

1. FOSSIL FUELS - TOO VALUABLE TO BURN

IT'S THE CARBON ATOM!

Whether it's coal, petroleum or natural gas, the most important component is the carbon atom that makes "fossil fuels" so valuable. And how are we using these valuable resources? Mostly, we burn them. When they burn, oxygen from the air combines with the carbon atom and produces either carbon monoxide (CO) but mostly carbon dioxide (CO₂). What substance is the main driver for the greenhouse effect? You've got it: Carbon dioxide!

IF WE DON'T BURN THEM, WHAT SHOULD WE DO WITH THEM?

It is important that people are educated and come to realize that if we continue burning this precious resource at our present rate, it is nothing short of disastrous for the environment and it is stealing valuable natural resources from future generations.

There are literally millions of products that are manufactured using carbon as a base. The following is a short list of products made from Coal, Petroleum and/or Natural Gas: refrigerants; aerosols; antifreeze; detergents; dyes; adhesives; alcohols; explosives; weed killers; insecticides; insect repellents; synthetic fibers such as nylon, rayon, dacron, orlon; many other polymers such as polystyrene, polyethylene and synthetic rubber; fertilizers; medicines; paints; gasoline; blending agents; jet fuel; kerosene; light fuel oils; diesel; lubricating oils and greases; naphtha; paraffin; carbon black; asphalt; liquefied refinery gases; petroleum solvents; waxes; petroleum coke; road oil; still gas; benzene; toluene; xylene; microcrystalline petroleum waxes; bituminous or asphaltic concrete; roofing asphalts and pitches; coatings and cements; saturated felts and boards for non-building use; coke oven and blast furnace products; ammonia; fuel briquettes; petroleum pitches; plastics of all types and many more items. For more information, see:

<<http://chemed.chem.purdue.edu/genchem/topicreview/bp/1organic/coal.html>>

<<http://science.jrank.org/pages/532/Artificial-Fibers.html>>

<<http://www.smallbusinessnotes.com/businesses/naics/manufacturing/324.html>>

<<http://www.census.gov/prod/ec97/97numlist/324.pdf>>

Earth Policy Institute (Lester Brown): "What to do with the estimated 200 years' worth of coal still in the ground? Leave it there, Brown said. Predictably, his latest call to arms has aroused the ire of the coal industry, which accused him of 'grossly' exaggerating opposition to coal..." - Lester Brown: Time's Up, Coal by Jeremy Elton Jacquot, Los Angeles on 02.16.08.

COAL

Coal forms from the decomposition of layers of land-based plants, mainly trees. The most favorable period for creating coal was during the Carboniferous ("coal-bearing") Period which

was between 354 and 290 million years ago. Small quantities of coal were formed since that time, but carbon levels are not as high. Layers of decomposing plants sink under the weight of sediments and are transformed under higher temperatures and pressure. The cellulose in the wood is first changed into humic acids, then into bitumens and finally into elementary carbon. The process of coal formation takes millions of years. Anthracite, the oldest coal, has the highest carbon content of 86 to 98%.

Chemical analysis gives empirical formulas such as $C_{137}H_{97}O_9NS$ for the most abundant coal (bituminous) and $C_{240}H_{90}O_4NS$ for high-grade anthracite. <<http://chemed.chem.purdue.edu/genchem/topicreview/bp/1organic/coal.html>>

PETROLEUM

Petroleum formation likewise occurs over millions of years from various hydrocarbons combining with certain minerals such as sulphur under extreme pressure. Most if not all petroleum fields were created from the remains of small animal and plant life being compressed on the sea bed by billions of tons of silt and sand several million years ago.

During the decomposition process tiny bacteria clean the remains of certain chemicals such as phosphorus, nitrogen and oxygen. At the bottom of the ocean there is insufficient oxygen for these organisms to decompose entirely, but what remains will form a large, gelatinous mass consisting mainly of carbon and hydrogen, which will then slowly become covered by multiple layers of sand, silt and mud. This burying process takes millions of years, with layers piling up one atop another.

When the depth of the buried decomposing layer reaches somewhere around 10,000 feet the natural heat of the earth and the intense pressure will combine to act upon the mass.

Generally, during petroleum formation:

1. Lower temperatures will result in thicker, darker raw petroleum deposits, the most solid of which being a bitumen substance;
2. If the heat fluctuates too much then gas will be produced, often separating from the petroleum, sometimes remaining mixed with the raw oil;
3. If temperatures are too high, ± 450 degrees Fahrenheit then the original biomass will be destroyed and no gas or petroleum is formed;
4. As the mud and silt above the deposit become heavier and the forces placed upon the silt and mud begin to change the bottom layers of the compressing layer above, the petroleum will turn into shale which forms oil. Heat and pressure are not as great as petroleum formation, but "Oil shale generally contains enough oil that it will burn without any additional processing, and it is known as "the rock that burns" <<http://ostseis.anl.gov/guide/oilshale/index.cfm>>

Petroleum is a mixture of a very large number of different hydrocarbons. Gasoline is a widely used petroleum product especially in the USA. There are several substances that make up gasoline including elements such as sulfur, nitrogen, oxygen and some trace metals, but the most abundant hydrocarbon in gasoline is octane (C_8H_{18}). <<http://www.madsci.org/posts/archives/2001-04/987004809.Ch.r.html>>

There are many other hydrocarbons derived from petroleum including: butane (C₄H₁₀); pentane (C₅H₁₂); nonane (C₉H₂₀); hexadecane (C₁₆H₃₄); paraffin wax which has about 25 carbon atoms and asphalt that may have 36 carbon atoms or more. These different molecules are separated by fractional distillation at an oil refinery to produce gasoline, jet fuel, kerosene, and other hydrocarbons.

NATURAL GAS

Natural gas is generally formed from petroleum as stated in part 2 above under "PETROLEUM": "If the heat fluctuates too much then gas will be produced, often separating from the petroleum, sometimes remaining mixed with the raw oil."

"Natural gas is a mixture of lightweight hydrocarbons. A typical sample of natural gas when it is collected at its source contains 80% methane (CH₄), 7% ethane (C₂H₆), 6% propane (C₃H₈), 4% butane and isobutane (C₄H₁₀), and 3% pentanes (C₅H₁₂). The C₃, C₄, and C₅ hydrocarbons are removed before the gas is sold. The commercial natural gas delivered to the customer is therefore primarily a mixture of methane and ethane." <<http://www.daukhivietnam.net/forum/viewtopic.php?f=30&t=106>>

ARE FOSSIL FUELS RENEWABLE?

Since the formation of coal, petroleum or natural gas takes millions of years (see: <<http://www.green-planet-solar-energy.com/fossil-fuel-formation.html>>), they can hardly be deemed renewable, yet humankind has managed to almost completely deplete the world supply of petroleum in little more than a century, the US supply of coal is estimated to be about 200 years. (Note: in 1868 it was estimated that we had 10,000 years reserve; in 1904 we had 1000 years reserve; in 1988 there were 300 years; and in the year 2000 it was estimated to be 255 years of coal remaining.)

LET'S CALL THEM "FOSSIL RESOURCES"

Perhaps we should not be using the term "Fossil Fuels." The dictionary defines the word "fuel" as a "material such as coal, gas, or oil that is burned to produce heat or power." Instead, we should refer to them as "Fossil Resources" which would be far more fitting. It is a shameful waste to simply burn these natural resources since millions of products can be produced from them and yet most countries of the world are satisfied with burning them even though there are so many other ways of producing energy.

[Wisconsin Interfaith Power and Light - WIPL - approved April 6, 2010]