



e. = energy  
"alternative" → alternative to burning fossil fuels

car engine

## Fuel Cells

**Description of fuel cells:** batteries that run on  $H_2O$

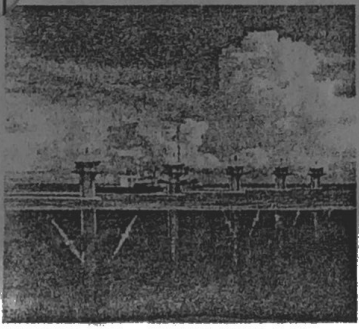
Renewable or nonrenewable

**How energy is produced:** hydrogen proton passes thru a membrane

**Ways we use energy from fuel cells:** generate electricity

**Who uses fuel cells and for what purposes:** NASA - space, research aquarium, people use in homes & cars ("hybrids")

**Effect of using fuel cells on the environment:** pollution free



clean

## Tidal Power/Energy

**Description of tidal energy:** underwater station on ocean floor sends power to shore during each tide (6 hours)

**Renewable** or nonrenewable

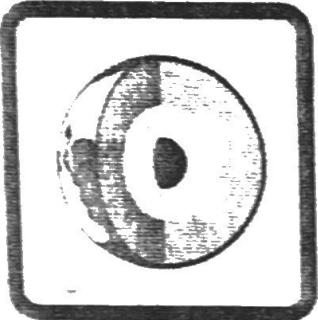
**How energy is produced:** tidal turbines - twin rotors capture infinite kinetic e. of tides (7 stories)

**Ways we turn tidal power into energy we can use:** connect turbines to power grid  
electric power

**Who uses tidal power and for what purposes:** Ireland, homes

**Effect of using <sup>tidal</sup> hydropower on the environment:** clean, eco-friendly, no oils

**Important facts about tidal power:** predictable energy output, reliable, efficient



# Geothermal Energy

Earth's interior

Description of geothermal energy: heat produced within Earth (core)

Renewable or nonrenewable:

Where geothermal resources are located and how we recover them: drill wells  
plate boundaries mostly, but anywhere

Ways we turn geothermal energy into energy we can use:

Pipe the heat where needed

Who uses geothermal energy and for what purposes:

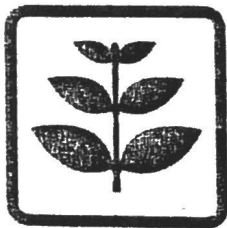
Power plants - convert to electricity      Homes - heat

Effect of using geothermal energy on the environment:

low emissions, clean

Important facts about geothermal energy:

not widely available  
expensive but long lasting



# life Biomass

Description of biomass: wood, straw, dung,  
are burned

Renewable or nonrenewable:

Ways we turn biomass into energy we can use: burn

Description of photosynthesis: sunlight → glucose  
 $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

Who uses biomass and for what purposes:

40% world's pop., cooking/warm

Effect of using biomass on the environment:

large amount of  $CO_2$  emissions

Important facts about biomass:

smoke kills people

# Biofuel

convert plants  
to liquid fuel

ferment to make  
gasahol / ethanol

autos + planes

takes up land to grow  
plants (corn)

not e. efficient  
need fossil fuels  
to grow crops

\* better technology??



# Coal "fossil fuel"

**Description of coal:** swamp plants + sediments compact

**Renewable or nonrenewable:**

Non-R

**Where coal is located and how we recover it:** all over Earth dig it out (mining)

**Ways we turn coal into energy we can use:** burn it

**Who uses coal and for what purposes:**

\$ + heat, electricity

Western countries, China + India

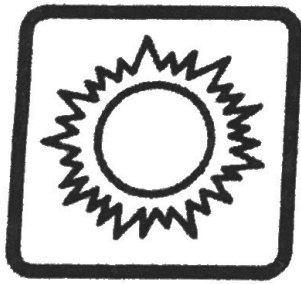
**Effect of using coal on the environment:**

emissions - smog, acid rain, toxins, ash, CO<sub>2</sub>

mining is damaging

**Important facts about coal:**

Transporting coal is EXPENSIVE. Produces 30% of US electricity



# Solar Energy

**Description of solar energy:**

Sun's e. travels to Earth (electromagnetic radiation)

**Renewable** or nonrenewable:

Renew

**How solar energy is produced and how we recover it:**

Fusion: Hydrogen combines into Helium, releases energy

**Ways we turn solar into energy we can use:**

Solar collectors - turn radiant e. into heat      Photovoltaic cells - turn e. into electricity

**Who uses solar and for what purposes:**

Homes/buildings - heat  $H_2O$  & interior, produce electricity

**Effect of using solar on the environment:**

no air or  $H_2O$  pollution

**Important facts about solar:**

Not always available, expensive

New technologies will bring price down



# Natural Gas (fossil fuel)

Description of natural gas:

methane, plants decay w/o  $O_2$ ,  
 $CH_4$  with ad.

Renewable or nonrenewable:

non-r

Where natural gas is located and how we recover it:

lakes + ponds, swamps, landfills  
drill into oil, coal, shale (fracking)

Ways we turn natural gas into energy we can use:

burn it

Who uses natural gas and for what purposes:

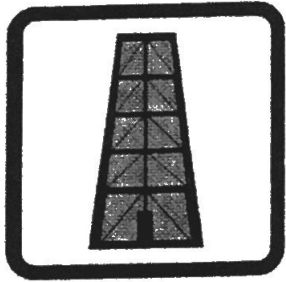
industries, households, power plants, some transportation; makes plastics + fertilizer; provide heat

Effect of using natural gas on the environment:

Uses up water! Contaminates  $H_2O$  with sand + chemicals, waste water, earthquakes

Important facts about natural gas:

less emissions than coal + petroleum



# Petroleum (Fossil fuel)

**Description of petroleum:** form from plankton on ocean floor - millions of years

**Renewable or nonrenewable:** non-renewable

**Where petroleum is located and how we recover it:**  
under ocean      drill off-shore, ...

**Ways we turn petroleum into energy we can use:**

burn it

**Who uses petroleum and for what purposes:** gasoline, fuel, plastic  
everyone (developed world) almost everything

**Effect of using petroleum on the environment:**

air pollution, CO<sub>2</sub> emissions, oil spills, ...

**Important facts about petroleum:**

Used more than any other e. source, US doesn't have enough - import  
Middle East has most





# Uranium / Nuclear

Primary source  
in Raleigh

**Description of uranium:** shattering nucleus of atom

**Renewable or nonrenewable:**

**Where uranium is located and how we recover it:** mined from the Earth's crust

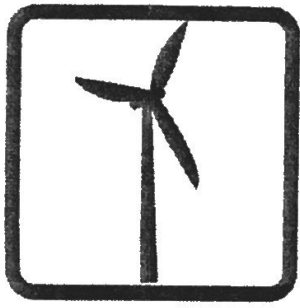
**Ways we turn uranium into energy we can use:** heat  $H_2O \rightarrow$  turns turbines, generates electricity

**Who uses uranium and for what purposes:**  
power plants - electricity

**Effect of using uranium (nuclear energy) on the environment:** no  $CO_2$  emissions  
nuclear waste: radioactive for long time      nuclear weapons

**Important facts about uranium (nuclear energy):**  
more e. in uranium than any other e. source  
can replace using fossil fuels

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# Wind Energy

**Description of wind energy:** circulation of air

**Renewable** or nonrenewable:

**Where wind energy is located and how we recover it:** wind "corridors", wind farms  
NC-coast

**Ways we turn wind into energy we can use:** blades turn, turbines produce electricity  
long power lines

**Who uses wind and for what purposes:**

Texas, electricity

**Effect of using wind on the environment:** Bird kill, noise; no emissions

**Important facts about wind:** Need good wind, must have backup

Takes up land (also used for farming)