

Alternative Energies

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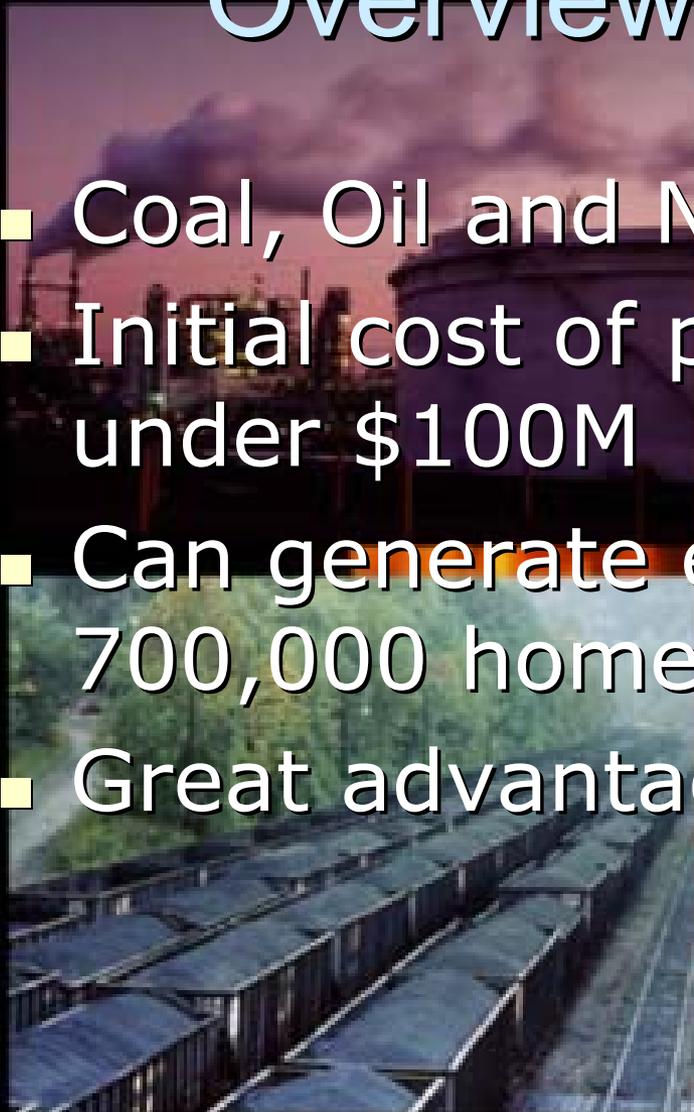
Erin Jones

Overview

There are several alternative energies for the present most popular energy supplies, fossil fuels and nuclear energies. Some of these alternatives is solar energy, biomass energy, and wind energy. These alternative are renewable and less harmful for the environment. Research is being conducted on these alternative to make them more feasible.

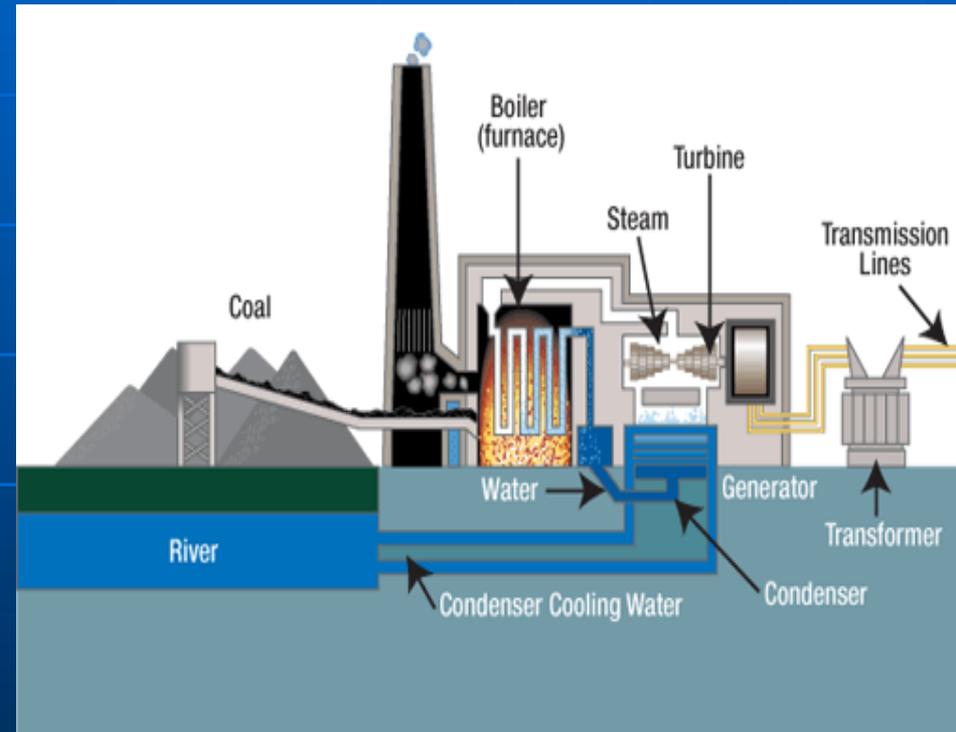
Overview of Fossil Fuels

- Coal, Oil and Natural Gas
- Initial cost of plant depends on size – under \$100M
- Can generate enough kW/hr for 700,000 homes a year
- Great advantages and disadvantages



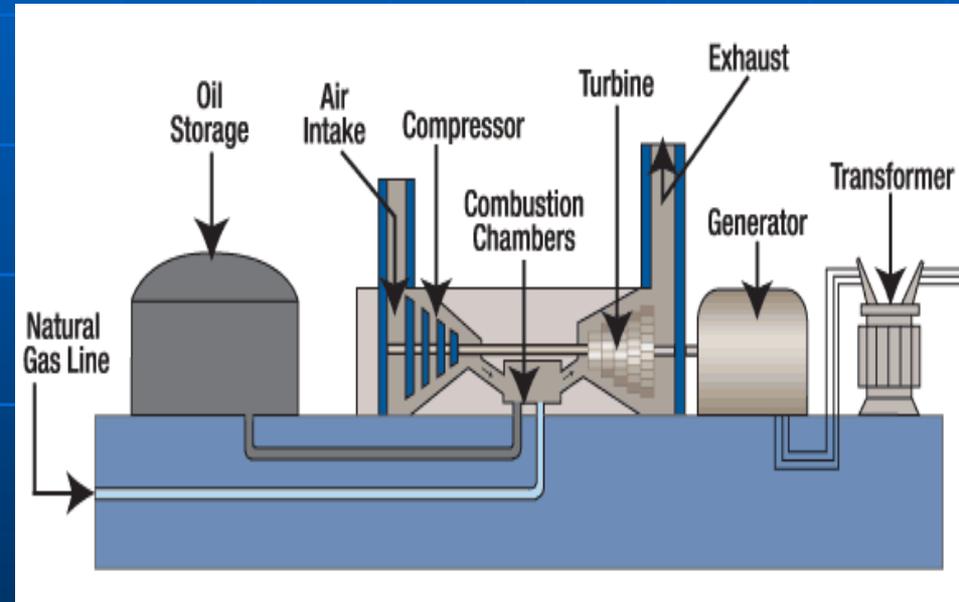
Coal Fired Plants

1. Coal enters plant
2. Coal is burnt to heat water to steam
3. Steam rotates turbine
4. Creates electricity
5. Coal exits plant through smokestack



Combustion Turbine Plant

1. Gas and oil mix in combustion chamber
2. Air is let in and when the mixture is right, ignited
3. Exhaust produced rotates turbine and exits
4. Transformed into energy



Pros and Cons

■ Pros

- Large amounts of electricity
- Easy transportation of materials
- Can be built anywhere

■ Cons

- Large amounts of pollution – CO₂, acid rain
- Mining coal is difficult and dangerous
- Coal plant take up much of land surrounding for fuel storage.

Solar Power

■ Definition

- “Solar Power is the technology of obtaining usable energy from the sunlight of the sun.”

■ Different Kinds

- Heat- Used in hot water, building heating, and cooking.
- Electric generation- Through photovoltaic and heat engines.
- Desalination of water.

Solar Power

■ Pros

- No pollution that effects the earth.
- No moving parts that could break.
- The cell of a photovoltaic system could last for decades.

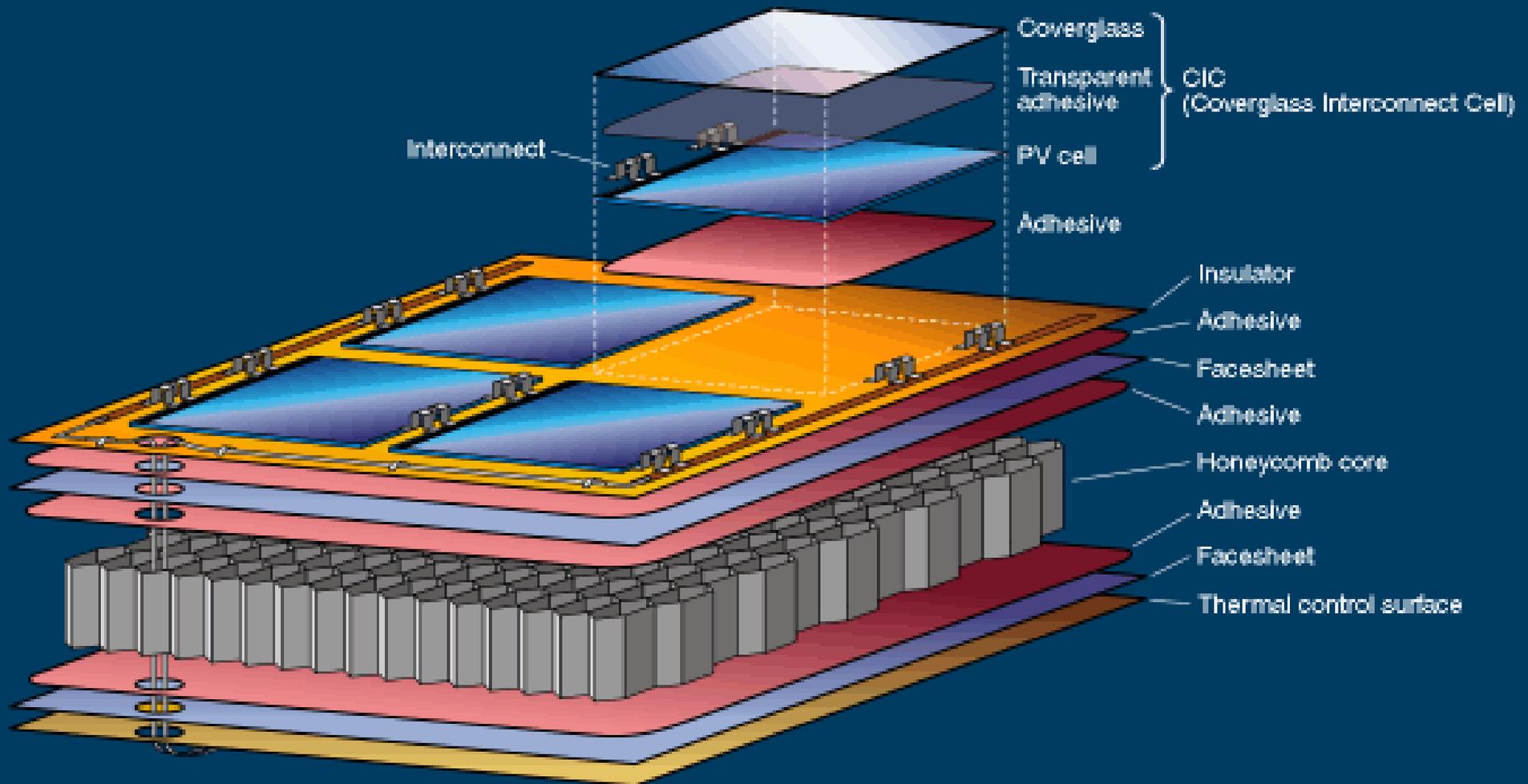
■ Cons

- Large initial capital investment.
- Limited power density
- For massive amounts of energy to be produced you need a lot of space (Industries).

Solar Power Costs

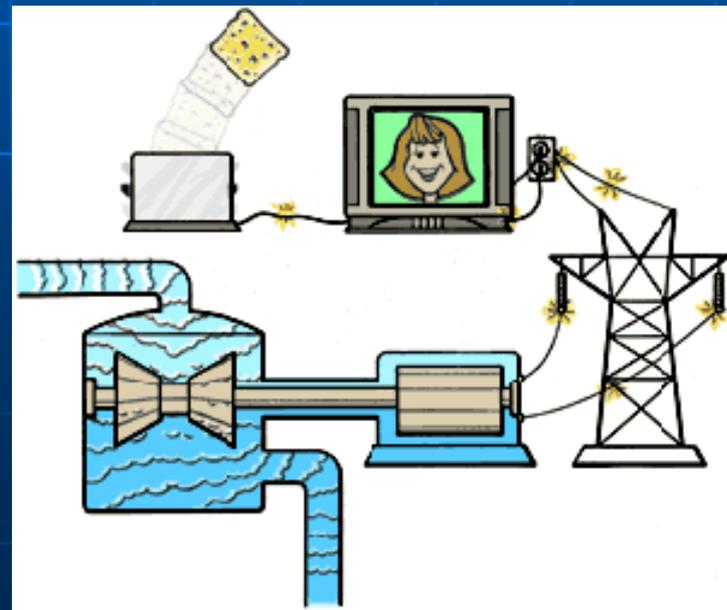
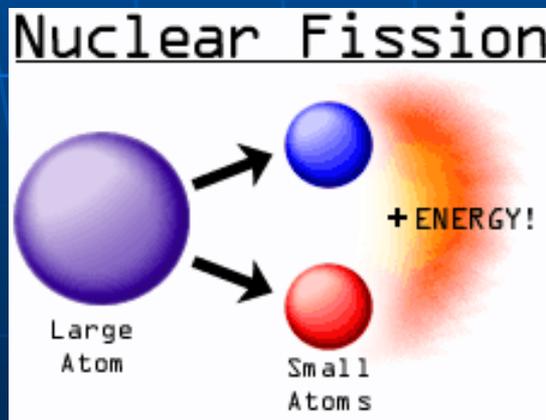
- There is enough sun hitting the tops our houses to pay for all the electricity needed. Only 10-30% at most used.
- On average, the watt for a panel will cost you around \$5.
- The best way to purchase panels is in big quantities of small panels.
- There also is differences in the type of panels.
 - Integrated thin film technology- is less costly, but gathers less energy from the sun.
 - Discrete cell technology- Can give you an average of 14 percent of the energy stored from the suns rays
 - Dendritic web- Can give you around 28 percent of the energy stored from the sun. Also is said to be the most cost efficient.

Solar Panel Parts



What Is Nuclear Energy?

Nuclear energy is a process in which it uses the energy from the splitting of the Uranium-235 atom to heat steam. This steam is then used to turn a turbine inside a generator which in turn creates electricity.



Nuclear Energy Overview

- A cost of up to \$6 Billion to build a nuclear energy power plant
- Uranium-235 is a non-renewable fuel source, thus making Nuclear Energy non-renewable
- Uses a mixture of Uranium-238 and 235 is used as the fuel for a Nuclear Power Plant
- Plutonium-239 is the byproduct of the fission process
- A 1000 MWe reactor can produce 7.9 billion KWh in one year if it runs at 90%. (covers about 740,000 households)

Nuclear Energy Cont.

- U.S. has 104 Nuclear Power Plants
- China has 9 Nuclear Power Plants
- World total is 443 Nuclear Plants
- 19.3% of U.S. power produced is from Nuclear Power Stations
- 2% of Chinese power is produced from Nuclear Power Stations
- 20-30 tons of nuclear waste is produced each year per plant.
- Can cost upwards of \$100 million to decommissioning power plants
- Average of 40 year life expectancy

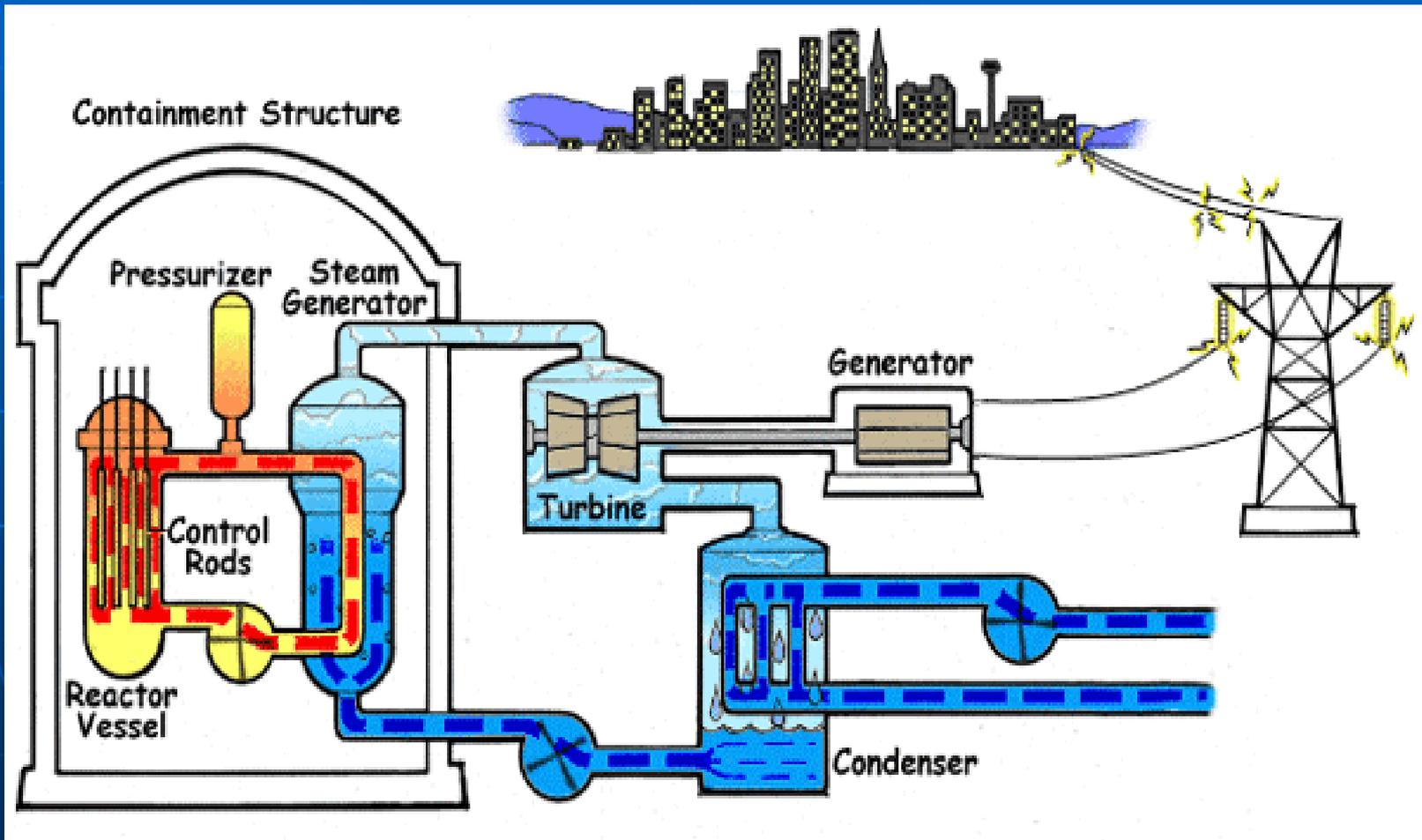
Pro's and Con's

- No greenhouse gas emissions
- Does not pollute the air
- Small solid waste generation
- Low fuel costs
- Large fuel reserves
- Risk of accidents
- Nuclear waste
- Nuclear byproducts can be used for weapons
- High initial cost
- High cost of decommissioning
- Thermal pollution

Costs and Problems

- A cost of \$2.46 per kilowatt-hour in 1995 for production
- A cost of \$1.72 per kilowatt-hour in 2005 for production
- Average cost of \$4-6 billion per plant, to build
- Problems arise in need for ensuring security of byproducts
- Immense amount of energy is needed to build a Nuclear power plant doesn't start turning a profit till after its 7th year on average

Process



What is Biomass?

❖ **Biomass is a renewable energy resource derived from all plant material. Examples of this energy source include:**

- The lignin, mainly includes the log, the sawdust, the branch and the root, the leaf and so on.
- The agricultural reject, mainly is the straw stalk, the stone, the corncob and so on.
- Aquatic plant, like algae, hyacinth and so on.
- Oil-bearing crops, like cotton seed, hemp seed, tung tree and so on.
- The processing reject, including food, slaughters, the brewery, the paper mill excreta and trash and so on.
- zoological and botanical excrement.

Benefits

- Energy efficient
- Extensive source
- Use waste materials
- great foreground
- Safety and renewable

Disadvantages

- Some waste materials could not be collected all year
- Plant can store a very small amount of solar energy into organism
- Make greenhouse gases
- Abundant moisture organic (50%~95%)

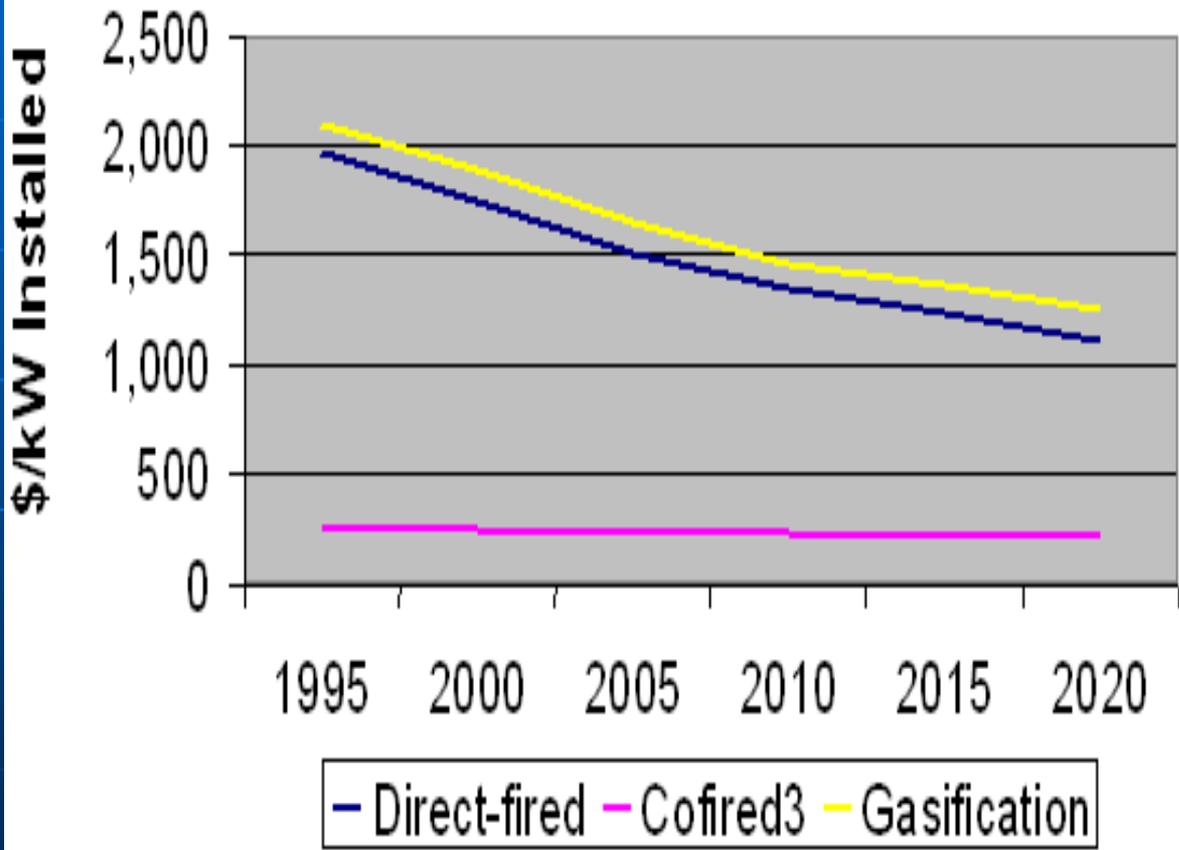
- Combustion and Gasification Facilities
(Direct-fired)

- Ethanol Production & Biodiesel Production
(Co-fired)

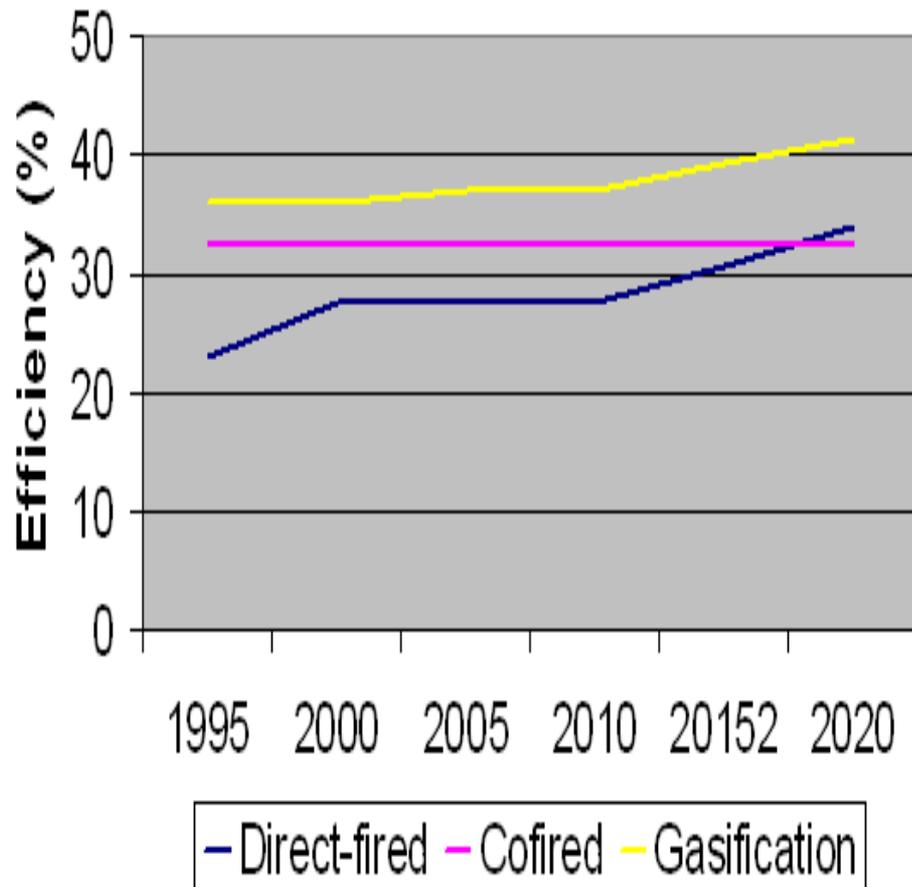
- Biogas Facilities
(Gasification)

In the different forms, the initial cost of biomass is different about \$200-\$100,000(Just for the machine or raw materials)

Biomass Power Capital Costs



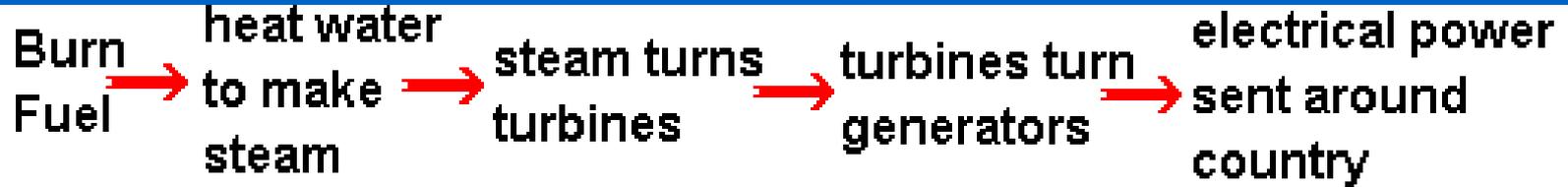
Biomass Plant Efficiencies



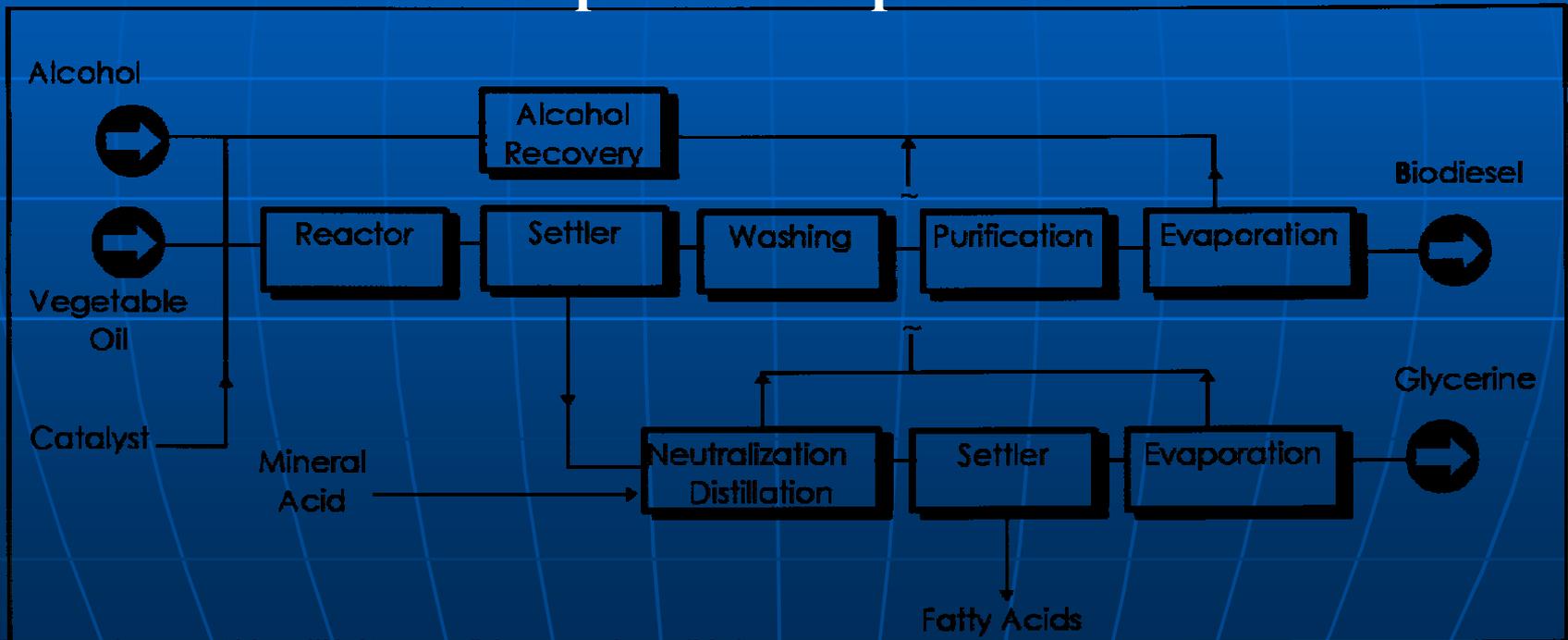
- A 10 cubic meters of biogas digester can make the annual festival two tons of diesel
- China's development of biomass resources total about 700 million tons of standard coal
- Now there are more than 140 ~180 billion tons of plants growing every year. If we change them into fuels, they are almost 10 times more than our fuels we are using now every year.
- Biomass fuels takes up 15% of the current fuels that we are using now.

Process

Burning biomass plant:



Biodiesel production process:



<http://home.clara.net/darvill/altenerg/biomass.htm> (Up)

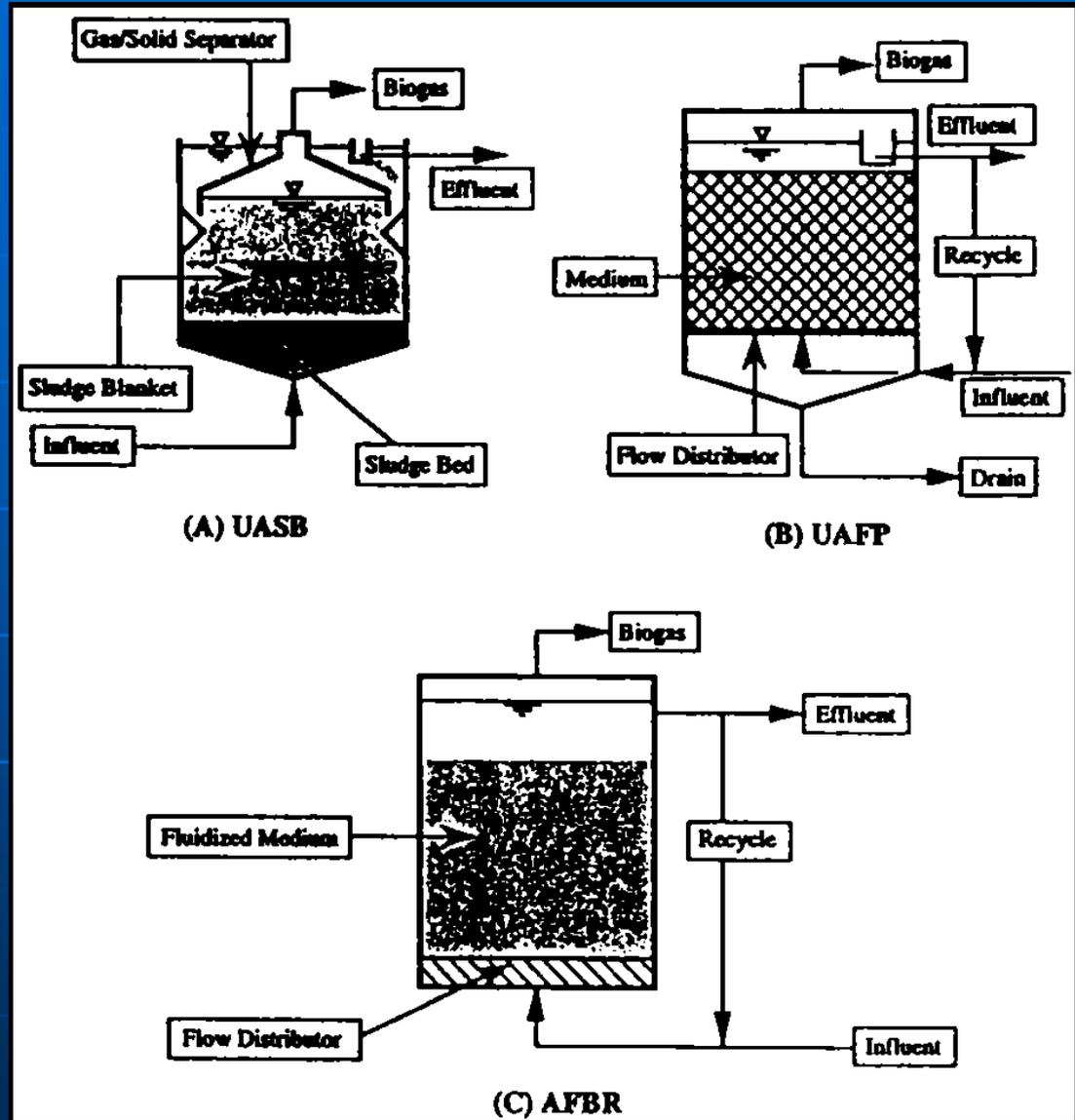
<http://www.sustainability.dpc.wa.gov.au/CaseStudies/biodiesel/biodiesel.htm> (Down)

Biogas Facilities

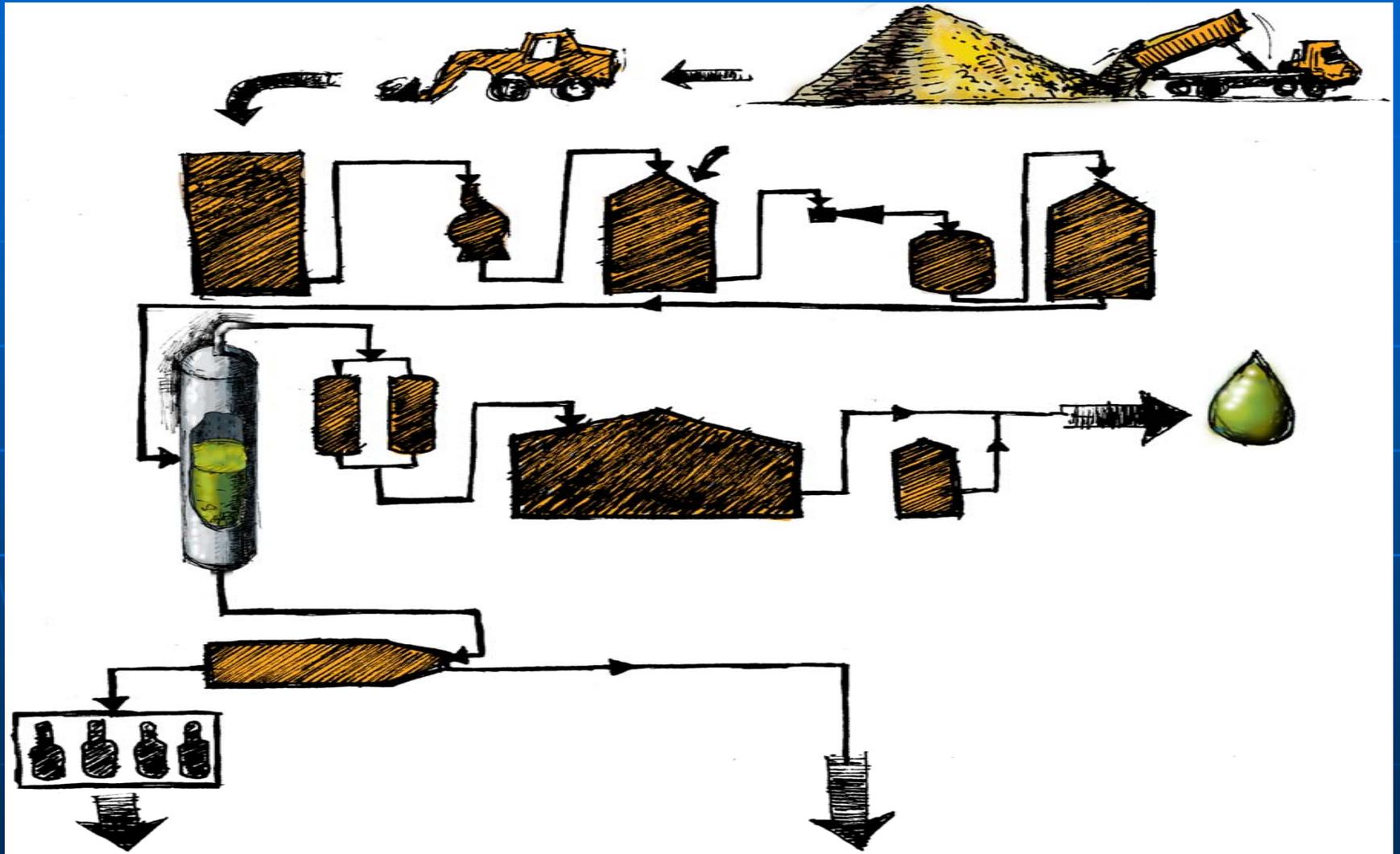
Three types

- Fixed dome
- Floating drum
- Balloon

1. A lot of bacteria work together to make organic matter releasing gas
2. The bacteria live on organic matter and change things to compounds producing



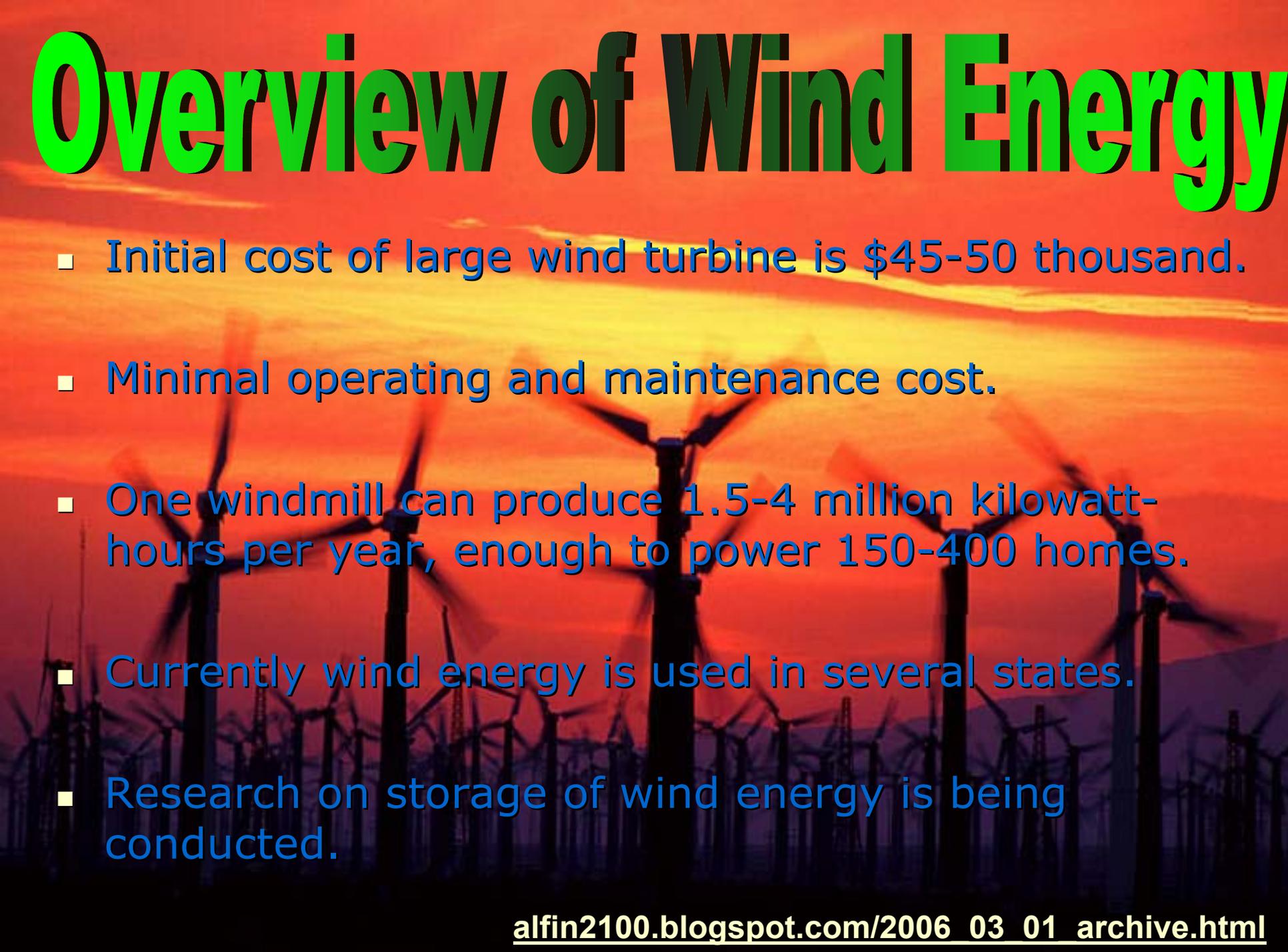
Ethanol Production



The Future of Biomass

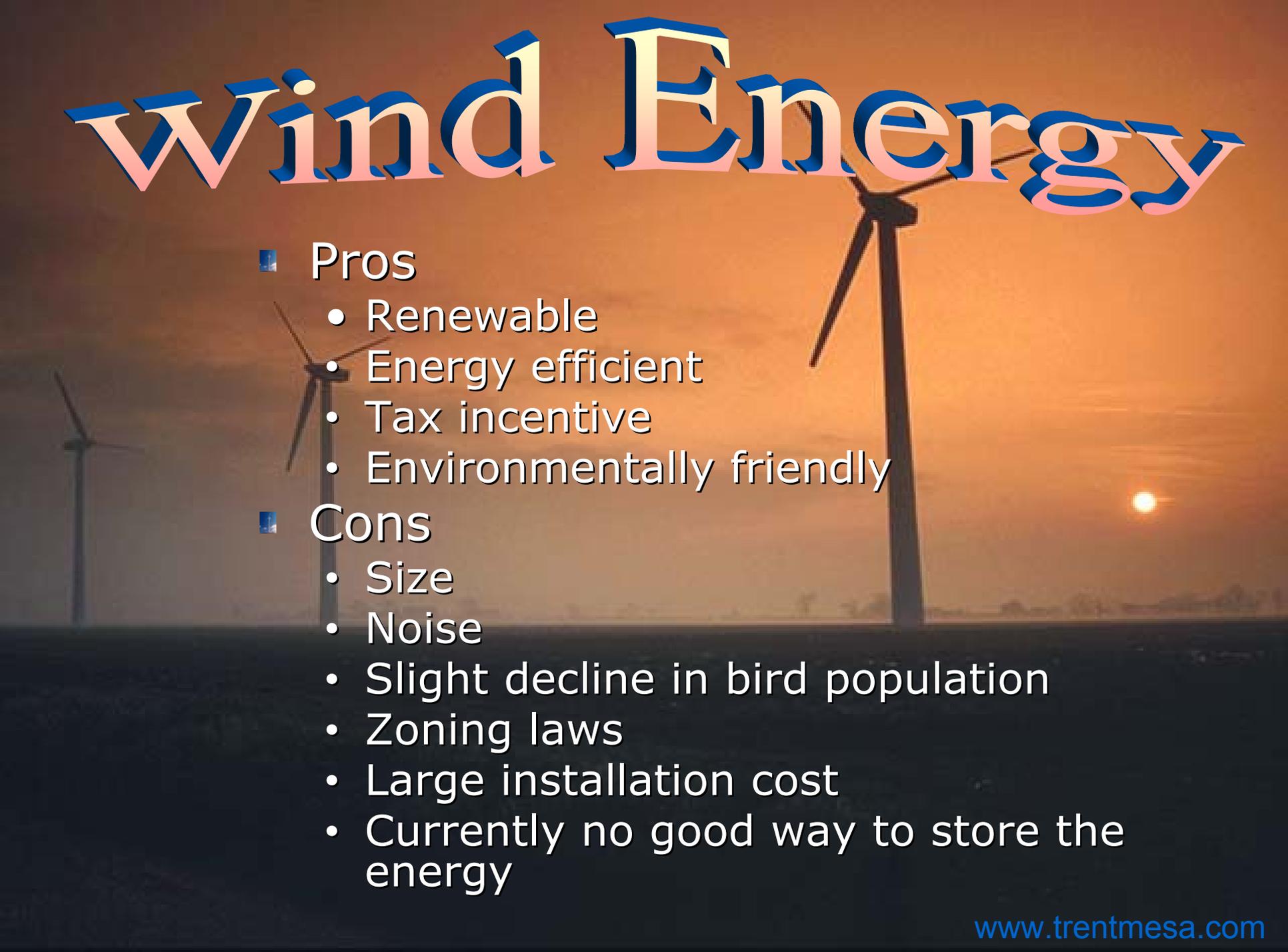
- Biomass energy looked like all is very commonplace, even is the useless waste, but it is the renewable energy which grows continually, actually can recycle waste, the enough humanity develops the use well. The energy stored in biomass is equivalent to 10 times the world's annual energy consumption. We have a long, long way to go.

Overview of Wind Energy



- Initial cost of large wind turbine is \$45-50 thousand.
- Minimal operating and maintenance cost.
- One windmill can produce 1.5-4 million kilowatt-hours per year, enough to power 150-400 homes.
- Currently wind energy is used in several states.
- Research on storage of wind energy is being conducted.

Wind Energy



- Pros

- Renewable
- Energy efficient
- Tax incentive
- Environmentally friendly

- Cons

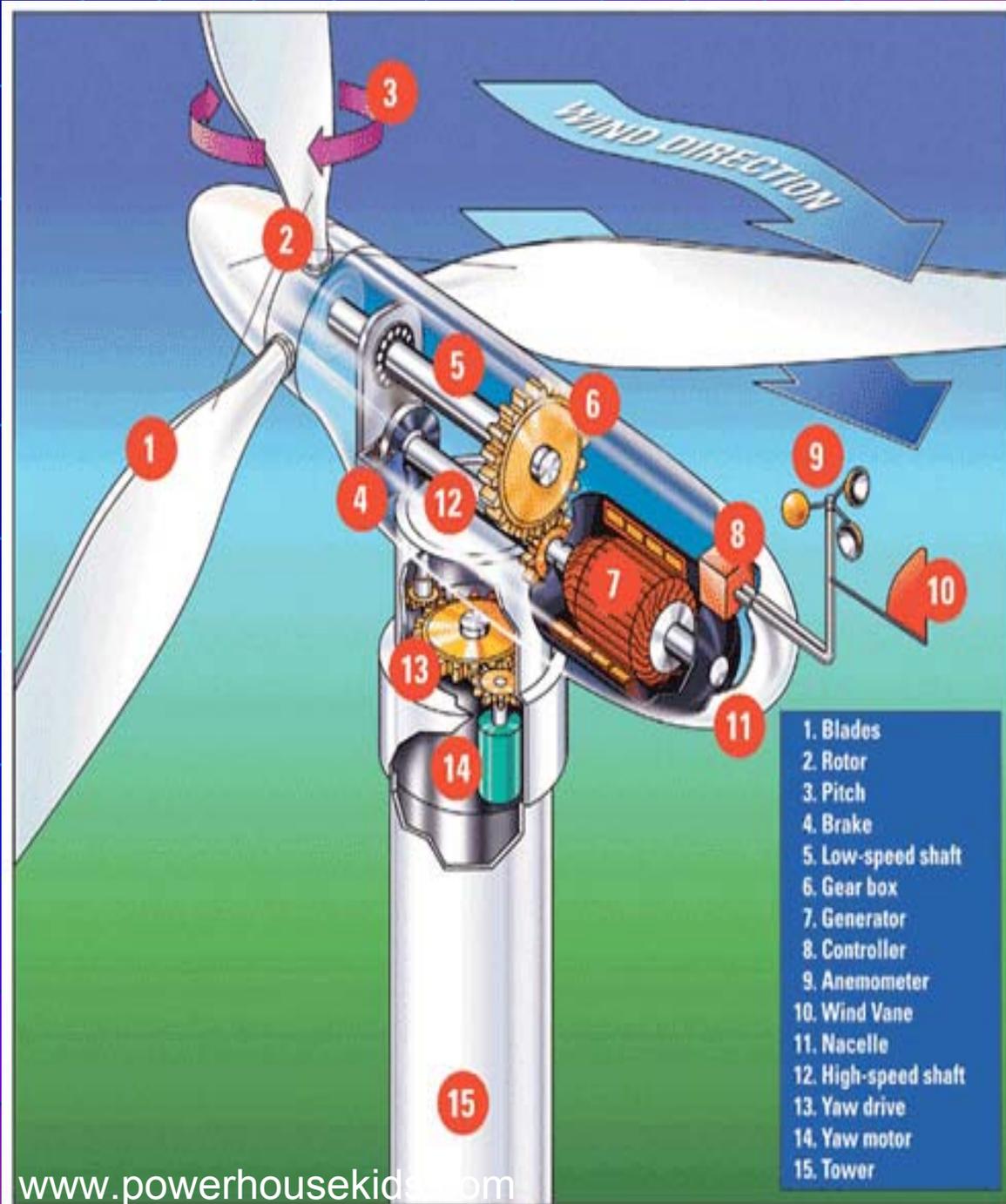
- Size
- Noise
- Slight decline in bird population
- Zoning laws
- Large installation cost
- Currently no good way to store the energy

Cost Analysis for a Small Turbine Used by One Household

- Average electric usage for one household is 9,400 Kilowatt hours
- Small wind turbine cost \$20,000.
- Lifetime of turbine is 20 years.
- Average cost of a kilowatt hour from electric company is \$0.0986.
- Interest rate 5%
- Net present savings over 20 years is \$95,502 this value is excluding maintenance cost.
- On average it takes 6 to 15 years to pay for itself in savings.

PROCESS

- 1.) The wind turns the blades.
- 2.) Which spin a shaft
- 3.) Which connects to a generator
- 4.) That makes electricity



Conclusion

These alternatives are environmentally friendly and are renewable. The plan is that these alternative will become more predominate than the most currently used fossil fuels and nuclear energy.

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