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About solar energy

How does solar electricity work? Solar electricity is a silicon based technology. Impurities in the silicon allow electrons to be knocked off and flow when exposed to light. These electrons are funneled through wiring printed onto the face of the solar cell and can be used in the same way electricity from a battery is used. When you look at a solar cell you can see the wiring. If you can see the cell, electricity is flowing because light in any amount is all it takes to make it work.

Because solar cells produce the same kind of electricity as produced by a battery (Direct Current), which is different from the power from a household outlet, we couple solar panels to a device called an "inverter". The purpose of an inverter is to take the electricity from the

panels and perform two different operations. On one hand it converts it to power that operates like an outlet (Alternating Current). On the other hand it regulates the power so it fits neatly into the specifications provided by the power company regardless of what the weather is like and adjusts for clouds, birds, and the position of the sun in the sky.

What is a grid connected system? A Grid Connected system is a solar electric system that is connected to a commercial energy supply which is sometimes called the electricity grid or power grid. This gives your excess power a place to go and be usefully used. Otherwise that power is simply lost. The grid is the best backup power system available. You basically use the electric grid as your battery and fill up reservoirs, pile up coal, etc. until needed and never maintain a battery system nor incur the costs of installing an expensive battery backup system. When available there's really no reason to disconnect a system from the grid.

The one downside to most grid connected systems is that they must shut down during a blackout. The reason for this is safety for the electrical workers who are restoring service. If your solar electric system continued producing power it would risk electrocuting these people. Where necessary it is possible to install solar power systems which operate even when the grid is disconnected. This requires substantial changes to the wiring of the structure and incurs annual maintenance costs. Celestial Power is happy to specify a system that allows power grid independence. That is not included in this proposal and incurs additional costs to the investment.

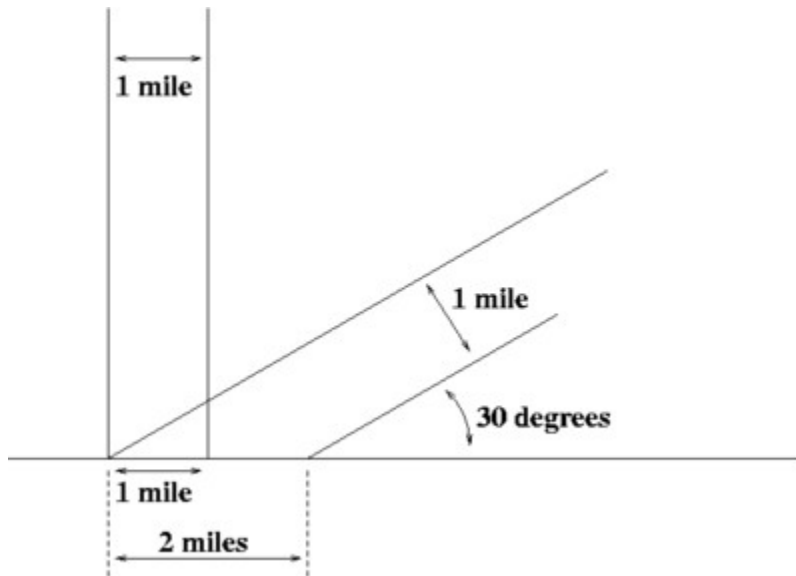
What is "Distributed Generation"? The term "Distributed Generation" refers to a utility strategy of generating power all over the service area instead of importing power from

large power plants. Each solar electric generator placed on a building or structure generates power helping ease congestion on feeder circuits and helping the utility avoid brown and blackout caused by that congestion.

What makes Solar electric "green"?

- Solar has no direct pollution. Once created it produces clean energy that does not pollute the environment.
- Solar is energy positive. It takes about 36 months for a solar electric system to produce more energy than went into making the panels and inverter. For the rest of it's service life that system produces power. So it's net is around 800% more power than went into making it. Compare that to biofuels which are 5%-20% energy positive.
- Solar is renewable. The fuel source is the sun and using the sun for power does nothing to deplete that resource for future generations. The main component of solar panels is silicon - sand - as plentiful as any resource on the face of the earth.

How does the production of the system vary with the seasons? The path of the sun changes in the sky as the earth wobbles. The seasonal cooling we're familiar with is in part because the angle of the sunlight changes. This effects solar panels in the same way. It's easier to see in a diagram. Sunlight spreads out over a larger area but the energy in the sunlight is the same. So when the sun is overhead, as during the summer, the energy is more concentrated.



How long does a solar electric system last? The components of a solar electric system are remarkably long lived. The system itself has no moving parts to wear out. The panels are warranted to produce 80% of their rated power for 25 years and are built to withstand winds over a hundred miles per hour and sizable hail. The output falls off somewhat during the first few years then stabilizes. In fact, the very first solar cells built by Bell Labs 50 years ago still work nearly as well as they did when they were first made and you can expect the panels on your building to last like this as well. The inverter is a different story. While it is a very solid piece of equipment it is also a machine with a lot of energy pushing through it. The inverters are warranted to perform for 10 years and typically live much longer than that. But they will wear out long before the panels and you can expect to replace them once during the warranty period of the panels.