

HARNESSING SOLAR ENERGY

Why?

How?

When?

A course for ElderU
by Gerry Pageau, P.Eng.

Lesson 3

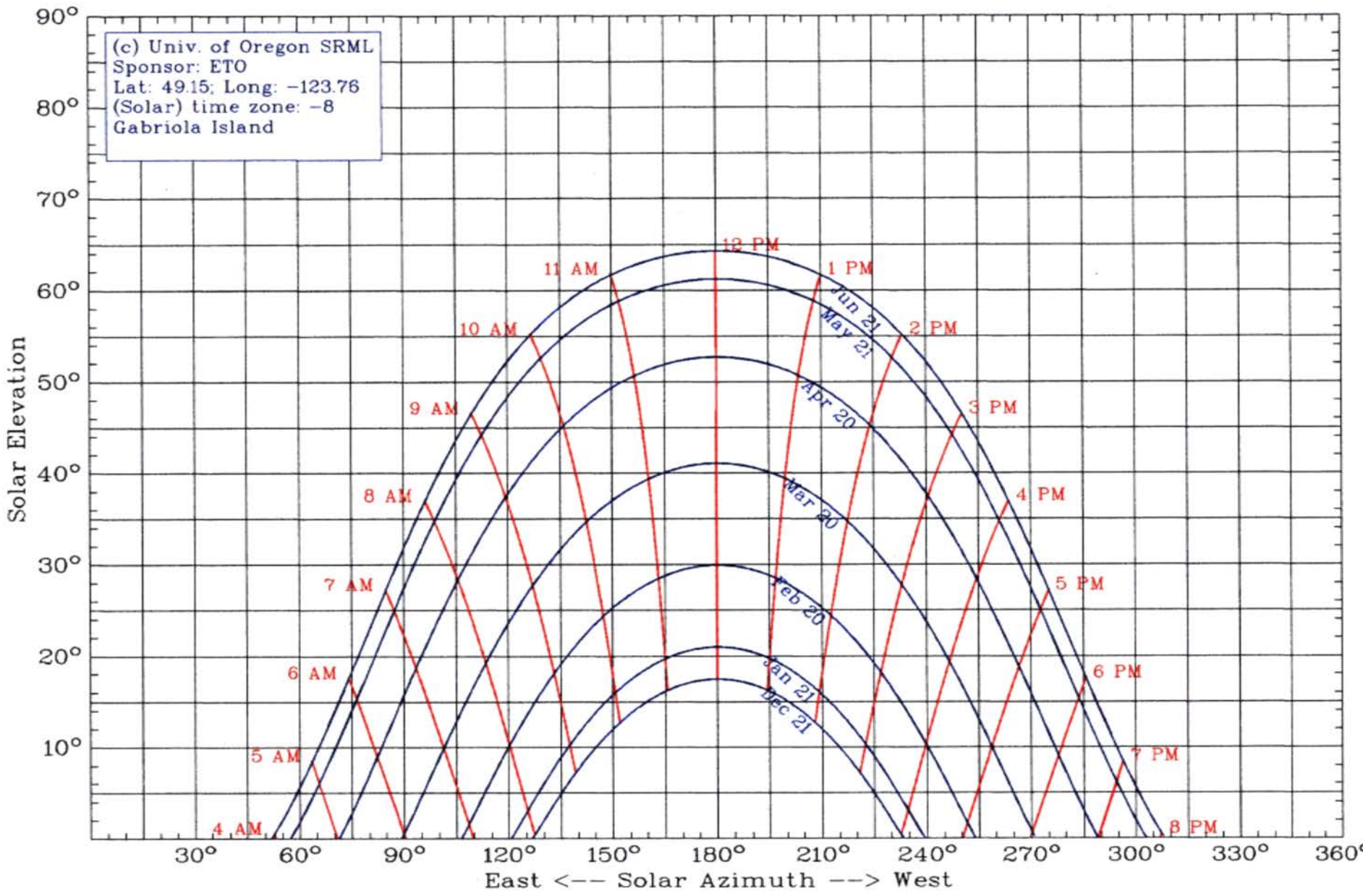
Output of 5.75 kW Solar Array on Sunshine Coast (Lower Rd & Hwy 101)

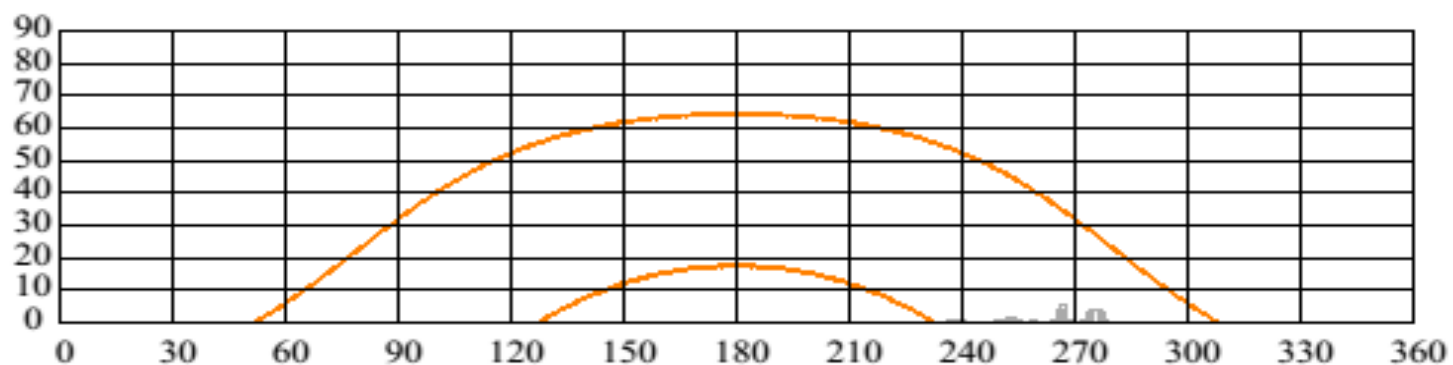
Solar Power Produced by Month		
Month	kWh Produced	
Jan-2015	175.7	
Feb-2015	339.0	
Mar-2015	513.8	
Apr-2015	808.0	
May-2015	1052.0	
Jun-2015	1069.5	
Jul-2015	1039.9	
Aug-2015	884.8	
Sep-2015	712.2	
Oct-2015	449.2	
Nov-2015	278.0	
Dec-2015	<u>102.9</u>	
Total	7425.1 kWh/yr	
System peak power	5.75 kW peak	
	1291 kWh/yr per kW peak	

Heating Fuel Energy and Cost

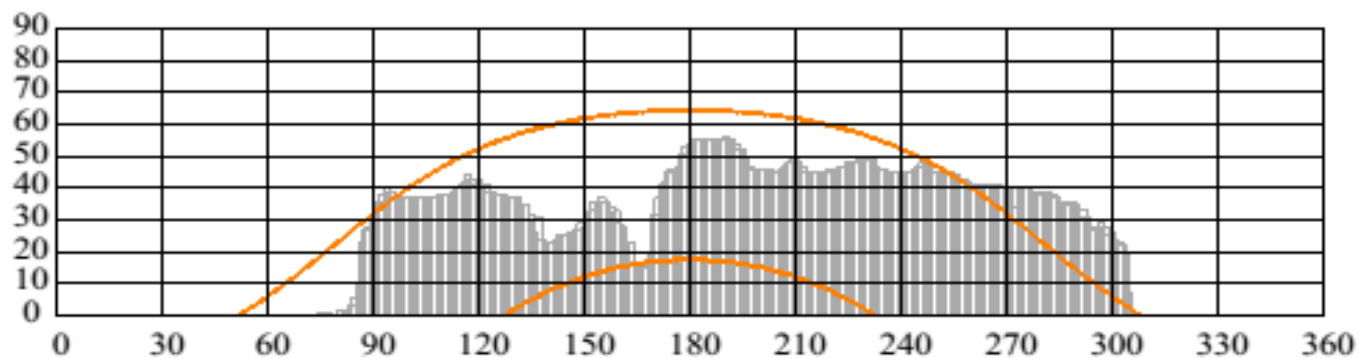
Fuel		100 GJ of Energy Per Year			
		BC, Apr 2016		NB, 2005?	Tonnes of CO2
Oil		\$3298.		\$2,635.25	7.56
Electricity		\$2775.		\$2,511.11	14.33
Natural Gas		\$1753.		\$1,257.89	5.47
GSHP		\$925.		\$837.04	4.78

On Sunshine Coast, to produce 100 GJ of energy per year, a 22 kW solar array would be needed. \$60k - \$70k





	Solar Energy Actual Tilt: 49 Actual Az: 179 No Shade kWh/m sq/day	Solar Energy Actual Tilt: 49 Actual Az: 179 Shade kWh/m sq/day	Shade Derating % Captured
January	1.4	1.4	100 %
February	2.8	2.8	100 %
March	3.5	3.5	100 %
April	5.3	5.3	100 %
May	5.6	5.6	100 %
June	5.4	5.4	100 %
July	6.2	6.2	100 %
August	5.8	5.8	100 %
September	5.2	5.2	100 %
October	2.8	2.8	100 %
November	1.7	1.7	100 %
December	1.3	1.3	100 %
Total Annual	3.9	3.9	100 %



	Solar Energy Actual Tilt: 49 Actual Az: 179 No Shade kWh/m sq/day	Solar Energy Actual Tilt: 49 Actual Az: 179 Shade kWh/m sq/day	Shade Derating % Captured
January	1.4	0.1	6 %
February	2.8	0.2	8 %
March	3.5	0.8	23 %
April	5.3	2.1	41 %
May	5.6	3.9	70 %
June	5.4	4.3	80 %
July	6.2	4.9	79 %
August	5.8	3.2	56 %
September	5.2	1.5	29 %
October	2.8	0.5	18 %
November	1.7	0.1	7 %
December	1.3	0.1	5 %
Total Annual	3.9	1.8	47 %

Net Metering (NM) at BC Hydro

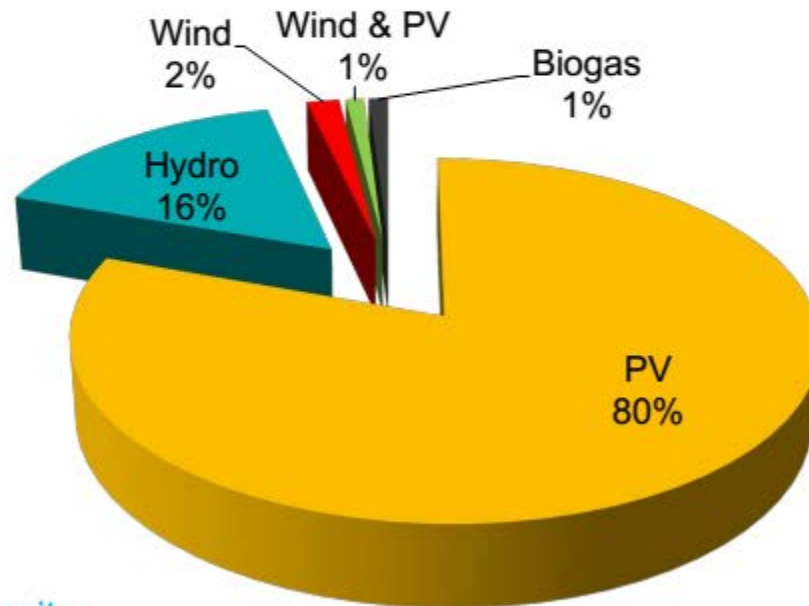
- Started in 2004
- Tariff Rate Schedule 1289
- Eligibility:
 - Residential and small commercial customers
 - Up to 100 kW
 - Clean and renewable energy source
- Open application window – come when you are ready
- Simple process, no cost to interconnect to the grid*
- Requires full load displacement before payment (annual basis)
- Annual excess electricity is paid at a rate of 9.99 cents/kWh
- Technical requirements = DGTR/100
- Electricity flow is measured by Smart Meter

BC Hydro Net Metering in numbers

As of November 2014:

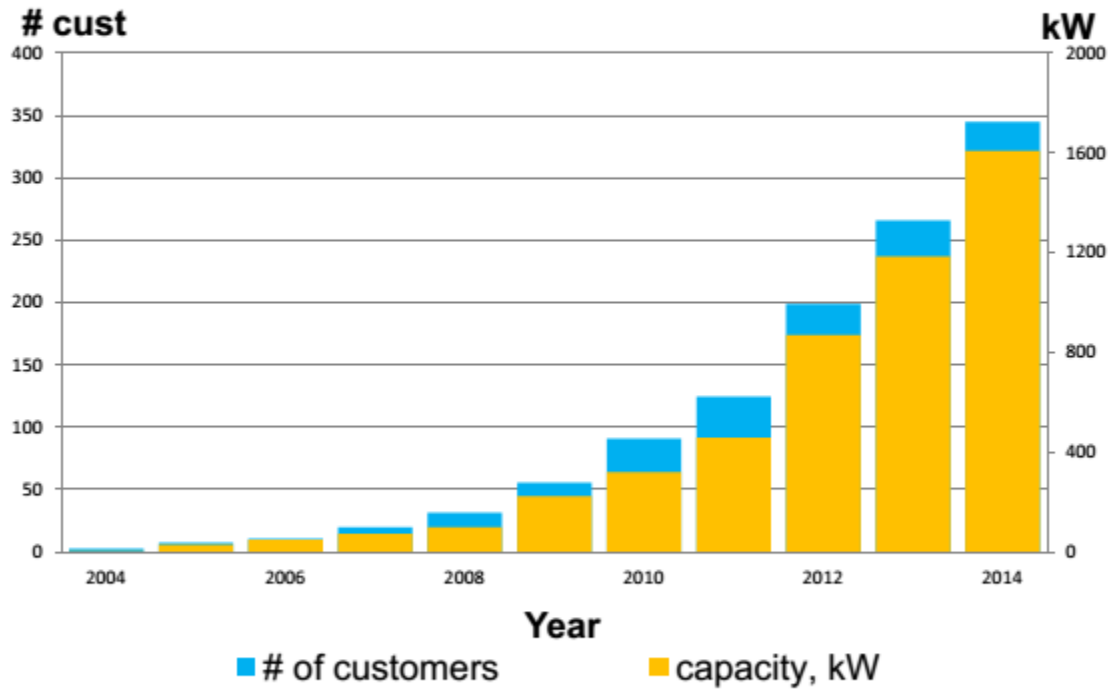
371 NM customers – 2 MW installed capacity:

- 345 solar PV
- 12 Hydro
- 9 Wind
- 4 Wind & PV
- 1 Biogas

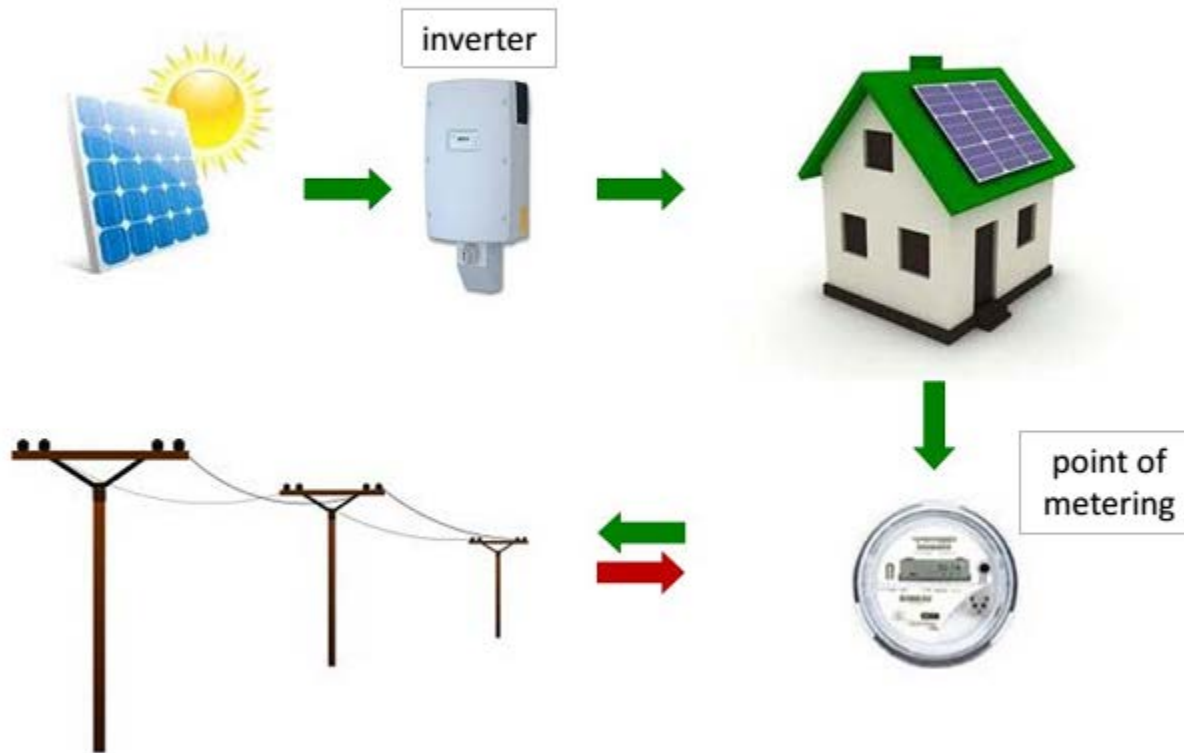


By Installed Capacity

Solar PV Growth in BC



What is Net Metering?



Smart Meters

ELECTRICITY CONSUMPTION



When '01' appears in the top left corner, the smart meter shows your total electricity consumption since the meter was installed - measured in kilowatt hours.

A kilowatt hour is a unit of electrical consumption equal to the amount of electricity needed to burn ten 100-watt light bulbs for one hour.

ELECTRICITY GENERATION



When '02' appears in the top left corner, the smart meter shows the net amount of electricity generated at your home or business if you have small generating units such as solar panels.

BC Hydro able to offer programs, enabling you and your community to generate power for your own use and sell excess electricity back to the BC Hydro.

http://www.bchydro.com/energy-in-bc/projects/smart_metering_infrastructure_program.html#how_meters_work

NM Billing

- Inflow (net consumption)
- Outflow (net generation)
- Billed on net of inflow and outflow:
 - If *inflow* > *outflow* -> charged for *inflow* – *outflow*
 - If *outflow* > *inflow* -> bill \$0, *outflow* – *inflow* -> credit to Customer Generation account



NM Billing – Net Inflow



Prepared For
JOHN SOLARIS
111 WELLKNOWN ST
VICTORIA BC V8Z 1P3

Billing Date
Oct 09, 2014
Account Number
XXXXXXXXX
Pay By
Oct 31, 2014
Please Pay
\$99.16

Invoice Number:
XXXXXXXXXXXX

<p>Meter Reading Information</p> <p>Electric: Meter # 1234567 Aug 08 16000 Oct 07 17228 61 days 1228</p> <p>Electric Outflow: Meter # 1234567 Aug 08 1100 Oct 07 1257 61 days 157</p> <p>Next meter reading on or about Dec 04</p>	<p>Previous Bill</p> <p>Balance payable from your previous bill 68.59 Thank you for your payment Aug 14, 2014 68.59CR</p> <hr/> <p>Balance from your previous bill \$0.00</p> <p>BC Hydro</p> <p>Electric Charges</p> <p>Aug 08 to Oct 07 (Residential Conservation Rate 1101) Basic Charge: 61 days @ \$0.16640 /day 10.15* Energy charge: Step 1: 1061 kW.h @ \$0.07520 /kW.h 79.79* Rate Rider at 5.0% 4.50* * GST 4.72</p> <hr/> <p>\$99.16</p>	<p>Taxes</p> <p>The following is a summary of taxes billed to your account since your last invoice: GST at 5 % on 94.44 4.72</p> <hr/> <p>Balance payable \$99.16</p>
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Daily Average Comparison
Oct 2013 22 kWh
Oct 2014 20 kWh

Thank you for keeping your account up to date.

NM Billing – Net Outflow

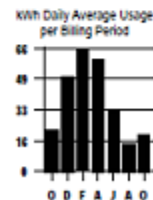
BChydro 

Prepared For
JOHN SOLARIS
111 WELLKNOWN ST
VICTORIA BC V8Z 1P3

Billing Date	Account Number
Oct 09, 2014	XXXXXXXX
Pay By	Please Pay
Oct 31, 2014	\$11.18

Invoice Number:
XXXXXXXXXX

Meter Reading Information	Previous Bill	Balance payable from your previous bill	68.59
		Thank you for your payment Aug 14, 2014	68.59CR
Electric:		Balance from your previous bill	\$0.00
Meter # 1234567	BC Hydro	Electric Charges	
Aug 08 16000		Aug 08 to Oct 07 (Residential Conservation Rate 1101)	
Oct 07 16000		Basic Charge: 61 days @ \$0.16640 /day	10.15*
61 days 0		Energy charge:	
Electric Outflow:		Step 1: 0 kW.h @ \$0.07520 /KW.h	0.00*
Meter # 1234567		Rate Rider at 5.0%	0.50*
Aug 08 1100		* GST	0.53
Oct 07 1257			
61 days 157			\$11.18
Next meter reading on or about Dec 04			



Daily Average Comparison
Oct 2013 22 kWh
Oct 2014 20 kWh

Taxes

Customer Generation Account (Net Metering Rate 1289)
Previous Balance: 10 kWh Current Balance: 167 kWh

The following is a summary of taxes billed to your account since your last invoice:
GST at 5 % on 10.65 0.53

Balance payable \$11.18

Thank you for keeping your account up to date.

NM on MyHydro

Net consumption for the last 7 days



*A negative value means that on that date you generated more electricity than you consumed.



[View detailed consumption](#)

Learn when you're using the most electricity and find ways to save.

Current billing period

Feb 26 - Mar 25, 2013

Net consumption to date (27 days):

313kWh*

*This is an estimate. Consumption costs don't include taxes and other fees which appear on your bill.

Consumption alerts

Set up alerts to keep up to date on your electrical consumption.

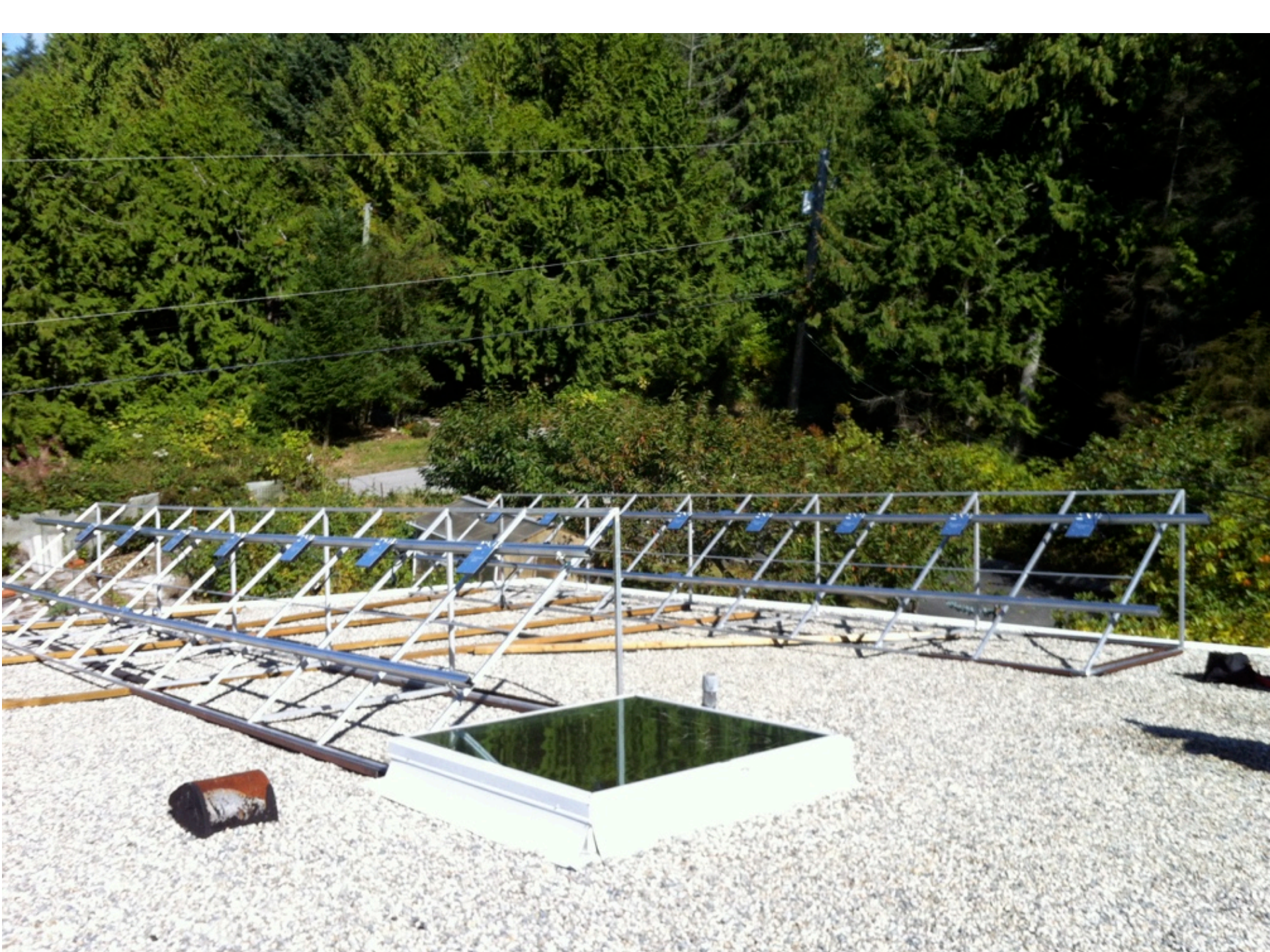
[Set up alerts](#)

<https://www.bchydro.com/accounts-billing/customer-service-residential/understand-electricity-consumption-residential/understand-your-net-consumption.html>

Recent Changes to NM

- ✓ Increased maximum size of generators eligible under NM to 100 kW
 - Requires professional design and installation
 - P.Eng seal requirement
 - Incremental costs











Residential Solar Power:

- good for the environment
- good investment where return grows as energy cost rises

PROTECT YOUR ASS

