ALL SOLAR inc.

Renewable Energy Systems
Sales & Services

3rd Edition Catalog

Photovoltaic
Wind Power
Solar Heating
Water Pumping
System Design
Consultation
Installation
Repair

1463 M Street • Penrose, Colorado 81240 • 800.499.4055 • 719.372.3808 • www.asolarelectric.com • allsolar@scswifi.net

Meet Your Support...

All Solar is now in its 13th year as a Renewable Energy Company. Jeremy and I have had quite a journey and owe our success to our outstanding family who is always encouraging us, our friends who make a life for us outside of work, and of course our customers, who are now friends, who took the chance on us and have recommended us to someone they know. THANKS TO ALL OF YOU, we could not have made it this far without any of you.

In our last edition, Jeremy and I had decided to build a solar passive home. We started building in 2007 and completed our home in April of 2009 (picture). It was quite an adventure! Jeremy and I learned a lot about each other as well as how hard it really is to build a home, work together and also be married. We got thru it and are much stronger in our life together. We owe thanks to some very well educated contractors and family and friends who helped our dream home become a reality. Our home is constructed out of SIPs and nine windows on the south side for passive solar. Above the windows is an overhang with a 4.5kw photovoltaic array as well as an Apricus Solar Hot Water system for our radiant floor and domestic use. We are enjoying our home and always talk about when we are going to build again!

Our children Emily and Ryley still keep us busy. As always we enjoy following them in their adventures. Emily graduated in October of 2010 from the Denver School of Massage Therapy and is a Certified Therapist. Emily is living in Arizona and is finding out how life as an adult is not as much fun as she thought. Her father and I are very proud of her and know she will continue to grow into a wonderful, caring and responsible young woman. Ryley is in High School and in the winter time lives for snowboarding. He spends a lot of time checking out runs all over Colorado, he has even gotten his dad and I on the slopes a few times. In the spring, Ryley trades in his snowboard for a baseball bat and becomes a member of the Husky Baseball team. Ryley is driving and is already picking out his dream car. He is not for sure what path he wants to take after High School but we tell him he has plenty of time and to enjoy his freedom. Our children have been an inspiration to us, we love their enthusiasm for life, how they try new things, how they finish what they started, and congratulate them both on the many accomplishments in school and life they have experienced. We love you both and thanks for your support and help in building our home and the business.

Jeremy, as always, is the backbone of All Solar. He has proved himself numerous times to be a very reliable contact for Renewable Energy and has so much knowledge and enthusiasm to share about alternative energy that you may be in for a long conversation! Jeremy custom designs your system, installs and provides service and repair to all types of Renewable Energy Systems. He learns new things everyday and attends training to keep up with new products and advancements being made in the alternative energy market.

We encourage each of you to come in and see us and visit with Jeremy or I about Renewable Energy and how it can become a part of your life. We love our work and enjoy working with people to help become a "greener" society. We thank you for your interest in Renewable Energy and look forward to meeting you. Please enjoy the 3rd edition of our catalog. We are extremely pleased with the positive feedback we received on the other two and we hope we don't let you down. As always any questions, comments, and advice is appreciated and well accepted. We will be here, hopefully for another 13 years, and are looking forward to a bright, sunny, and windy future.

Amy Rodriguez

Efficiently Running Your Home

"Anything that uses electricity can be powered by alternative energy; the choice will be very deep pockets or learning how to conserve."

Conservation does not mean learning to go without, it means learning to do things more efficiently.

ELECTRICAL LOADS. An electrical load is anything that consumes electricity. Sizing a solar electric system for your home is based on this load. To determine the total electrical load we use watt-hours per day. The higher the watts the more power your home consumes and the more solar or wind power your home will need.

Lighting accounts for 50% of the total electrical load when using incandescent bulbs. Compact fluorescent or standard tube-type fluorescent lights produce as much light as incandescents, yet use only one-fifth as much power (saving 80%). Checking into LEDs is also a great power saving choice.

Refrigeration is a must in today's home. American's have been spoiled with enormous side-by-side, ice and water-dispensing refrigerators that consume 5000 to 7000 watt-hours on an average day. Not a wise choice in an energy-efficient home! Shop around, efficient refrigerators can be found. The Sun Frost is the most efficient refrigerator on the market today, requiring only one 100 watt module. Using a propane refrigerator is also a good choice for your home, and uses no electrical power at all! If the Sun Frost or propane refrigerator is not an option, do not worry, when shopping look for the energy star logo on appliances and compare the annual energy usage. These energy star appliances are comparable in price, look, and quality to any conventional appliance that gobbles up the energy.

Kitchen Appliances like microwave ovens, blenders, mixers, food processors–all the common kitchen appliances are appropriate loads if your inverter is sized to handle them. Even though some of these appliances may draw quite a lot of power, they do so for relatively short periods of time. Watch out for electrical heating elements like toasters, coffee makers, waffle irons, hair dryers, and clothing irons. While your inverter may be able to drive them, they will rapidly deplete your batteries if left on for extended periods of time.

Cooking needs to be done on a propane range. Electric ranges use far too many watts. There are manufactures that make energy-responsible gas ranges, it is worth seeking out these appliances for your energy efficient home.

Entertainment Equipment Stereos, CD players, computers, TV's, VCRs: you got 'em, we all love 'em. (Please read the section on inverters, pg. 16 for more information on modified sine wave vs. pure sine wave inverters, it's important for electronics).

EVERY $1 SPENT
for efficient appliances
SAVES $5 in renewable
energy system components.

Personal computers are one of the easiest appliances to run on renewable energy, the average computer will draw about 100 watts, with an ink jet printer only drawing 25 to 35 watts of power. Laser printers gobble up the energy. Stereos, TVs, and VCRs can easily be powered with alternative energy, with so many makes and models the best advice we can offer is plug it in and try it out.

Washers and Dryers represent one of the largest loads in today's homes. Full-sized, 2000 watt or larger inverters will handle most types of washers. Gas dryers only draw 300 to 400 watts and are no problem to run. (Solar driers — clotheslines are even easier and much cheaper to run and can be used during most of the year).

Water Pumping can also be a large load. Most AC powered water pumps are very inefficient and typically use three times as much wattage per gallon as a comparable high efficiency AC pump. (For more information see page 30.

Your single most important job when planning your power system is to ensure that no precious power is wasted.

CAUTION!

Electric ranges and ovens, electric water heaters, baseboard heaters, and electric dryers are power hogs. Explore your solar and gas powered options.

Air conditioning makes life bearable (or possible) in many areas, but power consumption is very high for all current-production air conditioners. If a building has been designed to remain cool inside despite a high outside air temperature, we believe it will require much less artificial cooling. If living in a dry climate, evaporative coolers are a good idea. Evaporative coolers use one-third the energy of an A/C unit, and can be run with suitably sized, stand-alone equipment. Better still, if you haven't built your house, design one that doesn't need air conditioning to survive!

Forced-air-heating systems and pellet stoves use large amounts of power to run the fans and combustion air blowers during the time of year (winter) when most independent systems can least afford energy drain. If you can possibly use a radiant floor system, a wood stove, wall-mounted gas heaters (without fans), an active hot air collector, or better yet, good initial passive solar design, then your system will be vastly less expensive.

Parts of an Off-Grid Energy System

SOLAR ELECTRIC PANELS: Convert sunlight directly into electricity to charge storage batteries. One of the most reliable means to generate your own electricity, solar panels can generate power for decades and require little maintenance. Solar electric generating systems may be sized to provide ample power for most typical residential and commercial power requirements.

CHARGE CONTROLLER: A charge controller is a device used to control the amount of power generated from a PV array, wind turbine, etc., to a battery. It is used to protect the batteries from harmful overcharge conditions.

WIND TURBINE: A wind turbine generates electrical current as its blades spin. The faster the blades spin the more electricity is generated. Residential scale wind turbines produce between 400 and 3,000 watts of power.

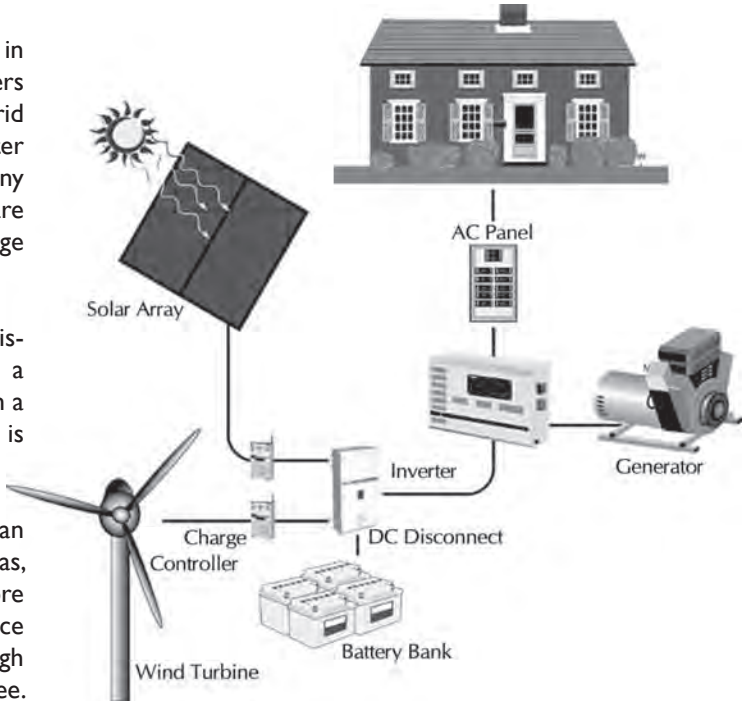
INVERTER: Converts the DC power stored in batteries to regular household current. Inverters function as the brains of your fully automatic off grid electric system. The power rating of the inverter determines how many appliances you can use at any one time. Most have built-in battery chargers which are designed to be used with generators to quickly recharge batteries when solar power is not sufficient.

ELECTRICAL PANEL (AC PANEL): A distribution terminal for electrical wiring (also called a circuit breaker panel or breaker box). All the wiring in a home or office terminates at a main electric panel and is supplied with electricity from the inverter.

ENGINE POWERED GENERATOR: Uses an engine to generate electricity, typically from natural gas, propane, or diesel fuel. Unlike batteries, which store only a fixed amount of energy, a generator can produce electricity for as long as it is supplied with fuel. A high quality generator can be fairly quiet, but never noise free. Like all engines, generators require periodic maintenance.

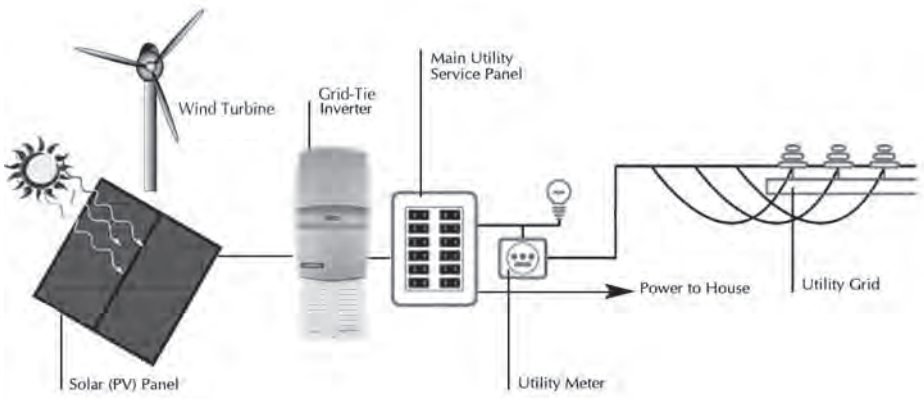
BATTERY BANK: Stores use for energy on demand. In an Off-Grid electrical system the battery bank provides the reservoir of energy available to power loads. The size of the battery bank determines how long power will be available before battery recharging becomes necessary. The power rating of the battery charger determines how quickly your battery bank can be recharged by a generator or other outside AC source.

DC DISCONNECT: A DC disconnect is almost identical to the AC circuit breaker found in your home. It is designed to protect DC circuits (batteries, PV arrays, etc.) from short circuits or overload conditions.



Courtesy of Xantrex Technologies

Parts of a Grid-Tie Energy System



Courtesy of Xantrex Technologies

SOLAR ELECTRIC PANELS: These convert sunlight directly into electricity. One of the most reliable means to generate your own electricity, solar panels can generate power for decades and require little maintenance. Solar electric generating systems may be sized to provide ample power for most typical residential and commercial power requirements.

WIND TURBINE: Enjoy the benefits of utility power, while reducing your electric bill every time the wind blows.

GRID-TIE INVERTER: Converts the DC power from modules/wind into AC power to run your household loads. All current grid-tie inverters used today are safe for utility workers and are fully automatic in operation with 90+% conversion efficiency.

MAIN PANEL (AC PANEL): A distribution terminal for electric wiring (also called a circuit breaker panel or breaker box). All the wiring in a home or office terminates at a main electrical panel and is supplied with electricity from the inverter.

GRID-TIE INFORMATION: A basic grid-tie system consists of solar panels or a wind turbine and a grid-tie inverter. Once installed, the inverter converts the power generated by your solar array or wind turbine to utility grade AC power for use in your home or business. Any excess power is seamlessly pushed back to your utility company. For grid-connected homes and business, inverters offer utility interactive power electronics that can literally spin your meter backwards. Connecting the sun/wind to your utility meter is a simple way to increase green energy production and improve the environment.

Did You Know?

More energy from the sun falls on the earth in one hour than is used by everyone in the world in one year!

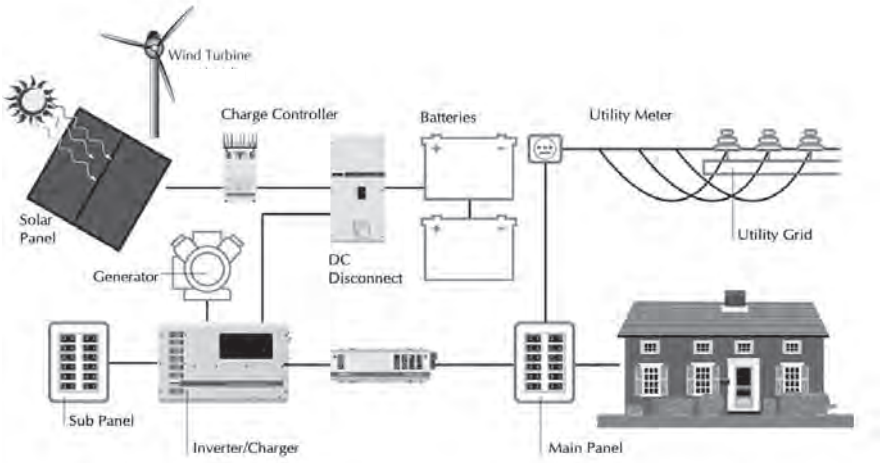
Parts of a Grid-Tie Energy System

with battery back-up

BATTERY BANK: This stores use for energy on demand. In a Grid-Tie electrical system the battery bank provides the reservoir of energy available to power loads. The size of the battery bank determines how long power will be available to run critical loads in the event of a power outage. There are a number of types of deep cycle batteries available which are suitable for back-up applications, some are sealed and require virtually no maintenance.

CHARGE CONTROLLER: A charge controller is a device used to control the amount of power generated from a PV array, wind turbine, etc., to a battery. It is used to protect the batteries from harmful over-charge conditions.

SOLAR ELECTRIC PANELS: These convert sunlight directly into electricity to charge storage batteries. One of the most reliable means to generate your own electricity, solar panels can generate power for decades and require little maintenance. Solar electric generating systems may be sized to provide ample power for most typical residential and commercial power requirements.



Courtesy of Xantrex Technologies

WIND TURBINE: A wind turbine generates electrical current as its blades spin. The faster the blades spin the more electricity is generated. Residential scale wind turbines produce between 400 and 3,000 watts of power.

DC DISCONNECT: A DC disconnect is almost identical to the AC circuit breaker found in your home. It is designed to protect DC circuits (batteries, PV arrays, etc.) from short circuits or overload conditions.

SUB-PANEL (AC PANEL): a distribution terminal for critical electrical loads to be powered in the event of a power outage. These could include lights, refrigeration, and water pumps.

INVERTER: Converts the DC power stored in batteries to regular household current. Inverters function as the brains of your grid-tie electric system. Most have built-in battery chargers which are designed to recharge batteries using the grid.

MAIN PANEL (AC PANEL): A distribution terminal for electrical wiring (also called a circuit breaker panel or breaker box). All the wiring in a home or office terminates at a main electrical panel and is supplied with electricity from the utility company.

AC power is what utilities commonly supply to their customers.

DC power is what solar and wind produce, and can also be stored.

System Sizing Worksheet

Every watt of energy *not* used is a watt that doesn't have to be produced, processed, or stored."

Device	How many?	Watts	Hours of Daily Use	Watt Hours per Day
Example: TV	1	150	2.5	375
			TOTAL WATTS USED	

Please e-mail us for an expanded, easy-to-use "System Sizing Worksheet": allsolar@scswifi.net.

Average Power Usage of Typical Appliances

Fluorescent Light (100w)	30w	Electric Blanket	180w
Coffee Pot	1200w	Ink Jet Printer	35w
Electric Iron	1500w	Garage Door Opener	350w
Microwave	1700w	Hair Dryer	1500w
Refrigerator	1500w	VCR	40w
Toaster	1200w	Incandescent Light Bulb (100w)	100w
Dishwasher	1500w	Stereo	30w
TV (LCD 42" color)	150w	Gas Dryer	400w
Computer	80w–200w	Washing Machine	1450w
Vacuum	700w	Electric Dryer	4000w

Off-Grid Power Systems

These are a few of the many off-grid systems we have available. These systems are designed to give you an idea of what equipment is needed, an estimated cost of a system, and the amount of power each system provides. We offer free custom design according to individual need and/or budget. Please call for YOUR INDIVIDUALIZED SYSTEM!

RV SYSTEM

This system is designed for battery charging. Inverter can be added if 110vac is required.

- One 130 Watt Solar Module
- RV Rack
- 20amp Controller
- Two 215ah Batteries
- Balance of System Parts

$1,200

CABIN SYSTEM

This system provides 370 watts of battery charging power. The inverter will operate a small microwave, TV and VCR, minimal lighting, and other small appliances up to 2400 watts.

- Two 185 Watt Solar Modules
- Flush Mount Roof Racks
- 40amp Controller
- Six 215ah Batteries
- 2400 Watt Inverter
- Required Disconnects
- Balance of System Parts

$5,200

CUSTOM HOME SYSTEM

This system offers 3600 watts of usable power to run most common household appliances. Your backup generator can be used to charge the batteries and run high demand loads. The array can provide up to 10kwh per day based on average sun hours in Colorado.

- Twelve 200 Watt Solar Modules
- Top of Pole Mount
- 60amp Charge Controller
- Sixteen 370ah Batteries
- OutBack VFX3648 Inverter
- OutBack Mate Controller & Display
- PSX-240 Auto Transformer
- Required Disconnects
- Balance of System Parts

$24,100

ELITE HOME SYSTEM

This 5520 watt array will keep you up and running with nearly 23,000 watts of usable power per day. Dual 3600 watt inverter/chargers of pure sine wave output are designed to run all common household appliances and will run your 220 volt well pump. The Skystream 3.7 wind turbine is a great addition on those cloudy days.

- Twenty-four 230 Watt Solar Modules
- Two Top of Pole Mounts
- 60amp Charge Controller (2)
- Twenty-four 2430ah, 2 volt Batteries
- OutBack VFX3648 Inverter (2)
- OutBack Mate Controller & Display
- OutBack Autoformer
- Skystream 3.7 Wind Turbine
- 70-Foot Guyed Tower
- Required Disconnects
- Balance of System Parts

$75,000

Grid-Tie Power Systems

Cañon City, Colorado

Pueblo West, Colorado

Grid-Tie Systems are becoming more attractive due to the Federal Tax Incentive that can reduce the price of a system up to 30%. Also, some local utility and government programs are offering solar rebates for alternative energy systems...IT'S TIME TO CONNECT TO THE SUN!

These systems are designed to work with your local utility company. Your system can be designed to take care of a percentage of your current usage or designed larger to sell back to your utility provider. These are example systems and may not be designed for your usage. Please contact us . . .

WE CAN CUSTOM DESIGN A SYSTEM FOR YOU!

SMALL HOME SYSTEM. ***Will produce an average of 15.5kwh/day****

3.6 KW Array

Fronius 4000 Watt Inverter
Sixteen – 230 Watt Solar Modules
Flush Mount Roof Racks
Required Disconnects
Balance of System Parts

$14,800.00

CUSTOM HOME SYSTEM. ***Will produce an average of 25.8kwh/day****

6.1 KW Array

SMA 6000 Watt Inverter
Twenty-Six – 235 Watt Solar Modules
Flush Mount Roof Racks
Required Disconnects
Balance of System Parts

$25,000.00

ELITE HOME SYSTEM. ***Will produce an average of 35.6kwh/day****

8.4 KW Array

SMA 4000 Watt Inverters (2)
Forty – 210 Watt Solar Modules
Flush Mount Roof Racks
Required Disconnects
Balance of System Parts

$36,000.00

*Based on 6 hours output and system efficiency of 77%

Photovoltaics

We call it "solar electricity." Photovoltaics (PV) convert sunlight into electricity through the use of specially designed silicon cells. These cells are assembled together into modules and the modules are connected together to form an array. Arrays can be installed on a south-facing roof, a ground mount, on a stationary pole mount, or a tracker. PV is the best way to convert sunlight directly to electricity and an ideal energy alternative for your home.

"I am very impressed with your high level of workmanship, Jeremy. You did a great job on my installation and one can easily tell that is was completed by a professional who is proud of his work."

G. Rogers, Canon City, CO

SOLAR ELECTRIC MODULES have no moving parts and are virtually maintenance free. Most manufactures offer a 25 year warranty on modules. PV is the most fail proof part of a renewable energy system.

SOLAR MODULES can be sized for any need and installed almost anywhere.

Putting solar energy to work can save you money, conserve precious natural resources, and slows environmental decay.

The sun's energy is abundant, environmentally benign, and free!

Cañon City, Colorado

YINGLI SOLAR

CONERGY

SunWize® TECHNOLOGIES

CanadianSolar

SUNTECH

SANYO

LUMOS

SHARP

UNI-SOLAR®

We offer MANY different brands of solar modules.
Please call for availability and current pricing!
800.499.4055 • 719.372.3808

Module Mounts

Types of Mounts

Roof/Ground Mounts — standard RGM racks are made of structural aluminum. In addition to the standard configuration we offer low-profile and two-tier roof/ground mounts. Our roof/ground mounts are available with either telescoping or one-piece legs. Racks with telescoping legs are adjustable from 20° to 65°. Racks with one-piece legs have adjustment points of 30°, 45° and 60° and with the back leg removed can be set at 0° (parallel to roof).

Top of Pole Mounts — standard TPM racks have heavy steel mounting sleeves, elevation pivots and strong backs that are painted with a silver/aluminum industrial urethane enamel. The module rails are mill-finish structural aluminum angle. All models are seasonally adjustable from 15° to 65° in 10° increments.

Trackers — follow the sun and can give you 25% more electrical output from your solar array compared to modules on a fixed mount.

BASIC INFORMATION

Peak Sun Hours for Colorado are from 9:00 a.m. to 3:00 p.m. Place your solar arrays where they will receive the most sun during those hours with no shading.

Solar South is the direction solar arrays should face and where the sun is at noon.

The Tilt of Array is fixed at the latitude of your site for optimal yearly output..

Wind Speed. All standard mounting structures are designed and warranted to withstand 90 mph winds.

ZOMEWORKS
Passive Energy Products

UNIRAC
Bright Thinking in Solar

DPW | SOLAR
PREFORMED LINE PRODUCTS

We carry a full range of mounting hardware.
Call us for a price on a specific mount to match your panels.
719.372.3808 • 800.499.4055

Wind Turbines

Wind Power is a clean, safe, reliable source of energy. The only cost is the equipment used to harness the energy. THE ENERGY ITSELF IS FREE!!!!

Wind Power technology has improved over the past twenty years. Wind turbines are often the most sensible way to boost the capacity of a renewable energy system. When the sun doesn't shine the cooler temperatures help to create a breeze that can be put to work turning a wind turbine.

Wind Basics

Wind speed data can be obtained from the airport nearest to your home. This information is normally collected at 30 feet above ground level, which is about the minimum height to set a wind generator, as wind speeds are somewhat slower and are subject to more turbulence closer to the ground. In other words, the higher above the ground, the more significant the wind speed, and the more power generated.

Colorado is a national wind energy leader. The state has grown its wind portfolio, generating the third highest percentage of power from wind of any state.

A commonly asked question: Is there enough wind at my site? Sometimes a visual assessment of available wind power can be sufficient. Raise a light flag and make a habit to observe trees and shrubbery around your site. At 4 to 7 mph, you can feel the wind on your face and leaves will rustle. At 8 to 12 mph, leaves will be in constant motion and the flag will raise in the wind. Wind speeds of 13 to 18 mph raise dust and move small branches, and at 19 to 24 mph, trees in leaf begin to sway. At 25 mph, large branches begin to move and you've got great wind-generating potential!

For most wind turbines, an average wind of 7 to 10 mph is required before a wind turbine will begin generating electricity and an average speed of 10 to 12 mph is required before they become economical. Even though you think your site is windy, you must remember that the average wind speed is critical.

Wind turbines are virtually maintenance free, but like anything with moving parts they will require some kind of inspection. We suggest taking your wind turbine down once a year, for a routine check. Most turbines on the market today offer a 5+ year warranty and are designed for up to 20 years of life.

Wind turbines are an attractive addition to any system because of the very little maintenance they require, they are easy to install, and are self-regulating. Used in conjunction with solar panels, wind energy is a renewable energy source that doesn't pollute our environment and is a viable source of energy.

According to a resource assessment from the National Renewable Energy Lab, Colorado's wind resource could provide nearly 25 times of the state's current electricity needs.

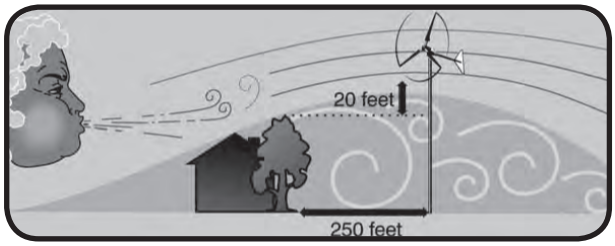
SOUTHWEST WINDPOWER

AIR BREEZE AIR 40 WHISPER

Turbines	Rotor Diameter	Weight	Start-Up	Voltage	Rated Power	Cost
Air Breeze	3.8 feet	13 lbs..	4.9 mph	12/24/48	160 W @ 28 mph	$1195.00
Air 40	3.8 feet	13 lbs.	4.9 mph	12/24/48	400 W @ 28 mph	$895.00
Whisper 100 (Marine version available)	7 feet	47 lbs.	7.5 mph	12/24/36/48	900 W @ 28 mph	$2875.00 $3181.00
Whisper 200 (Marine version available)	9 feet	65 lbs.	7 mph	12/24/36/48	1000 W @ 28 mph	$3814.00 $4038.00
Whisper 500	15 feet	155 lbs.	7.5 mph	24/36/48/230	3000 W @ 24 mph	$8985.00

Tower Kits

Southwest Windpower has designed a series of tower kits specifically for the Air and Whisper wind turbines. Each tower kit comes with all the hardware necessary to install your tower.



A tower too short is like putting a solar system in the shade.

Air Guyed Towers: (pipe and anchors sold separately)
27-foot tower kit $228.00
45-foot tower kit $323.00

Whisper 100/200 Guyed Towers: (pipe and anchors sold separately)
24-foot tower kit $504.00
30-foot tower kit $859.00
50-foot tower kit $1225.00
65-foot tower kit $1425.00
80-foot tower kit $1995.00

Whisper 500 Guyed Towers: (pipe and anchors sold separately)
30-foot tower kit $1358.00
42-foot tower kit $1556.00
70-foot tower kit $1991.00

Air Anchors (set of 4):
36-inch anchors $119–$171
48-inch anchors $133–$200

Whisper Anchors (set of 4):
36-inch anchors $209.00
48-inch anchors $242.00
60-inch anchors $392.00

Accessories for Air and Whisper Products sold separately. CALL for more information.

SKYSTREAM 3.7®

A revolutionary small wind turbine for utility-connected homes and businesses.

Help offset your electric bills
Produces low cost energy
Blends into the environment
Designed for long life

Take Control of Your Energy Needs

Designed for homes and small businesses, the Skystream 3.7 converts wind into clean electricity you can use. It's the first compact, user-friendly, all-inclusive wind generator (with controls and inverter built in) designed to provide quiet, clean electricity in very low winds.

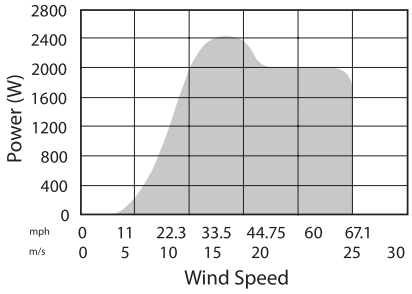
Skystream 3.7 can help offset a household or small business's total energy needs. And because it operates at a low RPM, Skystream is as quiet as the trees blowing in the wind.

Skystream 3.7

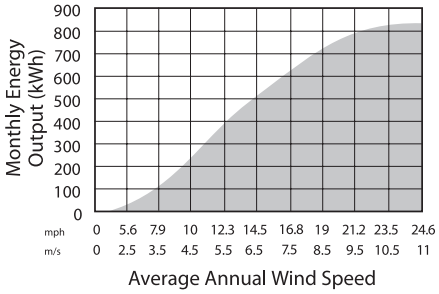
Rotor Diameter	12 feet
Weight	170 lbs.
Start-up	8 mph
Voltage	120/240vac
Rated Capacity	2.4kw
5 year warranty	

Capture energy from the wind
Remain connected to the Grid
Reduce your electric bill

POWER ²



MONTHLY ENERGY



Skystream 3.7 Turbine and Tower Pricing

- Includes Skystream 3.7 Turbine, Skystream Tower, Skyview Monitoring Software and Skylevel Uptower Kit
- Foundation Kits, Foundation Rod Bolt Sets, Gin Pole Kits, Hinge Plate Kits – sold separately
- Pipe Sourced locally and is additional for Guyed Towers; Shipping is additional

Skystream 3.7 Turbine / 45' Monopole Tower $12,775
Skystream 3.7 Turbine / 55' Monopole Tower $15,440
Skystream 3.7 Turbine / 70' Monopole Tower $18,950
Skystream 3.7 Turbine / 42' Guyed Tower $10,125
Skystream 3.7 Turbine / 70' Guyed Tower $10,675

*Skystream 3.7 Marine Version Available

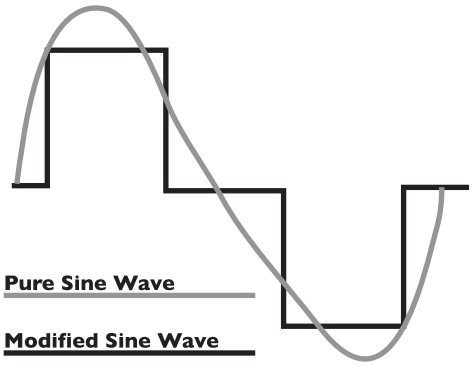
Inverter Basics

An inverter is the basic component of all renewable power systems. It is a sophisticated microprocessor controlled device that transforms DC power collected from your renewable energy source into household (AC) electricity. An off-grid inverter is capable of powering your home independently of the electric company, while a grid-tie inverter slows down your meter or allows you to sell the excess renewable power you harvest back to the utility company. Modern inverters have caused a quiet revolution in the way we live with alternative energy systems, providing silent AC electricity anytime, anywhere.

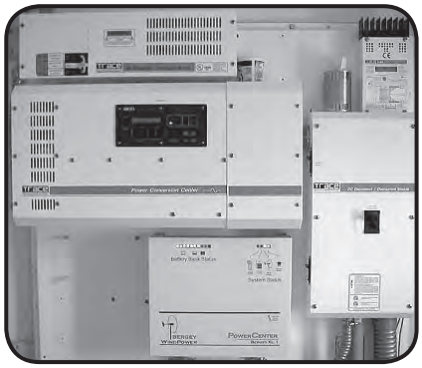
Today's inverters, which simulate utility power electronically, produce two types of AC power: modified sine wave or pure sine wave. The difference between these types of inverters are subtle, but significant in the way they operate certain types of loads.

Modified Sine Wave Inverters can adequately power most household appliances and power tools. These inverters are less expensive. However, this waveform may present certain compromises with some loads such as microwave ovens, printers, ceiling fans, clocks, and some cordless tool chargers.

Pure Sine Wave Inverters are the most sophisticated inverters on the market today. They are designed to replicate and even improve on the quality of electricity supplied by utility companies.



INVERTERS INSTALLED BY ALL SOLAR, INC.



When selecting an off-grid inverter make sure it will run the largest loads in your home at the same time (example: washing machine and water pump). Also keep your future needs in mind, as you add to your system (more panels, wind, or batteries), having an inverter already capable of expansion will help you avoid the cost of upgrading your inverter.

Inverters

Schneider Electric manufactures a complete range of power products to suit various budgets and electricity requirements. From complete ready-to-install power systems to components that can be integrated into a system by a certified dealer.

Inverter/Chargers — XW Utility Interactive, Pure Sine Wave (2 year warranty)

	Input	Watts	Output	Cost
XW4024	24 volt	4000w	120/240vac	$3,950.00
XW4548	48 volt	4500w	120/240vac	$3,950.00
XW6048	48 volt	6000w	120/240vac	$4,650.00

XW Accessories SOLD SEPARATELY

Inverter/Chargers — TR Series, Modified Sine Wave (2 year warranty)

	Input	Watts	Output	Cost
TR1512	12 volt	1500w	120vac	$950.00
TR1524	24 volt	1500w	120vac	$950.00
TR2412	12 volt	2400w	120vac	$1,145.00
TR2424	24 volt	2400w	120vac	$1,145.00
TR3624	24 volt	3600w	120vac	$1,425.00

TR Accessories SOLD SEPARATELY

Accessories – XW and TR Inverters

XW System Control Panel	$300.00
XW Auto Generator Start	$200.00
XW Conduit Box	$250.00
XW Connection Kit	$850.00
XW Power Distribution Panel	$1,500.00
Battery Temperature Sensor (BTS/15)	$29.00
Battery Temperature Sensor (BTS/35)	$32.00
TR-Conduit Box	$250.00
TR-Remote On/Off Switch	$150.00

xantrex™

Schneider Electric

FRONIUS GRID CONNECTED INVERTERS

Efficient, Reliable, High Power

Fronius Inverters form the core of a PV system

FRONIUS IG INVERTERS

	IG2000	IG3000	IG4000	IG2100
Recommended PV Power	1500-2400w	2100-3300w	3000-4800w	4100-6100w
Operating DC Voltage Power	150-450v			
Nominal Output Power	2000w	2700w	4000w	5100w
Nominal AC Output Voltage	240v	240v	240v	240v
Warranty	10 years (additional warranty can be purchased)			
Price	$2,161.00	$2,534.00	$3,502.00	$3,897.00

FRONIUS IG-PLUS INVERTERS

	IG+3.0	IG+3.8	IG+5.0	IG+6.0	IG+7.5	IG+10.0	IG+11.4
Recommended PV Power	2500-3450w	3200-4400w	4250-5750w	5100-6900w	6350-8600w	8500-11500w	9700-13100w
Operating DC Voltage Power	230-500v						
Nominal Output Power	3000w	3800w	5000w	6000w	7500w	9995w	11400w
Nominal AC Output Voltage	208v / 240v / 277v						
Warranty	10 years (additional warranty can be purchased)						
Price	$2,938.00	$3,292.00	$4,647.00	$4,807.00	$5,266.00	$6,859.00	$7,543.00

SMA AMERICA UTILITY INTERTIE INVERTERS

Efficient, Safe, Simple

Graduated Power Classes Provide Flexibility in System Design

SMA SUNNY BOY INVERTERS–with Fused DC Disconnect

	3000US	3800US	4000US	5000US	6000US	7000US	8000US
Continuous PV Power	3000w	3800w	4000w	5000w	6000w	7000w	8000w
Operating DC Voltage Power	175-400v	250-480v	220-480v	250-480v	250-480v	250-480v	300-480v
Nominal AC Output Voltage	208/240v	240v	208/240v	208/240/277v	208/240/277v	208/240/277v	240/277v
Warranty	10 / 15 / 20 years						
Price	$3,150	$3,900	$3,900	$5,100	$5,438	$5,925	$6,450

CONTACT US FOR ALL YOUR INVERTER NEEDS!

OutBack Power Systems

With an emphasis on product performance, OutBack has established itself as the product of choice in harsh environmental conditions and applications where product reliability is paramount. OutBack Power Technologies has set the bar for delivering high quality, cutting edge power conversion electronics.

RV INVERTERS we have them!

INVERTERS/CHARGERS

	Input	Watts	Output	Cost
FX2012T	12v	2000w	120v	$2,369.00
FX2524T	24v	2500w	120v	$2,369.00
FX3048T	48v	3000w	120v	$2,369.00
VFX2812	12v	2800w	120v	$2,569.00
VFX3524	24v	3500w	120v	$2,569.00
VFX3648	48v	3600w	120v	$2,569.00
GTFX2524	24v	2500w	120v	$2,369.00
GTFX3048	48v	3000w	120v	$2,369.00
GVFX3524	24v	3500w	120v	$2,569.00
GVFX3648	48v	3600w	120v	$2,569.00
GS8048	48v	8000w	120-240v	$5652.00

***5-year warranty FX=sealed VFX=vented**
GTFX=grid interactive sealed GVFX=grid interactive vented

Remote Monitor and Controller for Outback System

Outback Mate $295.00

Outback Mate3 $595.00

We offer a wide range of inverters and accessories.

If you do not see the inverter/accessory of your choice listed, please contact our office and we will find it for you.

Batteries

Batteries are a very important part of your system. Purchasing batteries is a big investment, so knowing how to care for and maintain your batteries will prolong the life of your system and will be an easy task if you understand what your battery bank can do. Below we help you understand what type of batteries to use, what the proper installation procedures are, and how to maintain the life of your batteries.

A battery is like a bucket, where renewable energy is the source that can fill it!

DEEP CYCLE BATTERIES are commonly used in an off-grid Alternative Energy system. Deep cycle batteries are made to withstand many cycles. Cycles are when a battery is discharged and then recharged. Deep cycle batteries are designed to be repeatedly discharged by as much as 80% of their capacity, so they are a good choice for power systems.

INSTALLATION (deciding where to place your battery bank) is an important decision. Batteries perform best in a temperature range between 50-80°F. Batteries release hydrogen when they are being charged, so a properly vented battery bank is a must. It is necessary to build an insulated battery box and properly place battery bank within 10 feet of your inverter.

MAINTENANCE of your battery bank is important, for you are storing your own power. Maintenance of the battery bank consists of keeping the cells full of distilled water, equalizing the batteries periodically, minor record keeping, and understanding the voltage level of the batteries. The voltage level of batteries tells you what state of charge your battery bank is at. (See table at right.)

This table is good for estimating Battery State of Charge if the battery has had no energy input or output for at least three hours. The table is good for batteries at 77°F. If the batteries are at a lower temperature, expect lower voltage readings, conversely, expect higher voltage readings if the temperature is higher.

% of Full Charge	12 Volt	24 Volt	48 Volt
100%	12.7	25.4	50.8
90%	12.6	25.2	50.4
80%	12.5	25.0	50.0
70%	12.3	24.6	49.2
60%	12.2	24.4	48.8
50%	12.1	24.2	48.4
40%	12.0	24.0	48.0
30%	11.8	23.6	47.2
20%	11.7	23.4	46.8
10%	11.6	23.2	46.4
0%	<=11.6	<=23.2	<=46.4

Your battery bank is only as strong as your weakest battery.

Call us for ALL of your battery needs!

DEKA BATTERIES are designed to offer reliable, low maintenance power for renewable energy applications where frequent deep cycles are required and minimum maintenance is desirable. (12 volt batteries also available.)

- **8L16 - $264.00.** 370ah, 6 volt, 11¾" x 7 x 16½", 12 month free replacement
- **GC15 - $132.00.** 230ah, 6 volt, 10¼" x 7⅛ " x 10⅞", 12 month free replacement

Surrette

These batteries are designed specifically for alternative energy systems. (12 volt and 2 volt batteries also available.)

- **S460—$420.** 350 ah, 6 volt, 108 lbs. 12½" x 7⅛" x 16¾". Free replacement within 24 months, 84 months prorated.
- **S530—$462.** 400 ah, 6 volt, 117 lbs. 12½" x 7⅛" x 16¾". Free replacement within 24 months, 84 months prorated.
- **Larger amphour capacity batteries available from Surrette.** Call for information.

The Warranty on Surrette Batteries does not cover shipping damage; cracked covers; cracked cases; bulged cases from heat, freezing or explosion; discharged batteries; the use of undersized batteries and batteries damaged from defective electrical equipment. This warranty covers only manufacturing defects.

Trojan® BATTERY COMPANY

Trojan's industrial line is engineered specifically to support renewable energy systems that require large daily loads where the batteries are cycled regularly. These high amp-hour capacity batteries are ideal for use in large off-grid photovoltaic (PV) systems, off-grid hybrid PV systems, grid-tied PV systems with battery backup, smart grid peak shifting systems and a variety of other applications. (12 volt batteries also available.)

- **L16RE-A - $333.00.** 380ah, 6 volt, 11⅝" x 7 x 17 11/16", 24 month free replacement
- **L16RE-B - $379.00.** 410ah, 6 volt, 11⅝" x 7 x 17 11/16", 24 month free replacement
- **T105RE-C - $172.00.** 250ah, 6 volt, 10⅜" x 7⅛" x 11 12/16", 24 month free replacement

If your battery choice is not listed, please let us know, we have access to a variety of batteries.

Charge Controllers

MORNINGSTAR corporation

Morningstar Controllers offer exceptional reliability, PWM battery charging and consistent high quality. 5 year warranty.

SUNGUARD-4

12V	4 amp	$35

SUNSAVER W/LVD

12V	6amp	$64 (w/oLVD $52)
12V	10amp	$76 (w/oLVD $60)
24V	10amp	$84
12V	20amp	$104
24V	20amp	$110

SUNLIGHT

Lighting Controller

12V	10amp	$118
24V	10amp	$126
12V	20amp	$152

BZ Products

MPPT500

12/24/48 selectable battery voltage. 500 watt PV input. 45 amps max. battery charge current. Digital metering, temp sensor. **$280.00/5 year warranty**

MPPT250

12 volt battery only. 250 watt PV input. 25 amps max. battery charge current. Digital metering, aux battery charger and LVD. **$160.00/5 year warranty**

M20+

12/24 volt. 25 amp PW Controller. Digital volt, amp meter and aux battery charger. **$120.00/5 year warranty**

M25

12/24 volt. 25 amp PWM Controller. Remote digital volt/amp meter. **$130.00/5 year warranty**

OutBack Power Systems

Dual OutBack Inverters–Dual FM60s Grid Tie with battery backup system Installed by All Solar Inc.

FLEXMAX CHARGE CONTROLLERS

FM60	12-60VDC 60 amps	$749
FM80	12-60VDC 80 amps	$849

The FlexMax Maximum Power Point Tracking (MPPT) charge controllers enable your PV system to achieve its highest possible performance. It can be used with battery systems from 12 to 60VDC. The FM60/80 allows you to use a higher output voltage PV array with a lower voltage battery. The FM60/80 comes standard with a display of the PV system's performance. The four-line, 80 character, backlit LCD display is used for programming and monitoring of the system's operation. 2 year warranty.

xantrex™ Schneider Electric

XANTREX C-SERIES-CHARGE, DIVERSION OR LOAD CONTROLLERS

These pulse width modulated (PWM), field adjustable controllers work as a solar charge controller or a DC load controller or a diversion controller. All models automatically initiate a three-stage battery charging cycle and feature an LED status light displaying charging functions and battery state-of-charge. UL listed. 2 year warranty.

Model	Voltage	Rated PV Current	Price
C12	12V	12 amps	$110
C35	12/24V	35 amps	$119
C40	12/24/48V	40 amps	$159
C60	12/24V	60 amps	$199

CM digital meter C-series $99

CM/R-50 Remote LCD digital display with 50' cable for C-Series $126

CM/R-100 Remote LCD digital display with 100' cable for C-Series $146

MidNite SOLAR, inc

The Classic MPPT Charge Controller substantially increases the flexibility, features and range currently found on MPPT controllers. The Classic is the only MPPT controller that has Arc Fault Detection, making this controller the safest controller available.

Classic 150	150v	up to 96 amps	$850.00
Classic 200	200v	up to 79 amps	$900.00
Classic 250	250v	up to 63 amps	$950.00

* 150, 200 and 250V operating voltages.
* 12-72V battery charging standard with models up to 120V
* Battery bank
* Built in DC-GFP and Arc Fault Detector
* Solar, wind and hydro MPPT modes
* Ethernet, USB and RS232
* Remote and local displays possible
* 20 megs of data logging
* Set up Wizard

Blue Sky ENERGY

SOLAR BOOST CONTROLLERS

Blue Sky Energy controllers employ Maximum Power Point Tracking (MPPT) which increases charge current up to 30%. A manual equalize function is also provided to periodically condition liquid electrolyte lead-acid batteries. A digital display shows battery voltage, solar panel current, output charge current, charge mode and state-of-charge. The controllers feature an advanced fully automatic three stage charge control system to ensure the battery is properly and fully charged. 5 year warranty.

Model	Voltage	Rated PV Current	Price
SB2000E *with display*	12V	25 amps	$285
SB2000E wall mount box			$35
SB3048L	24/48V	30 amps	$569
SB3048L *with display*	24/48V	30 amps	$659
SB50L	24/48V	50 amps	$519
SB50DL *with display*	24/48V	50 amps	$609

SOLAR DEPOT

CONERGY

Optional Accessories Available for all Charge Controllers

Balance of System Components

Each alternative energy system is different and will require different parts to complete the system design. We pass all NEC (National Electric Code) requirements and make sure your system is designed properly with your safety in mind and well as protecting system components.

OutBack POWER™

OUTBACK AUTO TRANSFORMER

For step-up, step-down and balancing applications. Autotransformer 6kVA 120/2040VAC $539.00

LIGHTNING ARRESTORS

Lightning surge arrestors provide protection to electrical equipment by reducing problems due to lightning strikes or power surges. UL Listed.

Model	Description	Price
LA302DC	DC Arrestor	$42
LA602DC	DC Arrestor	$44
LA302R	AC Arrestor	$50
LA303R	AC Arrestor	$54
LA603G	AC Arrestor	$80

TRIMETRIC TM-2025 BATTERY METER

The TriMetric battery monitor is designed to assist in battery care, conservation and system maintenance of battery powered systems that use storage batteries with system voltage from 12-48 volts. The TM-2025 measures volts, amps and amps-hours and features a "battery % full" display and a "battery reminders" display.

Model	Price
TM-2025 AH Meter	$193
48 Volt Adapter	$25
Surface Mount Box	$15
500A/50mV Shunt	$31

CLASS T FUSES

Model	Description	Price
JJN100	100A replacement fuse	$19.50
JJN200	200A replacement fuse	$30.50
JJN300	300A replacement fuse	$73.95
JJN400	400A replacement fuse	$57.50

ALL SOLAR inc.

"We purchased all our solar and wind equipment from All Solar, Inc. We are totally satisfied with everything we bought. We can't praise All Solar enough for the workmanship and the service we received. We would highly recommend All Solar to anybody interested in alternative energy."
— Johnson, Florence, Colorado

MidNite Solar, Inc

OUTBACK E-PANEL
MNE125AL-L 125a/125vdc $529.00
MNE175AL-L 175a/125vdc $559.00
MNE250AL-L 250a/125vdc $559.00

DC DISCONNECT
MNDC125 125a/125vdc breaker $205.00
MNDC175 175a/125vdc breaker $235.00
MNDC250 250a/125vdc breaker $235.00

PV COMBINER
MNPV3 3 circuit $89.00
MNPV6 6 circuit $109.00
MNPV12 12 circuit $179.00
MNPV16 for Grid-Tie Inverters $399.00

TWO POLE BREAKER
MNEAC15/20-2P 15 amp/20amp $30.00
MNEAC30/50-2P 30 amp/50amp $30.00

BABY BOX ENCLOSURE
BBE $36.00

PANEL MOUNT BREAKER
MNEDC125 125 amp $54.00

PANEL MOUNT BREAKERS
MNEDC 05–100amp $20.00

DIN RAIL MOUNT BREAKERS
MNEAC 10, 15, & 20amp $15.00
MNEAC 30, 40, 50 & 60amp $15.00

150VDC DIN RAIL MOUNT BREAKER
MNEPV 150vdc $13.00

GROUND FAULT PROTECTOR
MNDC-GFP63 63amp (150vdc) $69.00
MNDC-GFP80 80amp (150vdc) $69.00
MNDC-GFP50 50amp (300vdc) $119.00

LIGHTNING ARRESTOR
MNSPD115 0-150vcd $119.00
MNSPD300 0-300vac/0-385vdc $119.00
MNSPD600 0-485vac/0-640vdc $119.00

BACK UP KIT
MNBUK $359.00

TOUCH SAFE FUSE HOLDER
MNTS $6.25

STOP SWITCH FOR WIND TURBINES
MN/SS $89.00

TRANSFER SWITCH
MN/TS30 30amp $129.00
MN/TS60 60amp $129.00

BATTERY CAPACITY METER
MNBCM $69.00

BATTERY ENCLOSURE
MNBE-A 29"X14.5"X27.25 $425.00
MNBE-B 33.6"X15.25"X35.2" $605.00

Solar Heating

Let the SUN do the heating for YOU!

Solar Heating Basics

There are two types of solar heating collectors; a collector that will heat water and one that will heat air. Solar hot water — can be used in a direct pump system, closed loop system, and a drain back system (see box at right for explanations); all these systems can also be used for radiant floor heating systems. Solar hot air is used for space heating of homes and buildings.

For more information see the following pages:

Solar Hot Water	page 27
Radiant Floors	page 28
Solar Hot Air	page 29

GUIDELINES FOR A BASIC DESIGN

- **Placement of Collectors.** Most solar collectors are placed on a roof where they receive good south facing sun exposure and have easy access for plumbing.
- **Tilt of Collectors.** Solar collectors work best in direct sunlight. A well made solar collector produces about half the heat in light cloudy weather as it does in full sunlight. We know that the sun is higher in the summer time so all collectors will receive 50% to 100% more heat in the summer time than in the winter, but we must think of winter time when we need the most heat. Solar heating collectors should be tilted for winter time which is at an angle equal to your location's latitude plus 15° to optimize their production.
- **Space Requirements.** Solar hot water systems require more space because of the different components (tank, pumps, lines, etc.) that are needed to complete the system. Solar hot air systems need enough space in your attic to place a blower and hoses.
- **Extras We Need to Know.** To properly size a solar heating system, knowing the square footage or the amount of gallons you need is a great place to start. We can do the rest for you.

DIRECT PUMP SYSTEMS are more commonly used in non-freezing climates. Water from your home's water heater is pumped through the collectors to directly heat your water heater. Direct pump systems can also be used in simple radiant heating applications.

CLOSED LOOP SYSTEMS are the most common. Solar closed loop systems circulate antifreeze for freeze protection and heat transfer. A heat exchanger is used with pumps to heat a storage tank. The storage then preheats your water heater and can be integrated into a radiant floor heating system.

DRAIN BACK SYSTEMS require collectors be mounted above the storage tank. The benefit to drain back systems is that the collectors are empty whenever there is no solar activity, providing freeze protection. Drain back systems utilize immersed heat exchangers in a non-pressurized tank. The tank water circulates through the collectors and back to the tank. Your home's water lines are connected to the coils in the tank to provide pre-heated water for your water heater. Drain back systems are also a perfect match with radiant floor heating systems.

How Big is Your Carbon Footprint?

Solar Hot Water

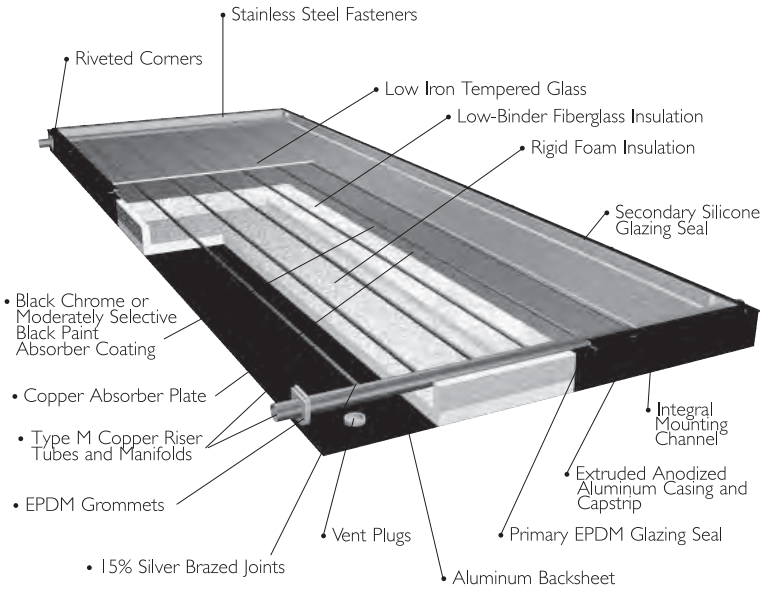
Solar hot water systems convert sunlight into heat and transfer that heat to a fluid through solar collectors on the roof to reduce the amount of natural gas, propane or electricity you consume for heating water.

Example:

DOMESTIC GLYCOL HOT WATER PREHEAT SYSTEM WITH STORAGE TANK

Flat Plate Collector System (equipment only)			
1-4x10 Collector	Sunearth Controller	80 Gallon Storage Tank w/Heat Exchanger	
Glycol	Expansion Tank	Collector Mounting Kit	
Pumps and Valves	Sensors and Gauges	Misc. Components	$4500–$5000
Evacuated Tube Collector System (equipment only)			
1-Ap30 Collector	Sunearth Controller	80 Gallon Storage Tank w/Heat Exchanger	
Glycol	Expansion Tank	Collector Mounting Kit	
Pumps and Valves	Sensors and Gauges	Misc. Components	$4700–$5200

These systems are designed to store solar heated water and supply your existing electric or gas fired hot water heater with pre-heated water. All you need is the room for the storage tank and a south facing roof surface for the collector. This system can provide up to 80% of your hot water needs and is designed to be cycled daily.



Call us today for a solar hot water heating system designed for you.

Labor, freight, piping, insulation, glycol, miscellaneous hardware and wiring vary with each job.
Estimated installation: $2500 • Estimated components: $300 • Estimated freight: $200
(taxes not included)

Radiant Floors

RADIANT FLOOR HEATING

Radiant floor heating is a centuries old heating technique. Radiant floor heating systems use channels or pipes that are embedded in-or installed under-the floor. Floors made of concrete or some other dense material perform best, but lightweight floors have also been used with moderate success. A heated fluid (water or other heat transfer fluid) is pumped through this network. The thermal mass of the floor absorbs the heat from the fluid and radiates it evenly into the living space. The thermal mass of the floor acts as a heat battery, making these systems very efficient. Radiant floor heating systems also allow the heating appliance to fire at a slower rate and less often, thus saving fuel.

There are a number of ways you can use active solar collector systems with radiant floors. The most popular is using a storage tank to help supplement the boiler. This type of solar radiant floor heating system provides greater heat storage capacity and better control over the floor temperature. Such systems usually have a heat exchanger in the storage tank for preheating domestic hot water as well.

GET YOUR OWN CUSTOM-DESIGNED SYSTEM

Solar Radiant Floor Systems are custom designed. There is no "cookie cutter" system as all homes are different and the way the solar energy is used varies with the lifestyle of the homeowners. Call us today for a quote on a solar radiant floor system!!

Information Needed to Perform a Heat Loss Calculation for your Radiant Floor Heating System:

1) Square Footage of Heated Area
2) Size of Exterior Doors and Windows
3) Wall Height
4) Insulation Values
5) Crawl Space/Slab?
6) Lowest Outdoor Temperature
7) Desired Indoor Temperature
8) Number of Zones
9) Propane, NG, or Electric

Call us today for a system designed for you: 800.499.4055

Westcliffe, Colorado

ADVANTAGES OF RADIANT FLOOR HEATING

Most people who own radiant floor heating feel that the most important advantages are comfort and quiet operation. Radiant floor systems allow even heating throughout the whole floor. The room heats from the bottom up, warming the feet and body first. Radiant floor heating also eliminates the draft and dust problems associated with forced-air heating systems.

Example system:

2400 sq. ft. home

- 260 gallon storage tank
- (4) Apricus (Ap30) Evacuated Tube Collectors
- Tilt Mounting Racks
- Solar Diversion Valve
- Controller
- Pumps
- Misc. Components

$16,000–$18,000

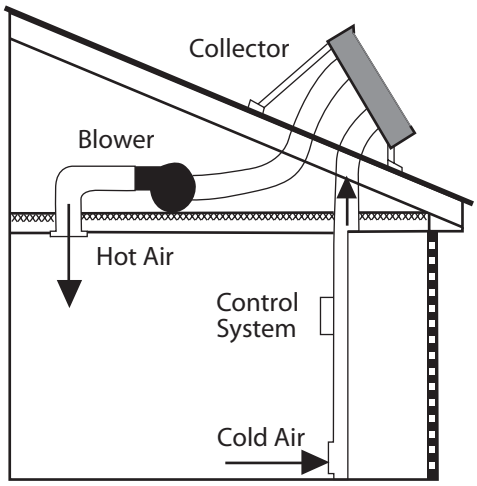
(price does not include installation, freight, taxes)

Solar Hot Air Systems

CLEAN ENERGY FROM THE SUN TO HEAT YOUR HOME OR OFFICE

AIR COLLECTOR SYSTEMS. Solar air collectors are similar in operation to liquid collectors with one major exception. Air is circulated through the collector and is the medium of heat transfer. Since air will not freeze under any normal circumstances on the planet, all of the techniques and equipment needed to protect liquid systems can be ignored. Air collectors are for supplemental space heating of homes and buildings.

Pueblo, Colorado



Courtesy of AAA Solar

THE COLD AIR INLET TO THE HEATING SYSTEM IS THE KEY TO EFFICIENCY AND COMFORT. To heat any given space, the cold air must be removed and circulated through the heater; therefore, the inlet must be ducted so it is on or near the floor. If the inlet is placed on the ceiling, the heater will tend to recirculate the hot air and leave the floor cold. The hot air supply may be placed at the ceiling or on the floor with little difference in performance. If placed on the floor, the hot air rises to the ceiling within a short distance. Since collectors are normally installed on the roof of the building being heated, it is best to place the hot air outlet in the ceiling to shorten the duct run. A system installed in this manner de-stratifies, or mixes, the air in a building like a ceiling fan, in addition to supplying solar heat.

FEATURES

Simple and Efficient • No Freezing • No Chemicals • Low Maintenance
One Moving Part • Easy Installation • 5 Year Warranty

SunAire 32 Sq. Ft. Air Collector System

This system includes all mechanical equipment needed for a home heating system. The area that this system heats varies to location and application — can heat up to 800 square feet. This system would be shipped via motor freight. Crating charges apply. System includes:

- 32 sq. ft. SunAire Hot Air Collector
- Blower
- Backdraft Damper
- Line voltage Thermostat
- Snap Disc Controller, Installation Kit, and Mounting Kit

Price: $1,615 (excluding: sales tax, freight and labor)

Crate Fee:
1-3 systems $150.00 (shipped freight collect)
4-6 systems $250.00 (shipped freight collect)

Average Installation: $1,200–$1,400

SunAire 40 Sq. Ft. Air Collector System

This system includes all mechanical equipment needed for a home heating system. The area that this system heats varies to location and application — can heat up to 1000 square feet. This system would be shipped via motor freight. Crating charges apply. System includes:

- 40 sq. ft. SunAire Hot Air Collector
- Blower
- Backdraft Damper
- Line voltage Thermostat
- Snap Disc Controller, Installation Kit, and Mounting Kit

Price: $2,010 (excluding: sales tax, freight and labor)

"Thanks to All Solar, we are absolutely thrilled with our active hot-air solar system. We have two panels on the roof with two blowers going into our great room. The heat also flows into the other wings of the house, and we don't have to start the wood stove until evening."
— Johann, Penrose, Colorado

Water Pumping

Pump water with sunshine!

The sun is the natural source of energy for an independent water supply. Solar pumps operate anywhere that the sun shines, and the longer it shines, the more water they pump. Photovoltaic modules, the power source for solar pumping, have no moving parts, require no maintenance and last for decades. A properly designed solar pumping system will be efficient, simple and reliable.

Where there are no power lines, solar pumps offer a clean, dependable, money-saving alternative. Most solar pumps use a tank to store water, with the pump powered directly from the PV array. 3 to 10 days of storage is recommended for reliable water supply. Storage requirements will vary with local climate and your pattern of water usage. A battery system may be used to provide pressure on demand, as for a home or for drip irrigation.

HOW MUCH WATER DO I NEED?

Household: 10-50 gallons per day per person

Small Animals: ¼ gallon per day per 25 lb. of body weight

Cattle & Horses: 10-30 gallons per day in dry weather

Our systems are carefully sized to match your lift and water requirements. In order to ensure that you are supplied with the correct pumping system, we will need to identify your individual needs and conditions.

DESIGN QUESTIONS

What are your daily requirements? _____gallons (*use table above*)

Production of the well _____ gallons per minute

Well Depth _____feet

Static Water Level (*where the water comes up to in the well*) _____ feet

Additional vertical lift to storage tank location_____ feet

Design Pressure _____psi

"I just wanted to let you know how pleased we are with our solar-powered water pumping system that you installed for us. Pumping water 195 feet up and then a half mile to our stock tanks was the only thing that kept us in the cattle business during the recent drought. Thanks for solving our livestock water problem, as well as for great service."
— Fritz Sr.,
Diamond Double S Land & Cattle Corp.

SHURflo®
Pentair Water

Great for livestock, irrigation, pond aerations, remote homes and cabins.

Model	Lift	Maximum Flow Rate	Voltage	Solar Modules/ Battery Bank	Warranty	Price
9300 Series	up to 230 ft.	112 gallons per hour	12 or 24V	2-4 solar modules PV direct or battery (*not included*)	1 year	$830.00

CALL FOR SPECIFIC PRICING FOR YOUR APPLICATION.
Let us Design a Water Pumping System for You!

GRUNDFOS®

The SQFlex system from Grundfos is more than just a solar pump; it's a revolution in remote water supply. It's advance design allows it to adapt to virtually any application, providing water, wherever necessary, and whatever the local conditions.

This is the ultimate submersible pump for water lifts of up to 525 feet. Pumps can be directly powered by solar or wind power or can be run on an inverter, a generator, a battery or the utility grid or any combination of these sources.

Whether it's used for livestock watering, a pressure system on a remote cabin, or for irrigation, the SQFlex system can be tailored to any requirements. Based on the location, depth to water, and the amount of water required, Grundfos' exclusive sizing program finds the best pump and most efficient energy source for the system.

The SQFlex system means:

- simple installation
- reliable water supply
- virtually no maintenance
- cost-efficient pumping–every day!

$1,925.00*
1 yr. warranty; 5 yr. available

DRY-RUNNING PROTECTION

This unique feature shuts down the pump if it detects water shortage. Every SQFlex pump comes standard with this sensor pre-installed, protecting the well from being over-pumped and the motor from burning out.

CENTRIFUGAL PUMP (4")

For high flow applications with moderate heads, this pump type is capable of providing up to 75 gal/min and never needs maintenance.

HELICAL ROTOR PUMP

Designed to pump high heads very efficiently, this pump type allows pumping levels as deep as 525 ft. The simple design requires no maintenance, ever.

MATERIALS

All Stainless steel for long pump life.

MOTOR

Only one motor covers the entire pump range. Designed for maximum efficiency, it also features a very high starting torque for reliability and a soft-start feature, so the pump can start and stop an unlimited number of times without harm.

ELECTRONICS

Built in protections against over-temperature, overload, and over and under-voltage for reliability, as well as two-way communication with an interface box to alert you if there's a problem.

ANY VOLTAGE

The motor can operate at any voltage from 30-300 VDC and 90-240 VAC without additional controls or different settings, making sizing and installation easy, including retrofits. AC power capabilities mean every SQFlex pump has the ability to use an AC generator for backup power.

*Price does not include solar panels or wind turbine; controllers, batteries, switch boxes or breakers. This equipment is sold separately..

Generator

Generators are a great source of back-up power to any alternative energy system! Generators can be used to power larger loads that your alternative energy system was not designed to power, and charges batteries when the voltage has become to low.

AIR COOLED LPG/NG RESIDENTIAL STANDBY GEN-SET

SENTRY-PRO By GILLETTE GENERATORS

SUBARU ENGINE-GENERATOR WITH KW POWER RATINGS RANGE

Model SPS-120-1-1; 120/240 Voltage Phase 1; 12kw; 60Hertz, 50 amps

$4200.00 plus shipping
($200–$400 estimated shipping)

MODEL SERIES	HZ	STANDBY 130°C RISE		PRIME 105°C RISE	
		LPG	N.G.	LPG	N.G.
SPS-120	60	12.0	11.0	10.0	9.0

STANDARD FEATURES

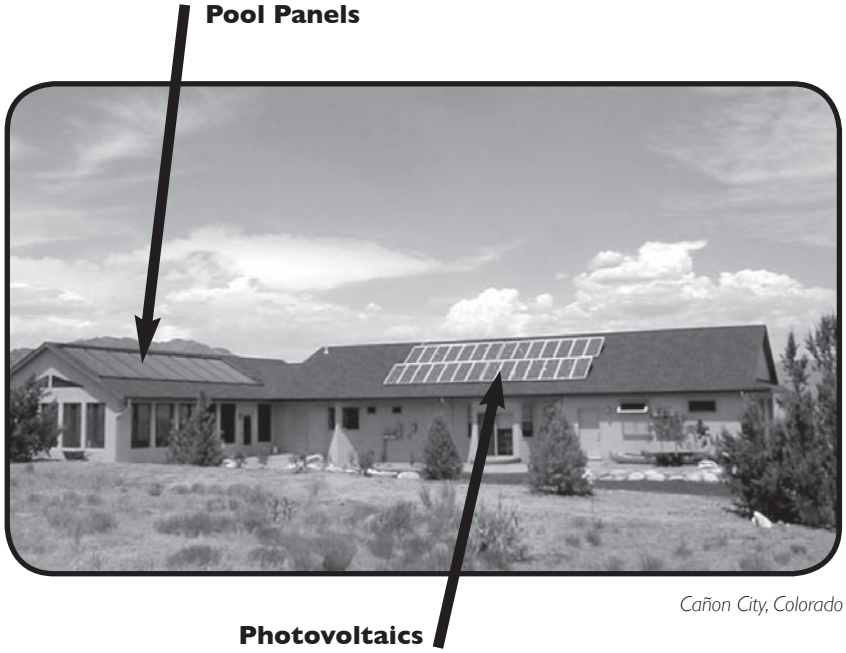
- Generator sets are USA wound, built, and thoroughly tested.
- Full power capacity to start up to a 5 ton A/C unit, equipped with "Easy Start" circuitry.
- UL-1446 certified
- Capacitor load compensated (CLC) voltage regulation for ±3% is standard on all gen-sets.
- 2 Built-in dual oil coolers yield longer engine service life.
- A brushless rotating field generator design with shunt wound excitation system and available at a broad range of voltages.
- Solid state, digital microprocessor logic and ultra-bright LED, annunciation display for different engine and generator functions, plus automatic fault shutdowns; high temp., over-crank, over-speed, under-speed, low oil, and low battery.
- Generator set control systems components and accessories provide a 2-year limited warranty at time of initial start-up. Optional extended warranties are available. Generators and engines are governed by separate warranties.

GENERATOR RATINGS					LIQUID PROPANE GAS FUEL				NATURAL GAS FUEL			
GENERATOR MODEL	VOLTAGE		PH	HZ	130°C RISE STANDBY RATING		105°C RISE PRIME RATING		130°C RISE STANDBY RATING		105°C RISE PRIME RATING	
	L-N	L-L			KW/KVA	AMP	KW/KVA	AMP	KW/KVA	AMP	KW/KVA	AMP
SPS-120-1-1	120	240	1	60	12/12	50	10/10	42	11/11	46	9/9	38
SPS-120-3-2	120	208	3	60	12/15	42	10/12.5	35	11/13.8	38	9/11	31
SPS-120-3-3	120	240	3	60	12/15	36	10/12.5	30	11/13.8	33	9/11	27

Pool Heating

You Can Double Your Swimming Season!

Solar pool heating gives you all these pleasures with no operating costs since energy from the sun is free. And today's solar pool heating technology is as reliable and affordable as ever.



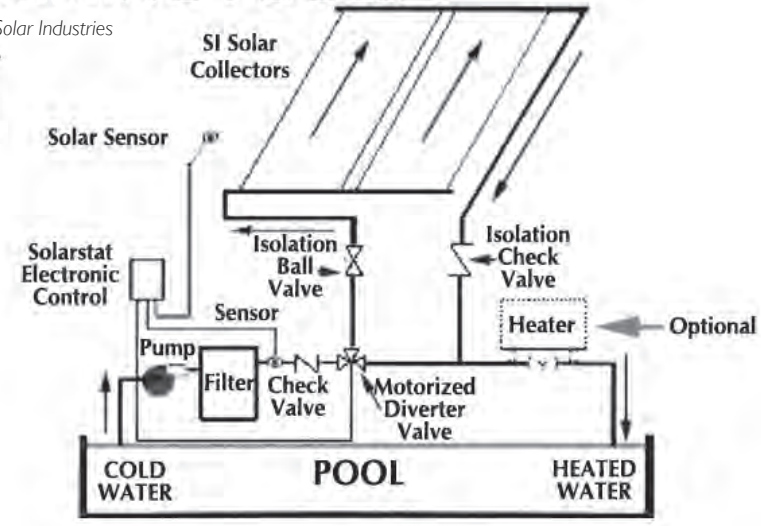
Cañon City, Colorado

Call for a custom design system for your pool. 719.372.3808

SAVE WITH SUNSHINE!

SYSTEM DIAGRAM FOR SWIMMING POOLS

Courtesy of Solar Industries



Renewable Energy Assessment

This form helps us determine the best renewable energy system to meet your needs and budget. Please fill out the form and return it to All Solar Inc., who will then contact you to discuss system options, prices and product features and to schedule a time for a site visit.

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Day Phone: _____ Evening Phone: _____

Cell: _____ E-Mail Address: _____

Installation Address (if different): _____

_____

Best Way to Contact You: ❑Mail ❑Day Phone ❑Evening Phone ❑E-Mail ❑Cell

Best Time of Day to Reach You: _____

Who is Your Electric Utility Provider? _____

Type of Gas: ❑Propane ❑Natural Gas ❑None

County: _____ City Limits: ❑Yes ❑No

Return this form to All Solar Inc.

1. Which of the following renewable energy categories are you interested in? (please check all that apply)
   ❑Photovoltaic Grid-Tie Systems ❑Photovoltaic Off-Grid Systems ❑Wind Power
   ❑Solar Water Pumping ❑Solar Water Heating ❑Solar Space Heating
   ❑Radiant Floors ❑Other _____

2. Please tell us why you are interested in a renewable energy system: (please check all that apply)
   ❑Reduce my electricity bill ❑Reduce my gas bill
   ❑Back-up power ❑Energy independence/self sufficiency
   ❑Save Money ❑Clean, environmentally-friendly
   ❑ Far from power grid ❑Other_____

3. Is this property ❑an existing home ❑new construction

4. If you are considering a photovoltaic system please answer the following questions:
   a. Electricity usage?_____kWh per month / day / year (circle one)
   b. Provide ❑100% ❑75% ❑50% ❑25% of my electricity usage ❑Other _____
   c. Battery backup for emergency power, what "critical loads" would you like to run during an outage?
      ❑Refrigerator ❑Furnace ❑Fan or pump ❑Security System ❑Water Pump
      ❑Computer ❑T.V. ❑Lights ❑Other _____
   d. How do you want the system mounted? ❑Roof ❑Ground ❑Pole ❑Not Sure
   e. Do you have a south facing roof that is clear of shading? ❑Yes_____ft. x _____ft. ❑No
   f. What type of roof do you have? ❑Asphalt shingle ❑Spanish tile ❑Concrete tile ❑Flat roof
      ❑Other _____ How old is your roof?_____

5. If you are considering a wind system please answer the following questions:
   g. What type of wind turbine? ❑grid-tie turbine ❑off-grid turbine
   h. Any height restrictions in your area? ❑Yes_____ ❑No ❑Not Sure
   i. Average wind speed in your area? _____mph ❑Don't Know
   j. Do you know what size of turbine you are looking for? ❑Yes_____ ❑No
   k. Describe your location:_____

6. If you are considering a solar heating system please check which type(s) of heating system you are interested in:
   ❑domestic pre-heat ❑radiant floor ❑space heating

7. What price range best fits your budget for renewable energy? $ _____

8. How soon will you be ready for installation of your system? _____

9. Best day of week for a site visit?_____ Time:_____

How did you hear about All Solar Inc? _____
_____
_____

ALL SOLAR always welcomes any comments or suggestions you may have _____
_____
_____

Service Agreement Programs

Service AFTER the Sale!

GOOD REASONS

- Keep equipment in optimal working condition
- Prevent an unexpected failure
- Routine maintenance is scheduled and performed for you

PROGRAMS AVAILABLE

Service Contracts are good for one year; can renew yearly on/before renewal date; terms-prepaid; programs and prices are subject to change yearly. Programs are inspections only; any equipment/supplies/labor needed to repair a malfunctioning unit (if found) are additional and will be discussed before repairing.

Photovoltaic **3 x year for $290**

Items to Check: Array Output, Wiring & Visible Connections, Rack Hardware, Battery Specific Gravities and Fluid Levels.

Wind **3 x year for $320**

Items to Check: Turbine Output, Wiring & Visible Connections, Guy Wire Tensions (adjust as needed), Battery Specific Gravities and Fluid Levels.

Solar Hot Water **3 x year for $305**

Items to Check: Heat Transfer Fluid P.H. Test, Wiring & Sensor Connections, Pump(s), & Valve(s) Operation, Collector Rack Hardware, System Pressure.

Water Pumping **3 x year for $290**

Items to Check: Pump Flow Rate, PV or Wind Source Checked for Proper Output, Wiring & Visible Connections.

Solar Pool Heating **3 x year for $275**

Items to Check: Temperature Differential Across Array, Proper Operation of Valves & Controls (auto), Visible inspection of Piping for Leaks.

Radiant Floors **3 x year for $290**

Items to Check: System Operation & Fluid P.H. Check (if needed), Proper Supply/Return Temperatures (adjustments made if needed).

Solar Hot Air **3 x year for $290**

Items to Check: Collector Glazing, Blower Oiled, Control System, Collector Mounts & Weather Proofing of Outdoor Ductwork.

If two or more programs are needed, you will receive 25% off the total price of each program.

All Solar Inc.

ALL SOLAR INC. is open Monday through Friday and weekends by appointment, excluding holidays.

PAYMENT METHODS. All orders are payable in U.S. dollars, by personal or company checks, money orders, bank checks, Visa, MasterCard and American Express; credit card processing fees may apply. There is a $25.00 fee on all returned checks. Deposit required on items of $100 or more.

ALL SOLAR is able to drop ship from our suppliers, UPS or Regular Postal Service. Most products can be shipped within 48 hours, other products are made to order and will require a longer wait time. **Shipping charges apply to all orders.**

YOU MAY RETURN any and all equipment purchased within 30 days for a refund. All goods returned for refund must be in unused condition and in the original packaging. A restocking charge will be assessed. (All returns subject to management approval.)

ALL WARRANTIES are given in writing by the manufacturer. Warranty situations are between you and the manufacturer. All Solar Inc offers warranty on select used equipment. It is very important that you keep both the warranty and invoice as most warranties are from the date of purchase. ***Please note that labor and shipping are not covered under the manufactures warranty.**

IF YOU ARE UNABLE TO FIND A PRODUCT or need technical assistance, please do not hesitate to contact our office. Our staff is very resourceful and helpful and will be more than happy to assist and advise you in the most appropriate manner.

THE RENEWABLE ENERGY MARKET is ever changing and we strive to keep up-to-date with all the new technology and advances in products and services, so **please note that prices and products are subject to change without notice.**

THANK YOU to all of our customers, friends, and family who have made our journey into the world of Renewable Energy a success. Your support, referrals, and kind words have been a key factor to our growth.

PLEASE VISIT OUR FACILITY, located right off Hwy 50 between Pueblo and Canon City. Our office is setup harvesting energy from the sun and wind using the products we offer. We live everyday with the products we sell, so you will have the best support system ever.

Thank you for your interest in Renewable Energy.

We are looking forward to a bright, sunny, and windy future!

Jeremy and Amy Rodriguez

Visit Us!

All YOUR alternative energy needs in ONE place!

DRIVING DIRECTIONS:

All Solar is located 20 minutes west of Pueblo along HWY 50, approximately 3.5 miles inside the Fremont County line. All Solar is located on the south-side of HWY 50.

Along HWY 50 coming from the east All Solar is approximately 11 miles from Canon City and 3 miles from the HWY 115 over pass.

LOOK FOR THE WIND TURBINES SPINNING!

Index

Notes

One Stop for ALL of your Renewable Energy Needs

All Solar, Inc. is your alternative energy source. We offer everything you need to harvest energy from the sun and wind.

Our expertise lies in our dedication to educating people about the usages of renewable energy, as well as our outstanding service before, during and after your purchase.

ALL SOLAR inc.