Roundtable Forum

MDEC 2008

Alternative Fuels

Hosted by
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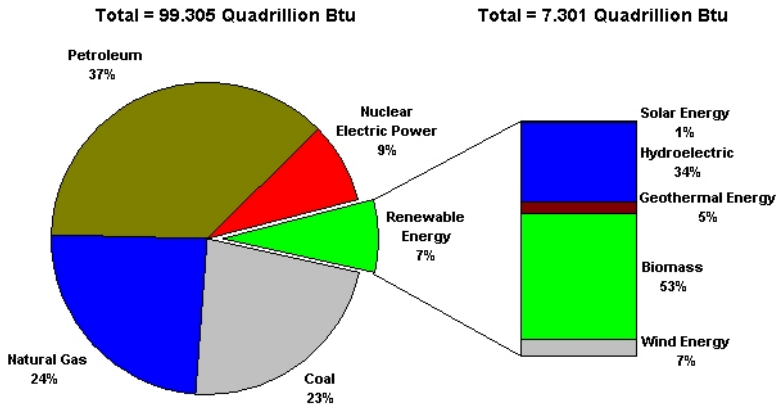
Renewable Energy Consumption in the USA Energy Supply, 2008



Source: Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels.

Alternative Fuels

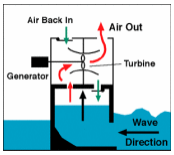
1. Renewable Energy
2. Biomass
3. Alcohol fuels
4. Hydrogen
5. Compressed Air
6. Alternative fossil fuels
7. Nuclear fuels

1. Renewable Energy

- Biofuels
- Geothermal
- Hydro power
- Solar power
- Tidal power
- Wave power
- Wind power





What are Biofuels?

Biofuels are produced from living organisms or from metabolic by-products (organic or food waste products). In order to be considered a biofuel the fuel must contain over 80 percent renewable materials.

2. Biomass

- Miscanthus
- Switchgrass
- Hemp
- Corn
- Poplar
- Willow
- Sugarcane
- Oil palm
- Algae oil

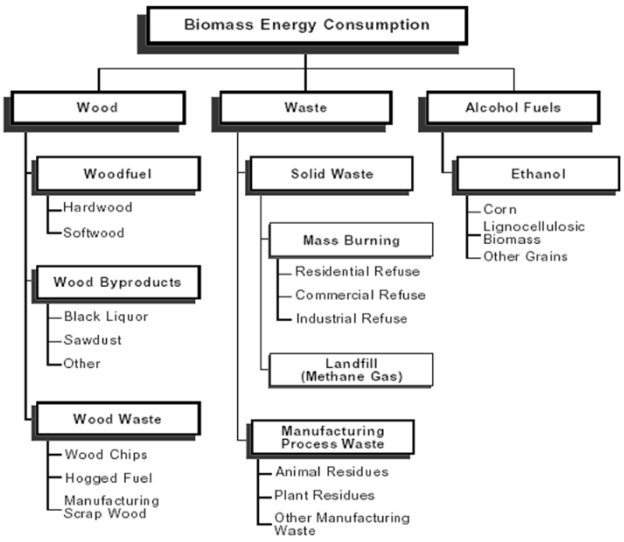
Options to Burning the Biomass

Thermochemical. When plant matter is heated but not burned, it breaks down into various gases, liquids, and solids. These products can then be further processed and refined into useful fuels such as methane and alcohol. Biomass gasifiers capture methane released from the plants and burn it in a gas turbine to produce electricity. Another approach is to take these fuels and run them through fuel cells, converting the hydrogen-rich fuels into electricity and water, with few or no emissions.

Biochemical. Bacteria, yeasts, and enzymes also break down carbohydrates. Fermentation, the process used to make wine, changes biomass liquids into alcohol, a combustible fuel. A similar process is used to turn corn into grain alcohol or ethanol, which is mixed with gasoline to make gasohol. Also, when bacteria break down biomass, methane and carbon dioxide are produced. This methane can be captured, in sewage treatment plants and landfills, for example, and burned for heat and power.

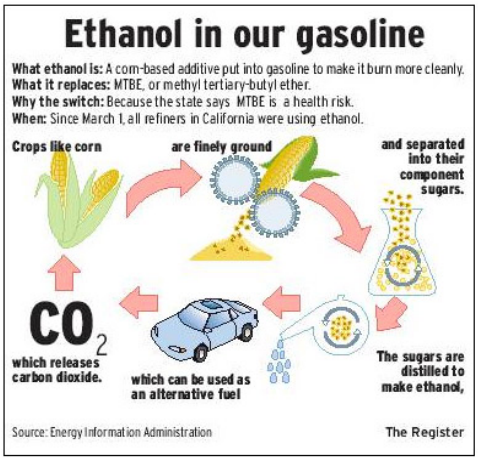
Chemical. Biomass oils, like soybean and canola oil, can be chemically converted into a liquid fuel similar to diesel fuel, and into gasoline additives. Cooking oil from restaurants, for example, has been used as a source to make "biodiesel" for trucks. (A better way to produce biodiesel is to use algae as a source of oils.)

Biomass Energy Resource Hierarchy



3. Alcohol Fuels

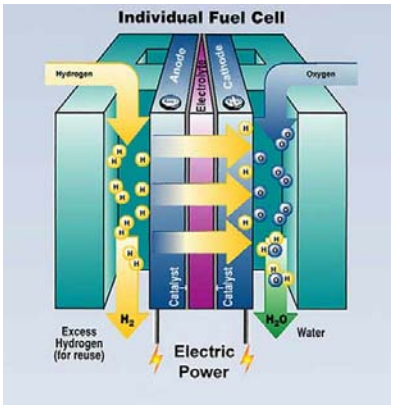
- Methanol
- Ethanol



4. Hydrogen

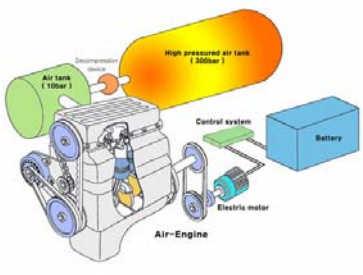
- Steam methane reformation
- Electrolysis of water

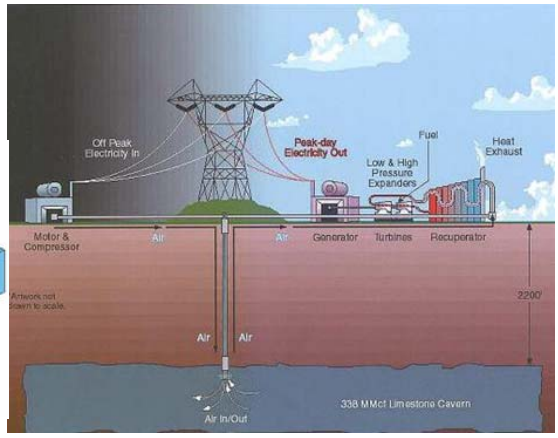
Honda fuel cell car



5. Compressed Air

- Air engine
- Air storage



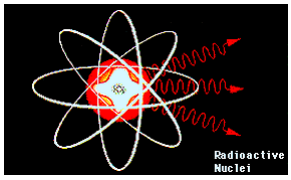


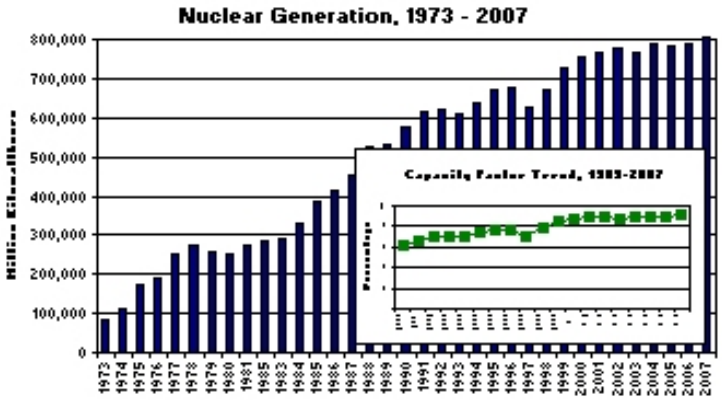
6. Alternative Fossil Fuels

- Compressed natural gas
- Fischer-Tropsch Process
- Methane hydrate

7. Nuclear Power

- Nuclear fission
- Nuclear fusion
- Radioactive decay





There are many alternative fuels, but very few have proven viable underground.
The discussion focused on bio-diesel.

Biodiesel Issues

- Storage
- Life span
- Cold weather
- Contamination
- Cold starting
- Gelling or wax build-up
- Emissions
- Power
- Toxicity
- Cost
- Availability
- Quality
- Bacteria
- Supply

Thank you.