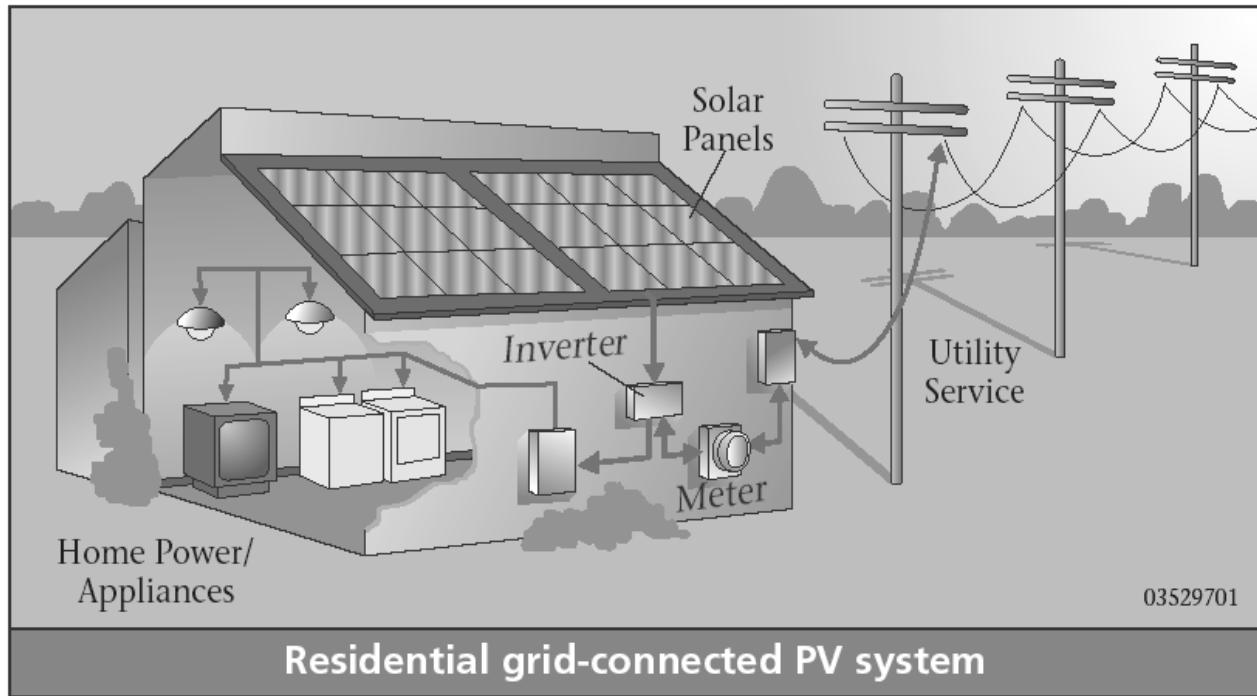


BASICS OF A SOLAR ELECTRIC SYSTEM



What is a solar photovoltaic system?

Photovoltaic (PV) systems convert sunlight directly to electricity. They work any time the sun is shining, but more electricity is produced when the sunlight is more intense and strikes the PV modules directly (as when rays of sunlight are perpendicular to the PV modules). Unlike solar thermal systems for heating water, PV does not use the sun's heat to make electricity. Instead, electrons freed by the interaction of sunlight with semiconductor materials in PV cells are captured in an electric current.

PV allows you to produce electricity—without noise or air pollution—from a clean, renewable resource. A PV system never runs out of fuel, and it won't increase U.S. oil imports. Many PV system components are manufactured right here in the United States. These characteristics could make PV technology the U.S. energy source of choice for the 21st century.

The basic building block of PV technology is the solar "cell." Multiple PV cells are connected to form a PV "module," the smallest PV component sold commercially. Modules range in power output from about 10 watts to 300 watts. A PV system connected or "tied" to the utility grid has these components:

- One or more PV modules, which are connected to an inverter
- The inverter, which converts the system's direct-current (DC) electricity to alternating current (AC)
- Batteries (optional) to provide energy storage or backup power in case of a power interruption or outage on the grid.

AC electricity is compatible with the utility grid. It powers our lights, appliances, computers, and televisions. Special appliances that run directly on DC power are available, but they can be expensive. Before you decide to buy a PV system, there are some things to consider:

First, PV produces power intermittently because it works only when the sun is shining. This is not a problem for PV systems connected to the utility grid, because any additional electricity required is automatically delivered to you by your utility. In the case of non-grid, or stand-alone, PV systems, batteries can be purchased to store energy for later use.

Finally, unlike the electricity you purchase monthly from a utility, PV power requires a high initial investment. This means that buying a PV system is like paying years of electric bills up front. Your monthly electric bills will go down, but the initial expense of PV may be significant. By financing your PV system, you can spread the cost over many years, and rebates can also lighten your financial load. In an increasing number of areas of the country, the “levelized” cost of a PV system over time is less expensive than the purchase of electricity from a utility. And the lifetime cost of the PV-generated electricity offers a hedge against the possibility of increases in fuel costs for conventional generation.

Incentives – Contact your local electric utility to see if it offers incentives for the installation of a solar array. There will continue to be a 30% Federal Investment Tax Credit available to homeowners and businesses for the installation of solar until the end of December 2016. Installations must be up and running by that date for the credit. This is a credit on the taxes you owe; the government will not write a check. We hope the FITC will be extended beyond this date, but there is no guarantee. Commercial installations will drop to 10%, residential to 0. 2016 will be extremely busy for solar installers, so if you are considering adding a solar array, start interviewing installers now.

Net Metering — Check with your local utility to learn if and how you would be credited or reimbursed for your generation of electricity. Most common is what is called net metering. Under such plans, the customer is billed for the net electricity purchased from the utility over the entire billing period—that is, the difference between the electricity coming from the power grid and the electricity generated by the PV system. Through net metering, the customer obtains the full retail electricity rate—rather than the much lower wholesale rate—for kilowatt-hours of PV-produced electricity sent to the utility power grid. The benefits of net metering to consumers are especially significant in areas such as Hawaii and New York, which have high retail electric rates. Utilities also benefit because the solar-generated energy often coincides with their periods of “peak” demand for electricity.

A very small number of utilities (Austin Energy is the only one in Texas) will bill you for all the electricity you use, including what you self-generate, but then simultaneously credit you at a different rate (for most customers, a higher rate) for everything you generate.

Source: Much, but not all, of the above was borrowed from publications of the U.S. Department of Energy’s National Renewable Energy Laboratory