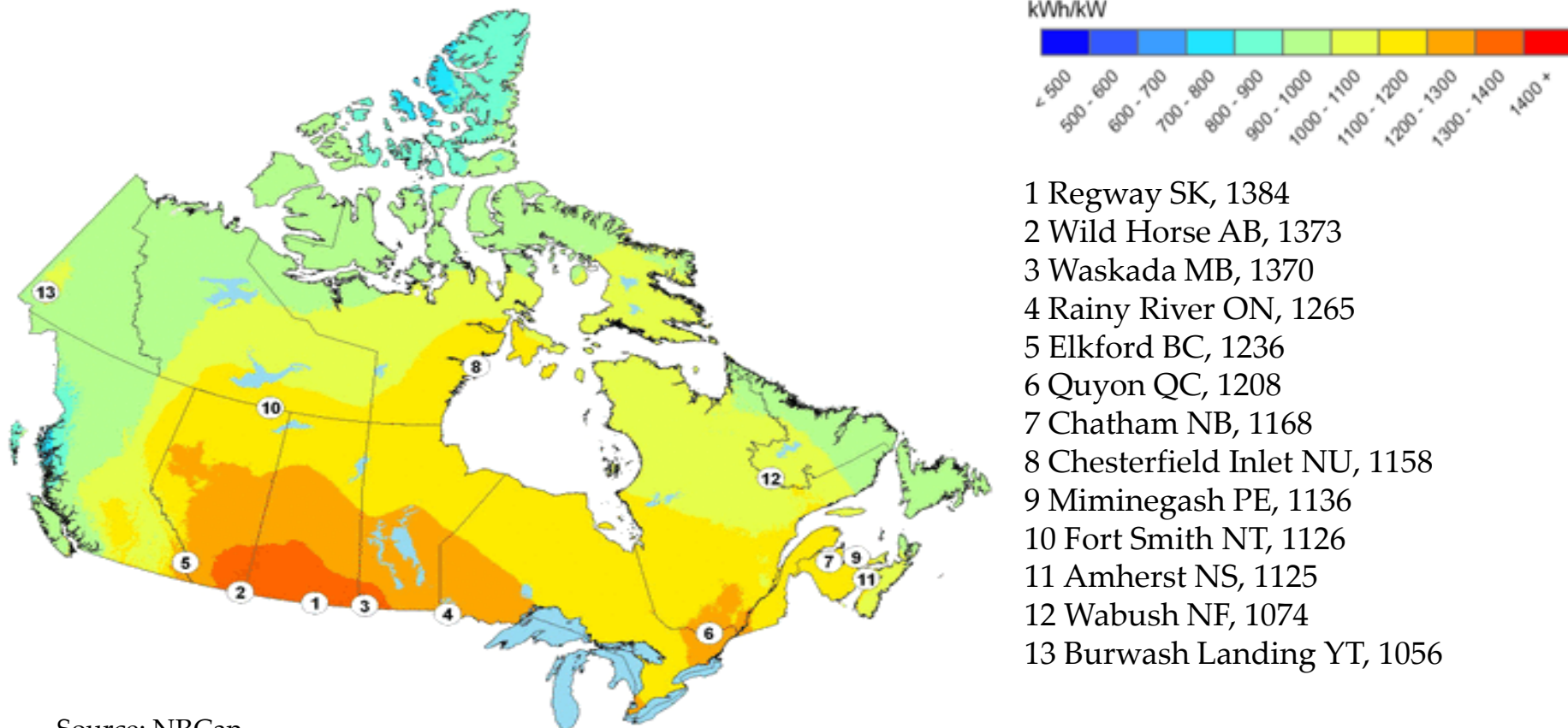
# BUILDING SCREENING CRITERIA

There are a variety of financial and technical criteria that have to be considered when assessing solar viability for a commercial building.

Criteria	Criteria Type	Rated or Mandatory	Minimum Requirement / Notes
Structural Capacity	Technical	Mandatory	4 to 6 psf
Roof Age	Technical	Mandatory	< 5 years
Utility Grid Capacity	Technical	Mandatory	Based on size of solar system
Building Electrical Infrastructure	Technical	Rated	Based on size of solar system and building equipment
Buildable Area on Roof	Technical	Rated	> 40,000 sqft
Avoided Cost (Value of Electricity)	Financial	Rated	Varies by Province
Solar Irradiance	Financial	Rated	Varies by Province
Who Pays The Electricity	Financial	Rated	Landlord/Manager vs. Tenant
GHG Avoidance	Environmental	Rated	Varies by Province

The prairies are Canada's sun belt with fixed tilt capacity factors from 15 to 16%, as compared to Ontario in the 13 to 14% range.

## Solar Resource Map



Source: NRCan

# FINANCIAL ANALYSIS » WHAT IS AVOIDABLE THROUGH NET METERING / BILLING?

In general, approximately 70% of a customer's electricity bill can be eliminated through net metering / net billing.

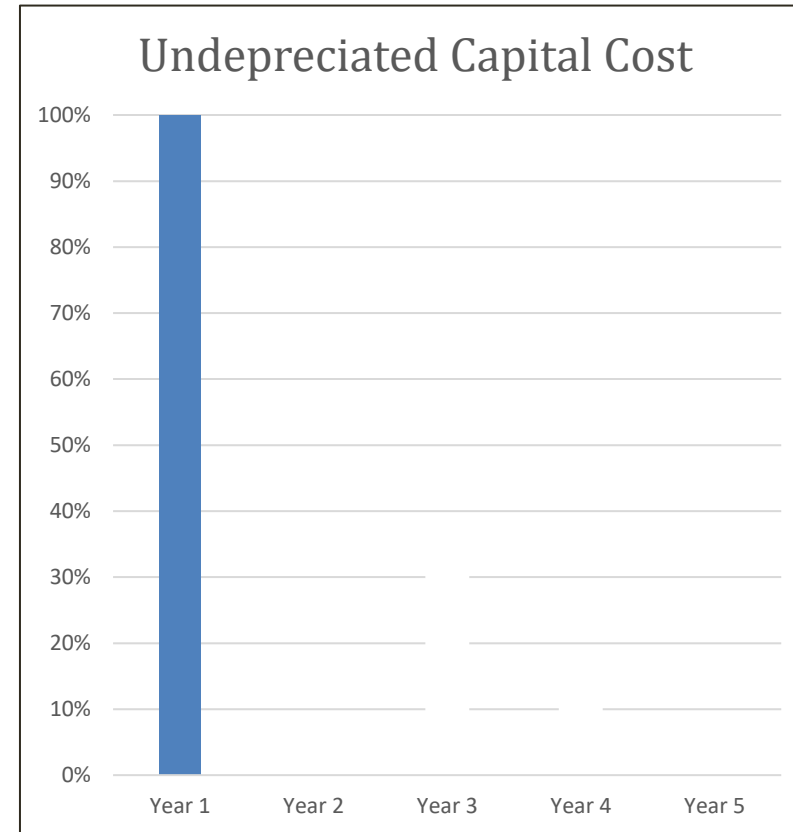
Avoidable Costs		Billing Analysis	
Charge Type	Avoidable	12 Month Summary of Bills	
Electricity Commodity (HOEP + GA)	Yes	Period	Jan – Dec 2017
Customer Charge	No	Adjusted Total Consumption	1,817,520 kWh
Delivery	Depends	Base Electricity Cost (HOEP)	\$29,035
Regulatory	Yes	Global Adjustment (GA)	\$185,545
Debt Retirement	No	Regulatory Charges	\$9,764
Line Losses	Yes	Total Volumetric Charges	\$224,344
		Avg. Volumetric Energy	0.123 \$/kWh
		Total Electricity Cost	\$305,988

ILLUSTRATIVE

Solar PV is included in Capital Cost Allowance category, 43.2, which allows for 100% depreciation in year 1.

## Depreciation Tax Benefits

- 2018 Federal Fall Economic statement updated treatment of investments in CCA 43.1 & 43.2
- 100% of solar and battery storage investments can be depreciated in the year they are made.
- This creates a tax reduction benefit for profitable businesses





# FINANCIAL ANALYSIS» ILLUSTRATIVE RETURNS AND PAYBACKS

Project Size (kW)	Estimated Sqft Needs (Industrial)	Estimated Sqft Needs (Retail)	Total Capital Cost	25 Year Net Savings	Taxable Entity	After Tax IRR	Payback
500	75,000	100,000	842,000	1,703,000	FALSE	11%	10.5
500	75,000	100,000	842,000	1,957,000	TRUE	15%	7.9
750	112,500	150,000	1,216,250	2,630,000	FALSE	11%	10.1
750	112,500	150,000	1,216,250	2,991,000	TRUE	16%	7.6
1,000	150,000	200,000	1,579,500	3,568,000	FALSE	12%	9.8
1,000	150,000	200,000	1,579,500	4,032,000	TRUE	17%	7.4

**Notes:**

- Capital cost a preliminary estimate subject to site visit and Connection Impact Assessment
- Assumes a 3.5% annual escalation in rates
- Assumes no structural or roofing upgrades required
- Full design and power engineering included
- Taxable Entity means the owner can take advantage of 100% accelerated depreciation (CCA 43.2)
- Includes preventative on-going O&M Costs
- Unlevered returns shown, third party financing available

Solar PV is a mature technology and considered an infrastructure investment due to its low operating risk profile and predictable cashflows, very similar to real estate assets.

## Key Takeaways

- Owner and tenant education on the current technology maturity (cost and performance) are key.
- Solar can be a win-win-win investment for owners and tenants
  - Provide for accretive returns to owners while investing in their buildings
  - Lower tenant costs
  - Improve sustainability performance metrics for owners and tenants (carbon and resilience)
- Solar is easiest to implement where the owner pays electricity costs and can mix the solar investment within an existing CAM pool
- Solar still represents a good opportunity for industrial buildings where owners and tenants are interested in making it work

# THANK YOU. QUESTIONS?



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