The Back Panel

Off-Grid Thinking Since The Late 1900's

For many people, the words "Off-Grid" conjure images of hippies & hermits. Of gardens & goats in some remote patch of forest.

For others, it simply means flipping the bird at the power utility.

The word 'off-grid' is synonymous with independence. A willingness to do more with less instead of less with more. To be something of a contrarian to the musings of the Anthropocene.

Whether your current off-grid needs involve powering an LED light bulb in a remote farm building, keeping your camera charged during an expedition, or reducing your monthly utility bills by generating some of your own power, I hope that we can help you achieve your desired level of "off-grid".

Graham Morfitt, Owner

BSc (Physics), Dipl.BA

Discover what solar can do for you!

Proudly supporting Canadian federal & provincial government ministries, Canadian Forces, universities & colleges, environmental & research firms, and thousands of Canadians with their self-sufficient energy projects.

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Modern Outpost

For Today's Pioneer

Since 1998

Canada's DIY Solar

Reliable Power . Responsible Power . For Home & Away

2023

Grid-Tied Homes & Businesses

It's time for lower energy bills, greater independence, and higher resale value!

Off-Grid Lodges, Cabins, & Tiny Homes

Escape the noise, fuel cost, & unreliability of generators.

RV's, Trailers, Trucks, & Vans

The point of the exercise is independence anywhere.

Kayaks, Yachts, & Rainforests

Solar is the energy source that can handle damp climates.

Backpacks, Drones, Cameras, & Phones

Portable power sources that won't slow you down.

Roof Road Water Trail

On Grid Packages

Electricity rates have been rising 3-5% per year on average.

Time-Of-Use billing is a popular revenue booster for utilities. Take control of these costs!

Grid-tie solar is easy, affordable, & is the home improvement that appreciates.

How Does It Work?

Solar systems connect to your electrical panel, & the energy is available to all home appliances.

When you generate less than your home needs, & at night, the utility covers the shortfall.

Generate more than you consume, excess goes out onto the grid & you get credit.

Your meter tracks all the inflows & outflows & your bills shrink.

Request your home analysis!

MyGrid Series

Because you want to make a wise investment for your home or property. Choose a design philosophy that meets your goals for energy production & aesthetics. We'll use this as a basis for equipment selection & design parameters. Order any of these on our website.

My Grid Peak

Optimized for performance & aesthetics on your residential rooftop.

The highest power all-black, split-cell solar modules from our list of leading manufacturers. All roof attachments are hidden under the array. The all-black racking system is cut flush to the edge of your solar modules & capped for a neat, tidy appearance with no clunky silver hardware. Finish it off with array edge trim. Micro inverters on the roof connect your system to the grid. Only the communications box resides in your living space.

MyGrid Eco^2

Economical. Environmental.

This design uses the most economical solar modules and grid-tie inverter available from our top-tier manufacturers.

No compromise in quality. Install it, connect it, and recover the cost in record time.

MyGrid Max

The highest power. Period.

Designed with the maximum rooftop power density as the goal.

The highest efficiency modules, paired with an inverter platform that will generate the most energy per year possible from your roof space.

MyGrid Crystal

Frameless all-glass modules for style.

When you'd like your solar system to make a statement, we'll step outside the box. Using frameless modules, structures such as gazebo atriums, awnings, & carports take on a sophisticated appearance unlike any other.

Off-Grid Packages

Need power for a remote home, shed, or research site? Maybe it's you & your backpack in the wild.

How To Off-Grid

Assess your energy needs on a daily or weekly basis. Estimate solar yield under your most challenging skies & select solar modules to match your needs.

Battery storage delivers day & night in any voltage format: 5V USB, USB-PD, 12V, 16V, 19V, 24V & other DC, household AC (120V or 240V).

Budget!

Add it all up…

Cell phone: 15Wh/day
Laptop: 100Wh/day
Lights x 4: 60Wh/day
Fridge: 1600Wh/day

Download our off-grid worksheet

Trek & Kayak Series

Going on an expedition? Trip of a lifetime? Then you probably don't want dead cameras, drones, GPS, or phones. Charge anything, anywhere.

Trek North

Sensitive folding or rollable thin film solar up to 120W for high performance at high latitudes. Rugged, packable lithium batteries with connections you need for your gear.

Kayak Kits

Marine-grade solar straps to the deck. Watertight wire & connectors reach the battery in the hatch. Silent performance for peaceful journeys!

Socrates & HPS

Convenient solar-ready battery kits. Pack your power to the cabin, campsite, or use for home backup.

HPS

Canadian-made BattPacks ultra rugged!

Socrates

Upgradeable, expandable, serviceable. Built from the best brands.

MyGrid Equinox

Solar energy systems designed for small residential applications that greatly simplify installation & maintenance. 3-season performance, with generator input to back-up dark winter months.

Tiny Homes

We keep things simple.

Solar that compliments your roof, or that can be deployed easily in small A-frames on the ground. Wall-mounted equipment box provides AC power to your service panel.

Cabins

From the rustic shack, to the full-service outback lodge, systems are designed in any size or shape. Roof, ground, or pole mount the solar.

MyGrid Escape

Building a get-away van? Upgrading your boat? Outfit your ride with solar modules that make the best use of limited space. Even on low profile & curved surfaces.

Solar Modules

Cells

Crystalline
The cell type used in most modules.
Crystalline cells pack the most power per square meter, & are very stable, providing 25-year warranties & 40+ year expected service life spans.

Split-Cell?
Split-cell means that the cells are half-cut, & modules built in two halves. This means more efficient internal wiring, & superior shade tolerance.

Semi-Flexible Modules?
Not really. They're not entirely bendable, but can hold a gentle curve. Great for vans & boats, offering lightweight, low-profile charging. Look for IBC cells for best durability.

Cold Weather Voltage Rise!
Modules produce higher voltages in cold temperatures. At -35C, voltages can be up to 20% higher. So, make sure your system's design accounts for this.

Mono : The most efficient cells (20-24%)
Poly : Often more affordable (18-20%)
Common Sizes...
- 12 Cell - Consumer product size for 5V USB charging
- 32/36 Cell - Small off-grid size, suited to 12V batteries
- 60/66 Cell - The common residential size (on/off grid)
- 72/78 Cell - Commercial & industrial system size

Thin Film
Effective vs efficient. Thin film modules are less efficient, & have shorter service lives than crystalline. However, greater light sensitivity means reliable yield for the same power rating, hence application in low-light & shaded conditions.

Lightweight & can be applied to flexible backings for packable systems. Ideal for pack-in camps, & high-latitudes.

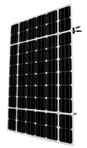
CIGS : Sensitivity & efficiency (13-15%)
Amorphous : Best for low-light (8-10%)

Choosing

With 40+ year expected service lives. You may only purchase modules once. Choose wisely!

Project Needs
Assess your energy consumption, & research what solar resource the installaiton site offers. Shortlist module types & sizes that meet your needs.

Aesthetics
When modules won't be seen, power beats pretty. When curb appeal matters, don't settle for the ordinary. Black or silver framed panels are available. Choose racking equipment to match.



Ethics
We vote with every purchase we make. So we choose from companies that manufacture with higher standards. **SolarScorecard.com**

Quality
Most manufacturers offer performance warrenties of 25yrs, but power levels at that point varies. The best product warrienties are pushing 15yrs. Learn more at **PVEL.com**

Highlights

For every job, there is a correct tool. So, we offer hundreds of models from the leading manufacturers. Your optimal solution is here.

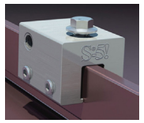
Hanwha Q.Cells : Top value in split-cell design
Solaria : Supreme aesthetics & power density
Lumos : Frameless glass/glass for architecture
Go Power! SolarFlex : Semi-flex done right
Goal Zero : The name brand in portable
PowerFilm : Portable thinfilm with military creds
Voltaic Systems : Rugged project modules

...& more

Download our Solar Slate buying guide

Mounts

1. **Respect Your Roof**
Preserve your rafter & truss engineering! Use quality attachments with proven flashing & sealing. Waterproofing is not a place to cut costs. Use inter-rafter blocking when anchoring lag bolts. No attic? Use surface attachments.



2. **Reputable Rails**
Choose solar module racking products with credentials. Choose an aesthetic finish that suits the roof - basic for barns, sleek for the house.

3. **Cable Care**
Keep all cabling tied neatly to the modules & racking to avoid friction wear with the roof surface. Minimize conduit visibility & use critter caging when needed.

4. **Angle Arguments**
Azimuth as close to due-South as possible. Avoid shade, especially between 10am & 2pm.
Grid-tie: Max annual energy harvest
Typical tilt angle: latitude minus 15 degrees
Most homes are 20-30-degrees = close enough!
Off-Grid: Maximize yield in your worst month.
Typical tilt angle: latitude plus 15 degrees
Use ground mounts, pole, or tilt-up options.

5. **Setback Safety**
Plan for maintenance access, plus water & snow.

Solutions

More options than you can shake a shingle at.
Pitched Roof Systems : Shingle, tile, metal
Flat Roof : Ballasted, with or without anchors
Pole Mounts : Side, top, fixed, or tracking
Ground : Fixed, or seasonally adjustable

Download our Mounting Montage buying guide

Controllers

Used in off-grid systems to manage the energy flowing from solar modules into batteries. They are essential for proper charging & battery health.

Types

MPPT
Maximum Power Point Tracking controllers find the voltage & current that maximizes your solar output power, and then converts those quantites for optimum battery charging. The result is up to 30% more current flowing to batteries than with PWM. MPPT controllers work with higher module & array voltages, providing greater design flexibility.

Note: Not all MPPT algorithms are created equal! Look for sampling rates, voltage & current ranges, & shade handling (full I-V curve sweep). The top brands talk about algorithms, while the cheap ones don't & yield only slightly better than PWM.

PWM
Pulse-Width Modulated are cost-effective, multi-stage chargers tuned for solar. Cost-effective for small arrays & remote projects like lighting, & monitoring systems.

Highlights

Victron : Advanced for marine & mobile
Outback Power : Off-grid specialists
Genasun : Compact, robust, & zero RFI noise

...& more

Download our Controller Compendium buying guide

Inverters

Grid-Tie

Designed to sync solar arrays directly to the utility grid. No batteries needed. The energy generated is energy you don't need to buy from the utility.

Micro Inverters
For simple, expandable grid-tie systems, it is tough to beat a microinverter system. They are mounted on your racking behind the solar modules. 240VAC wiring & rapid shutdown safety.

String Inverters
Centralized architecture feeding strings of solar modules into a single inverter. These usually offer the lowest cost on large solar arrays (5kW+). Require rapid shutdown on residential.

Choosing

When selecting an inverter platform, consider...
- Reliability of the brand
- Handling of shading issues on the array
- Rapid shutdown safety options
- Monitoring platform & sophistication
- Available installation space needed
- Installation access for servicing
- Expandability
- Battery storage options

Battery-Based

Hybrid
Think of these as off-grid systems, but with output to grid options. Great flexibility in managing multiple energy sources. Use a generator & the grid as a back-up to help charge your batteries when sunlight is weak. Perhaps sell excess energy to the grid when batteries are full. Ideal for areas prone to blackouts, & max resiliency.

Inverter/Chargers & Stand Alone
Used in off-grid homes, RVs, boats, & back-up, applications. Models with built-in battery chargers can charge battery banks from the grid, but are not able to sell energy back.

Pure Sinewave or Modified Sinewave?

Without getting too technical, a "pure sinewave" inverter generates a smooth, stable, electrical signal. "Modified sinewave" generate a less sophisticated output that can run most appliances. Pure sinewave inverters are far better for computers, audio/video, & medical devices. Modified sine works fine with most non-inductive loads (things without motors or voltage conversions), and are more affordable.

Highlights

Enphase Energy : Leading micros & micro grid
SMA : Leading european: grid-tie, off-grid, hybrid
Sol-Ark : Intuitive, versatile hybrid systems
Outback Power : Classic off-grid systems
Victron : Premium marine, mobile, & off-grid
Samlex : Comprehensive catalogue, ultra-reliable

...& more

Power Panels
Make it easy... order a pre-wired inverter panel. MPPT controller(s), lightning arrestor(s), breakers, & load centre. All to code & ready to hang on the wall & connect.

Download our Inverter Index buying guide

Batteries

Lithium

The leading commercially-available chemistry with the highest energy density. More energy storage in a smaller space, with less weight. Larger up-front cost, but far better lifetime economics due to greater charge-discharge cycle efficiency.
The most common of Lithium flavours...

LiFePO4 (Iron Phophate or LFP)
Used for large storage systems.
Safest, most stable variety.
Very high cycle life.
NMC
High desity, used in EV's.
Cobalt content con.
Polymer
The pouch type used in cell phones & laptops.

Lead-Acid

Robust, serviceable, & recyclable. A cheaper price tag than lithium but a higher overall lifetime cost due lower efficiency & cycle life. Size, weight, & scalability can also create challenges, but it's still the right choice for many situations.
Flooded:
Tough, but requires watering & monitoring.
Sealed (AGM, Gel):
Maintenance-free, no gassing, cold temps.
OPzV & OPzS Tubular Plate:
Low self-discharge, excellent cycle life.
Lead Carbon (AGM):
High cycle life, tolerant of partial charges.

Choosing

For portable applications, lithium is the logical lightweight choice. For remote stand-by needs, Gel & AGM work great. For maintenance-free long cycle life, the LiFePO4 Lithium is the standard. Shop for brands with a proven track record & strong warranty. Batteries are expensive!

Care

Be nice to your batteries & they'll be nice to you.
- Size your bank to avoid deep discharges
- Program chargers according to manuals
- Check-up on your batteries regularly
- Do not charge Lithium below 0ºC. Warm them!
- Build a battery box for protection

Highlights

SimpliPhi Power : Leading modular lithium
Discover Battery : Comprehensive premium line
RELiON : Comprehensive line of Lithium for AGM repl.
Goal Zero : Portable power packs of all sizes

...& more

Download our Battery Bibliography buying guide

BOS

LED Lighting

The most efficient way to get photons from electrons. A 13W LED bulb producing 800 lumens equates to a 60W bulb. The temperature rating denotes colour spectrum. 5000K is a daylight white. 4000K is more yellow, 6000K is more blue.

Water Pumping

A very common solar application. We can help you crunch the numbers.

Switches, Lights, & Knobs

PV wire, connectors, combiner boxes, disconnects, breakers, fuses, busbars, system monitoring.

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