

Carbon Neutral Government Symposium

Solar PV Systems

Vancouver, Dec 2014



Canadian Solar Industries Association
L'Association des Industries Solaires du Canada

www.cansia.ca

Introduction to CanSIA

About us:

- Trade Association for the Canadian solar industry.
- Represent over 700 corporate members nationwide.

Mission and Strategic Objectives:

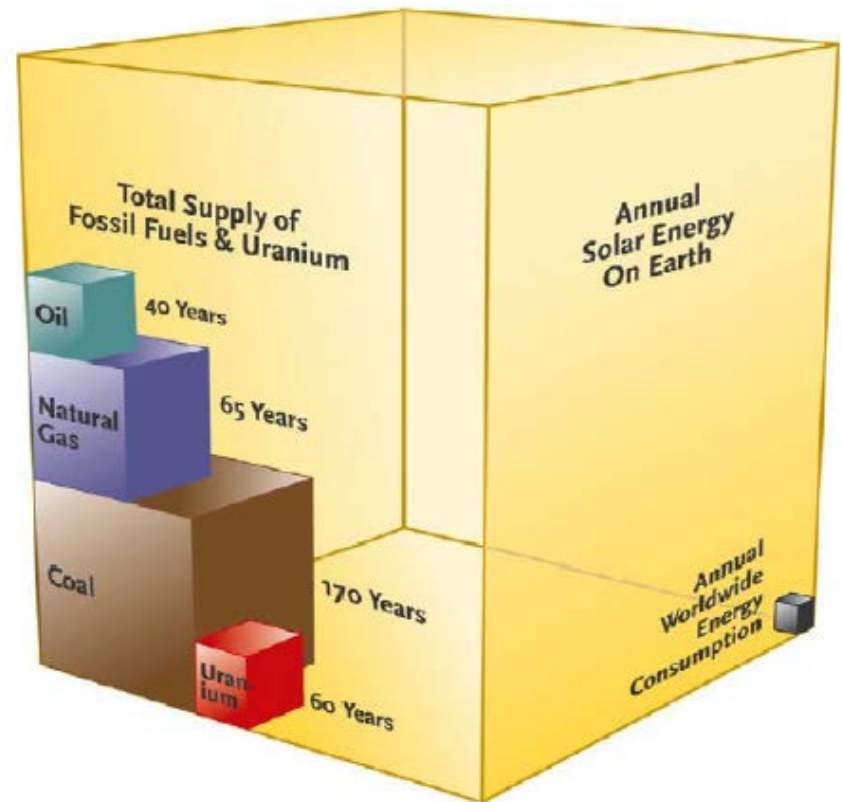
- Strengthen and expand Canadian solar markets.
- Develop an efficient and professional solar industry with the capacity to provide innovative solar energy solutions.



Solar Energy Available

"I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait till oil and coal run out before we tackle that."

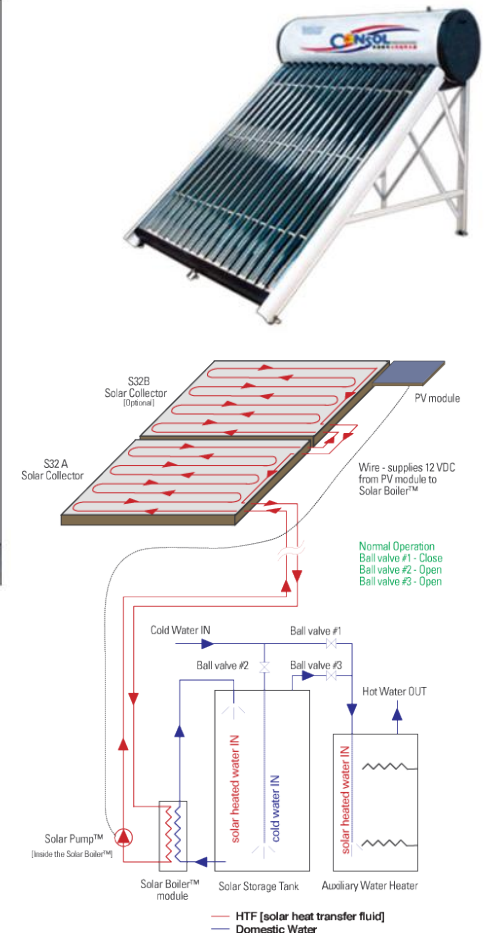
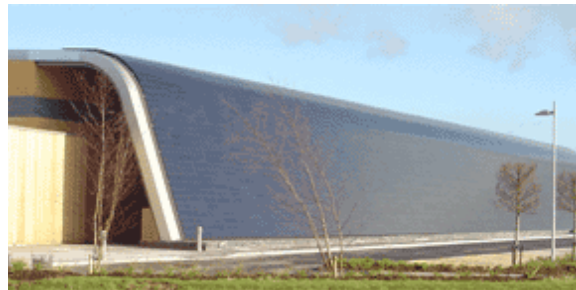
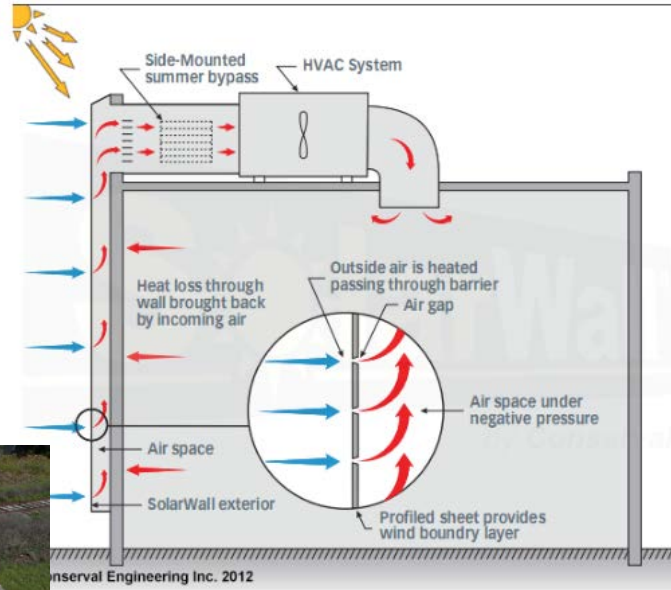
- Thomas Edison



Source: US Solar Energy Industry Association, AGM, 2009

How we use Solar Energy

Solar Hot Water
Solar Wall
Solar Electric
PHOTOVOLTAIC



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Source; HES, Solarwall,
Thermodynamics

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Applications for Solar: Off Grid

Remote Homes



Lodges/Fish Farms



Telecom



Rail/Highway/Traffic



Applications for Solar: Grid Tie



**Solar
Farms**

Residential

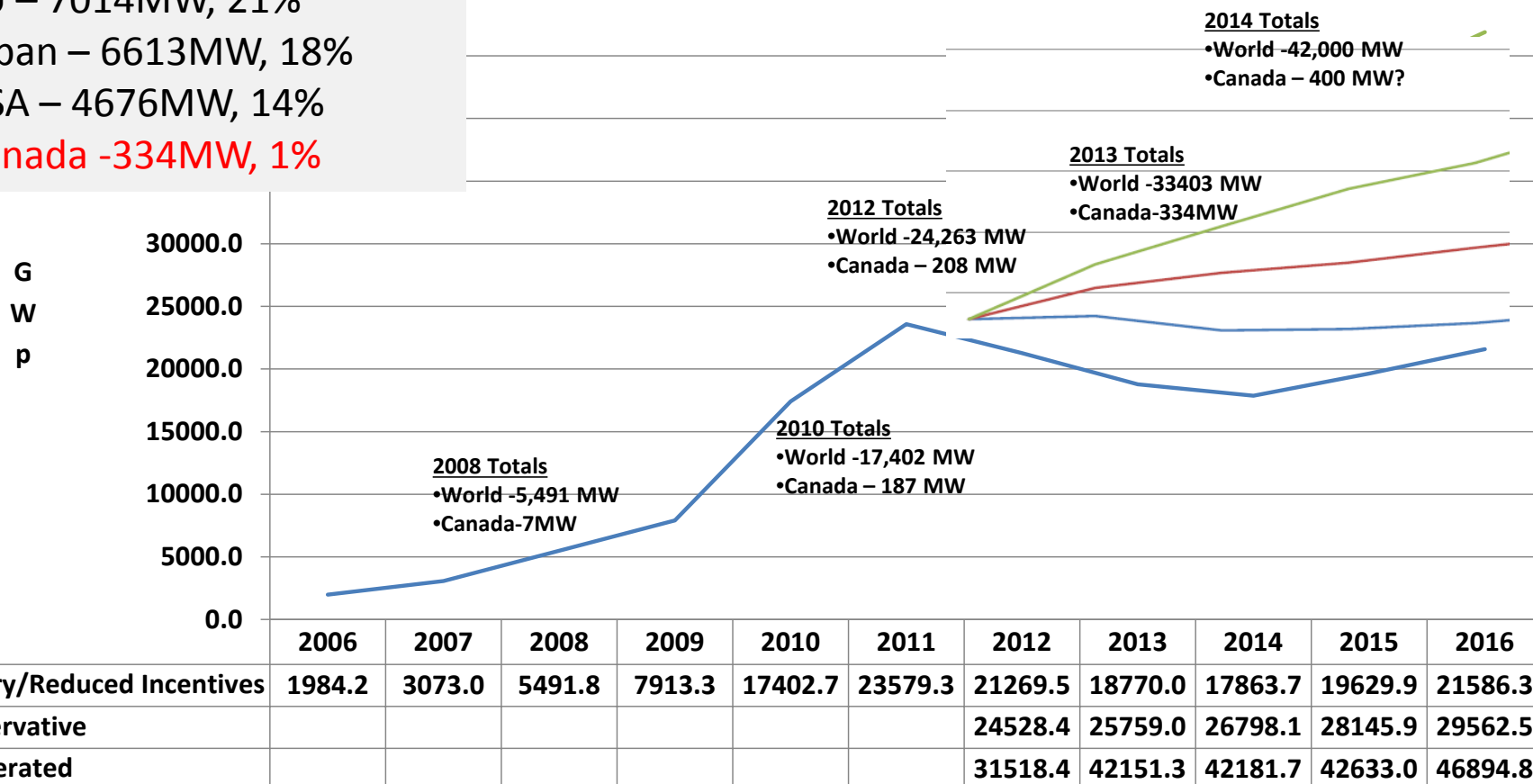


Commercial Buildings

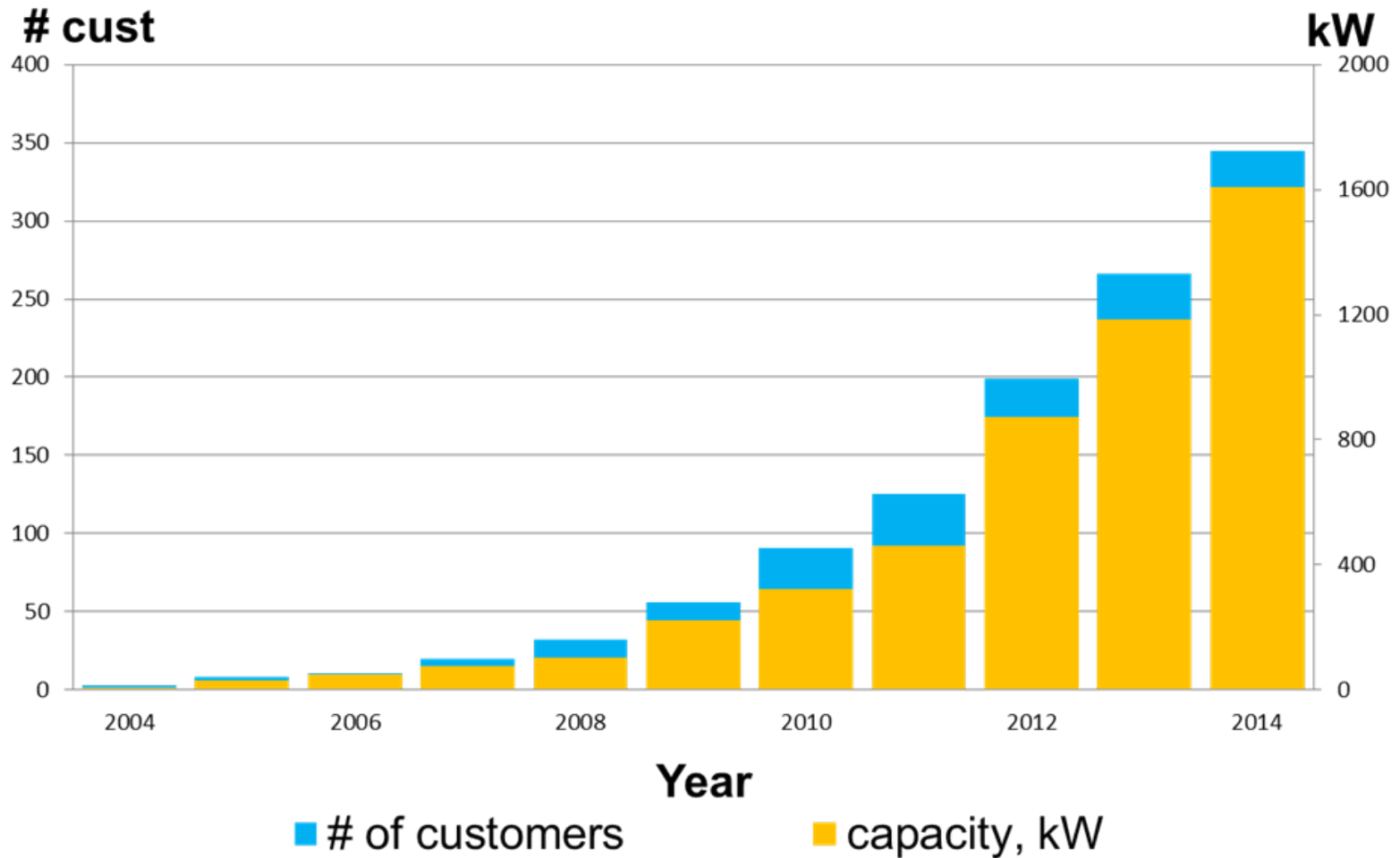


World Solar Market

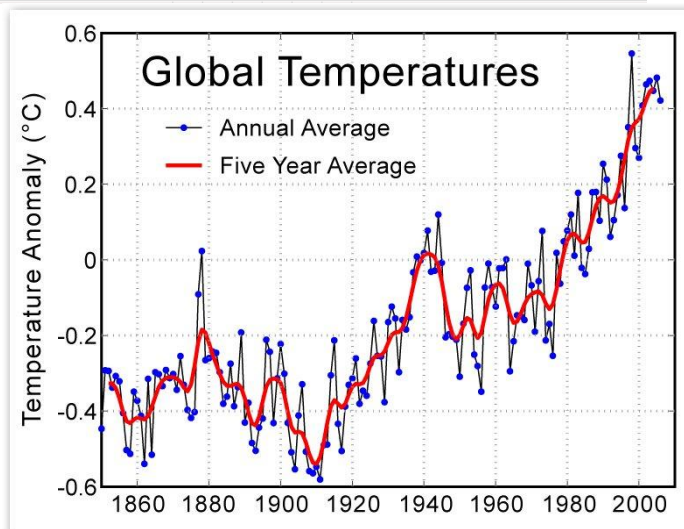
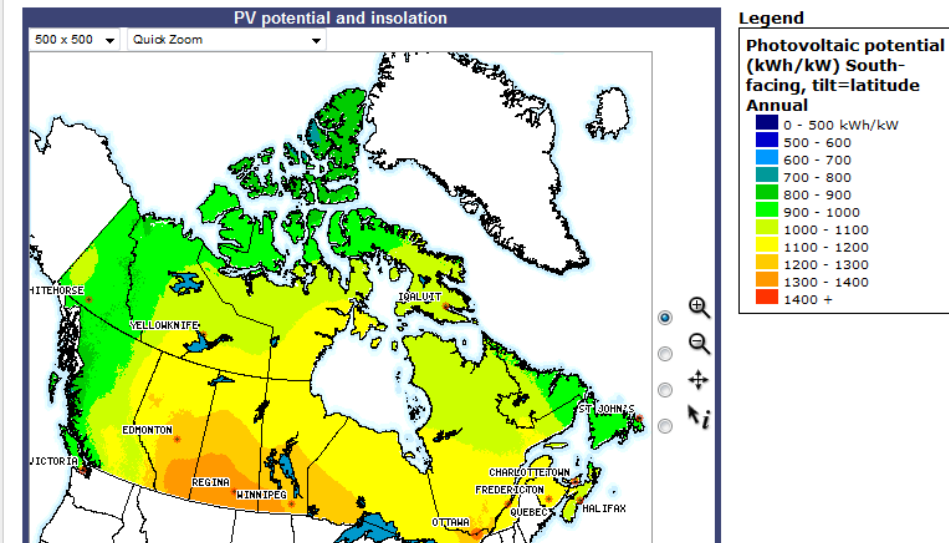
- China – 12.02GW, 36%
- EU – 7014MW, 21%
- Japan – 6613MW, 18%
- USA – 4676MW, 14%
- Canada -334MW, 1%



BC Hydro Net Metering Market



Why is there so much growth in solar electricity?



**Green Jobs created 35/MW
Distributed Generation
30% more Solar
potential than Germany
Incentive Programs
Falling Costs
Grid parity in 2020-
2025
Carbon Offsets**

Economic Development and Job Creation

35 Green Jobs per MW (4200 - Canada 2010)

25 of those jobs are installers

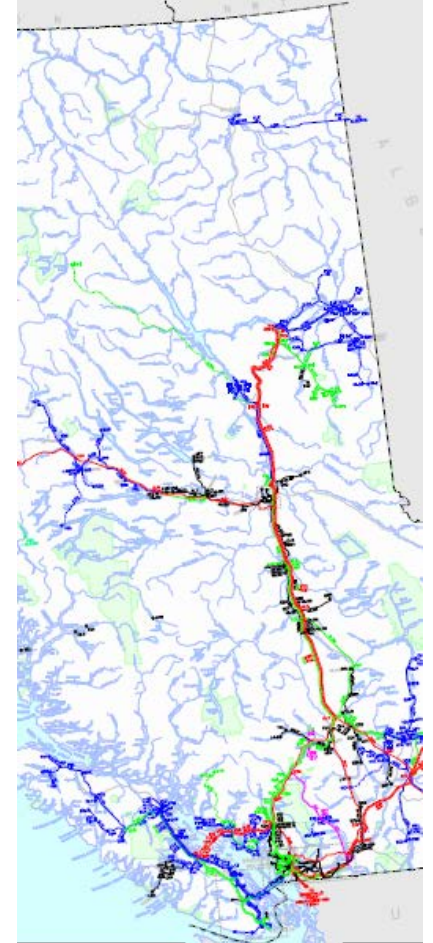
Regionally diversified – Victoria to Prince George



Distributed vs Central Generation

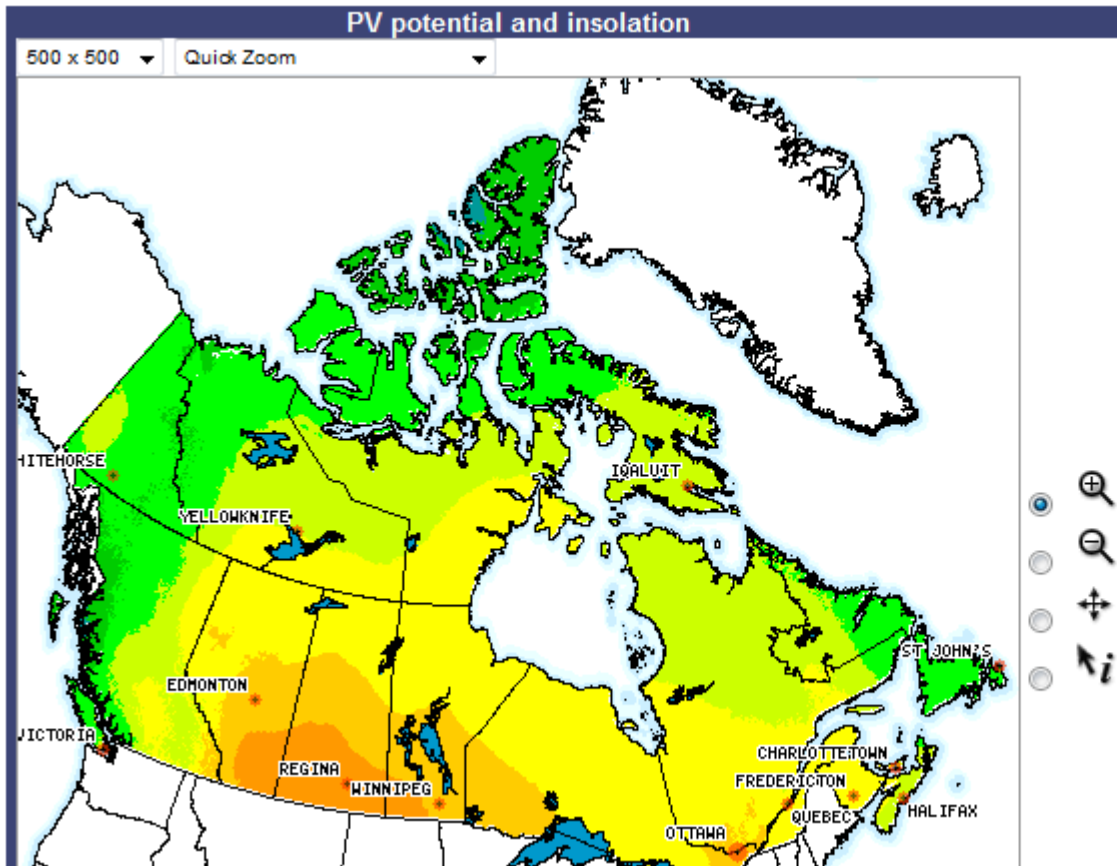
Power would have to travel 1000 km's to come from Peace Canyon to Victoria. Up to 20% of the energy can be lost through transmission.

Relieving burdens on grid distribution and transmission capacity, improving system efficiency, reliability and power quality and reducing the volume of power needed from centralized generation assets.



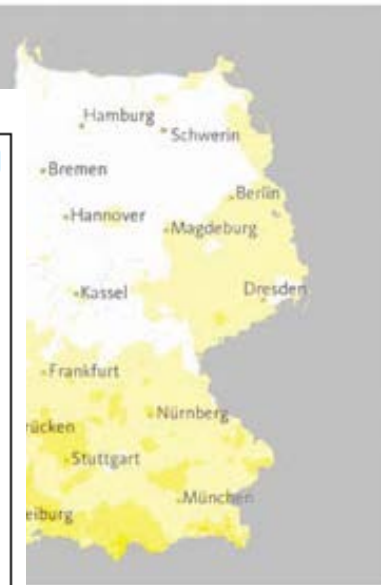
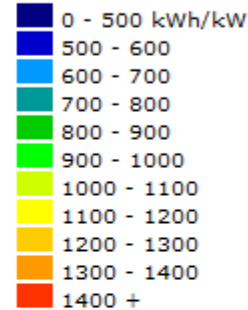
Solar Potential - Canadian

4.13 Sun Hours



Legend

**Photovoltaic potential
(kWh/kW) South-
facing, tilt=latitude
Annual**

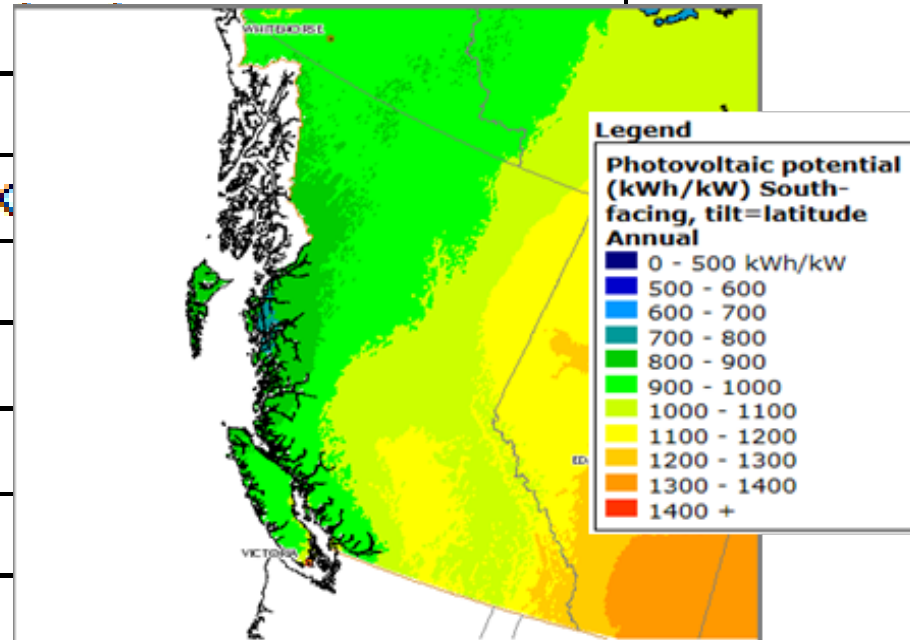


3.2 Sun Hours

30% More Solar
Potential than
Germany

1 kW of PV in BC

City	Electrical Production/kW ¹
Victoria	1086
Vancouver (YVR)	1055
Abbotsford	991 k
Kelowna	1209
Kamloops	1182
Fort St John	1197
Cranbrook	1229
Prince George	1046
Average	1124 kWh per year



Helping Hand - Solar Electric Programs in Canada



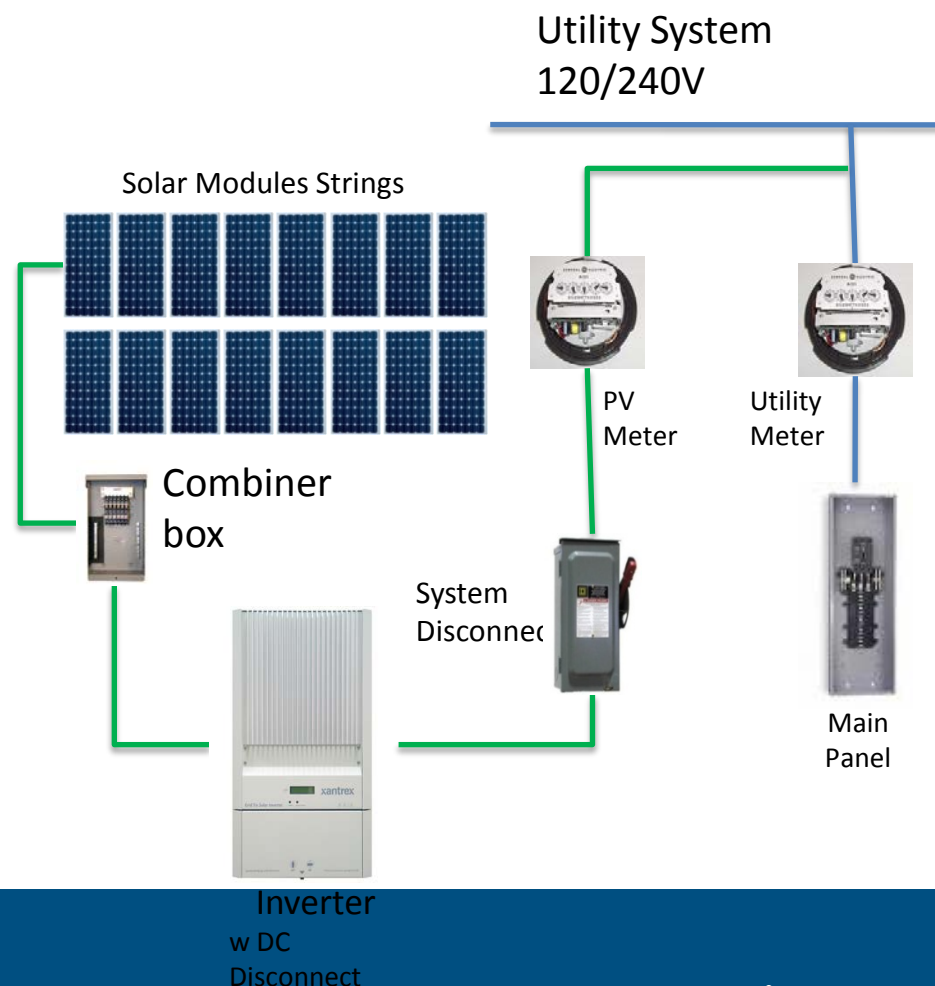
**NET METERING – BC,
ON, MN, NS, NB, NF,
PEI**

NET BILLING – AB, NWT

REBATE – SASK

**STANDING OFFER
PROGRAM– ON, BC**

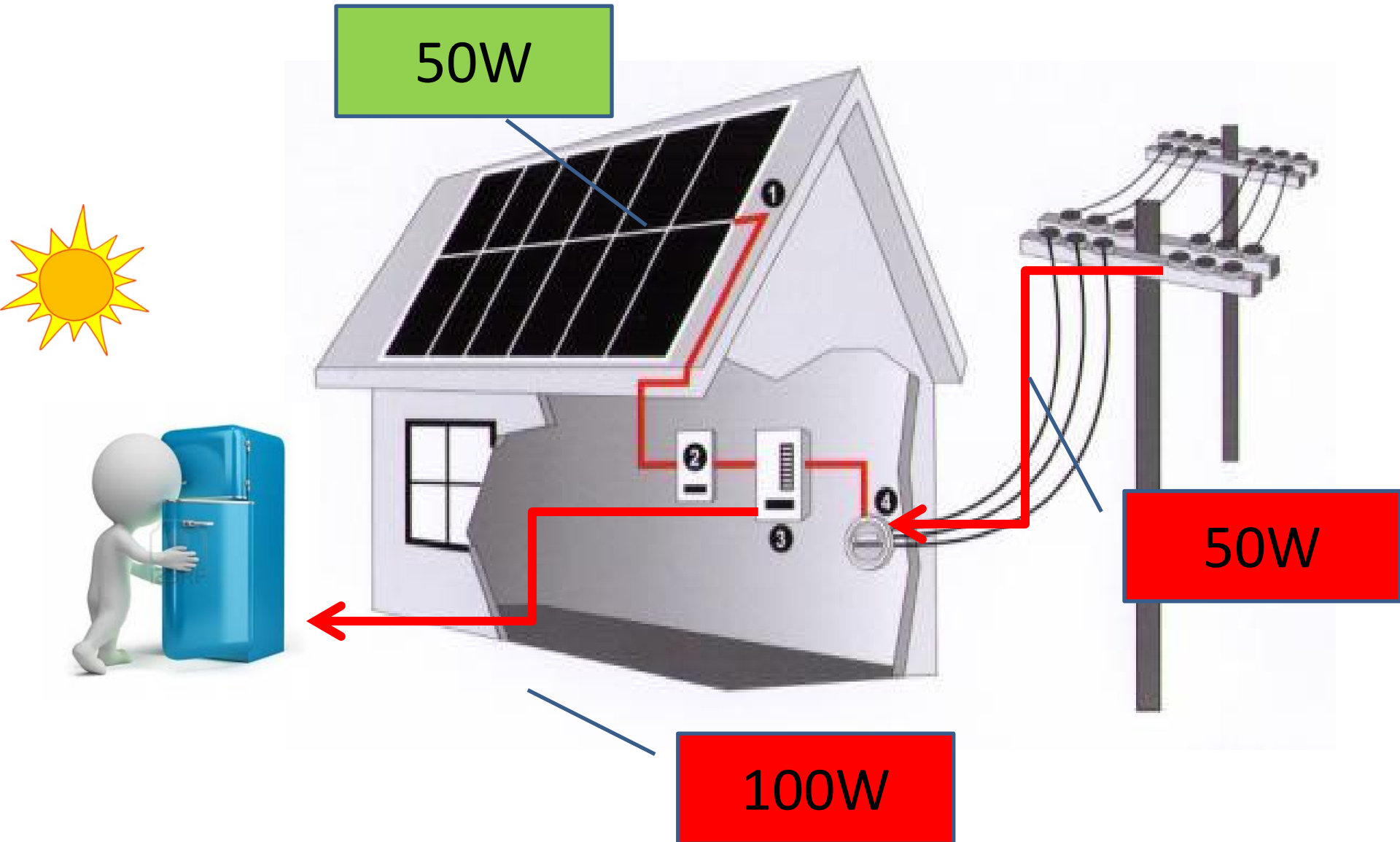
**FEED IN TARRIF –
ONTARIO-39.6/kWh**



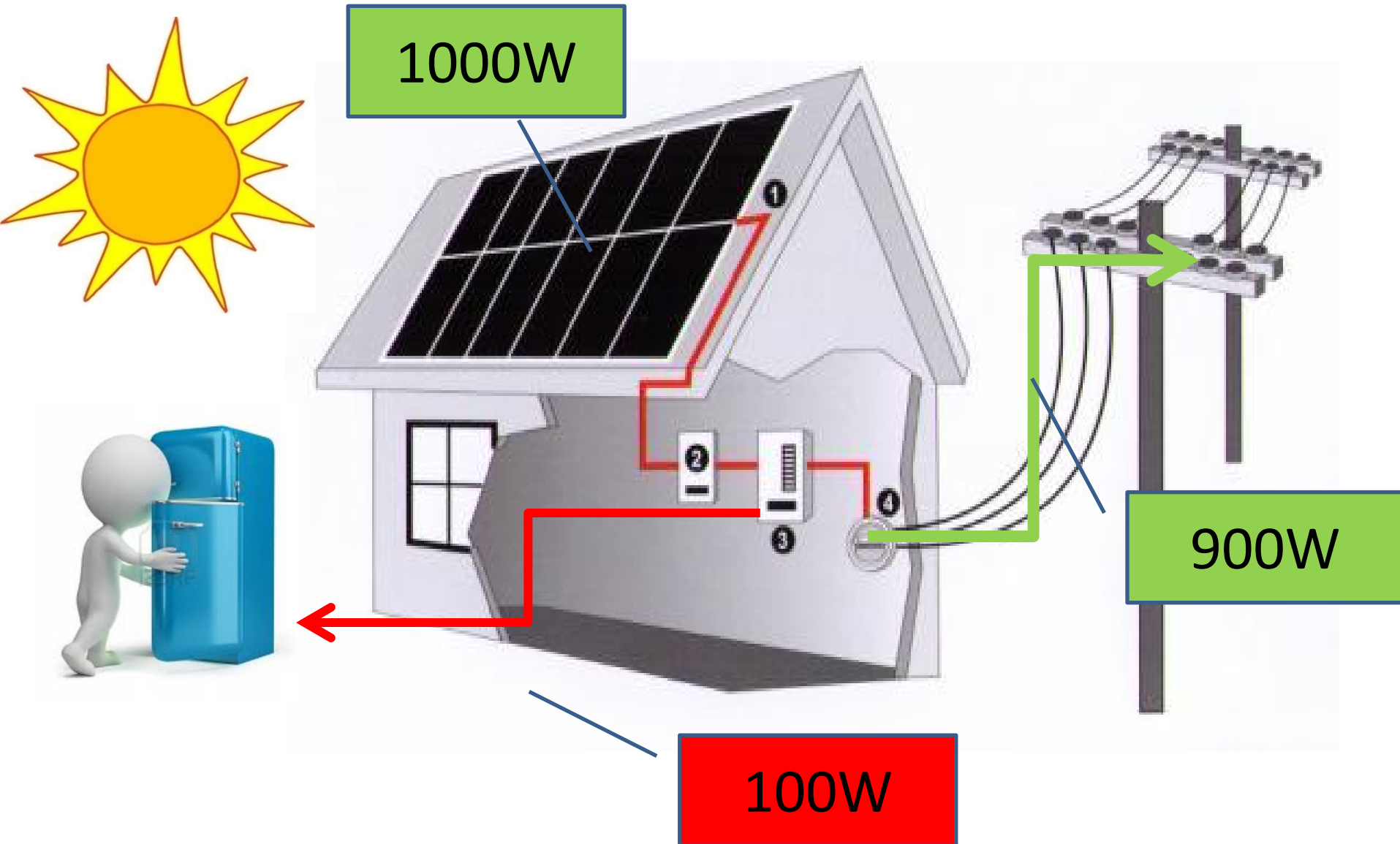
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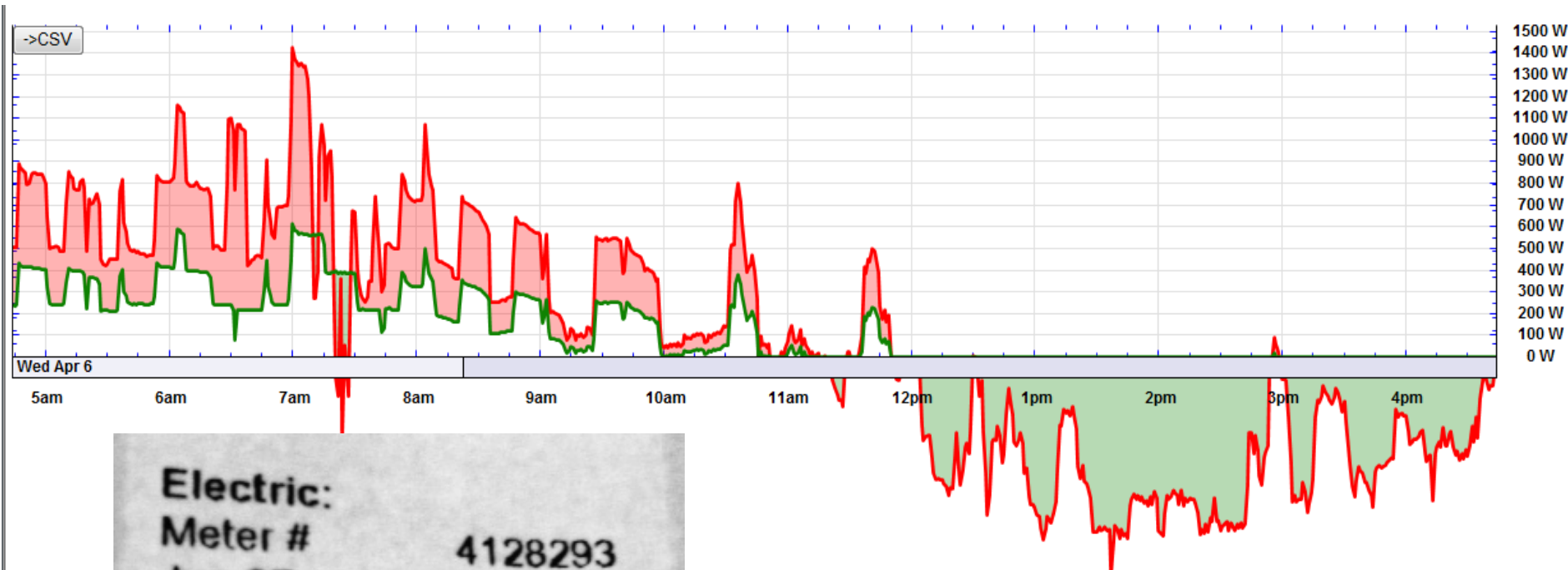
Net Metering -Reducing the Load



Net Metering – Outflow Credit



Net Metering



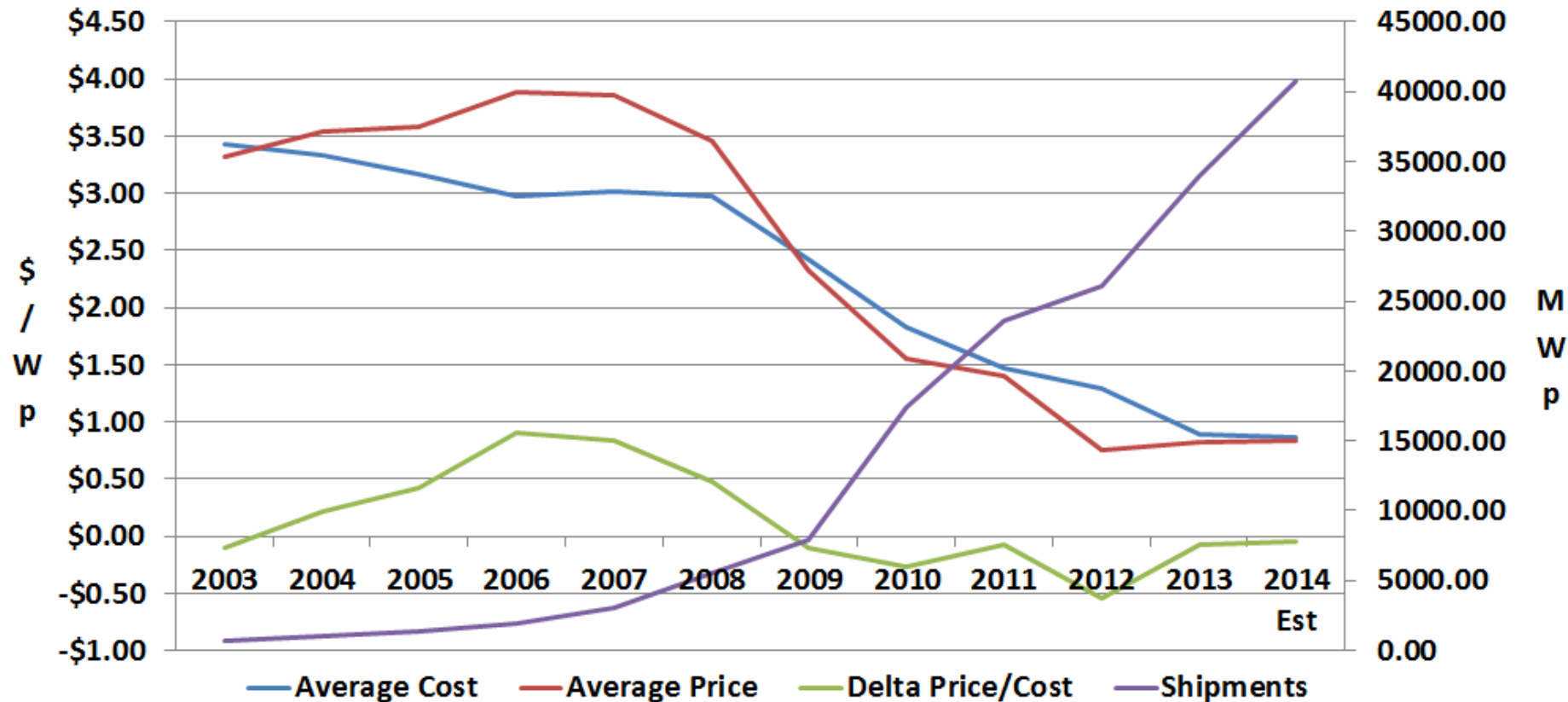
Electric:

Meter #	4128293
Jun 07	15702
Aug 07	16653
62 days	951

Electric Outflow:

Meter #	4128293
Jun 07	816
Aug 07	1077
62 days	261

PV prices are falling (5%?)13%/year



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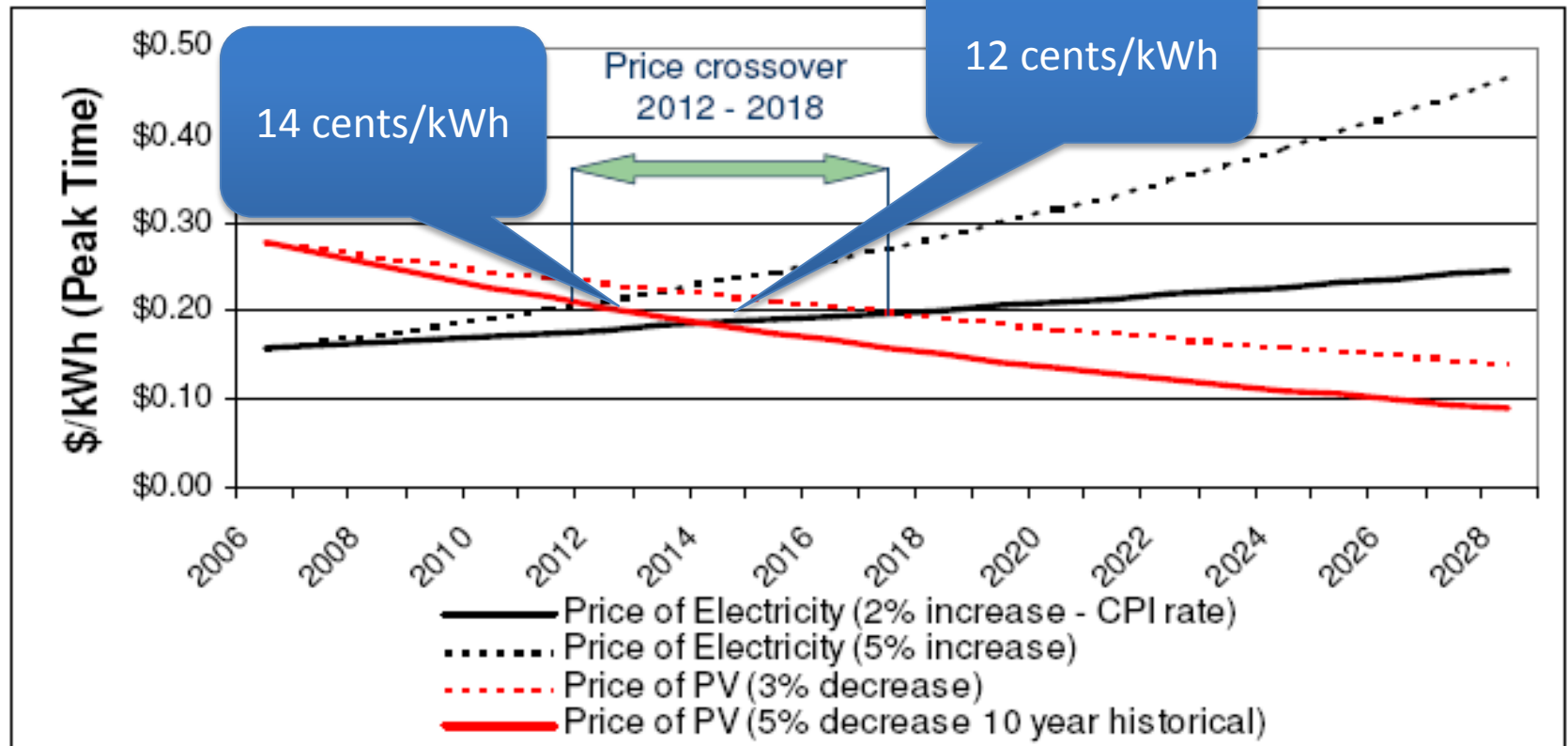


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2005- 160W - \$1,555- \$9.71/W
2011- 225W - \$807 - \$3.58/W
2014 – 250W - \$225 \$0.90/W

Grid Parity – Solar Down vs Hydro Up

Increase in electrical rates 2-7% per year?
PV installed costs continue to fall



2013-BC Hydro forecasts 26% rate increase by 2016

Determine your cost of Energy

Assumptions:

- ▶ 10kW @ \$35,000
- ▶ Owner gets 11,000 kWh per year (Victoria)
- ▶ PV Solar systems last 30 years
and

$$30 \times 10,860 = 325,800 \text{ kWh}$$

So:

$$\begin{aligned} \text{Cost per kWh} &= \$35,000 / 330,000 \\ &= 10.74\text{¢} \end{aligned}$$

We pay \$0.12 at 320 Mary St as of April 1

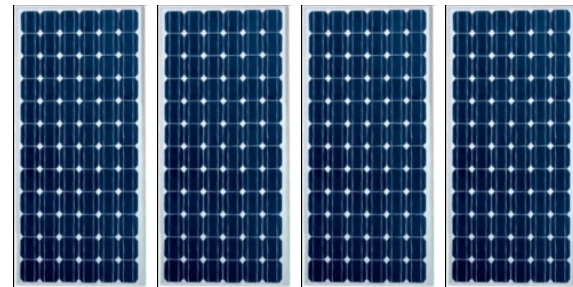


CARBON OFFSETS

Carbon Contributor



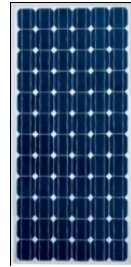
Carbon Neutral



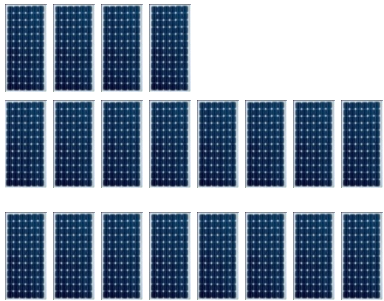
6.24
g/kWh



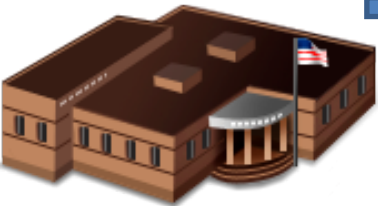
Grounds Keeping – Fuel vs Elec



GHG Saved = **411 kg/year**



GHG Saved = **16,308 kg/year**



1



4



2



4

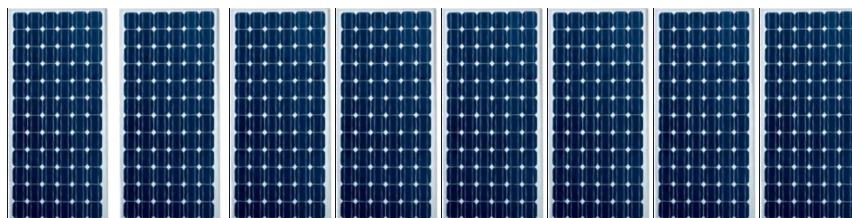
Domestic Hot Water- Gas vs Elec

GHG saved = **901 kg/year**

40 Gallon tank

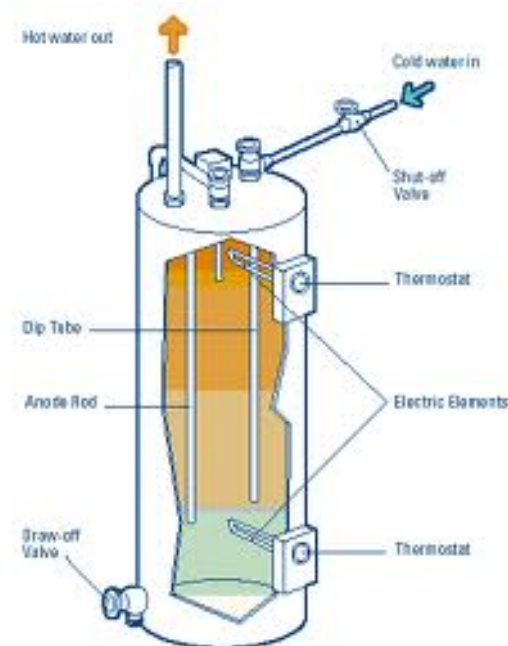
4 person use

2.0 KW SOLAR PV SYSTEM
8 x SOLAR MODULES



=

ELECTRIC HOT WATER



2,200 KWh

Residential EV Owner

ELECTRIC VEHICLES

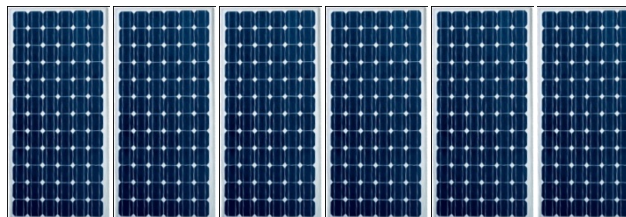


16,000 KM/YR +

GHG saved =
3211 kg/Year

1.5 KW SOLAR PV SYSTEM

6 x SOLAR MODULES



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Source:

www.cansia.ca

Heating – Gas Furnace vs Heat Pump

GHG Saved = **3172 kg/year**

2000sf-2500sf Home – 50% Heating Capacity

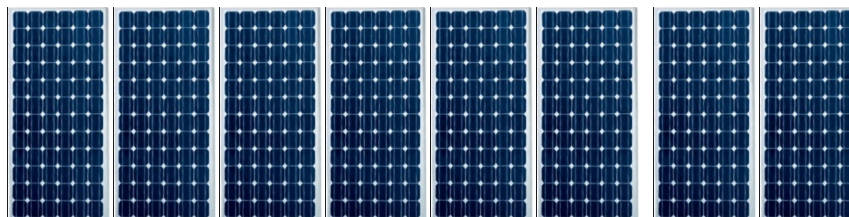


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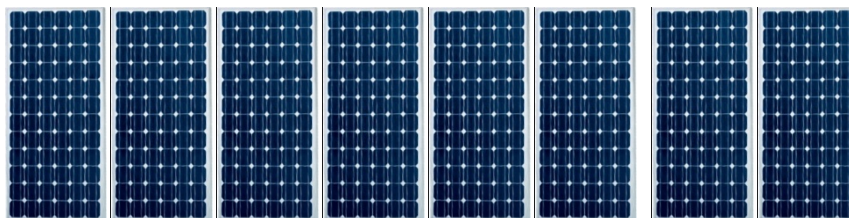


4039 kWh/year

3.75KW of SOLAR PV



15 x SOLAR MODULES



Example- Residential

7.5KW SOLAR PV SYSTEM

Yard Equipment

Hot Water

Heat Pump

Electric Vehicle

GHG saved =

7695 kg/year



Example- Educational Building

73KW SOLAR PV SYSTEM

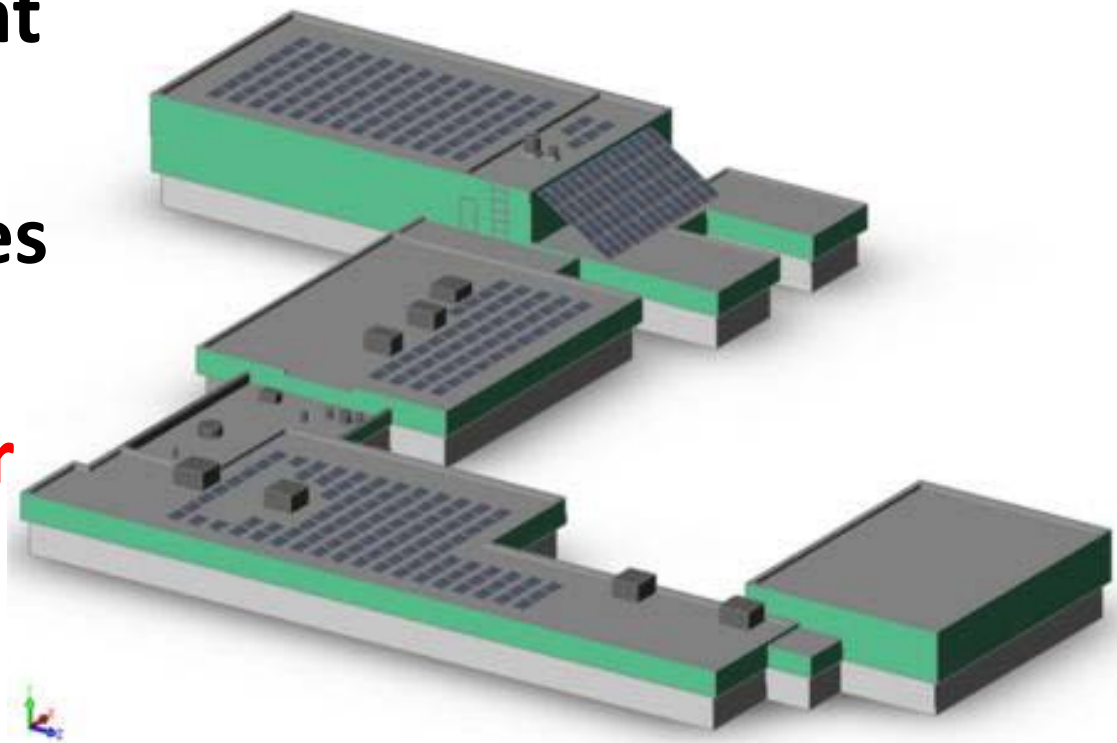
Yard Equipment

Heat Pumps

Electric Vehicles

GHG saved =

66,137 kg/year



Camosun College

Grounds Keeping Equipment
Golf Carts
EV charging station
Bike charging station



- ▶ 923 kWh used
- ▶ 4430 kWh generated

McNair Secondary School



Educational Benefits
Real time production data



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