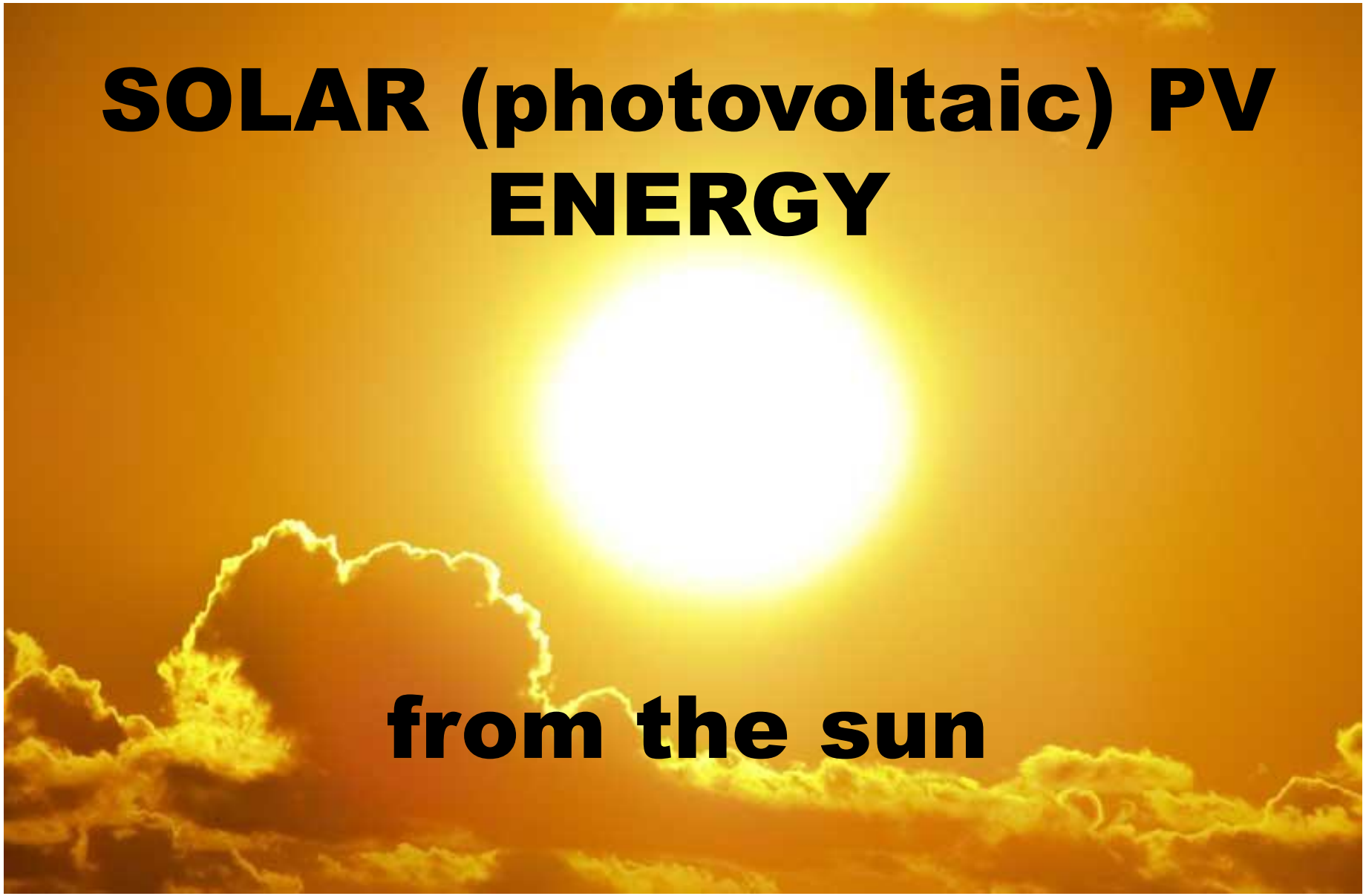
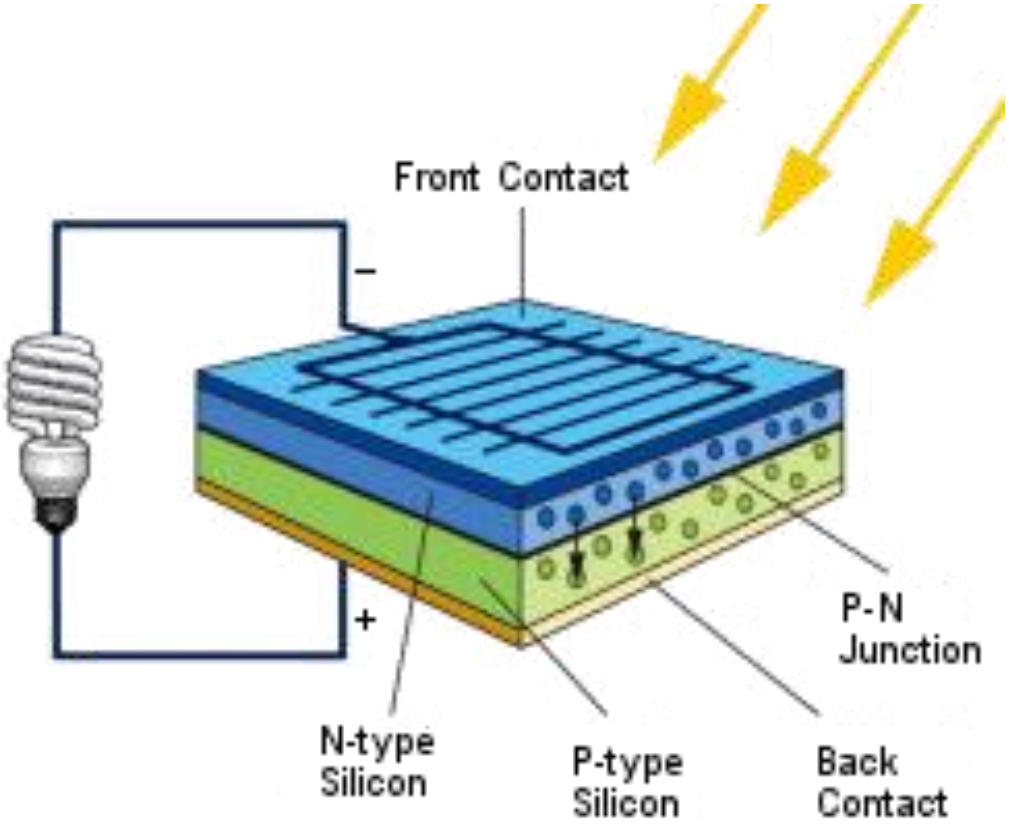
# SOLAR (photovoltaic) PV ENERGY




1. Photo: Anthropocene Magazine

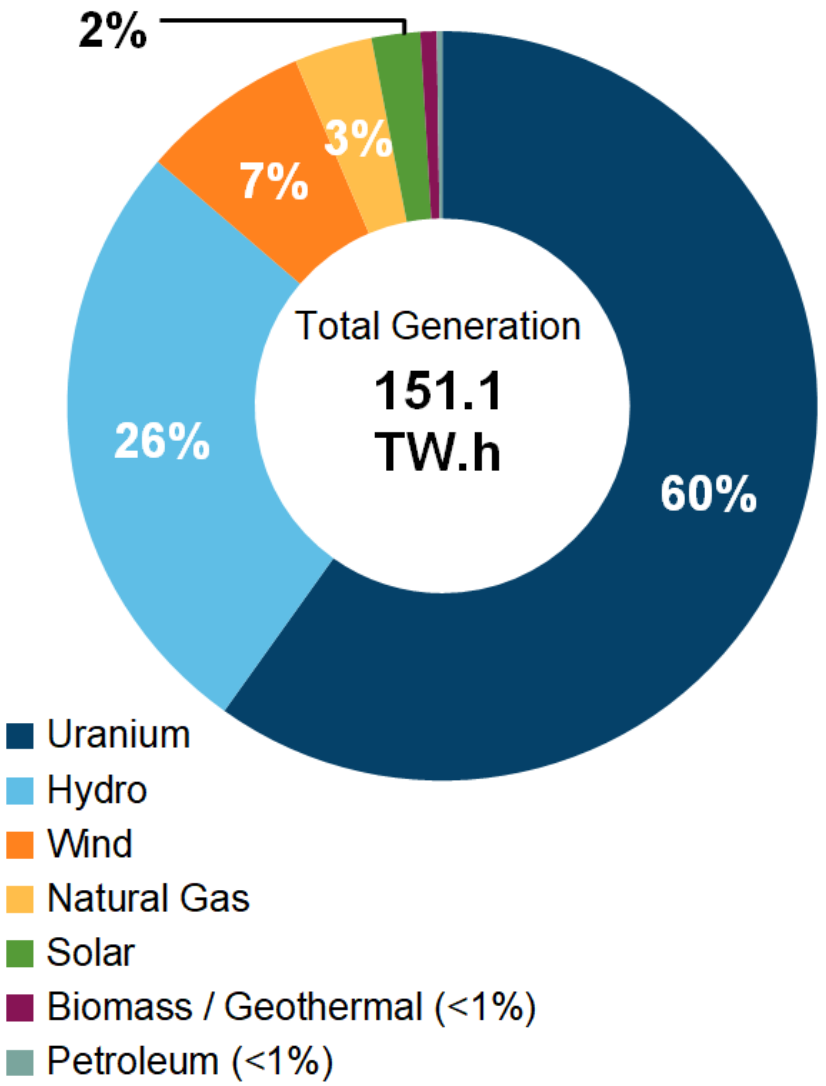
*This presentation is prepared by Natalie Beauregard, C.E.T., Mar. 18, 2021*

# How Solar Electricity Works



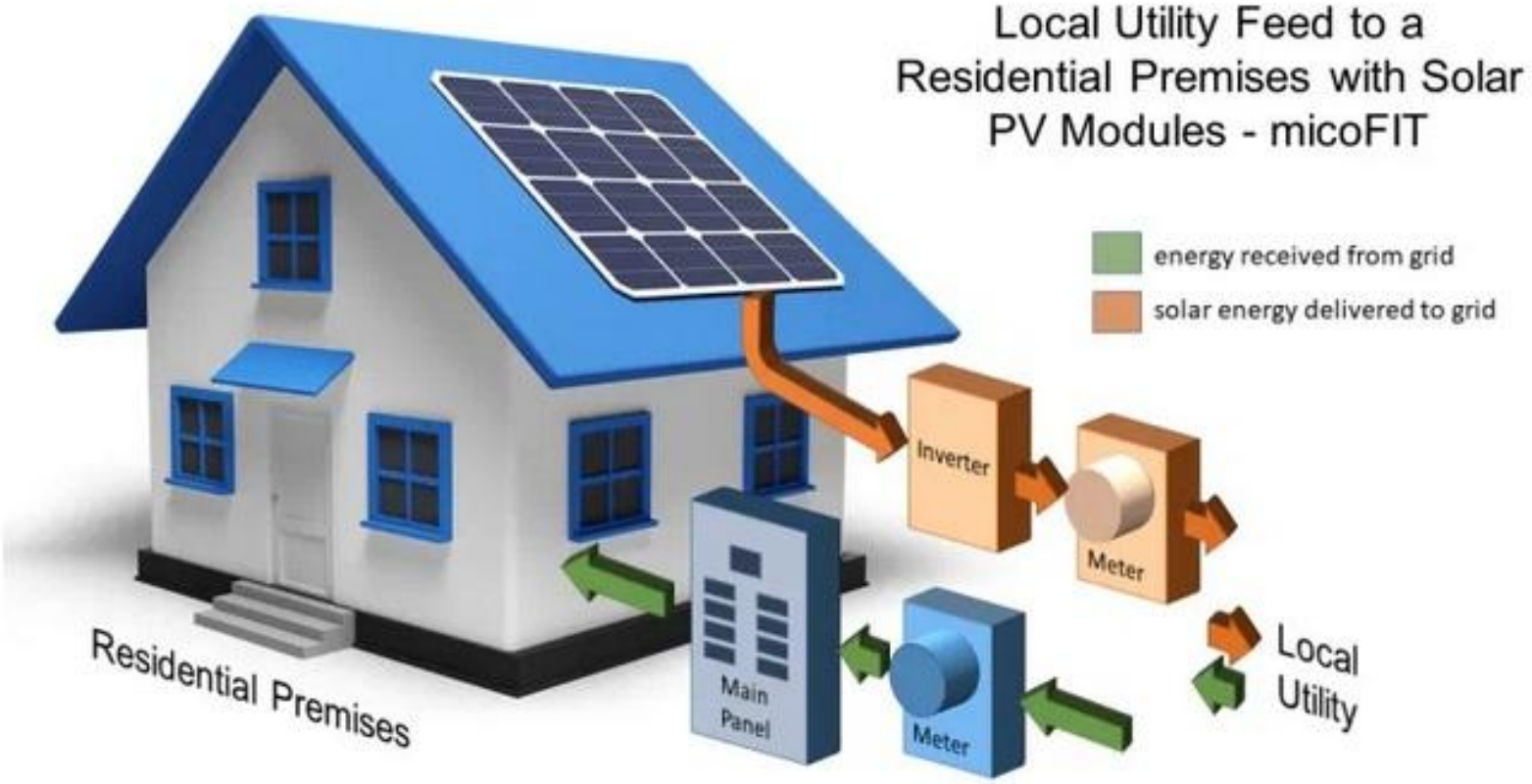

2. Diagram . The Renewable Energy Hub

# Ontario Electricity Generation 2018




3. Chart. Canada Energy Regulator.

# Solar PV Grid Connect
# Feed In Tariff - FIT

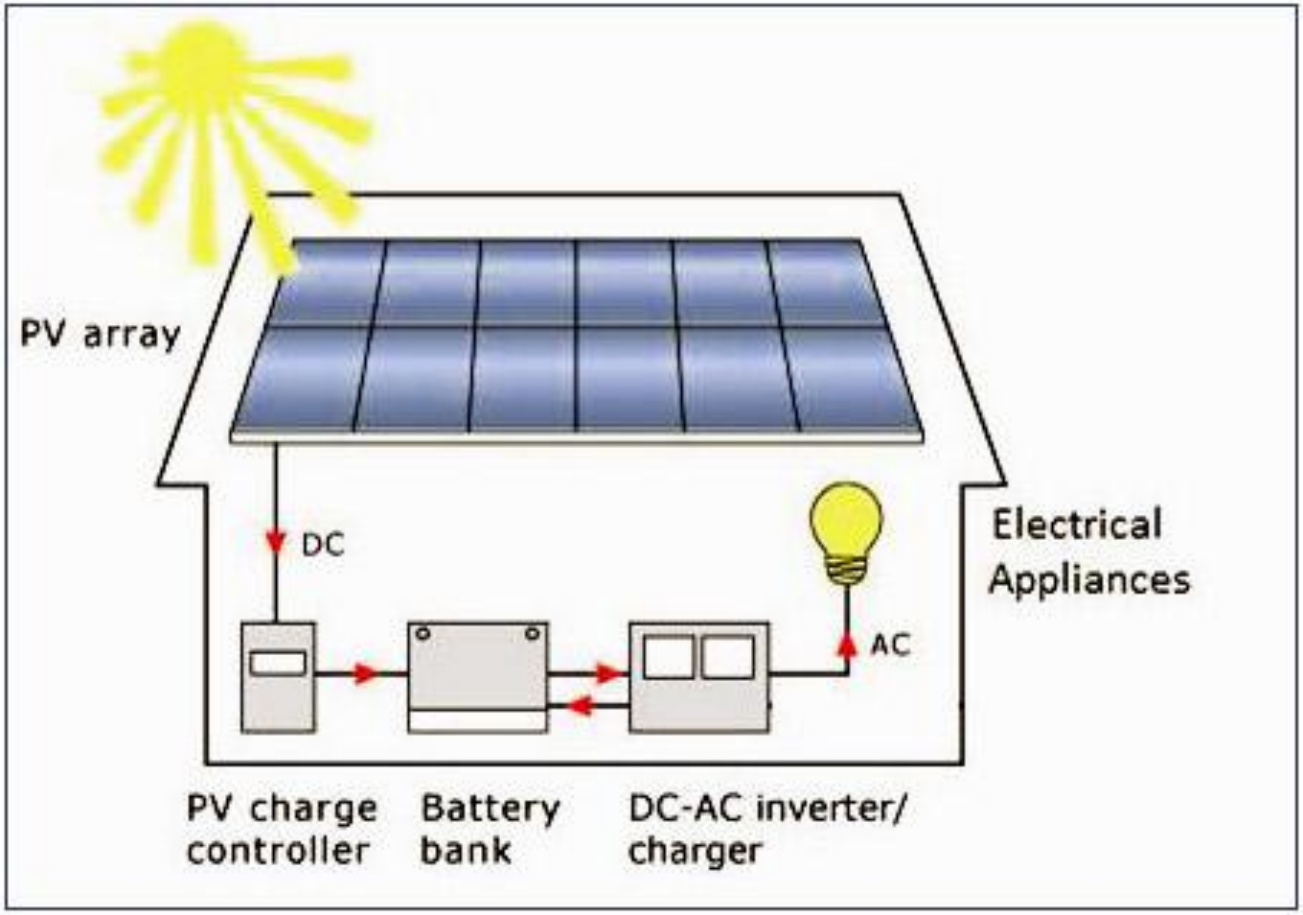



4. Diagram. Life By Numbers.

# Solar PV Grid Connect
# Net Metering


5. Diagram. Life By Numbers.

# Solar PV Off Grid




6. Diagram. Ontario Solar Installers.

# Solar PV System Costs


| System Size | Average Price per Watt | Total Average Cost |
|---|---|---|
| 4kW | $ 2.81/W | $ 11,240 |
| 5kW | $ 2.74/W | $ 13,700 |
| 6kW | $ 2.64/W | $ 15,840 |
| 7kW | $ 2.62/W | $ 18,340 |
| 8kW | $ 2.66/W | $ 21,280 |

**Note:** Data comes from Solar Reviews and is as of September 2020. Both figures reflect the cost prior to receipt of any incentives.

7. Diagram Smart Asset.

# Typical Wattages of Appliances

Aquarium = 50–1210 Watts
Clock radio = 10 Watts
Coffee maker = 900–1200 Watts
Clothes washer = 350–500 Watts
Clothes dryer = 1800–5000 Watts
Dishwasher = 1200–2400 Watts
Dehumidifier = 785 Watts
Electric blanket- Single/Double = 60 / 100 Watts
Ceiling Fans = 65–175 Watts
Window Fans= 55–250 Watts
Furnace Fans= 750 Watts
Hair dryer = 1200–1875 Watts
Heater (portable) = 750–1500 Watts
Clothes iron = 1000–1800 Watts
Microwave oven = 750–1100 Watts
CPU - awake / asleep = 120 Watts / 30 Watts or less
Monitor - awake / asleep = 150 Watts / 30 Watts or less
Laptop = 50 Watts
Radio (stereo) = 70–400 Watts
Refrigerator (frost-free, 16 cubic feet) = 725 Watts
19" Television = 65–110 Watts
27" Television = 113 Watts
36" Television = 133 Watts
53"-61" Projector = 170 Watts
Flat screen Television = 120 Watts
Toaster = 800–1400 Watts
Toaster oven = 1225 Watts
VCR/DVD = 17–21 / 20–25 Watts
Vacuum cleaner = 1000–1440 Watts
Water heater (40 gallon) = 4500–5500 Watts
Water pump (deep well) = 250–1100 Watts
Water bed (with heater, no cover) = 120–380 Watts

# Solar PV Load Requirement

**LOAD ANALYSIS FORM**

| Quantity | Appliance | Voltage (V) | Amperage (A) | Power (VxA=W) | Hours/ Day | Days/ Week | Total |
|---|---|---|---|---|---|---|---|
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# Solar PV Farm Grid-Tie in Ontario

**First Solar, Sarnia, Ontario, 97MW.** First Solar developed, engineered, and constructed the facility, and it will operate the Sarnia Solar Project for Enbridge under a long-term contract.

9. First Solar. Wikipedia.

# Solar PV Microgrid in Ontario

In northwestern Ontario, OPG and the Kiashke Zaaging Anishinaabek (KZA), also known as Gull Bay First Nation, recently celebrated the completion of a new micro grid that will help reduce the remote community's dependence on diesel generation.

10. Ontario Power Authority (OPG).

# Solar PV Trackers in Ontario

Solar tracking systems can be single-axis, dual-axis , passive or active. The path the sun travels is higher in the sky in the summer and lower in the winter.

11. Ontario Solar Installers.

# Solar PV Residential Roofmount

12. Photo. Tyler Hamilton. TV0.

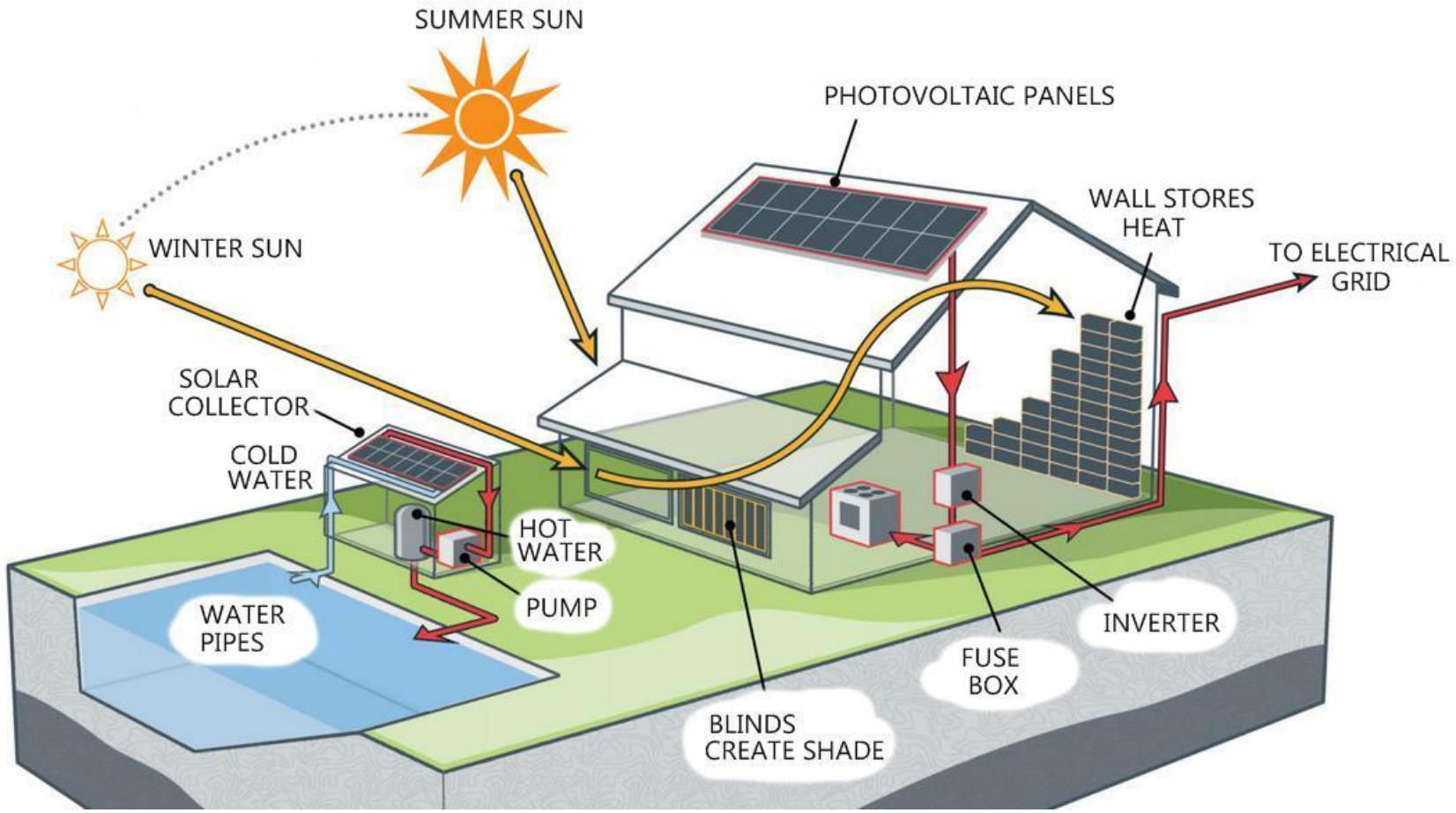
# Solar PV Residential Groundmount

13. Photo. Ottawa Valley Photovoltaic.

# Solar PV Mobile

14. Photo.  Generic Van Life.

# Active and Passive Solar Energy




15. Diagram. Ingenium. Canadian Museums of Science and Innovation.

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