PVWatts[®] Calculator Guide

(a public service provided by the Alberta Renewable Energy Alliance)



- This guide provides an example of how to use the National Renewable Energy Laboratory website PVWatts[®] Calculator
- Applied to a Calgary rooftop to estimate the potential for solar photovoltaic (PV) electricity
- This example applies to a garage roof
- The same process may be used for a house or commercial rooftop

Use Google™ earth <u>before</u> using PVWatts® Calculator

 Select and zoom in on your potential PV rooftop with Google Earth before activating the PVWatts[®] Calculator.

 With Google Earth you can obtain your array orientation (heading)

Use Google Earth first





6

Assume you will orient your agreed in a southerly direction

50°57'41.85" N 114°04'57.30" W elev 1072 m eye alt 1.17 km 🔘 Imagery Date: 9/22/2012



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11:42 AM

arth

Sign in



Now access the website:

'PVWatts[®] Calculator' at

http://pvwatts.nrel.gov/pvwatts.php





NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy,









Get Starte Customize Your System To Your Roof

On the map below, click the corners of the desired system. Note that the roof tilt and azimuth cannot be automatically from the aerial imagery, and consequently the estimated system size may not reflect what is actually possible.

Module Efficiency: Typical (15%) V System Size:

















javascript:showLightbox('draw');





INITIAL ECONOMICS (Optional)



facing due south

20	Tilt (deg):	14	O	
	Azimuth (deg):	174	0	
	INITIAL ECONOMICS (0	ptional)		

Modify the inputs below to provide an initial rough estimate of the cost of energy produced by the system. Note that comple utility rates and third-party financing can significantly change these values

System Type:	Residential	0
Average Cost of Electricity Purchased from Utility (\$/kWh):	No utility data available	0
Initial Cost (\$/Wdc):	3.70	0

Select your System 7

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	DC System Size (kW):	3.4	0	Draw Your System
	Array Type:	Fixed (roof mount)	0	Click below to customize your system on a map. (optional)
	DC-to-AC Derate Factor:	0.77	Derate Calc.	
	Tilt (deg):	14	0	
	Azimuth (deg):	174	0	
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Average Cost of Electricity	.12	8	



INITIAL ECONOMICS (Optional)

Modify the inputs below to provide an initial rough estimate of the cost of energy produced that complex utility rates and third-party financing can significantly change these values



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System Type:	Residential	0		
Average Cost of Electricity Purchased from Utility (\$/kWh):	.12	0		
Initial Cast (SAUda)	3.50	ā		

NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.



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	RESULTS		3,929	kWh per Year	
This RESULT	S	Solar Padiation		Enormy Value	
screen will g	give	(kWh / m ² / day)	(kWh)	(\$)	122
you an estir	natelanuary	2.14	171	21	
of the	February	3.06	226	27	
maximum	March	4.30	354	42	
	April	5.24	397	48	
annual savir	ngs May	6.06	465	56	
in electricity	/ if June	6.44	465	56	
you use ALL	July	6.98	512	61	
vour solar	August	5.94	435	52	
gonoration	September	4.56	326	39	
generation	October	3.63	278	33	
within your	November	2.18	167	20	
home	December	1.65	131	16	
	Annual	4.35	3,929	\$ 471	

Some design considerations for your installation

- Roof area can you fit a PV system on a SE, south, or SW facing roof?
 - Estimate approximately 6.4 square meters for 1.0 kWdc array
 - Each module is roughly 1 meter wide by 1.6 meters long
- Be aware of roof obstructions (e.g. vents)
- Roof Orientation avoid northerly facing
- Determine roof pitch if the array is fixed parallel to roof
- Roof condition? repairs in next 10 years?
- Asphalt roof preferred
- Cedar shake roof is not good
- Watch for shading from trees or adjacent buildings/chimneys etc

PV generation depending on orientation and tilt of array (kWh/yr/kWdc for Calgary location)



KWh/yr/kWdc for Calgary Latitude 51 degrees

Generation varies depending on orientation and array tilt

NOTE

Azimuth = 0 is due south when using RETScreen; Azimuth =180 is due south when using PV Watts Calculator

At azimuth = 0 and tilt of 45 degrees 100% of maximum is attained.

At azimuth = 0 and tilt of 15 degrees there is a loss in generation of 11%

tilt 45	tilt 30	tilt 15
1295	1253	1155
1281	1244	1149
1245	1215	1133
1187	1169	1106
1111	1109	1072
1021	1037	1031
923	959	986
	tilt 45 1295 1281 1245 1187 1111 1021 923	tilt 45tilt 30129512531281124412451215118711691111110910211037923959

south = azimuth 0	tilt 45	tilt 30	tilt 15
azimuth 0	100%	97%	89%
azimuth15	99%	96%	89%
azimuth 30	96%	94%	87%
azimuth 45	92%	90%	85%
azimuth 60	86%	86%	83%
azimuth 75	79%	80%	80%
azimuth 90	71%	74%	76%