GreenLife TECHNOLOGIES

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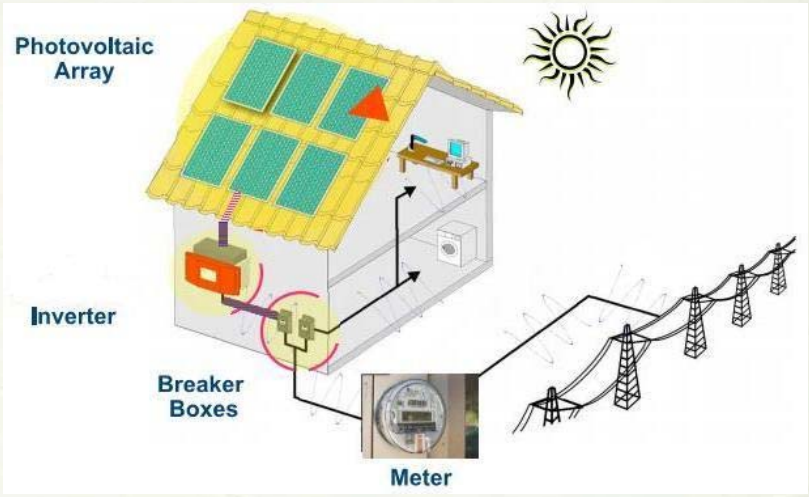
SOLAR PV INFORMATION

Thank you for the opportunity to present you with information about Solar Photovoltaic (PV) Energy Systems in the East Texas area. This document will give you a brief description of how the Solar PV system will work for a typical project, the system costs, and some recommendations.

How the Solar PV system for your project will work

Solar photovoltaic (PV) energy systems for most homes and businesses in this area are **grid-tie systems**. For a grid-tie Solar PV system, solar panels are mounted on the south facing roof of the building or on an adjacent structure, where they are most exposed to the sun. The PV panels will produce DC electricity when the sun is available. The DC electricity passes through wiring to an inverter which converts it to AC electricity which is compatible with the wiring, lighting and appliances in your building. When the sun is not available, electricity is provided by the electric utility grid. The Solar PV array is normally sized so that during the day, when the sunshine is available, excess energy will be produced. This excess energy will pass backward through the electric meter and into the electric grid. In most cases, you will receive full or partial credit on your electric bill for this excess electricity. For grid-tie systems, when the electric grid is not available, the solar energy system will not produce electricity. These systems typically cost $3 to $5 per watt of installed solar power.



Some customers in the area are utilizing another type of system called a **grid-tie with battery backup system**. This system is more complicated than a standard grid-tie system. For a grid-tie with battery backup system, solar panels are mounted on the south facing roof of the building where they are most exposed to the sun. The PV panels will produce DC electricity when the sun is available. The DC electricity passes through wiring to a charge controller where it either charges a bank of batteries or (if the batteries are fully charged) it passes the electricity to an inverter which converts it to AC electricity. This electricity is used by your building. Excess energy is produced just as with a grid-tie PV system.

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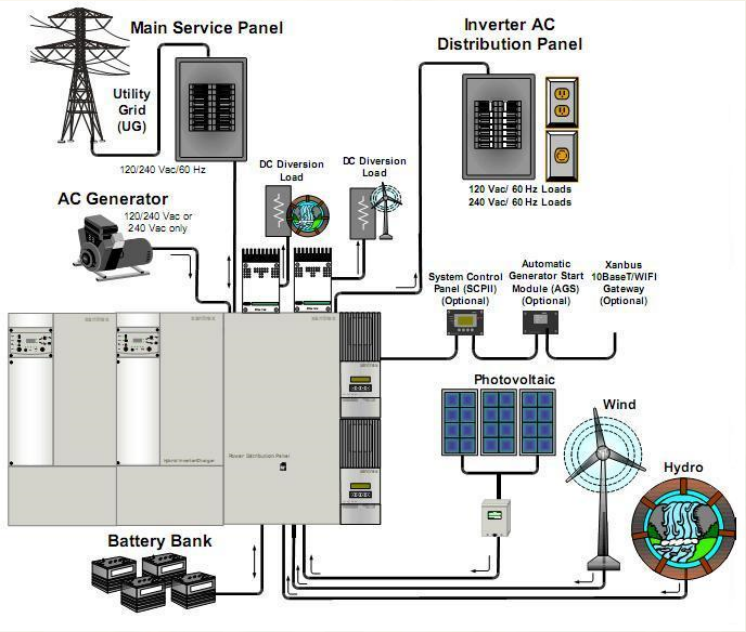
The main difference between the two systems from a functional standpoint occurs when the utility grid is not operating. For a grid-tie system, there is no power from the Solar PV array and no power from the utility when the grid is down. For a grid-tie with battery backup system, the building will receive electricity from the bank of batteries and the batteries are being continuously recharged by the Solar PV array. In most cases, however, the bank of batteries is not large enough to supply all of the power needs of the building, therefore only essential electrical needs are satisfied.



The functional difference between the two systems results in a more complicated and more expensive design. There are three main components that are added to the grid-tie with battery backup system: (1) A controller which monitors the status of the solar panels, batteries, and the utility grid. (2) A bank of batteries which provides power when the utility grid is down. (3) A distribution panel which contains the circuitry for loads which will be powered by battery backup.

The two system types also have other differences. The two systems both have inverters, but the inverters have different properties. Grid-tie inverters are capable of converting DC electricity from high voltage solar arrays. Grid-tie with battery backup inverters convert DC electricity from low voltage battery banks and low voltage solar arrays. As a result, solar array wiring is different for the two types of systems. Grid-tie with battery backup systems typically cost $4 to $6 per watt of installed solar power.

System Design:

The size of a solar energy system is normally determined by the amount of energy that the building will require and the proportion of the electricity that you would like to provide with the solar energy system. The average home in Texas uses about 10,000 to 16,000 kwh/year of electricity. Most solar energy systems are designed to provide 50% to 100% of these requirements.

The size of a Solar PV system is designated by the number of Standard Test Condition (STC) watts that it produces. Typical system sizes for residences range from 3,000 watts to 10,000 watts. A 10,000 watt system will produce up to 14,000 kwh/year under ideal conditions. This is enough to offset 100% of the electricity required by a typical home.

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The ideal location to place a Solar PV system on a home is on the south facing roof at a 7/12 to 8/12 pitch. This roof must be unshaded from 10:00 a.m. to 3:00 p.m. in order to produce the optimum amount of energy. Systems can produce up to 80% of optimum production on roofs that are facing due east or due west as long as there are no shading conditions. Solar PV systems usually require about 1 square ft. for every 10 watts. A 5,000 watt system will require about 500 square feet of roof area.

If there is not sufficient space on the roof for a Solar PV energy system, the panels can be placed on a ground mounted framework, a pole mount, or even on a canopy or carport. Pictures of some mounting situations are shown below. More examples can be found at our website: http://www.greenlifetechinc.com

Canopy Mount Systems

System Costs:

The cost of a Solar PV system is determined by the size of the system and the site conditions. Also the federal government will provide a tax credit of 30% of the cost of a solar PV system. Currently the federal government will provide a tax credit of 30% of the cost of a solar PV system. The federal government will also allow rapid depreciation (over a period of 5 years or less) for a commercial Solar PV system.

Presented below is an estimate for a 3,000 watt, 5,000 watt, and 10,000 watt grid-tie, roof mount system. Also presented is the cost of a 5,000 watt grid-tie with battery backup and a 10,000 watt battery backup system.

System Cost/Performance Summary (see below for net cost calculation)

Note: the Energy Production for each system is based on ideal site conditions

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System	Total Cost	Net Cost	Energy Production
3.0 kW grid-tie	$9,900	$6,930	3,765 kwh/year
5.0 kW grid-tie	$14,900	$10,430.	7,000 kwh/year
10.0 kW grid-tie	$25,900.	$18,130.	14,000 kwh/year
5.0 kW battery	$23,900.	$16,730.	6,000 kwh/year
10.0 kW battery	$39,900.	$27,930.	12,000 kwh/year
25.0 kW commercial	$67,500.	$27,169.	35,000 kwh/year

To offset the cost of solar PV systems, the federal government is offering tax credits of 30% of the cost of the system for homes. The cost of the 3.0kw system will be:

$9,900. **Total System Cost** (includes full service, parts, delivery, installation, warranty, sales tax)

($2,970.) **Federal Tax Credit** (30% of total cost)

$6,930. **Total Net Cost of System after taxes** (This assumes that the incentives are taxable. Please check all tax calculations with your accountant)

Pole Mount System

System Specifications

These systems will include solar panels mounted on the south facing roof and inverters mounted on your building near the electric meter and all other meters and disconnects which are required by the NEC and the local incentive programs. We can provide most any brand of solar module or inverter but we typically use REC Group solar modules (produced in the U.S. and Norway) and Fronius or Power One inverters (produced in Germany and the U.S.). The solar modules have a 25 year warranty and the inverters have a 10 year warranty. This is top of the line equipment and the balance of system components (mounting hardware, wiring, etc.) are composed of stainless steel and aluminum and are designed to last for the life of the system. All roof attachments are installed with flashing rather than caulk so that the possibility of a roof leak is eliminated.

Benefits of Solar

- A solar energy system will offset your utility cost.
- A solar energy system will benefit the environment by offsetting the production of:
  - CO2, the leading greenhouse gas
  - NOx, which creates smog
  - SO2, which causes acid rain
  - Particulates that cause asthma

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Renewable Energy Systems

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- A solar energy system will increase the value of your home.
- A solar energy system will decrease our need for foreign oil.
- It will provide electricity which is exempt from future energy cost increases for your home or business for 25 or more years.
- For battery based system, it will provide power when the utility grid is not available.

Ground Mount System

What is the Next Step

GreenLife Technologies, Inc. is a National American Board of Certified Energy Practitioners (NABCEP) certified installer. We are also a certified installer for the Oncor, SWEPCO, AEP, Entergy, Austin Energy and other incentive programs. We have engineers with over 20 years of experience and master electricians with over 40 years of experience on staff. We have installed grid-tie, grid-tie with battery backup and off-grid systems on roofs, ground mounts, pole mounts, pole mounts with tracking and canopy mounted systems.

If you find that you are interested in installing a Solar PV System, I hope that you will allow GreenLife Technologies, Inc. to serve you. We will travel to your site and make accurate measurements to determine the best design for your system. We will discuss with you and make final decisions on the specifications of the system, such as mounting system, component placement, etc. We will install your system and warrant it for 5 years (25 years on the solar panels, 10 years on inverter). An owner/operators manual will be provided.

If you have any questions, please give me a call at (903) 539-3406 or email me at dale@GreenLifeTechInc.com.

Sincerely

K. Dale Beggs

K. Dale Beggs, P.E.