

Solar 101

April 2023



SkyFireEnergy

Solar Energy Solutions

How Far We Have Come in 22 Years



- ❑ In our 22 years of business, we have designed and installed many of the largest and most complex commercial PV systems in Western Canada.
- ❑ Our staff includes **Professional Engineers, Certified Photovoltaic Technicians and CSA Certified Construction Electricians (Solar PV Systems Certified).**
- ❑ We have **installed thousands of renewable energy systems** across Canada and have solar PV systems in operation with more than 20 utilities in Canada.
- ❑ Our local staff experts in Calgary, Edmonton and Penticton serve all of Alberta, Saskatchewan, British Columbia, Manitoba and Northern Canada



Qualifications & Certifications



ENGINEERS &
GEOSCIENTISTS
BRITISH COLUMBIA



A P E G S
*Association of Professional Engineers
& Geoscientists of Saskatchewan*

T E S L A
POWERWALL
CERTIFIED INSTALLER



Canadian Renewable
Energy Association
WIND. SOLAR. STORAGE.



Our Vision

To bring the magic of solar power to the world for a stronger, healthier and more sustainable global community.

11526 76 Avenue

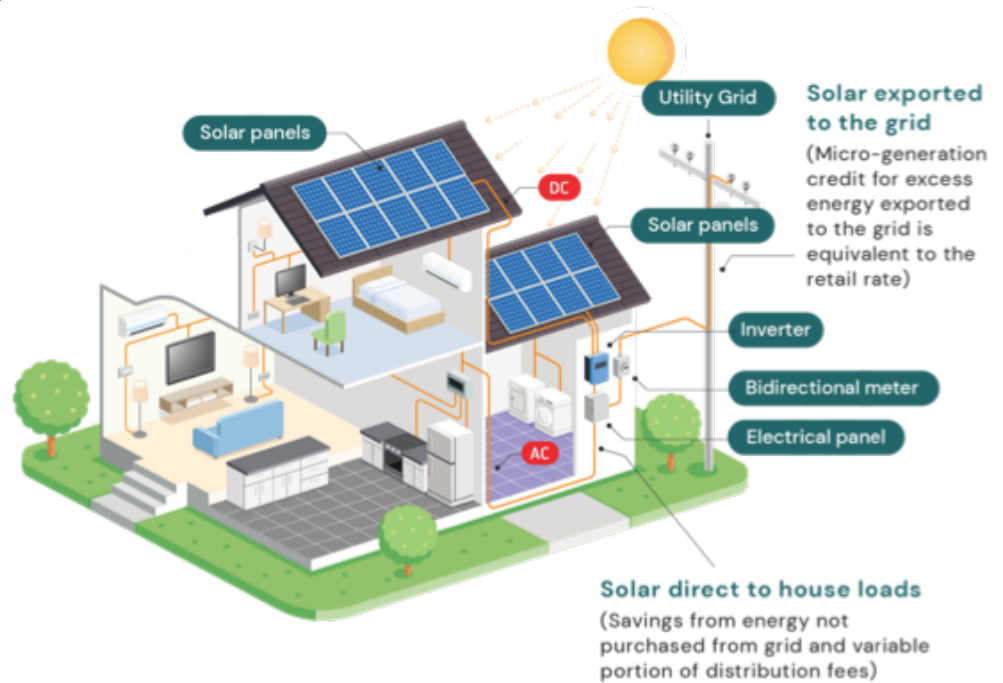


Energy Terms

- **kW kiloWatt**
 - measure of power ie 100W lightbulb is 0.1kW
 - 100W solar module is rating under ideal conditions
 - 1000W/m², 25deg C, sun is perpendicular to module
- **kWhr kiloWatt hour**
 - measure of energy, what is on your electric bill
 - 10 hours of 100W light bulb is 1kWhr
 - Can also measure battery storage capacity
- **Licensed Prepaid Contractor**
 - Regulated by Service Alberta
 - You have rights as a homeowner



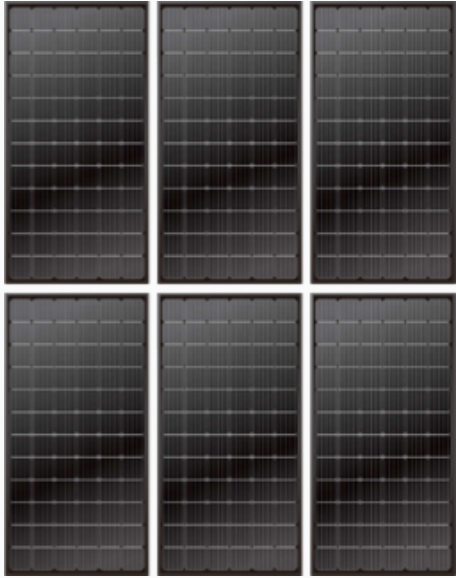
How Does Solar PV Work?



1. Solar PV modules are installed on rooftop, wall, ground, or carport. The photovoltaic cells convert sunlight into direct current (DC) power.
2. The inverter(s) convert DC electricity from the solar array into AC electricity found in the buildings (e.g. 120/240, 208, 480, 600VAC).
3. The inverter feeds electricity into the electrical distribution system.
4. The bidirectional meter keeps track of both energy imported from the grid and energy exported to the grid. Consumption is net-metered against production.
5. Your building remains connected to the utility grid (e.g. ENMAX, EPCOR, ATCO, Fortis Wires (AB), BC Hydro, FortisBC (BC), SaskPower (SK)) to supply you with energy when you require more power than your system is producing.



What is a Solar Module?



Solar Array



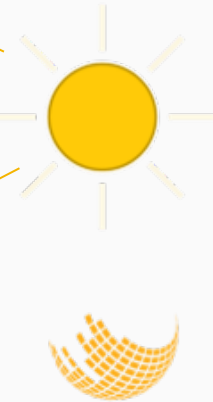
Semiconductor Junction



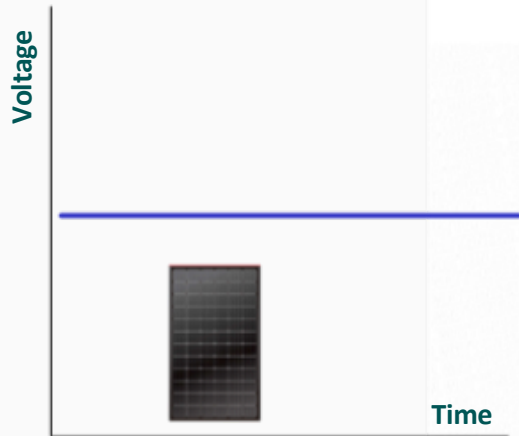
Solar Module



Solar Cell



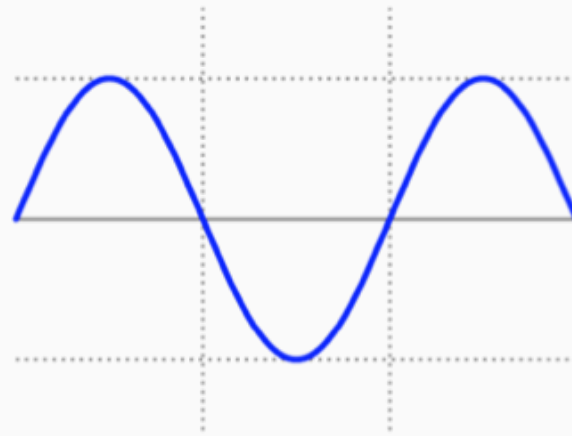
What Does The Inverter Do?



Direct Current
Solar Modules
Batteries



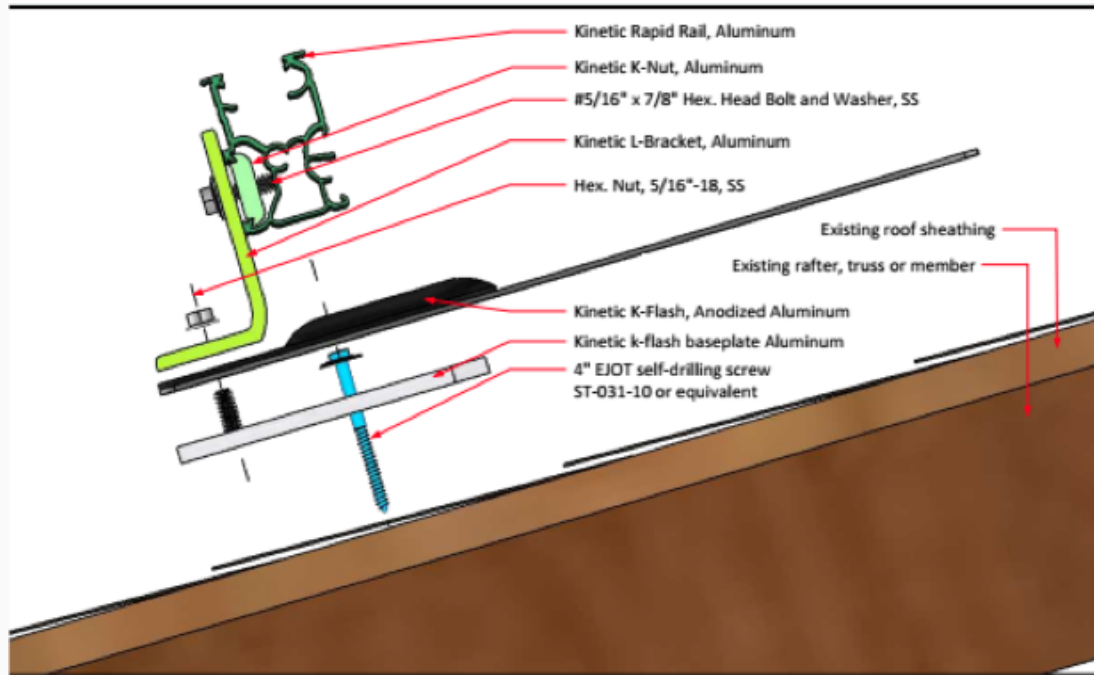
Inverter
Converts DC to AC



Alternating Current
Household electric system
Generators



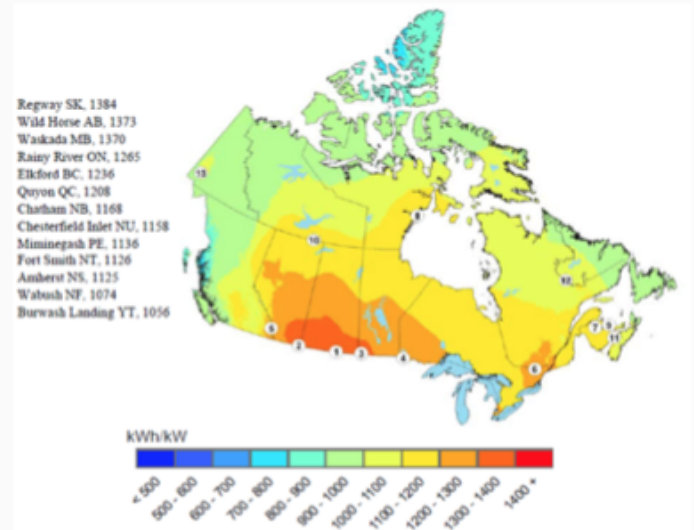
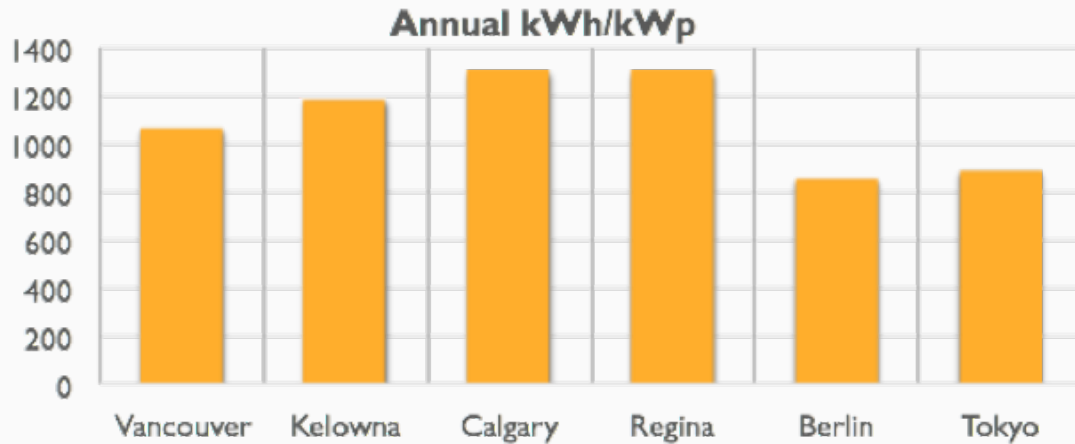
How is a Typical Array Fastened To The Roof?



- Proper flashing is critical to prevent leaks
- Attachment methods available for all types of roofs
- Asphalt shingle attachment shown



Do We Get Enough Sun?



Micro Generation Regulation Considerations

All provinces and territories have designed their programs around self consumption:

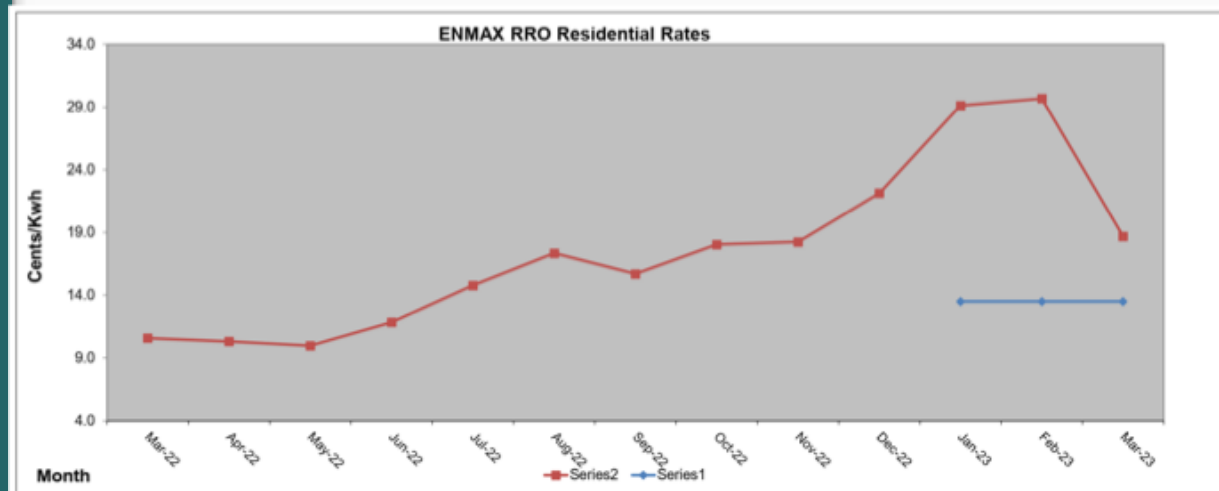
Alberta

- 5 MW max
- Net billing at
 - retail rate <150kW
 - pool price >150kW
- Savings on retail rate + transmission + variable distribution + local access fees for energy not purchased



Annual Regulated Rate For Power in Alberta (\$/kWh)

Rates are exclusive of transmission & distribution



Average RRO in 2022 = 13.32 ¢/kWh

Average for 2021 = 9.56 ¢/kWh

Average for 2020 = 6.61 ¢/kWh

February 2023 RRO was actually \$0.30+/kWhr

\$0.135 cap is deferred, not a subsidy

Payback vs Levelized Cost of Energy

$$\text{Levelized Cost of Energy (LCOE)*} = \frac{(\text{System Cost} + \text{Financing Cost} + \text{Maintenance Cost})}{\text{Energy production over 25 years}}$$

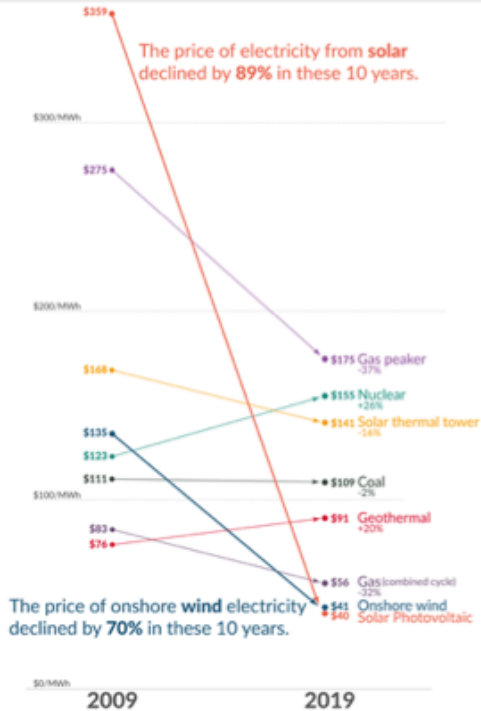
Typical solar LCOE is \$0.04/kWhr - \$0.10/kWhr

Western Canadian grid cost for delivered kWh is \$0.09 - \$0.17/kWhr

*Levelized cost of energy (LCOE) is a term used to describe the cost of the power produced by solar over a period of time (typically the warranted life of the system). By purchasing solar you are essentially creating a hedge against rising utility costs by fixing the per kWh rate at a known cost.



Alberta's Changing Energy Landscape



OPINION | Solar power is the new king, and that crown is going to be very difficult to knock off



In the case of fossil resources, competition comes with a built-in disadvantage



Sara Hastings-Simon · for CBC News · Posted: Oct 21, 2020 5:00 AM MT | Last Updated: October 21



According to the International Energy Agency, solar power has seen cost reductions of 80 per cent since 2010. For wind power, costs have dropped by 40 per cent over the same period. (CBC News)



What Makes a Home a Great Fit For Solar?



Sloped Roof
Facing South,
East or West



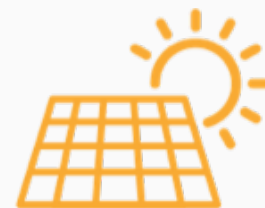
Open Roof
Space



Sufficient
Electrical
Panel Capacity



Bonus points:
Use new home
mortgage to add
solar



Bonus points:
Daytime Energy
Usage

Benefits of Solar for Homeowners

- Lock in electricity costs at a lower rate and receive credits on their bill for excess energy supplied to the grid.
- Little ongoing maintenance and systems last ~30 years.
- No additional costs! The warranties provided last almost as long as the lifetime of the system.
- Increase the resale value of the home.



Do Homes With Solar PV Sell For More?

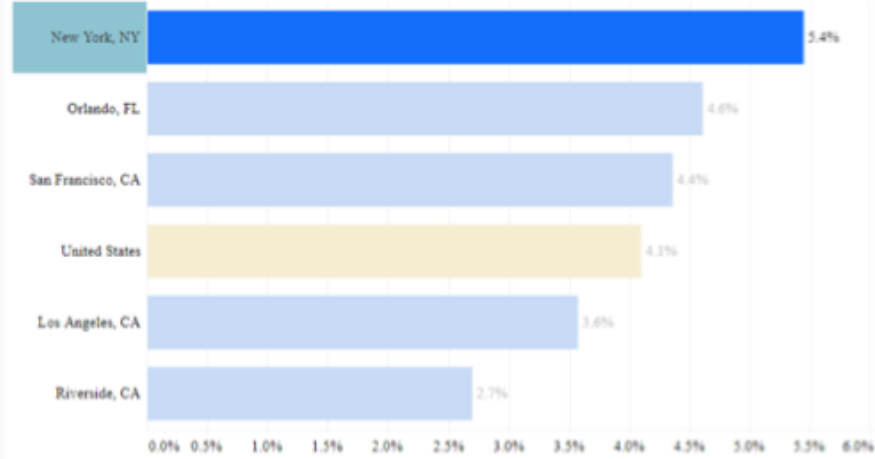
Homes with solar panels sell for 4.1% more

The price premium, as a percentage and as a dollar amount, that homes with solar power enjoy

Select view:

% premium

\$ premium



- One reason houses with solar-energy systems sell for more than those without them is they can provide substantial future energy cost savings.
- More than 80% of home buyers say energy-efficient features are important, according to the Zillow's Consumer Housing Trends Report.

Frequently Asked Questions

How long is the warranty period and lifespan of my solar PV system?

Most solar PV systems will last as long as 25 - 30 years – many of the first solar PV systems installed more than 30 years ago are still going strong.

10-YEAR
Solar Module
Warranty*

25-YEAR
Solar Production
Warranty*
(80% after 25 years)

10-YEAR
Inverter
Warranty*

5-YEAR
Installation
Warranty

Frequently Asked Questions



Will my home have power when the grid goes down?

Most systems we install are grid-tied and without battery back-up. Therefore, you will not have power during a grid outage and your PV system will shut down automatically during a grid outage to protect the safety of workers making repairs.

If you decide to install battery back-up, such as the Tesla Powerwall, it will be compatible with your existing PV system to provide uninterrupted electricity supply.



Frequently Asked Questions

What happens when it snows?

With a grid-connected solar PV system, the total annual energy production from the system is most important. The majority of the energy produced by a solar PV system in Canada is produced from March to October.

Results from NAIT's 5-year study proves that snow has a negligible impact (less than 5%) on the overall annual performance of your solar array.

Solar PV systems will actually clear themselves of snow. **Do not try to clean your solar modules!**

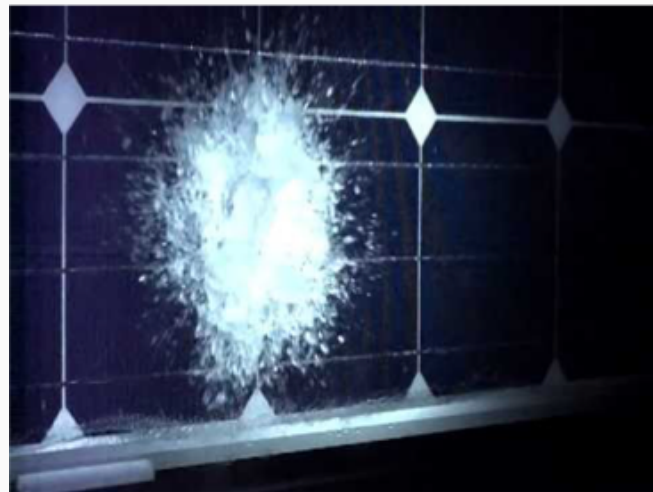


Frequently Asked Questions

Will my solar modules stand up to hail?

A solar module that is installed properly and tilted to face South should never break from hail. The module's tempered glass is typically rated for 1 inch hail at 55 mph.

To be on the safe side, we always advise our customers to add the solar system to their insurance policy. Typically, there is no additional fee for this, but if there is a fee, it will likely be in the range of \$20/year for most systems.



Frequently Asked Questions

Will my solar array generate energy on a cloudy day?

While solar modules generate the most electricity on clear days with abundant sunshine, your solar modules will still generate electricity on cloudy days, just not as much as it usually would.

On a cloudy day, typical solar modules can produce 10 - 25% of their rated capacity.

How to Pick a Contractor

- Do they do their own installations?
- Are they licenced? For electrical work and as a prepaid contractor.
- Do they have insurance coverage?
- Do they have WCB coverage?
- Do they have licenced electricians on staff? Mandatory for module installs in Alberta.
- How long have they been in business?
- Ask for references.

What to Expect On Your Electricity Bill

Electricity

Site ID:
Historical usage



Current Charges



- Balancing Pool Allocation
- Energy Management Rate Charge
- Distribution Fixed Charge
- Admin Fee
- Local Access Fee
- Fixed Usage Charges
- Transmission Variable Charges And Riders
- Distribution Variable Charges And Riders

Current measured usage and demand (if applicable)						provided by EPCOR Distribution & Transmission Inc.)	
Start meter reading (s)	End meter reading (s)	Conv. factor	Usage (kWh)	Meas. dmd.	Billed demand		
Jun 8/21	14612 A	Jun 30/21	14699 A	1	87.00		
Jul 1/21	14699 A	Jul 7/21	14764 A	1	65.00		

Current measured micro-generation exported				
Start meter reading (s)	End meter reading (s)	Conv. factor	Exports (kWh)	
Jun 8/21	9478 A	Jun 30/21	9887 A	409
Jul 1/21	9887 A	Jul 7/21	9977 A	90

Retailer charges - June 8 to July 7, 2021 \$ (86.15)

Energy charge - Fixed price electricity charges (plan expiry Mar 8, 2022)	
87 kWh × \$0.2585/kWh =	22.49
65 kWh × \$0.2585/kWh =	16.80
152 kWh × \$0.0085/kWh (energy management rate) =	1.29
Billing administration fee	6.50
Fixed price micro-generation credits	
499 kWh X \$-0.267/kWh =	(133.23)

Distributor charges - June 8 to July 7, 2021 \$ 29.71

(distribution services provided by EPCOR Distribution & Transmission Inc.)

Balancing pool consumer allocation	0.36
Local access fee (Edmonton)	1.47
Transmission charges	
Variable charges and rider(s)	5.00
Distribution charges	
Fixed charge	21.31
Variable charges and rider(s)	1.57

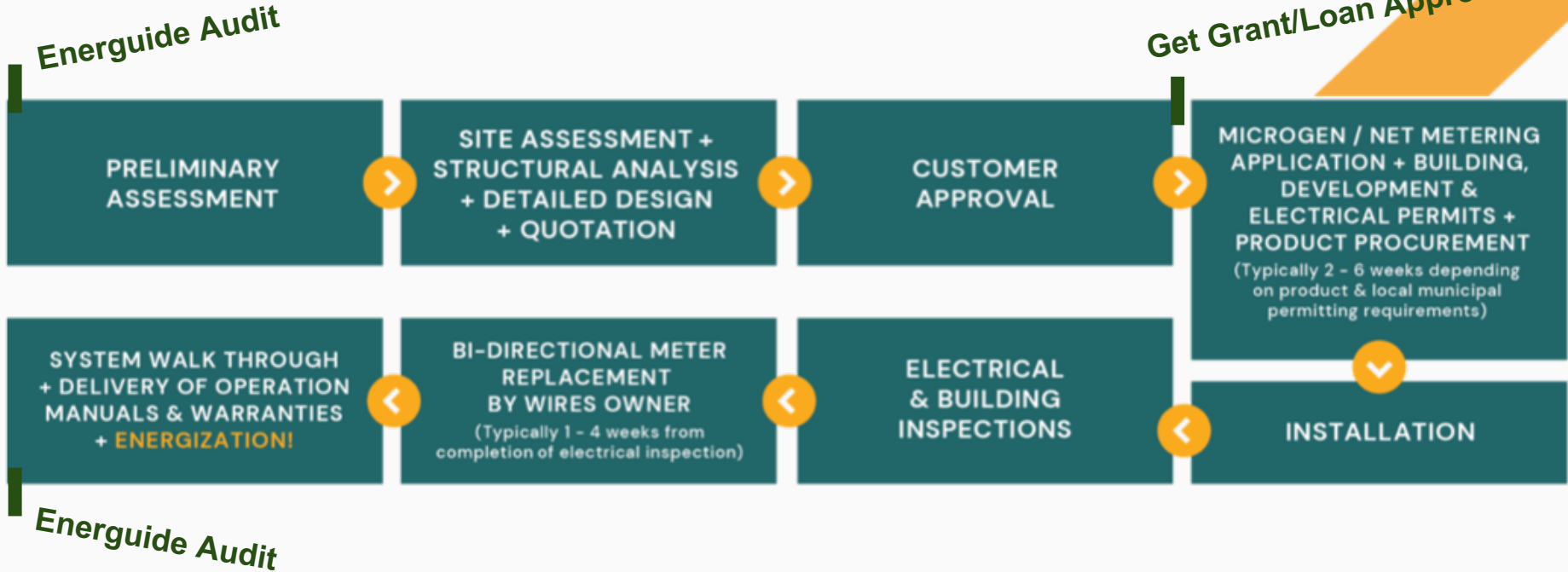
Total charges for this site (before GST) \$ (56.44)



What Grants, Loans and Incentives are Available

- **Greener Homes Grant**
 - \$1000/kW up to \$5000 plus \$600 towards audit cost
- **Greener Homes Loan**
 - Up to \$40,000 interest free for 10 years
 - Loan stays with homeowner
- **CEIP**
 - Low interest loan from City of Calgary
 - Loan stays with the house
- **Carbon offset**
 - ~\$400-\$534 per kW installed over 10 years

Installation Process & Timeline





Transport Company Head Office - Calgary (4.245 MWdc)

SkyFire
Projects



SkyFire Projects

Canadian Blood Services - 551 kWdc



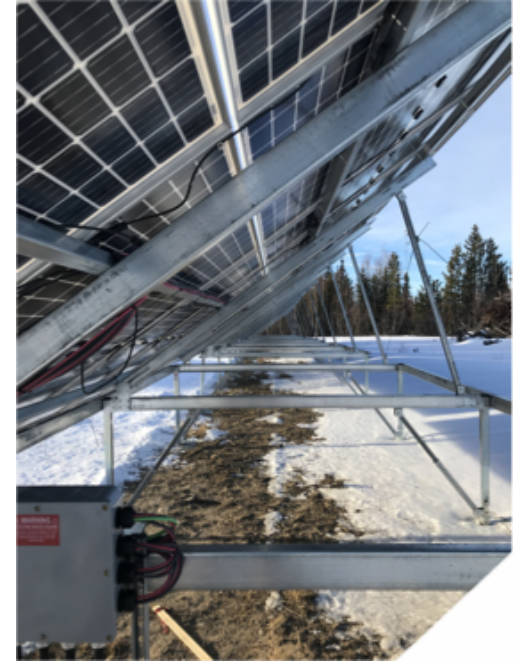
SkyFire Projects

U of C Social Science - 230 kW



SkyFire Projects

Telus Pelican Radio Site - 30.4 kWdc (off-grid)



SkyFire Projects

Typical Residential Installation



SkyFire Projects

Typical Residential Installation



Solar is Standard with Alberta's Largest Homebuilder - Expanded 2023 Deployment



Jayman BUILT Raises the Bar Again with New Standard Feature Aimed at Cutting Home Electricity Costs by 50 Per Cent

Alberta-based homebuilder increases standard solar panels from six to 10 on all new home builds beginning in 2023

January 30, 2023 10:00 ET | Source: Jayman BUILT



NOT OPTIONAL

A JAYMAN BUILT HOME SAVES YOU **UP TO 50% ON YOUR ELECTRICITY COSTS.**

Refrigerators, indoor plumbing, electricity. When shopping for a home, these are things that aren't optional. They're standard. We're like to add a few more to the list.

- 10 SOLAR PANELS**
- SMART HOME TECHNOLOGY**
- ULTRA-VIOLET LIGHT AIR PURIFICATION SYSTEM**
- TRIPLE PANE WINDOWS**
- ELECTRIC VEHICLE CHARGING SYSTEMS**
- TANKLESS HOT WATER HEATER**

THESE ARE SOME OF THE MANY FEATURES THAT ARE STANDARD-NOT OPTIONAL- WITH ALL 2023 JAYMAN HOMES, SAVING YOU UP TO \$500 ANNUALLY ON YOUR ENERGY COSTS.

A home is a major investment, and you need to be getting the most out of where you live. That's why we're including things to lower everyday costs and make life easier. It's what we do.

THAT'S NOTHING LIKE A 2023 JAYMAN HOME.

Jayman.com/NotOptional

netzero ENERGY

Committed to building a Quantum-Performance ecosystem in every community we build in. With our 4-Part Zero Carbon Footprint Commitment.

netzero ENERGY is an approved retailer of energy-efficient construction products. ©2023 Jayman BUILT. All rights reserved. HomeBuilder's Choice is a registered trademark of HomeBuilder's Choice. HomeBuilder's Choice is a registered trademark of HomeBuilder's Choice.

Avalon Master Builders Offers Net Zero for 0 Down and Expands Offering in 2023

LIVE IN CALGARY'S FIRST
NET ZERO
TOWNHOMES



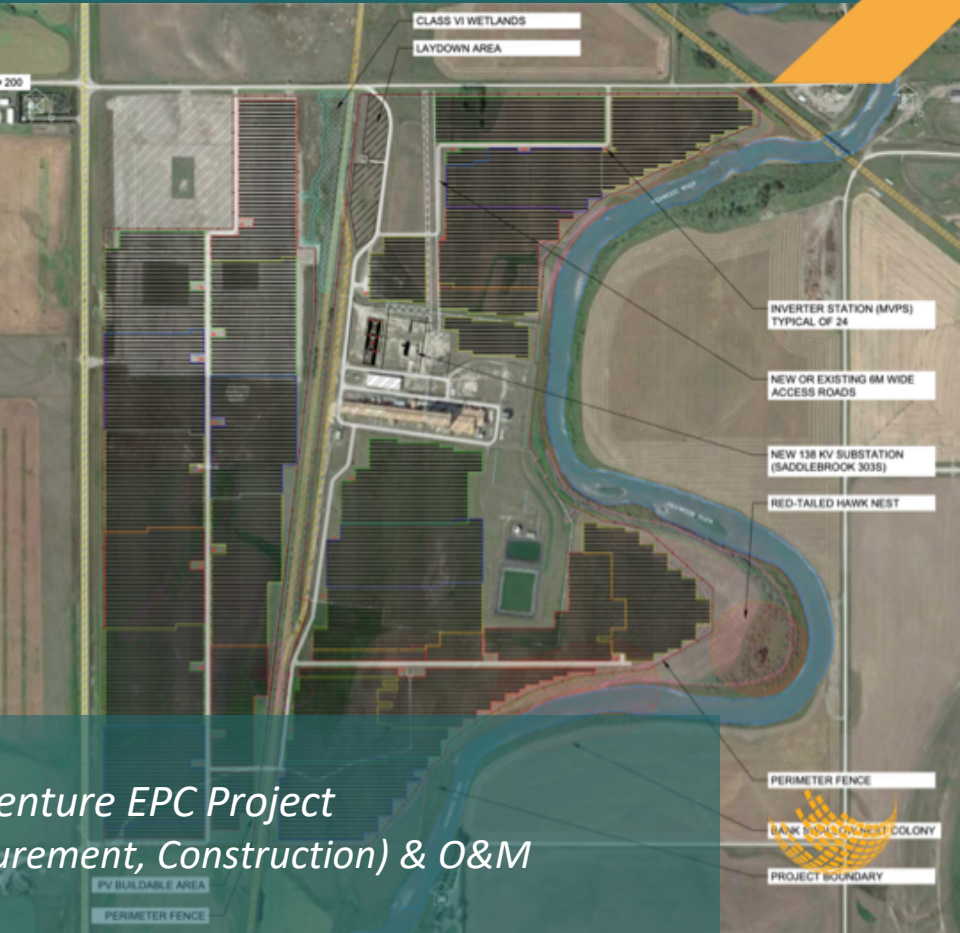
- SOLD OUT -



SkyFire Scope: Turnkey EPC (Engineering, Procurement, Construction)



Saddlebrook Solar, 106 MWp (2022/3; Under Construction)



*SkyFire Originated Joint Venture EPC Project
Scope: Turnkey EPC (Engineering, Procurement, Construction) & O&M*



PV to EV



Tesla Wall Connector





4038A



info@SkyFireEnergy.com

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