

# Alternative Energy



Alternative Energy refers to the energy produced from sources other than fossil fuels. This includes all renewable sources, which is produced from sources that do not deplete or can be replenished within a human's life time. Renewable power is booming, as innovation brings down costs and starts to deliver on the promise of a clean energy future. This means that renewables are increasingly displacing "dirty" fossil fuels in the power sector, offering the benefit of lowering carbon emissions and other types of pollution. Here's what you should know about the different types of renewable energy sources—and how you can use these emerging technologies for your own home.

## Geothermic Energy



Geothermal energy is heat derived within the sub-surface of the earth. Water and/or steam carries the geothermal energy to the Earth's surface. Geothermal energy can be used for heating and cooling purposes or harnessed to generate clean electricity if it is located close to tectonically active regions. The main advantages are that it is not depending on weather conditions and has very high capacity factors; for these reasons, geothermal power plants are capable of providing electricity for short and long-term flexibility. This key renewable source covers a significant share of electricity demand in countries like Iceland, El Salvador, New Zealand, Kenya, and the Philippines. Iceland, specifically, generates more than 90% of its electricity demand from

geothermal energy. Iceland, located where the North American and Eurasian plates are diverging, possesses enormous underground reservoirs of water that are continually renewed by annual precipitation from Iceland's glaciers. Shallow plumes of magma heat the deepest reaches of these reservoirs to temperatures in excess of 750 degrees Fahrenheit. By financing thermal and electric power plants throughout the country, as well as the infrastructure required to deliver hot water to homes, the Icelandic government not only eliminated the country's dependence on fossil fuels for heating and electricity, but also jump-started an entire industry.

## Solar Energy



Solar power is energy from the sun that is converted into thermal or electrical energy. Solar energy is the cleanest and most abundant renewable energy source available, and the U.S. has some of the richest solar resources in the world. Solar technologies can harness this energy for a variety of uses, including generating electricity, providing light or a comfortable interior environment, and heating water for domestic, commercial, or industrial use. There are three main ways to harness solar energy: photovoltaics, solar heating & cooling, and concentrating solar power. Photovoltaics generate electricity directly from sunlight via an electronic process and can be used to power anything from small electronics such as calculators and road signs up to homes and large

commercial businesses. Solar heating & cooling (SHC) and concentrating solar power (CSP) applications both use the heat generated by the sun to provide space or water heating in the case of SHC systems, or to run traditional electricity-generating turbines in the case of CSP power plants.

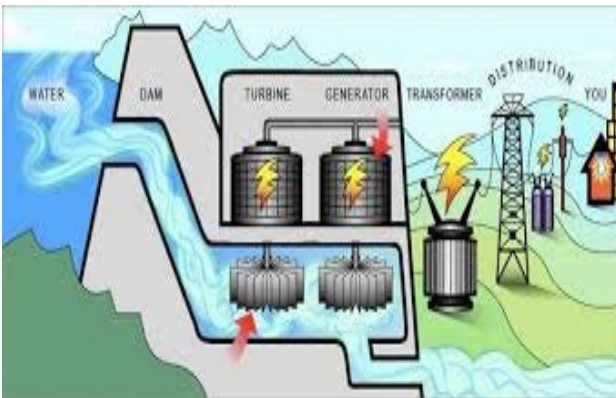
## Wind Energy



Wind energy (or wind power) refers to the process of creating electricity using the wind, or air flows that occur naturally in the earth's atmosphere. Modern wind turbines are used to capture kinetic energy from the wind and generate electricity. When the wind blows past a wind turbine, its blades capture the wind's kinetic energy and rotate, turning it into mechanical energy. This rotation turns an internal shaft connected to a gearbox, which increases the speed of rotation by a factor of 100. That spins a generator that produces electricity. There are three main types of wind energy: utility-scale wind, which uses wind turbines that generate 100 kilowatts to several megawatts of electricity that is delivered to a power grid and distributed to users by

utilities or power system operators. Distributed wind uses single, small-wind turbines that generate below 100 kilowatts of electricity that is used to directly power a home, farm or small business and is not connected to a grid. Offshore wind uses turbines that are erected in large bodies of water, usually on the continental shelf. Offshore wind turbines are larger than land-based turbines and can generate more power.

## Hydroelectric Energy



Hydroelectric energy, also called hydroelectric power or hydroelectricity, is a form of energy that harnesses the power of water in motion—such as water flowing over a waterfall—to generate electricity. People have used this force for millennia. Most hydroelectric power plants have a reservoir of water, a gate or valve to control how much water flows out of the reservoir, and an outlet or place where the water ends up after flowing downward. Water gains potential energy just before it spills over the top of a dam or flows down a hill. The potential energy is converted into kinetic energy as water flows downhill. The water can be used to turn the blades of a turbine

to generate electricity, which is distributed to the power plant's customers. Hydroelectric energy is the most commonly-used renewable source of electricity. The Three Gorges Dam in China is the world's largest producer of hydroelectricity. Other top producers of hydropower around the world include the United States, Brazil, Canada, India, and Russia. Approximately 71 percent of all of the renewable electricity generated on Earth is from hydropower.