Feb 2016

IPS Integrated Power Systems
Back-up and Solar Power Systems

Generating Electricity for a Sustainable World

Solar Grid Tie and Back Up Power Catalogue

2016

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Reducing Your Carbon Footprint

A properly designed Grid Tie System can have a positive effect on your utility bill!

Generating your own power with a solar PV system is now an affordable option.

Solar PV prices have now dropped to a level that payback for your system could be realized in 10 to 15 years depending on system size, southern exposure and utility price increases.

With both major utility companies, BC Hydro & Fortis Power, adopting the two tiered rate schedule it makes sense to include solar in your energy plan.

Most systems are mounted flush on the roof. This requires good southern exposure and enough roof space available for the panels. Each kilowatt of solar PV requires approximately 100 square feet of space.

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 and any excess being sent to the grid.

Micro hydro systems are available, however they 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

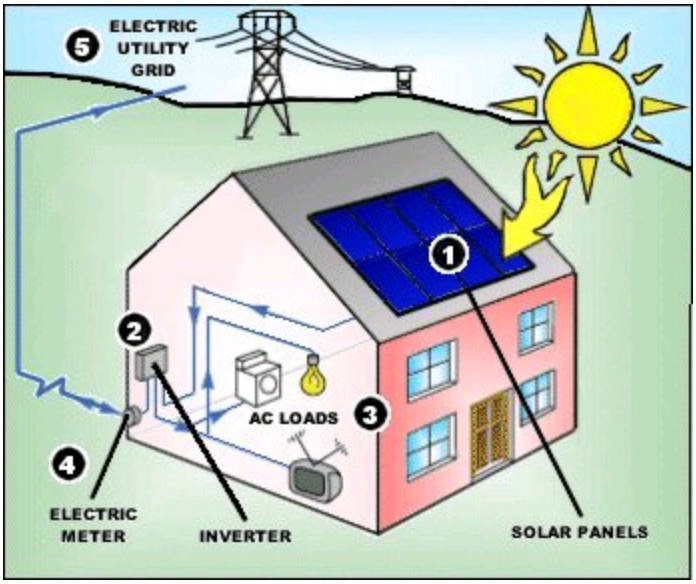
What is Grid-Tie?

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


Kelowna, 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:

$$\frac{1500 \text{ kWh/mo}}{30 \text{ days}} = 50 \text{ kWh/day} \qquad \frac{50 \text{ kWh/day}}{4 \text{ sun hours}} = 12.5 \times 1000 = 12500 \text{ watts}$$

12500 watts x 50% (your production) = 6250 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 25 250’s to produce 6250 watts….
6250/250 = 25 panels

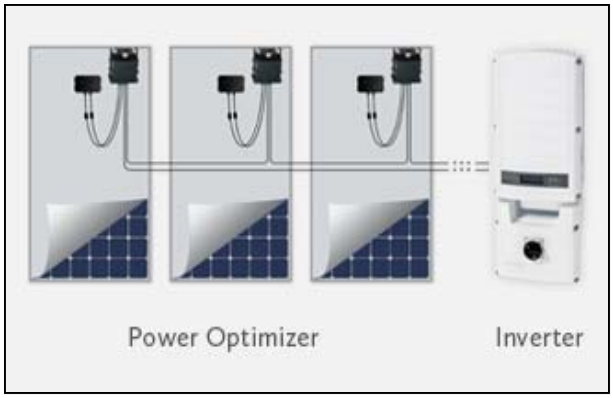
Note: These figures are approximate and do not take into account variable efficiency ratings of the solar panels or inverters.

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 **SolarEdge Power Optimizers**, highly efficient PV Inverters and an optional web portal for module-level monitoring and fault detection. The Power Optimizer is a DC/DC converter which is connected to each PV module. This increases the energy output from PV systems by constantly tracking the maximum power point (MPPT) of each module individually. Each power optimizer is equipped with the unique SafeDC™ feature which automatically shuts down the modules' DC voltage whenever the inverter or grid power is shut down.

The **SolarEdge PV Inverter** is specifically designed to work with the SolarEdge Power Optimizers. Because MPPT and voltage management are handled separately for each module by the power optimizer, the inverter is only responsible for DC to AC inversion. Consequently, it is a less complicated, more cost effective, more reliable solar inverter with a standard 12 year warranty, extendable to 20 or 25 years.
All systems include flush mount roof racking. These are 240/120 volt systems unless otherwise noted.



SE 5000 with 5200 watt Solar Array
GT9110
20 260 watt Solar Panels
1 Solar Edge 5000 watt Inverter
Flush Mount Roof Racking
Shingle Roof: $12,545.32
Metal Roof: $11,993.32

SE 7600 with 8580 watt Solar Array
GT9112
33 260 watt Solar Panels
1 Solar Edge 7600 watt Inverter
Flush Mount Roof Racking
Shingle Roof: $19,119.92
Metal Roof: $18,228.92

SE 10,000 with 10,400 watt Solar Array
GT9116
40 260 watt Solar Panels
1 Solar Edge 10000 watt Inverter
Flush Mount Roof Racking
Shingle Roof: $23,567.46
Metal Roof: $22,487.46

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

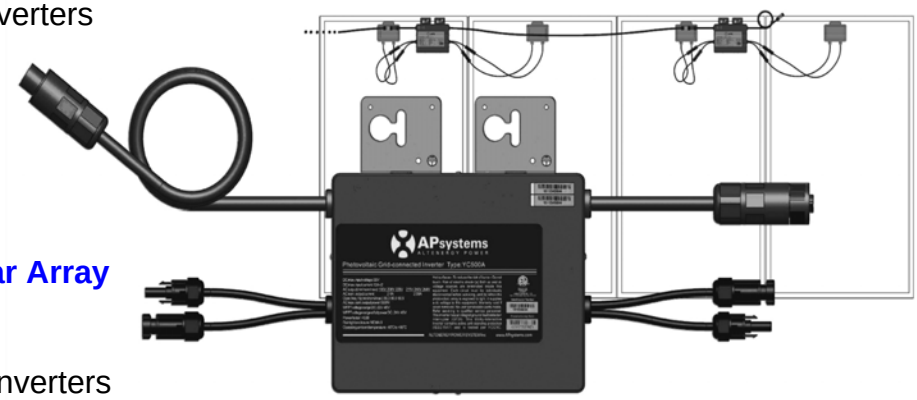
Grid-Tie Systems

APsystems: Leading the Industry in Solar Micro-inverter Technology

The APsystems Micro-inverter Solution integrates grid-tied micro-inverters with intelligent networking and monitoring systems to ensure maximum efficiency of your solar array and to optimize solar harvest.

This system combines APsystems Micro-inverters with a state-of-the-art communications unit, the APsystems Communicator (ECU), and advanced monitoring software, the APsystems Monitor (EMA), to bring you the most powerful, economical, reliable, intelligent and safe solar solution on the market today.

APS 3500 with 3640 watt Solar Array
GT9119
14 260 watt Solar Panels
7 APsystems 500 watt Micro-inverters
1 ECU Communicator
Flush Mount Roof Racking
Shingle Roof: $9,777.62
Metal Roof: $9,391.22



YC500A Micro-inverter

APS 7000 with 7280 watt Solar Array
GT9121
28 260 watt Solar Panels
14 APsystems 500 watt Micro-inverters
1 ECU Communicator
Flush Mount Roof Racking
Shingle Roof: $17,687.60
Metal Roof: $16,931.60

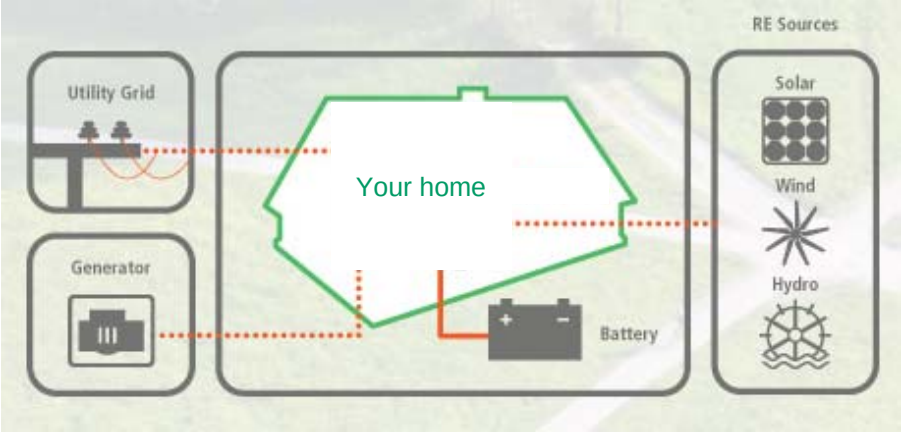
APS 10,500 with 10,920 watt Solar Array
GT9123
42 260 watt Solar Panels
21 APsystems 500 watt Micro-inverters
1 ECU Communicator
Flush Mount Roof Racking
Shingle Roof: $25,816.94
Metal Roof: $24,682.94

Available Options: 1. Web Based Monitoring System
2. Top of Pole Mount 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, such as a freezer full of food, 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 4000 watt Inverter with 7800 watt Solar Array GT9100

30 260 watt Solar Panels
Flush Mount Roof Racking
1 Outback 4000 watt Inverter/Charger
1 Outback System Controller
2 MPPT Charge Controllers
8 AGM Batteries - Capacity 18.7 kWh (390Ah@48V)

Shingle Roof: $32,994.09

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