

Academic Packet #2

Environmental Science- Unit 6 Class Work

- ❖ The work for Academic Packet #2 consists of work for Unit 6. Complete the assignments and return for credit. The assignments on Google Classroom and the Academic Packets that are available for pick-up are the same assignments. The notes on Google Classroom go with the assignments that are posted online or available for pick-up.

- ✓ Unit 6 Vocabulary Sheet

- ✓ Waste Management Notes- Power-point is on Google Classroom

- ✓ Renewable Energy Notes- The KEY to the notes is on Google Classroom

- ✓ Energy Resource Packet with Energy questions worksheet, crossword, and word search – this is also available on Google Classroom

- ✓ Energy/Waste Review sheet- this is also available on Google Classroom

- ❖ If you have any questions concerning the work, contact me at fking@dcboe.com .

Unit 6 Vocabulary

1. municipal solid waste (MSW)
2. e-waste
3. incineration
4. recycling
5. remanufacturing
6. hazardous waste
7. renewable energy
8. non-renewable energy

Waste Management Notes

- What should we do with our waste?

- Types of Waste

- _____ any unwanted or discarded material we produce that is not a liquid or a gas.
 - MSW- produce directly from _____
 - Industrial Solid Waste- produced indirectly by _____ that supply people with goods and services
- _____ Threatens human health or the environment because it is _____, chemically active, _____ or _____.

- Dealing with hazardous waste

- _____ less of it
- _____ reuse or recycle it
- _____ it to a less hazardous material
- Safely _____ what is left
- _____

- Wasting Resources

- _____ is industrial solid waste and _____ is MSW
 - Where is most of our MSW dumped? _____

- E- Waste (electronic waste)

- Growing problem
- US produces almost _____ of the world's e-waste and recycles _____ of it

SOLUTIONS- Reducing Solid Waste

- _____
- _____
- _____
- _____
- _____

- Reuse- reduced resource use, _____, and pollution in developed countries.

- Can be hazardous in developing countries who scavenge in open dumps.

- Recycling

- _____ (closed loop) recycling- materials are turned into new products of the same type.
- _____ materials are converted into different products.
- Environment and economic benefits
 - Decrease in pollution
 - Less deforestation
 - Less energy
- Disadvantages
 - Difficult to separate
 - Inconvenient
 - Reduces profit of landfills and incinerators

- Incineration- _____ solid waste

- Advantages
 - Reduce _____
 - _____
 - Reduce volume of waste
- Disadvantages
 - _____
 - Sorting is expensive
 - _____ chemicals
 - Acid Rain/Global Warming

Waste Management Notes

• Burying Solid Waste

- Open Dumps- mostly in _____ countries
- _____
- Advantages to Landfills
 - Liners control groundwater _____
 - Waste is _____ and prevents to spread of insects/rodents.
 - Collection of _____
- Disadvantages
 - Land prices _____
 - _____ cost of managing landfill
 - _____ liability
 - _____

• Composting

- Advantages
 - _____ rich soil
 - _____ water
 - _____ erosion
 - _____ toxic
- Disadvantages
 - _____
 - Insects and rodents
 - _____

• Remanufacturing

- Advantages
 - _____ material that would have been thrown out
 - _____
- Disadvantages
 - Exposed to _____ material.

• Exporting

- Advantages
 - Immediate _____
 - _____ for developing countries

○ Disadvantages

- _____ to transport
- _____ developing countries

Law and Regulations Dealing with Disposal

▪ RCRA-

- EPA sets standards on _____ disposing _____
- _____ open dumping

▪ TSCA

- _____ tracks industrial chemicals produced or imported into the US
- _____ chemicals that pose health risks.

▪ CERCLA

- Rules for _____ and abandoned hazardous waste sites
- Creates _____ for clean up

▪ Nuclear Waste Policy

- Provide locations for _____ disposal of _____ waste
- _____ of nuclear power plant must pay the _____ of the disposal.

RENEWABLE ENERGY SOURCES

Biomass – turning your leftovers into fuel

Advantages

- _____ and renewable energy resource
- _____ whenever it is needed. If sustainably farmed, plants grown for biomass
- _____ carbon emissions as they grow.

Disadvantages

- Biomass fuel can become _____ if the stock of plants or animals being drawn from is not being replenished as efficiently as it is being used.
- The burning of biomass fuel produces _____ like carbon dioxide, monoxide, methane, nitrogen oxides, and more if the emissions are not properly harnessed and recycled

Solar

Advantages:

- Does not produce any _____ or _____.
- Solar energy systems installed on buildings have very little _____ effect on the environment.
- Can save homeowners a lot of _____ as they no longer have to pay for power bills.

Disadvantages:

- Entirely dependent on _____, time of day and the earth's orbit, making it less consistent of a fuel source.
- Require a _____ area of land.

Wind

Advantages:

- Completely renewable resource that produces no _____ or _____.
- Once the turbines have been made, there's next to _____ and all electricity produced is completely free.

Disadvantages:

- Energy production is not _____, and if the wind is not blowing the electricity _____.
- _____ are _____ and disrupt the natural _____.
- kill _____ and _____ as the fly past

Hydropower

Advantages:

- _____ means of generating electricity,
- _____ fuel source that is renewable based on yearly rainfall.

Disadvantages:

- _____ rivers causes serious disruptions to _____ and surrounding nature, causing some people to become concerned that the natural impacts may result in more damage than they are worth.

Geothermal- energy that comes from heat underneath the ground

Advantages:

- _____, clean resource which can be harnessed without using any fossil fuels.
- produces _____ carbon dioxide than clean natural gas power plants, and it is available 24 hours per day, all year round.

Disadvantages:

- releases bad _____ caused by hydrogen sulfide gas,
- requires the disposal of geothermal fluids which might have some _____ materials in their contents.
- it's not an easily _____ resource in many locations.

Key

RENEWABLE ENERGY SOURCES

Biomass – turning your leftovers into fuel

Advantages

- Clean and renewable energy resource
- Harnessed whenever it is needed. If sustainably farmed, plants grown for biomass
- Offset carbon emissions as they grow.

Disadvantages

- Biomass fuel can become non-renewable if the stock of plants or animals being drawn from is not being replenished as efficiently as it is being used.
- The burning of biomass fuel produces Greenhouse Gases like carbon dioxide, monoxide, methane, nitrogen oxides, and more if the emissions are not properly harnessed and recycled

Solar

Advantages:

- Does not produce any air pollution or particulate matter
- Solar energy systems installed on buildings have very little negative effect on the environment.
- Can save homeowners a lot of money as they no longer have to pay for power bills.

Disadvantages:

- Entirely dependent on weather, time of day and the earth's orbit, making it less consistent of a fuel source.
- Require a large area of land.

Wind

Advantages:

- Completely renewable resource that produces no pollutants or ghg
- Once the turbines have been made, there's next to no cost and all electricity produced is completely free.

Disadvantages:

- Energy production is not continuous, and if the wind is not blowing the electricity stops flowing
- Turbines are and disrupt the natural landscape loud
- kill bats and birds as they fly past

Hydropower

Advantages:

- Cheapest means of generating electricity,
- Clean fuel source that is renewable based on yearly rainfall.

Disadvantages:

- Damming rivers causes serious disruptions to wild life and surrounding nature, causing some people to become concerned that the natural impacts may result in more damage than they are worth.

Geothermal- energy that comes from heat underneath the ground

Advantages:

- Affordable, clean resource which can be harnessed without using any fossil fuels.
- produces 1/10th carbon dioxide than clean natural gas power plants, and it is available 24 hours per day, all year round.

Disadvantages:

- releases bad odor caused by hydrogen sulfide gas,
- requires the disposal of geothermal fluids which might have some toxic materials in their contents.
- it's not an easily accessible resource in many locations.

Name: _____

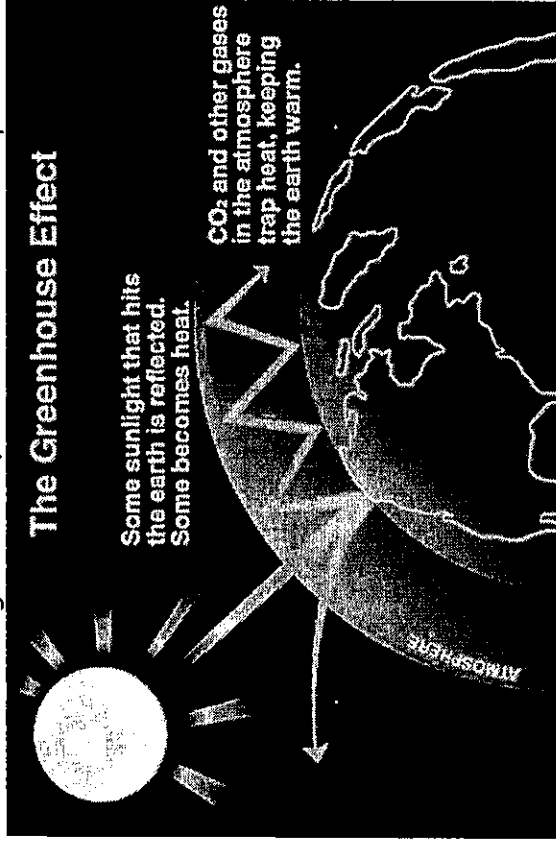
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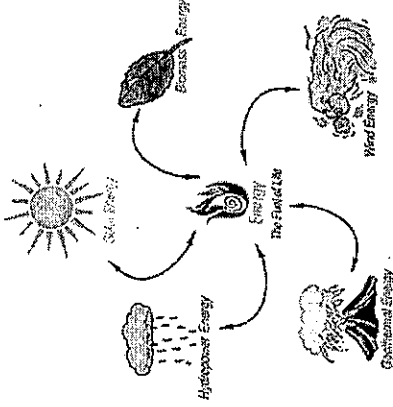
Energy Resources

Humans have been harvesting electricity and energy from natural resources for over a hundred years. This electricity is, or can be, used for almost everything we know today: from communication and lighting to cooking and transportation. However, not all electricity is produced in the same.

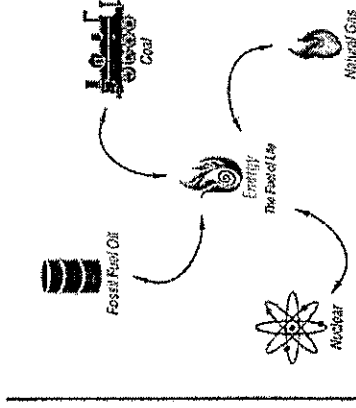
Energy resources are typically separated by how it is generated: *renewable* and *non-renewable*. **Renewable** energy resources generate electricity from sources that do not run out, or that can be renewed quickly. Hydropower generates electricity from moving water, which is very reliable - rivers rarely dry up, and tides and waves keep moving. **Non-Renewable** energy resources generate electricity from sources that cannot be quickly or easily renewed. Coal and petroleum take millions of years to form from dead life, and have limited amounts on Earth. Eventually these "fossil fuels" (energy sources formed from long-dead life) will run out with no way to renew them.



Renewable Energy



Non-Renewable Energy

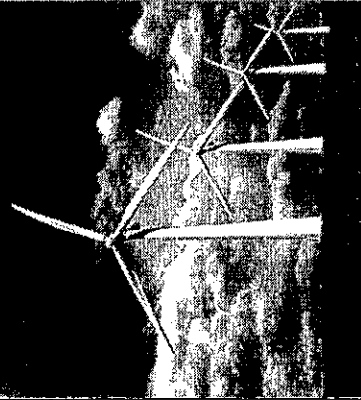


Another factor to think about with how electricity is produced is how each source affects the environment around us. Most renewable sources of energy do not emit **greenhouse gases**: chemicals in the air that capture sunlight and warm atmosphere. These are important because, with enough greenhouse gases in the atmosphere, it can become warm unnaturally, a process called **global warming**. *All fossil fuels release these chemicals when they are burnt*: coal, oil, petroleum, gasoline, and natural gas. Common greenhouse gases are carbon dioxide, methane, and water vapor. Furthermore, mining for certain resources, such as coal, can damage the environment.

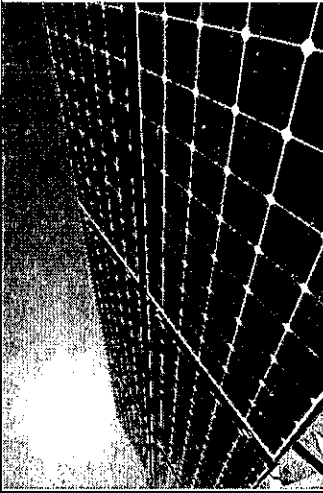


Open-pit coal mine. Notice how there is no life in or near this mine.

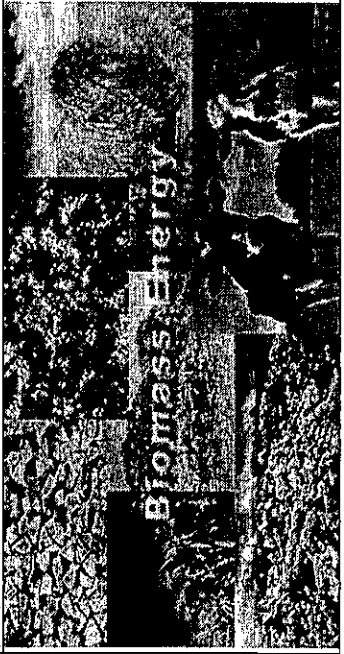
Renewable Resources are resources that are renewed naturally within a human lifespan. The sun, wind, hydropower, bioenergy, and geothermal are all renewed so that people can use them again and again without them running out. However, some of these sources can be considered to be limited because of how they generate electricity: the wind isn't always blowing, the sun isn't always shining, and rivers can dry up. There are areas, though, that are known for their wind, sun, and water: Nevada and Texas are known for being sunny, and decrease the limits of solar power because clouds rarely block the sun in these areas.



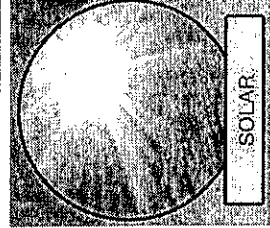
Wind energy produces electricity through the wind turning the blades on these towers. The blades spin turbines, producing electricity. This method works best in windy areas, and produces absolutely no carbon dioxide or methane.



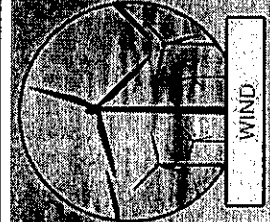
Solar power produces electricity through solar panels converting sunlight directly to electricity. It is considered "clean" because solar panels passively produce electricity without releasing carbon dioxide or methane.



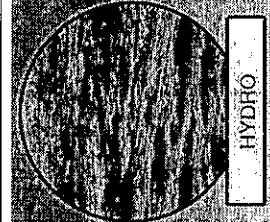
Biomass energy generates electricity through life: wood, corn, etc. This material can be burnt directly or rotted for methane, a fuel source. Cooking oils, such as vegetable oil, are normally generated from plants, and can be used as fuels in adapted engines: this means that some cars can run on the deep-frying oils used for french fries!



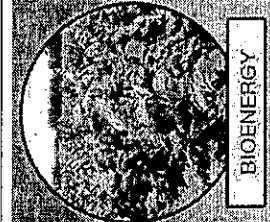
SOLAR



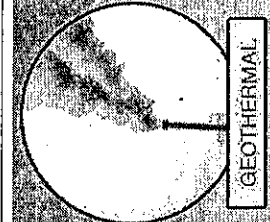
WIND



HYDRO



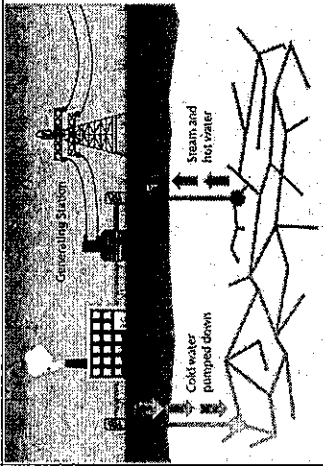
BIOENERGY



GEOTHERMAL

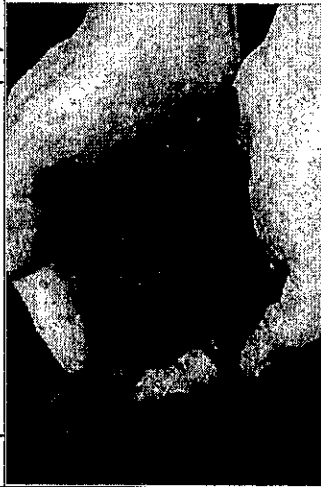


Hydroelectric energy, or hydro power, is generated by water moving through the power plant. Gravity always pulls water down, from the mountains to the sea, causing water to move. In the plant, moving water spins generators, which produce electricity.



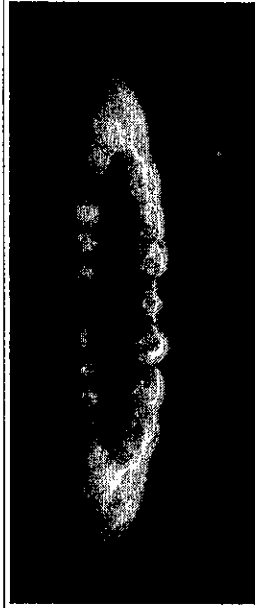
Geothermal energy can produce electricity by pumping water to hot areas in the Earth's crust. There, the water is heated to steam, runs up pipes to the surface, where it turns turbines and produces electricity.

Non-Renewable Resources are energy resources that are not renewed as quickly as we use them, if they renew at all. Except for nuclear, these resources are produced quickly, easily, and cheaply, are relatively cost-effective, and pollute the environment: releasing greenhouse gases, causing global warming, and some release chemicals that cause acid rain. The production of these energy sources involves mining (coal and nuclear) or drilling (oil and natural gas), which can be harmful to the areas around the production sites. "Fossil fuels" (oil, natural gas, and coal), formed from long-dead life, are limited in volume on Earth, meaning that one day these fuels will be used up. Nuclear is considered non-renewable because the radioactive materials used do not renew at all, but generate electricity in a unique way: unstable elements are mined and used to heat water, turning turbines to produce electricity. Nuclear facilities are large, expensive investments that pay out with electricity over time, so they are not as cheap, but have more fuel and potential than fossil fuels.

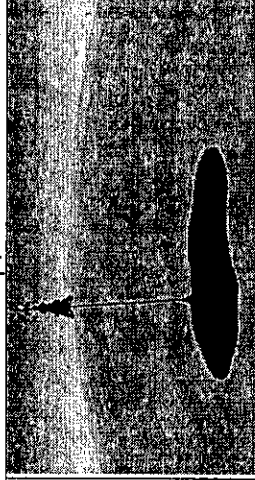
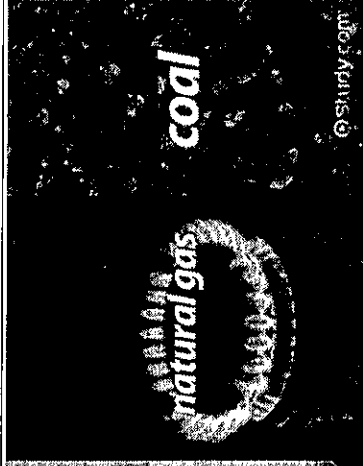
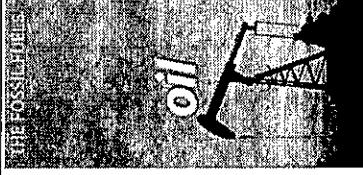


Coal is found underground, formed from the pressurized and heated remains of dead plants. It burns at high temperatures, which has been useful in transportation, transportation, and production of electricity. However, burning coal produces significant amounts of carbon dioxide, a greenhouse gas, along with other pollutants, causing global warming and acid rain. Mining, as the picture shows, can remove any vegetation in the area. This means that coal is a very environmentally damaging energy source.

Natural gas is a fossil fuel and a flammable gas, frequently used for lighting, cooking, and, more recently, vehicles. It is produced in a similar manner to oil: we drill a pipe to rock that contains the natural gas, and we pipe it up. Natural gas is primarily composed of methane, and produces carbon dioxide when burnt. Natural gas is considered "clean" because, while it still causes global warming if it leaks or is burnt, it is not as polluting as other fossil fuels.



Nuclear power uses radioactive materials to heat up water. These materials are mined, but contain great amounts of radioactive energy, which is released through fission: larger elements are split into smaller ones, converting mass into energy. While these carry some risk of the release of dangerous radioactivity, they are generally considered to be safe, and have potential for generating large amounts of energy.

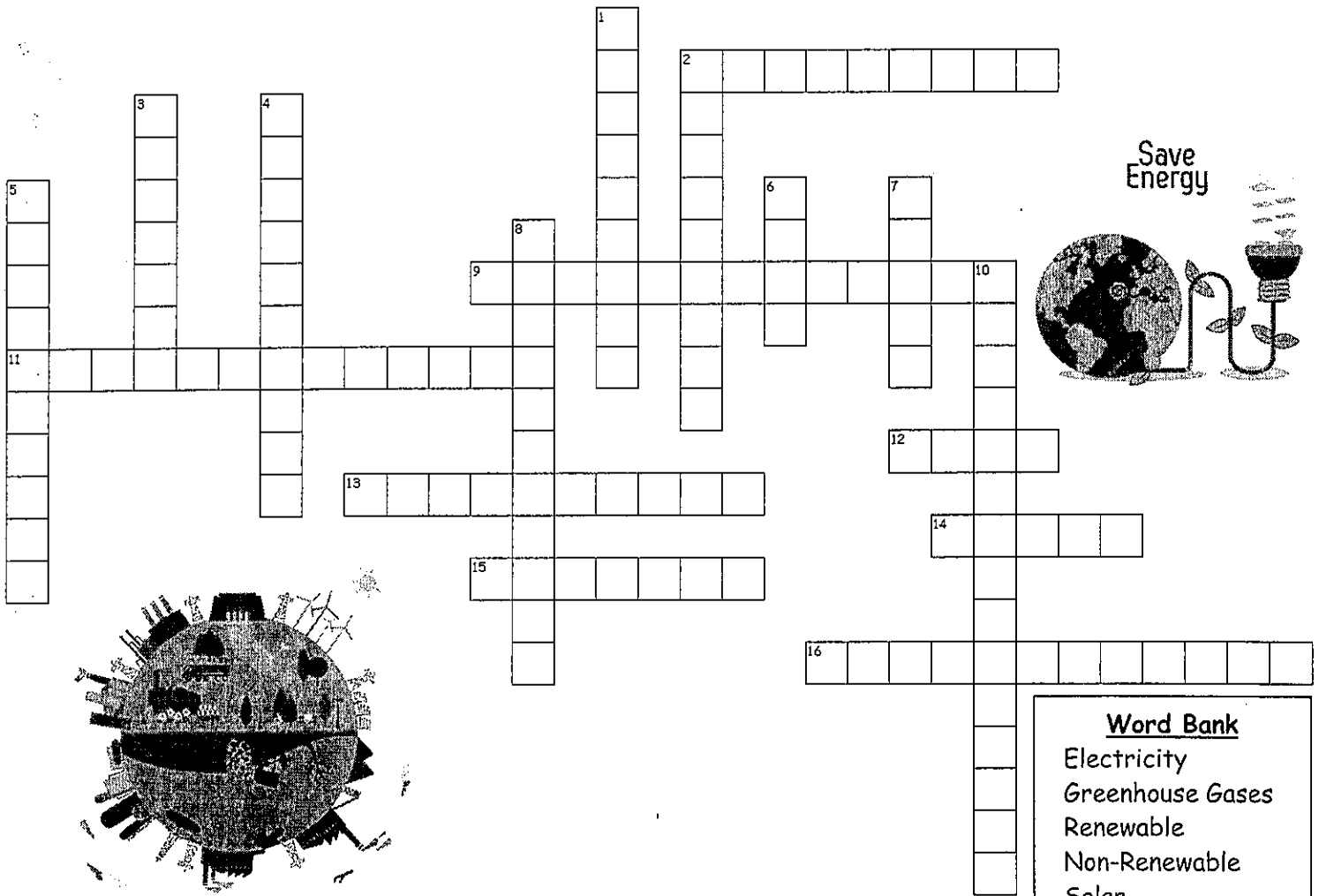


Oil, or **petroleum**, is produced by drilling a pipe into an oil-rich rock layer. Using various techniques, we can draw this oil up the pipe, and to the surface. Oil, like coal, produces plenty of carbon dioxide and pollutants when burnt, causing global warming and acid rain. Oil can leak from pipes and drill sites, which can cause more environmental damage and problems for life. Oil is what gasoline is made from: gasoline, when burned in cars, produces carbon dioxide.

Nuclear power uses radioactive materials to heat up water. These materials are mined, but contain great amounts of radioactive energy, which is released through fission: larger elements are split into smaller ones, converting mass into energy. While these carry some risk of the release of dangerous radioactivity, they are generally considered to be safe, and have potential for generating large amounts of energy.



Energy Resources Crossword



Word Bank

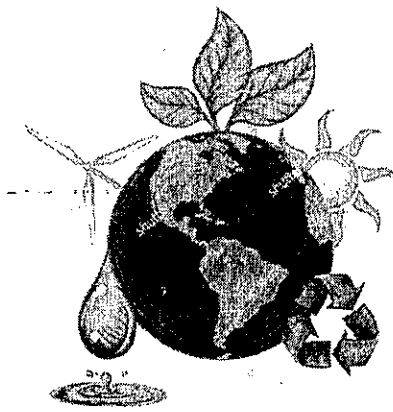
- Electricity
- Greenhouse Gases
- Renewable
- Non-Renewable
- Solar
- Wind
- Biomass
- Hydroelectric
- Geothermal
- Global Warming
- Fossil Fuel
- Coal
- Natural Gas
- Nuclear
- Petroleum
- Drill
- Pollution

Across

2. Contamination that is the environmentally damaging result of burning all fossil fuels
9. Rising atmospheric temperatures caused by the release of greenhouse gases
11. Energy source that produces from the electricity from moving water
12. Energy source that produces from the electricity from moving air
13. Liquid and solid energy sources formed from warmed long-dead life
14. Energy source that produces from the electricity from the sun
15. Energy source that produces from the electricity from life, such as corn and wood
16. Energy resources that are not readily replaced, and depleted when used

Down

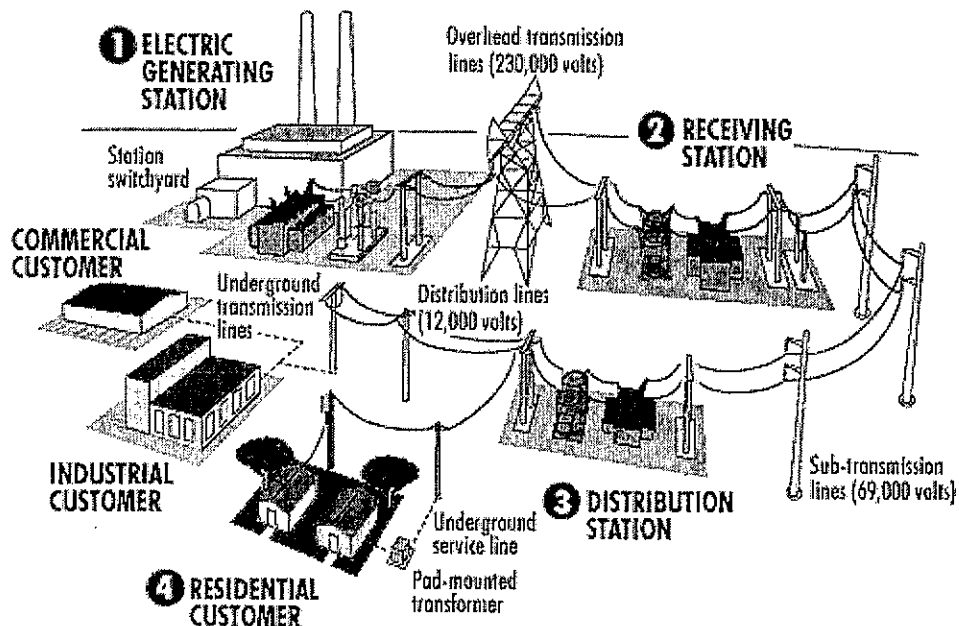
1. Energy resources that are not depleted when used
2. Liquid fossil fuel energy source that produces pollution when burnt
3. Energy formed from radioactive elements
4. Liquid fossil fuel energy source that produces electricity and heat as methane
5. Energy source that produces from the electricity from water heated underground
6. Solid fossil fuel energy source that produces electricity and heat from warmed and compressed long-dead life
7. Method for obtaining liquid fossil fuels
8. Why we build power stations, and the power for phones and TVs
10. Chemicals released into the environment when fossil fuels are burnt



Energy Resources Word Search

C V N A T U R A L G A S G Z
 S U P P N Z V C S J H N N J
 E L E H N L Y B O S Y U I P
 S L T S O L T D L K D C M J
 A E R N I I I S A N R L R W
 G U O E T R C B R O O E A A
 E F L R U D I G D N E A W T
 S L E B L R R E O R L R L T
 U I U S L E T O I E E G A W
 O S M S O N C T L N C B B I
 H S N S P E E H H E T H O N
 N O A A X W L E C W R U L D
 E F H M Z A E R F A I H G C
 E L S O T B H M T B C L O X
 R Y L I S L K A N L T A E X
 G P S B A E T L A E L B H O

RENEWABLE
 NONRENEWABLE
 SOLAR
 WIND
 BIOMASS
 HYDROELECTRIC
 GEOTHERMAL
 COAL
 NATURALGAS
 NUCLEAR
 OIL
 PETROLEUM
 DRILL
 POLLUTION
 ELECTRICITY
 GREENHOUSEGASES
 GLOBALWARMING
 FOSSILFUEL



Energy/ Waste Test Review

ENERGY SOURCES

1. What are 3 examples of renewable and non renewable energy sources? Know the difference!
2. List 2 advantages of fossil fuels and 2 advantages of renewable resources.
3. What are the 3 types of fossil fuels?
4. What environmental problems can burning coal cause? (Name 2)
5. What % of energy in the US is provided by nonrenewable resources and what % of energy is provided by renewable resources?
6. What element is used to create nuclear energy?
7. How does solar and wind energy create electricity?

WASTE MANAGEMENT

8. What should be our priorities (in order) when managing solid waste?
9. What does MSW stand for and what makes up the majority of our MSW?
10. Where does most of our MSW go and why is that a problem?
11. What are the 3 R's (in order)
12. What are the proper steps in dealing with hazardous waste?
13. What are 2 advantages and 2 disadvantages of recycling?
14. Why is reusing considered harmful in developing countries?
15. What is the problem with incineration?
16. Why is it illegal to transport our e-waste and what's happening to the countries allowing e-waste in?
17. What are the 4 laws dealing with waste disposal?
18. What does RCRA prohibit?
19. What does the TSCA regulate?
20. What has CERCLA created and why?