

# Clean Energy Glossary

There may be many new terms that both adults and students might encounter in their journey through this unit. Below you will find a short energy glossary in simple language. For more terms and additional definitions, you are encouraged to browse some of the glossaries on the Internet at the end of this section. Sometimes you might have to explore a topic a bit deeper to get an understanding you are satisfied with. Keep asking questions, looking up information and helping each other learn!

**Alternative Fuel:** Fuels not usually used but which may have human health or national security benefits. Some examples of alternative fuels would be natural gas, biodiesel, propane, or electricity. You can get more information than imaginable at this adult-oriented site, the Alternative Fuels Data Center: [www.eere.energy.gov/afdc](http://www.eere.energy.gov/afdc)

For more accessible information, download the fact sheets from Cars of Tomorrow and the American Community and Planet Connecticut at: <http://www.nesea.org/k-12/curricularunits/>

**Atmosphere:** Layers of gases around the earth, including the air we breath, which is mostly nitrogen (78%), about 21% oxygen, with the rest being small but very important amounts of other gases including water vapor, argon, carbon dioxide, neon, helium, methane, hydrogen, nitrous oxide and ozone.

**Biodiesel:** An alternative fuel made from fat or vegetable oil that can be used directly or mixed with a conventional diesel in a diesel engine.

**Climate:** Moisture, temperature, and weather averaged over a long time period in a particular region. Usually it is measured over a 30 year time period. Check out Columbia University's Climate Kids Corner for more information: <http://ocp.ideo.columbia.edu/climatekidscorner/>

**Climate Change:** Patterns of change observed in climate-may be used to describe natural changes over time or human caused changes such as global warming. The National Atmospheric and Oceanic Association has an educational site that provides an extensive resource on climate change and many other topics for students of all levels: [www.education.noaa.gov/students.html](http://www.education.noaa.gov/students.html)

**Electrical Circuit:** An unbroken loop of material that electricity can flow through-like copper metal wires. If there is a break in the circuit, the electricity does not flow and cannot do work.

**Electricity:** A form of energy. We can use it for power when we get the electricity to flow (in the form of tiny parts of atoms called electrons) through wires in large numbers. Try this site for deeper exploration: <http://science.howstuffworks.com/electricity.htm>

**Electricity Generation:** Electrical energy is produced in different ways. Most electrical generating stations today use steam to spin coils of copper wire inside a magnetic field, which creates electricity. To make steam, we usually burn fossil fuels, mostly coal or oil, although sometimes the water is heated from splitting atoms (nuclear energy) and sometimes it is heated by concentrating sunlight. Moving water or wind can also be used to spin a turbine, which in turn spin coils of copper wire inside a magnetic field. Solar-electric cells can also be used to generate electricity. They convert sunlight into electricity with no moving parts.

Generate your own electricity by following Activity #2 in the Wind Wisdom guide – a free download from <http://www.nesea.org/k-12/curricularunits/>

**Emissions:** Gases, particles, and materials released or emitted into the environment often due to combustion or burning of a fuel.

**Energy:** The capacity to do work. A resource for producing power.

**Energy Conservation Strategies:** Techniques for avoiding wasteful and unnecessary use of energy. Avoiding excessive or unneeded use of energy prevents pollution, and keeps animals, people, and plants healthier. Many people are surprised about how much money they can save, too!

**Energy Star:** A government-backed program helping businesses and individuals protect the environment through superior energy efficiency. It include an efficiency rating that is given to appliances, like a refrigerator or computer, that use significantly less energy compared to other similar appliances. For more information see [www.energystar.gov](http://www.energystar.gov)

**Fuel:** Anything we burn or can burn to get energy, such as wood, gasoline, coal, heating oil, propane, natural gas, etc. Note that some fuels are cleaner when they burn than others.

**Fossil Fuels:** Natural fuels such as oil, coal, and natural gas that took millions of years to form in the earth. They are rich in the elements carbon and hydrogen and come from the remains of ancient living things. A friendly way to learn about fossil fuels with games, history, activities and more is found at U.S. Energy Information Administration, Energy Kids Page: [www.eia.doe.gov/kids/energyfacts/index.html](http://www.eia.doe.gov/kids/energyfacts/index.html)

**Geothermal Energy:** Heat energy from inside the earth. Alliant Energy has a clear explanation with pictures and is friendly for a wide range of ages. [www.powerhousekids.com](http://www.powerhousekids.com)

**Global Warming:** A term given to the observable fact that the earth's average temperature is increasing. There is strong evidence that human's use of fossil fuels is responsible for much of the observed warming although changes in land use, such as cutting down large tracks of rain forests, and some natural climate trends also seem to contribute to the warming.

For more information see the U.S. Environmental Protection Agency sites: [www.epa.gov/globalwarming/kids/index.html](http://www.epa.gov/globalwarming/kids/index.html), and [www.epa.gov/climatechange/index.html](http://www.epa.gov/climatechange/index.html)

**Greenhouse Gases:** Gases in our atmosphere that absorb heat energy (infrared radiation) that is given off by earth, heat up, and re-radiate that heat energy, some of it back to the earth. Carbon dioxide, water vapor, methane, nitrous oxide, and a number of other gases can do this. Humans have made great changes in how much carbon dioxide is in the atmosphere due to burning fossil fuels and changes in land use, such as clearing forests of trees.

**High Efficiency:** Getting a lot more work out of a small amount of energy.

**Hydrogen Fuel Cell:** A device that converts hydrogen and oxygen into electricity, water, and heat. [www.fuelcellstore.com](http://www.fuelcellstore.com)

**Kilowatt-hour (kWh):** A unit of electric energy often used to keep track of the amount of energy you bought from the electric company. It tells you how much electric power or rate of energy use (measured in kilowatts) was used over a given time (measured in hours). Check out your electric bill and it will show how many kWh you used each month for the last year, and you can even learn to read the figure off your own meter.

**Mercury:** A poisonous metal that is released into the air when coal is burned among other things. It can build up in the bodies of living things over time. Too much mercury in the body causes brain and nerve damage, and developing babies and young children are most vulnerable. That is why there are warnings for women who could have children not to eat or to limit eating fish from Massachusetts's waters.

Good basic information for different ages can be found at:  
<http://faculty.washington.edu/chudler/merc.html>

For an adult site that is still useful to teens see:  
[www.epa.gov/waterscience/fishadvice/advice.html](http://www.epa.gov/waterscience/fishadvice/advice.html)

**Nonrenewable:** Once it's used up, it's gone. For example, coal, oil, and natural gas are non-renewable energy sources. It may have taken nature 100 million years to make them and we cannot replace them once used.

**Nuclear Power:** Splitting atoms produces heat that is used to heat water to move turbines and generate electricity. For a teacher created web site with interesting interviews, activities, and information see:  
[www.naschools.net/teachers/nuclear/nuclear.htm](http://www.naschools.net/teachers/nuclear/nuclear.htm)

**Ozone:** An important gas made up of three oxygen atoms, which is good for us up high in the atmosphere and bad for us and the environment down low.

Up high, ozone shields us from harmful radiation. Some human made chemicals can break down the layer of ozone up high in the atmosphere.

Ozone is bad for us down low where we breathe (it damages lung tissue) and where it damages plants, especially food crops. Ozone is

the major pollutant in smog, and a lot of it is created from our use of gasoline and other fossil fuels.

**PV Cells, or Photovoltaic Cells:** A solid-state device, mostly silicon, that enables light energy from the sun to be transformed into electrical energy and transported through wires to do work in an electrical circuit.

**Photovoltaic (PV) System:** A system of electrical energy generation that uses photovoltaic (PV) cells to convert sunlight into usable electric energy. Get many of your questions about PV systems answered at [www.solarenergy.org/resources/olderkids.html#1](http://www.solarenergy.org/resources/olderkids.html#1)

To learn more technical details about how photovoltaic cells work, see [www.howstuffworks.com/solar-cell1.htm](http://www.howstuffworks.com/solar-cell1.htm)

For inspiring profiles of interesting people involved in solar energy and a kid-friendly Q and A format, try Solar Energy International [www.solarenergy.org/resources/kids.html](http://www.solarenergy.org/resources/kids.html)

**Power:** The rate at which work is accomplished.

**Renewable:** A resource that renews or replenishes itself on a short time scale. Examples include solar, wind, geothermal, hydropower, and biomass. Here are a few sites:

For kids, Alliance Energy a company that serves utility customers with natural gas and electricity has basic simple information. [www.alliantenergykids.com](http://www.alliantenergykids.com)

The Energy Efficiency and Renewable Energy government site offers a kids home page with video clips, fact sheets, activities and more: <http://www.eere.energy.gov/kids/>

For older elementary through adult, The Union of Concerned Scientists has very readable information in "Energy 101" as well as sound information on how biomass, solar, hydroelectric wind and geothermal work. [www.ucsusa.org](http://www.ucsusa.org)

**Smog:** A mixture of air pollutants, mostly ozone. You cannot see as far when there is smog, and even at low levels, it can harm some people, inflaming their lungs, and making breathing difficult. Try out this interactive site: [www.smogcity.com](http://www.smogcity.com)

**Solar panels:** When referring to solar electric energy, a solar panel is a group of PV cells wired together and packaged in a protective case so that, when mounted in a sunny location, it can be used to convert sunlight into electricity.

When referring to solar heat energy, a solar panel is a collection of pipes connected together and packaged in a protective case so that, when mounted in a sunny location, it can be used to convert sunlight into hot water or, less often, hot air.

**Strip Mining:** A form of mining where the surface soil is stripped off to expose the substance being mined. Coal is often mined from the surface by mountain top removal.

This site offers information and resources about coal mining including strip mining: <http://www.enviroliteracy.org/article.php/1122.html>

This Public Broadcasting Station site offers a short description of a film "Razing Appalachia" some pictures and an insight on the controversies around the method:  
[www.pbs.org/independentlens/razingappalachia/mtop.html](http://www.pbs.org/independentlens/razingappalachia/mtop.html)

**Sustainable:** A practice of resource use that can be maintained indefinitely without causing major harm to the environment, animals, and plants.

**Technology:** Anything people have made could be called technology, but usually people think of advances in using scientific knowledge and applying it to a practical use, like creating photovoltaic cells or wind turbines.

**Turbine:** A machine that spins to generate power. Electricity can be generated if you spin magnets inside coils of wire. Michael Faraday was a scientist from the 1800s who figured out this important scientific idea that has been put to practical use ever since!

**Watt:** A watt is a measure of power often used to measure electric power. In other words, the rate, or how fast electric energy gets used. A 100-watt bulb can receive more energy per second than a 60-watt bulb and so it is brighter and hotter. A kilowatt (kW) means 1000 watts, a megawatt (MW) means a million (1,000,000) watts, and a gigawatt (GW) is a billion (1,000,000,000) watts.

**Wind Energy:** Today, wind energy refers to using blades attached to a turbine to convert wind energy into electric energy. It could also refer to converting wind energy into mechanical energy. Wind energy has been used for centuries to pump water and grind grains. Wind energy is the fastest growing source of electric energy in the world and in the United States. The American Wind Energy Association offers a thorough tutorial for more in depth and advanced exploration. Visit [www.awea.org/](http://www.awea.org/)

The Renewable Energy Research Laboratory Center for Energy Efficiency and Renewable Energy offers a series of reliable fact sheets on wind energy, perfect for an in-depth study on wind. See [www.ceere.org/rerl/about\\_wind/](http://www.ceere.org/rerl/about_wind/)

## **Energy Glossaries on the Internet**

### **Massachusetts Technology Collaborative's Energy Glossary**

Organized alphabetically and by topic.

<http://www.masstech.org/cleanenergy/energy/glossaryMAgov.htm>

### **U.S. Environmental Protection Agency's Clean Energy Glossary**

Written with adults in mind: [www.epa.gov/cleanenergy/energy-and-you/glossary.html](http://www.epa.gov/cleanenergy/energy-and-you/glossary.html)

### **U.S. Department of Energy, Energy Information Administration**

Though found on the Energy Kids Page, it uses many terms that could be challenging for kids to understand.

[www.eia.doe.gov/kids/glossary/index.html](http://www.eia.doe.gov/kids/glossary/index.html)

### **Clean Energy Tidbit**

To generate the same amount of electricity as a single 1-MW wind turbine for 20 years would require burning 26,000 tons of coal (a line of 10-ton trucks 10 miles long) or 87,000 barrels of oil. To generate the same amount of electricity as today's U.S. wind turbine fleet (6,374 MW) would require burning 8.6 million tons of coal (a line of 10-ton trucks 4,321 miles long) or 28 million barrels of oil *each year*.

[www.masstech.org/renewableenergy/Community\\_Wind/FAQ.htm](http://www.masstech.org/renewableenergy/Community_Wind/FAQ.htm)

Bird deaths from wind turbines are small compared with other human structures. [http://go.ucsus.org/just\\_the\\_facts/42.html](http://go.ucsus.org/just_the_facts/42.html)