



Generating your own Power
for a Sustainable World

Grid Tie and Back Up Power Catalogue

2011



www.switchenergy.ca

Reducing Your Carbon Footprint

A solar electric Grid-Tie System will not make you money!

In BC presently, there are few government incentives to offset the capital costs of a Grid-Tie system. Combined with this, is the fact that we currently enjoy one of the lowest rates in North America for electricity.

Purchasing a Grid-Tie system is largely a choice of values. Many of us don't think twice when purchasing newer vehicles costing in excess of \$30,000 that have a large carbon footprint with no payback and that quickly depreciate in value.

A solar electric system can last upwards of 30 years with little or no maintenance. This type of system will add value to your home if you ever decide to move.

Today's systems are approximately 95% efficient with almost all the power generated being utilized in your home with any excess being sent to the grid.

A wind and especially a micro hydro system, will have the ability to make you money. This will depend on the amount of resource available. These systems are not listed in our catalogue as each is site specific. Please call for an assessment.

Solar Electric Generation And Avoided Carbon Emissions

Solar electricity generation produces **zero** carbon emissions!

When solar electricity (or renewable energy) is produced, it displaces electricity that would have been produced at power plants from a mix of hydropower and renewable sources, coal and natural gas. Hydropower, like solar generation, releases zero carbon emissions. However, electricity produced from coal and natural gas produces 2.10 and 1.32 pounds of carbon emissions per kilowatt-hour respectively.



Vs



What is Grid-Tie?

The Basics of a Grid-Tie System

1. Solar Modules

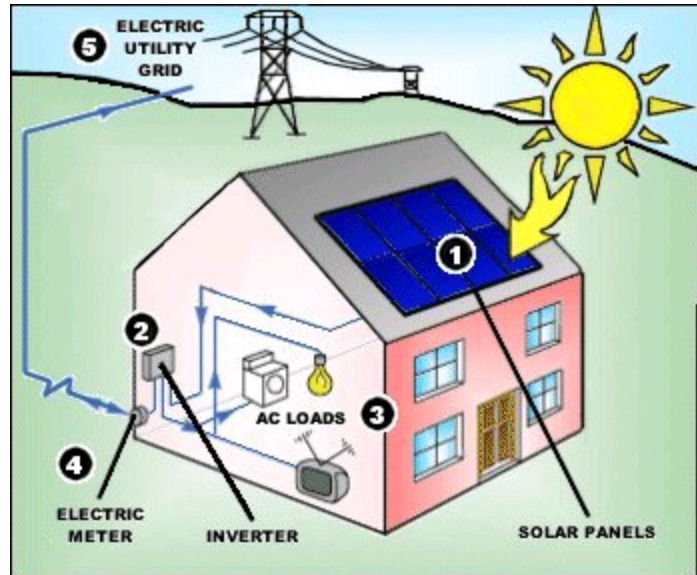
Solar Modules mounted on the roof or ground convert sunlight into DC power.

2. Inverter

This power is sent to an inverter which converts it into AC power - identical to that being sent to you from the utility company.

3. Electrical Panel

Power travels from the inverter to your electrical service box. The power from the electrical panel will be distributed to any electrical loads in your home.



4. Utility Meter

When excess power is produced by the solar panels, the power will flow into the grid through your electric meter. You are now “legally spinning your electric meter backwards” and are in essence, providing power to your neighbor.

5. Utility Grid

The utility grid automatically provides electricity when needed - at night and during the day when your demand exceeds your solar production.

Every watt-hour your system delivers is a watt-hour you don't have to buy from your utility company!

Before venturing into a Grid-Tie system, please be sure to check with your local utility for programs and regulations.



Salt Spring Island, BC



Gun Lake, BC



Arena Project in Nakusp, BC

Sizing your Grid-Tie System

Now that you know the basics, the next decision is “How big should I go?”

The following formula will give you an approximate system wattage so that you can get an idea of cost and components needed for your system. Please work with experienced IPS staff to design a system which fits within your budget and can be expanded as needed.

1. How much electricity do you use each month?
Look at your electric bills from the past year and find the average number of kWh per month then divide by 30 (days in a month).
2. How many peak sun hours do you get per day? Refer to sun hours chart on page 7.
3. What % of your home/business power usage will be supplied by solar/wind power from this system? If you want to produce 100% of your electricity, put 100.

This will give you your minimum system size (MSS) in watts.

For example:

$$\frac{900 \text{ kWh/mo}}{30 \text{ days}} = 30 \text{ kWh/day}$$

$$\frac{30 \text{ kWh/day}}{4 \text{ sun hours}} = 7.5 \times 1000 = 7500 \text{ watts}$$

$$7500 \text{ watts} \times 50\% \text{ (your production)} = 3750 \text{ watts (minimum system size)}$$

The MSS is the number of watts per hour your system needs to produce during peak sun hours in order to meet your needs. You can use this number to figure out approximately how many solar panels you will need. Divide the MSS watts by the wattage of the solar panel.

For example: it would take 21 Conergy P 185's to produce 3750 watts....
 $3750/185 = 20+$ panels

Note: These figures are approximate and do not take into account variable efficiency ratings of the solar panels or inverters.

System Size (in watts)	Monthly Output Capability (based on 3 sun hrs/day)	Monthly Output Capability (based on 4 sun hrs/day)
3330	299 kWh	399 kWh
4070	366 kWh	488 kWh
5550	499 kWh	666 kWh
6660	599 kWh	799 kWh
7400	666 kWh	888 kWh

Grid-Tie Systems

The following systems feature the Enphase Micro inverter. This is a modular based approach - one micro inverter attaches directly to each solar panel - which allows you to add up to 16 modules on a single string.

The advantage of this system is the potential for expansion in the future. As the need and/or budget grows, additional modules can easily be added without requiring the replacement of a large centralized inverter. All systems include flush mount roof racking. Depending on roof type, additional hardware may be required. The output is 240VAC and is available in 208 3 phase if needed.

Enphase 740 740 watt solar array

4 Conergy P 185 watt solar panels
4 Enphase micro inverters

Price: \$4,192.90

Enphase 1110 1110 watt solar array

6 Conergy P 185 watt solar panels
6 Enphase micro inverters

Price: \$6,234.50

Enphase 1480 1480 watt solar array

8 Conergy P 185 watt solar panels
8 Enphase micro inverters

Price: \$8,153.40

Enphase 1850 1850 watt solar array

10 Conergy P 185 watt solar panels
10 Enphase micro inverters

Price: \$9,997.82

Enphase 2220 2220 watt solar array

12 Conergy P 185 watt solar panels
12 Enphase micro inverters

Price: \$12,335.11

Enphase 2590 2590 watt solar array

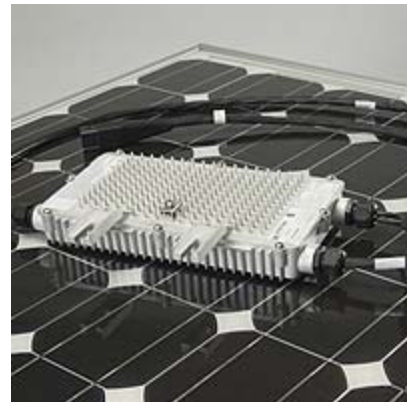
14 Conergy P 185 watt solar panels
14 Enphase micro inverters

Price: \$14,277.46

Enphase 2960 2960 watt solar array

16 Conergy P 185 watt solar panels
16 Enphase micro inverters

Price: \$16,115.80



Available Options: 1. Web Based Monitoring System
2. Top of Pole Mount or Tracking System for Solar Panels

Grid-Tie Systems

The following Grid-Tie systems contain flush mount roof racking, DC disconnects and wiring as well as the inverter and solar panels. These are 240 volt home systems.

The inverters used in these systems are designed and suitable for outdoor locations (if you prefer not to have it installed in your home).

GT3000 3000 watt inverter with 3330 watt solar array

18 Conergy P 185 watt solar panels
1 SMA 3000 watt inverter

Price: \$16,090.53

GT4000 4000 watt inverter with 4070 watt solar array

22 Conergy P 185 watt solar panels
1 SMA 4000 watt inverter

Price: \$19,486.35

GT5000 5000 watt inverter with 5550 watt solar array

30 Conergy P 185 watt solar panels
1 SMA 5000 watt inverter

Price: \$26,393.47

GT6000 6000 watt inverter with 6660 watt solar array

36 Conergy P 185 watt solar panels
1 SMA 6000 watt inverter

Price: \$31,119.48

GT7000 7000 watt inverter with 7400 watt solar array

40 Conergy P 185 watt solar panels
1 SMA 7000 watt inverter

Price: \$34,570.35



SMA Grid-Tie Inverter

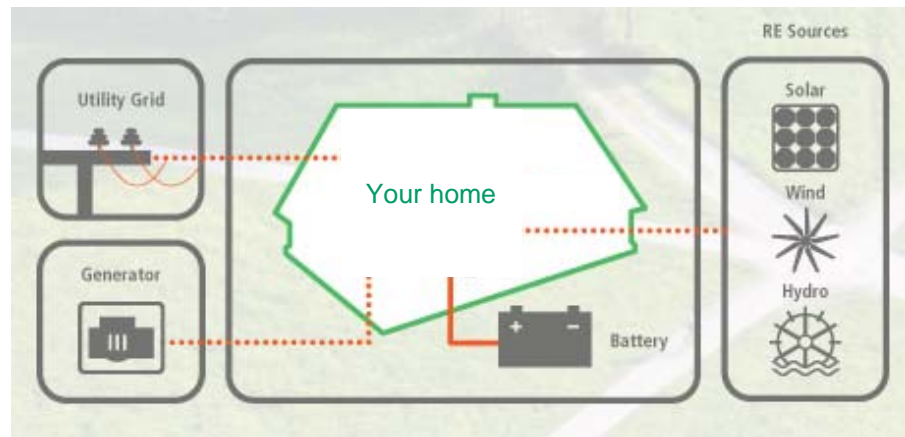
Available Options: 1. Wireless Display for Solar Array
2. Web Interface Data Logger
3. Top of Pole Mount or Tracking System for Solar Panels

Grid-Tie System with Backup Power

This system is for homes that are connected to the grid, and want to incorporate a renewable energy (RE) system with backup power. A grid-tie system allows any excess energy that is generated to be sold back to the utility company, and allows the grid to act as an additional energy source to charge the systems batteries. If the grid should fail, the inverter will automatically supply energy from the batteries and the RE sources, to support your homes electrical needs.

While this is the most expensive of the grid-tie systems, you can rest assured that your most valuable electrical loads (a freezer full of food, a priceless bottle of wine, etc.) will continue to run as if the power failure never occurred.

Grid-Tie System with Backup Power



This system is designed and ideal for areas that have frequent and/or long power outages.

Grid-Tie with Battery Backup #1 4500 watt inverter with 3330 watt solar array

- 18 Conergy P 185 watt solar panels
- 1 Flush mount roof racking
- 1 Xantrex 4500 watt inverter/charger
- 1 Xantrex power panel with system controller
- 1 MPPT charge controller
- 8 AGM batteries - capacity 18.7 kWh (390Ah@48V)

Price: \$26,441.26



Sun Hours Per Day

Several factors influence how much sun power your modules will be exposed to:

When you will be using your system—summer, winter, or year-round.

Typical local weather conditions.

Fixed mountings vs. trackers.

Location and angle of PV array.

We have provided the following chart which shows ratings that reflect the number of hours of full sunlight available to generate electricity. Your solar array's power generation capacity is dependant on the angle of the rays as they hit the modules. Peak power occurs when the rays are at right angles to the modules.

If you use your system primarily in the summer, use the summer value: if you are using your system year-round, especially for a critical application, use the winter value. Using the chart, you should be able to determine a reasonable estimate of the sun's availability in your area.

Province, City	Summer Avg.	Winter Avg.	Yr Round Avg.
Alberta, Edmonton	4.95	2.13	3.75
Alberta, Suffield	5.19	2.75	4.10
British Columbia, Kamloops	4.48	1.46	3.29
British Columbia, Prince George	4.13	1.33	3.14
British Columbia, Vancouver	4.23	1.33	3.14
Manitoba, The Pas	5.02	2.02	3.56
Manitoba, Winnipeg	5.23	2.77	4.02
New Brunswick, Fredericton	4.23	2.54	3.56
Newfoundland, Goose Bay	4.65	2.02	3.33
Newfoundland, St. Johns	3.89	1.83	3.15
Northwest Territory, Fort Smith	5.16	0.88	3.29
Northwest Territory, Norman Wells	5.04	0.06	2.89
Nova Scotia, Halifax	4.02	2.16	3.38
Ontario, Ottawa	4.63	2.35	3.70
Ontario, Toronto	3.98	2.13	3.44
Prince Edward Island, Charlottetown	4.31	2.29	3.56
Quebec, Montreal	4.21	2.29	3.50
Quebec, Sept-Isles	4.29	2.33	3.50
Saskatchewan, Swift Current	5.25	2.77	4.23
Yukon, Whitehorse	4.81	0.69	3.10