



RENEWABLE ENERGY BASICS

Illinois Solar Energy Association

www.IllinoisSolar.org



What Is Renewable Energy? (RE)

There are five principal sources of renewable energy (RE) - sunlight, wind, flowing water, biomass, and heat from within the earth. Most originate either directly or indirectly from the sun. RE is continually replenished, literally, as long as the sun continues to shine. In contrast, fossil fuels (oil, coal, natural gas) are “stored” solar energy from millions of years ago. They are nonrenewable, finite resources which will eventually be depleted - or become too expensive/damaging to retrieve.

Solar Photovoltaics (PV)

Photovoltaic solar cells convert sunlight directly into electricity. The simplest PV cells power watches and calculators. Larger arrays of PV cells generate electricity for stationary, portable, and remote applications. PV systems can also be integrated directly into building shells, operating independently or linked to the electric utility grid. PV cells, panels, and equipment (inverters, chargers) are solid state with no moving parts.



Solar Heating, Cooling and Daylighting

Passive solar design “builds in” features to collect and/or control the sun’s energy for heating, cooling, and daylighting. No “active” mechanical means are used (fans or pumps). Designed features include south-facing windows to collect the sun, and massive materials that absorb, store, and slowly release the sun’s heat within a well insulated shell.



Solar Thermal (ST)

Solar thermal collectors trap the sun’s heat like a closed car parked in the sun (greenhouse effect). Air or fluid is heated in the collectors and transferred (“actively,” via pump or fan) to a storage system for immediate or future use. Solar thermal technology is used in conjunction with existing heating equipment for water and space heating as well as for pools, spas, and process heat for industry. ST systems utilize reliable, proven technologies that been used successfully in Illinois for decades.



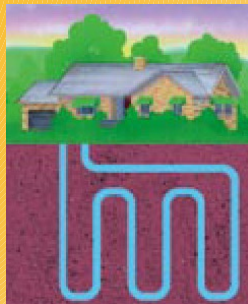
Wind

The sun’s heat drives the earth’s winds. Wind turbines transform the kinetic energy of the wind into mechanical or electrical energy. Wind energy can be economically harvested with both small and large scale applications; Utility scale wind is the fastest growing renewable energy worldwide.



Geothermal

A geothermal system collects heat that lies below the earth's surface. In winter, heat is drawn from the ground and transferred inside a building via a heat pump. In the summer, the process is reversed, transferring heat within the building into the ground. The temperature differential between the ocean's surface and depth can be utilized in a similar manner.



Biomass

Biomass describes, in one word, all plants, animals and organic matter on the earth. Biomass is the sun's energy stored in organic matter via photosynthesis. Energy is released when biomass is used to make heat, electricity or fuel. Biomass also includes animal and human energy.



Flowing Water

Hydroelectric generators convert the kinetic energy of flowing water into mechanical or electrical energy. The sun's heat (and resultant wind) causes the earth's water to evaporate, condense into rain and snow, and to flow via rivers & waves. Tidal energy comes from the gravitational pull of the moon and the sun upon the earth and its water.



Concentrated Solar

Solar collectors can also employ mirrors, reflectors or lenses to concentrate the sun's energy for a greater range of temperatures, pressures, or electrical output. The concentrated energy may be converted into steam or electricity, for use in commercial and industrial applications.



Electrical Grid Interconnection

Most RE systems installed today that generate electricity are connected to the utility grid through a meter that measures electricity flowing in both directions. Called "Net Metering", surplus RE generated is sold back into the grid; any off-peak power shortfall is balanced from the grid. RE serves as the primary source of power, and the grid as back up - thus avoiding the need for an energy storage system (batteries) or backup generator.

Did You Know?

Chicago has nearly as much usable sunlight as Atlanta or Los Angeles.

Chicago is the only city in the US with both solar PV and ST panel manufacturing & assembly facilities.

Illinois' first utility-scale wind energy project began generating 50MW of power in 2004. Nearly a dozen more wind farms are proposed in IL, with several poised for development.

Rebates, Grants and Credits

The Illinois Department of Commerce and Economic Opportunity (DCEO) offers a rebate and grant program to encourage investment, development and use of RE in IL: www.illinoisbiz.biz/com/energy

- **Rebates** up to 50% for small scale ST, PV, and wind installations.
- **Grants** up to 50% for large scale renewable energy projects.

The Illinois Clean Energy Community Foundation invests in clean energy development, funding grants for energy efficiency improvements and developing RE resources within IL: www.illinoiscleanenergy.org

Renewable Energy Credits (or "green tags") can be purchased directly from RE producers, community programs, retailers, and brokers. You purchase the "rights" to clean energy to offset your consumption, and bolster market incentives for further RE development.

JOIN the ISEA in the common goal of promoting solar/renewable technologies, providing energy education and establishing a sustainable energy network. Your support today can help provide a cleaner environment tomorrow. Become a member today.

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