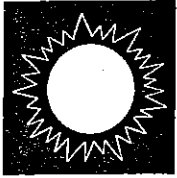




# ENERGY *debate*

## WIND

	RELEVANT		
	IT'S A FACT	ADVANTAGE	DISADVANTAGE
1. Wind is air in motion caused by the uneven heating of the earth's surface by the sun.			
2. Wind machines do not cause air or water pollution because no fuel is burned to generate electricity.			
3. Wind is a renewable source of energy.			
4. Wind machines operate on average about two-thirds of the time, though not always at capacity.			
5. For hundreds of years, windmills were used to grind wheat and corn, to pump water and to cut wood at sawmills.			
6. Wind machines have turning blades to collect the wind's kinetic energy. The blades are connected to drive shafts that turn electric generators to make electricity.			
7. Wind plants can convert 30-40 percent of the wind's kinetic energy into electricity.			
8. When the wind is not blowing, other sources of electricity must be used.			
9. The location of a wind farm is carefully planned, with good sites including the tops of smooth, rounded hills, open plains or shorelines, and mountain gaps.			
10. Wind machines provide the U.S. with enough electricity to power a city the size of Chicago, IL.			
11. Wind power plants, or wind farms, are clusters of dozens of wind machines spread over a large area. The land around the wind machines can also be used for grazing or growing crops.			
12. Wind farms are often owned and operated by business people who sell the electricity to utility companies.			
13. Wind machines can be used in remote areas that do not otherwise have access to electricity.			
14. Almost every state has the capacity to produce electricity from wind.			
15. The U.S. produces about a tenth of the world's wind energy.			
16. Older wind machines are very noisy; new technologies have eliminated most noise pollution.			
17. Windmills can injure birds that fly into the spinning blades.			
18. It costs about \$.05/kWh to produce electricity from wind power plants.			
19. New wind machines can generate electricity at about the same cost as coal-fired plants.			



# ENERGY *debate*

## SOLAR

	RELEVANT	
	IT'S A FACT	DISADVANTAGE
1. The sun radiates more energy in one second than people have used since time began.		
2. The sun is a big gas ball made up mostly of hydrogen and helium gas. It produces radiant energy in a process called nuclear fusion.		
3. Harnessing radiant energy from the sun is difficult because the energy that reaches the earth is very spread out.		
4. Only a small part of the solar energy radiated ever reaches the earth.		
5. It takes the sun's energy just over eight minutes to travel 93 million miles to the earth.		
6. Solar energy is a renewable energy source.		
7. Solar energy is used to heat buildings and water and to generate a small amount of electricity.		
8. The amount of solar energy reaching an area depends on the time of day, season of the year, cloud coverage and geographic location.		
9. Most of the solar energy we use every day cannot be measured.		
10. A solar collector can be used to capture sunlight and change it into usable heat energy.		
11. An active solar home in the Northern Hemisphere uses special collectors facing south to absorb sunlight and change it into heat. Air or water flows through the collector and is warmed by the heat.		
12. Passive solar homes do not need special equipment.		
13. Photovoltaic cells can convert radiant energy from the sun directly into electricity.		
14. Photovoltaic comes from the words <i>photo</i> meaning light and <i>volt</i> , a measurement of electricity.		
15. Photovoltaic – or PV – systems are expensive and are used mainly to generate electricity in remote areas.		
16. Small PV cells are used to power roadside telephones, calculators and toys.		
17. PV cells convert about 10 percent of the energy they receive into electricity.		
18. Electricity from PV cells costs about \$0.20/kWh. The average cost of electricity in the U.S. today is about \$0.08/kWh.		
19. Large solar systems can take up a large amount of land.		
20. Solar energy does not pollute the air.		



# ENERGY *debate*

## PROPANE

	RELEVANT		
	IT'S A FACT	ADVANTAGE	DISADVANTAGE
1. About half of the propane we use comes from natural gas processing and half from petroleum refining . We import about 10 percent of the propane we use.			
2. Under normal conditions propane is a gas, but under moderate pressure or low temperature, propane becomes a liquid.			
3. Propane is stored as a liquid in pressurized tanks because it takes up 1/270 of the space and is very portable.			
4. Propane becomes a gas when it is released from the pressure in the tank. As a gas, it is used to fuel appliances.			
5. Like natural gas, propane is colorless and odorless. An odorant called mercaptan is added as a safety measure.			
6. Propane is a nonrenewable energy source. It is the cleanest burning fossil fuel.			
7. Propane is moved through pipelines to distribution terminals.			
8. Propane is taken from distribution terminals to bulk plants by trains, trucks, barges and supertankers. Here, local dealers fill their small tank trucks and distribute it to their clients.			
9. Propane is mostly used in rural areas that do not have natural gas service. Homes and businesses use it for heating, hot water, cooking and clothes drying.			
10. Half of all America's farms rely on propane to dry crops, power tractors, heat greenhouses and warm chicken houses.			
11. Propane is also used by taxicab companies, government agencies and school districts to fuel their vehicles.			
12. Propane is clean burning and leaves car engines free of deposits. Engines fueled by propane also emit fewer pollutants.			
13. There is a slight drop in miles per gallon when propane is used to fuel vehicles.			
14. Propane isn't widely used as a transportation fuel because it is not as conveniently available.			
15. An automobile engine must be adjusted to use propane, which can be a costly process.			
16. Propane gas is heavier than air and can explode if a leak occurs.			
17. Propane is slightly more expensive than natural gas, heating oil or kerosene.			
18. Propane is clean burning; it is used to power indoor vehicles such as forklifts.			
19. Propane supplies and price are tied to oil and natural gas supplies and costs.			



# ENERGY *debate*

# PETROLEUM

	IT'S A FACT	RELEVANT	
		ADVANTAGE	DISADVANTAGE
1. The word petroleum is derived from the word <i>petro</i> meaning rock, and the word <i>oleum</i> meaning oil.			
2. Petroleum deposits were formed over millions of years from the remains of marine plants and animals.			
3. Petroleum is a nonrenewable energy source.			
4. Oil deposits are found in many areas, especially along the ocean coasts.			
5. The U.S. imports almost two-thirds of the petroleum it uses from other countries.			
6. The U.S. has large petroleum deposits in Alaska and offshore.			
7. Many offshore resources are not now being developed because of Federal government regulations against drilling in these areas.			
8. About 25 percent of the oil the U.S. produces comes from offshore wells, mostly in the Gulf of Mexico.			
9. Petroleum straight from the well – crude oil – is not usable. It must be refined into gasoline and other products.			
10. Refining – or cooking – petroleum at different temperatures makes the hydrogen and carbon atoms combine in many different ways.			
11. We get many fuels from refining petroleum – gasoline, kerosene, jet fuel – that can be burned to produce heat, light, electricity or motion.			
12. Many chemical products from petroleum can be used to make plastics, medicines, fertilizers and other products.			
13. When petroleum products are burned, potentially harmful emissions are produced.			
14. To protect the environment, oil drilling and production are regulated by federal and state governments.			
15. Oil is transported by pipeline, truck, or tanker to where it is refined and/or used.			
16. If oil is spilled into the water or onto the land, it can cause damage to the environment.			
17. Petroleum products are efficient, economical transportation fuels. Most transportation in the United States is fueled by petroleum products.			
18. Today, gasoline powered vehicles produce fewer emissions than they did in the 1970s, because of advances in engine design and fuel formulation.			
19. Petroleum is the United States' leading source of energy, supplying more than 37 percent of the energy used in the U.S.			
20. At current rates of consumption, there is a 75-125 year worldwide reserve of petroleum.			



# ENERGY *debate*

## NATURAL GAS

	RELEVANT		
	IT'S A FACT	ADVANTAGE	DISADVANTAGE
1. Natural gas is the result of the decomposition of tiny sea plants and animals that died millions of years ago.			
2. The chemical name for natural gas is methane.			
3. Natural gas is odorless; an odorant is added for safety.			
4. Natural gas can be processed and other products recovered from it.			
5. Natural gas is the cleanest burning fossil fuel.			
6. Usually, natural gas and petroleum are found together in underground deposits.			
7. In the past, oil drillers were not interested in the natural gas that was found at the site of an oil well. Often the gas was burned off at the site and wasted.			
8. The invention of high pressure pipelines has made it possible to ship gas all over the U.S.			
9. Leaks can occur in natural gas pipelines. Fires and explosions can result from these leaks if proper safety precautions are not taken.			
10. About 25 percent of the natural gas we use comes from offshore wells.			
11. Natural gas is considered a nonrenewable resource.			
12. Today, we have a large supply of natural gas and prices are reasonable.			
13. Industry is the number one consumer of natural gas.			
14. Natural gas can be used as a clean burning transportation fuel.			
15. It is estimated that natural gas supplies will last from 30 to 50 years at today's prices and consumption rate.			
16. There are large reserves of natural gas offshore, on the outer continental shelf and in the Gulf of Mexico.			
17. It is estimated that natural gas supplies could last 200 years at higher prices.			
18. More than half of the homes in the U.S. use natural gas for heat.			
19. Natural gas is used to produce peak load electricity because gas furnaces can be brought on line and shut down quickly and efficiently.			
20. Methane is a greenhouse gas. Scientists think that changing the levels of greenhouse gases in the atmosphere can affect the global climate.			



# ENERGY *debate*

# HYDROPOWER

	RELEVANT		
	IT'S A FACT	ADVANTAGE	DISADVANTAGE
1. Moving water has been used as a source of energy for thousands of years.			
2. Hydropower is considered one of the cleanest and cheapest energy sources in widespread use today.			
3. Water is considered a renewable energy source.			
4. Moving water can turn a turbine to generate electricity.			
5. Hydropower was first used to turn water wheels to grind grain.			
6. Hydroelectric power is considered reliable because dams can be built to store water. Controlling the flow of the stored water allows a power plant to operate in all weather conditions.			
7. About 5-10 percent of total U.S. electricity is generated by hydropower plants, depending on the amount of rainfall.			
8. Hydropower provides the U.S. with about 2.7 percent of our total energy consumption.			
9. In the last 50 years, hydropower production in the United States has increased by 900 percent.			
10. The nation's largest producer of hydroelectric power is the federal government, which operates many large dams and power plants.			
11. There are about 2,000 hydroelectric power dams in the U.S. today.			
12. There are about 63,000 dams that <i>do not</i> have generating plants on them.			
13. If we build generating stations at the most suitable dams and build new dams on suitable rivers, we can double our hydroelectric capacity.			
14. When a hydro dam is built, thousands of acres of nearby land are flooded to create a reservoir.			
15. Flooding alters or destroys many plant and animal habitats in the area.			
16. Dams can disturb the migration and spawning of fish populations in the river.			
17. Dams can alter the natural flow of the river and change the amount of water that reaches communities downstream.			
18. The reservoirs are often developed for recreational purposes, such as boating and fishing.			
19. The use of hydropower in the United States is not expected to increase significantly in the future.			
20. Some countries use hydropower as their main source to produce electricity. South America produces 75 percent of its electricity from hydropower.			



# ENERGY *debate*

## GEO THERMAL

	RELEVANT		
	IT'S A FACT	ADVANTAGE	DISADVANTAGE
1. Geothermal energy comes from heat within the earth.			
2. Features of geothermal energy are hot springs, volcanoes and geysers.			
3. Geothermal energy is generated in the earth's core, which is made of magma, or molten iron, surrounding a solid iron center.			
4. Red hot temperatures are continuously produced inside the earth by the slow decay of radioactive particles found in all rocks.			
5. Geothermal energy is renewable. The hot water used by power plants is continuously replenished by rain and the heat is continually produced.			
6. Wells can be built to pump superheated water to the surface.			
7. Geothermal energy is used to produce electricity and heat buildings.			
8. Geothermal energy was used by ancient people for heating and bathing. Hot springs are said to have therapeutic effects today.			
9. In 1904, the Italians first used the steam erupting from the earth to power a turbine generator.			
10. Dry steam reservoirs are the most efficient, but they are very rare.			
11. Geothermal energy is expected to grow in the future. It is estimated that geothermal energy could provide California with a tenth of its electricity in the next ten years.			
12. High temperature geothermal resources that are able to produce electricity are not economically available in all parts of the nation.			
13. The most active geothermal resources are found along major tectonic plate boundaries, where magma comes up to the earth's surface.			
14. Geothermal energy produces less than one percent of the electricity consumed in the nation.			
15. Geothermal energy does little damage to the environment, because the plants sit on or near the geothermal reservoir and do not burn any fuel.			
16. Geothermal steam and hot water contain traces of hydrogen sulfide and other gases and chemicals that are harmful at high concentrations.			
17. The gases and chemicals from geothermal power plants are usually injected back into the earth.			
18. The temperature of the earth a few feet underground remains constant year round - about 52 degrees Fahrenheit in moderate climates.			
19. Low temperature geothermal energy is available everywhere in the U.S.			
20. Geothermal heat pumps use the earth's constant temperature as an energy source to heat buildings in winter and cool them in summer.			



# ENERGY *debate*

## COAL

	RELEVANT		
	IT'S A FACT	ADVANTAGE	DISADVANTAGE
1. Coal is the most abundant fuel in the United States. We have about a 270 year supply at the current rate of consumption.			
2. Although coal is still being formed today, we use it thousands of times faster than it is formed.			
3. Coal generates about half of the electricity in the U.S.			
4. The United States exports about two percent of the coal it produces to other countries.			
5. Coal has been burned to heat food, living space, and water for thousands of years.			
6. Today, about 92 percent of U.S. coal is used to make electricity.			
7. When coal is burned, carbon dioxide, sulfur dioxide, nitrous oxides and other residues are produced.			
8. To remove coal from deep in the earth, mine shafts are constructed to bring the coal to the surface.			
9. An easier way to mine coal near the earth's surface is to remove the layers of earth to uncover the coal. This is called surface mining.			
10. Large amounts of land are disturbed in the process of surface mining.			
11. Surface mines can be restored to grasslands or parks after the coal is removed.			
12. About two-thirds of the nation's coal is produced from surface mines.			
13. The water that filters through abandoned mines can pick up chemicals that pollute the water if the mines are not closed correctly.			
14. Coal can be turned into other materials or products we can use.			
15. Coal can be turned into a gas. This process is too expensive to be used to replace oil and natural gas.			
16. Coal miners can develop lung diseases if they breathe too much coal dust at mine sites.			
17. New technologies allow coal to be mined and burned in cleaner ways.			
18. Clean coal technologies require less coal to produce the same amount of electricity.			
19. The methane gas that is found in much of the coal in the U.S. is a valuable resource.			
20. The coal industry spends billions of dollars to reduce harmful emissions from coal.			





# ENERGY *debate*

# BIOMASS

IT'S A FACT	RELEVANT	
	ADVANTAGE	DISADVANTAGE
1. Biomass is a source of energy from plant materials and animal waste.		
2. Biomass is a renewable energy source; we can grow more biomass.		
3. Biomass is difficult to store and transport because it decays.		
4. As biomass decays, more of its energy is available for use as fuel.		
5. Biomass was the first source of energy used by humans.		
6. Biomass is found throughout the nation.		
7. The amount of energy stored in biomass is less than the energy stored in the same amount of a fossil fuel.		
8. Biomass can be used as a fuel because it captures and stores radiant energy from the sun through the process of photosynthesis.		
9. Two percent of American homes use biomass (burn wood) for heat.		
10. Biomass is abundant and can be produced almost everywhere in the U.S.		
11. Burning biomass can produce harmful emissions.		
12. Burning biomass in a waste-to-energy plant produces electricity and heat.		
13. Biomass provides 2.9 percent of the nation's energy demand.		
14. Almost 80 percent of biomass energy comes from wood at the present time.		
15. Scientists are developing trees that can be grown to full size in less than half the time of the average tree.		
16. Biomass can be made into ethanol, a transportation fuel that is cleaner-burning than unleaded gasoline and produces less carbon monoxide when burned.		
17. Alcohol fuels made from biomass are more expensive than gasoline.		
18. Mixing ethanol with gasoline produces gasohol, a cleaner burning fuel used mostly in the Midwest.		
19. Burning biomass in a waste-to-energy plant reduces the amount of garbage sent to landfills.		
20. Waste-to-energy plants use scrubbers and other technologies to reduce emissions and odors.		



# ENERGY *debate*

# URANIUM

	RELEVANT		
	IT'S A FACT	ADVANTAGE	DISADVANTAGE
1. In 1939, scientists discovered that certain atoms could be split. The splitting of these atoms releases a great deal of energy.			
2. Over one hundred nuclear power plants using uranium for fuel are operating in the U.S.			
3. Nuclear plants provide about 20 percent of the electricity generated in the U.S.			
4. A nuclear reactor can supply a large amount of energy using a very small amount of fuel.			
5. The construction of nuclear power plants is very expensive compared to fossil fuel plants.			
6. Nuclear reactors do not burn uranium to generate electrical power, they split the uranium atoms, so their emissions are minimal.			
7. Uranium is easy to transport.			
8. Uranium is very inexpensive.			
9. The U.S. has abundant supplies of uranium. Today, however, we import most of the uranium used in power plants because it is cheaper to do so.			
10. Nuclear power plants produce electricity by heating water into steam, in the same way as fossil fuel plants.			
11. Workers at nuclear power plants receive less radiation from the plant than they do from other sources like medical x-rays and color TV sets.			
12. Some parts of reactors become radioactive after they have been used.			
13. Radioactive waste from nuclear power plants is stored underground in huge concrete tanks or in spent fuel pools at the plant sites.			
14. A permanent nuclear waste repository is planned for Yucca Mountain, Nevada.			
15. Uranium is a nonrenewable energy source.			
16. A nuclear power plant produces a lot of waste heat. If this heat is put into a moving water system, the water temperature can increase.			
17. The main health risk from a nuclear power plant is potential radiation exposure.			
18. Nuclear power plants in the U.S. are highly regulated and very safe.			
19. An accident at a nuclear power plant could cause widespread damage if people or the environment were exposed to high-level radioactivity.			