

BIOMASS BURNING: A REALLY BAD IDEA.

Western environmentalists seem to believe that there are two forms of carbon:

1. Good carbon, from biomass.
2. Bad carbon, dug out or pumped out of the ground.

As any chemist will tell you, there is only one element called carbon on planet Earth (disregarding isotopes in this discussion).

The burning of carbon in air produces carbon dioxide, which is usually vented into the atmosphere, where the CO₂ molecules remain for 100 years typically (half-life = 34 years). This highlights the core problem of the greenhouse effect: reducing emissions immediately has a delayed effect, because it takes the global filter system (a.k.a. The Biosphere) a long time to pull the CO₂ out of the atmosphere.

It is currently fashionable (2006) to issue statements such as:

“Biomass burning is carbon neutral, because the biosphere absorbs the carbon which it previously built into the burned plants.”

As far as the current greenhouse effect is concerned, that statement is incorrect.

It is true that, in the end, the emitted CO₂ will be reabsorbed by plants, but, as Lord Keynes once remarked:

“In the end, we’re all dead anyway.”

It’s all a question of timescales. It is often said that we are burning coal, which took millions of years to form, in just a few decades. The same argument applies to trees. Trees grow on timescales of decades to centuries, but we can burn a tree in minutes using modern combustion techniques. Both of the foregoing scenarios result in an atmospheric carbon dioxide imbalance.

This is the true situation:

The amount of carbon dioxide in the atmosphere depends only on the amount of carbon burned, not on its origin.

Two environmental laws may be used as part of the explanation:

1. Everything lands somewhere.
2. Whatever you do, imagine the consequences if 6 (9, or 12) billion people do the same thing.

Due to the untiring efforts of the world environmental movement, everybody is familiar with Law 1 as it applies to pollutants; but we are mainly concerned here with Law 2.

Imagine that God waved a giant magic wand, converting every fossil-fuel burning power plant in the world to burn biomass instead.

What a disaster!

Firstly, as stated above, the emitted carbon dioxide would remain at similar levels (we will not quibble here about carbon-hydrogen ratios).

Secondly, just about the entire Earth's surface would become denuded of vegetation, as humans engaged in their favourite activity; chopping down and burning trees.

Thirdly, as a result; the CO₂ levels would rise even more rapidly, as the biosphere would lose its capability to absorb the emissions.

We learn about "The Carbon Cycle" at school; but in fact there are many interlocking carbon cycles, with timescales ranging from 24 hours to millions of years.

Biomass burning is one of these carbon cycles, with a timescale, as mentioned above, of about 100 years.

In the natural world, biomass is burned regularly in forest fires etc.. The combustion gases thereby released contribute to the total CO₂ in the atmosphere, and therefore to a background level of greenhouse effect.

Mankind has been clearing the land and burning it for 1000's of years. It is possible that over the last 10,000 year interglacial period, one of relatively comfortable temperatures, the climate has been maintained to some extent by this boosting of the burning carbon cycle.

Due to the current human population explosion, with its expansion into the wilderness, the burning of biomass has increased dramatically, boosting the amount of atmospheric CO₂ significantly.

Europeans watch their TV's in alarm as poor farmers in South America burn down the jungle to eke out a living from the unfertile soil.

Possibly on the same evening, they watch another TV program approvingly showing “green” european farmers growing “energy crops”.

As far as the greenhouse effect is concerned, there is in fact no difference between the two cases.

That the harvested biomass is converted in factories into biodiesel or other useful fuels before it is burned makes no difference; what the misinformed european farmers are actually planning to do is to burn enormous areas of cropland, just like their contemporaries in the third world. This will increase the amount of CO₂ in the atmosphere, because the remaining biosphere area cannot absorb the atmospheric CO₂ as fast as it is being created. This statement applies equally to the burning of fossil fuels and biomass.

Now that the basic problem has been explored, here are further thoughts on biomass burning:

1. The Earth is a closed system.

The current world biomass production is fixed by diverse factors. Producing biofuels requires the use of currently unused land (available in Europe, for example), and/or further expansion of the human race into the wilderness. Large-scale desert irrigation to grow biofuels is technically feasible, but should only be undertaken after much careful study of global climate computer simulations.

2. Soil ecosystems.

The biosphere depends on a system of total recycling. In a natural ecosystem, plants grow and die in place, generally keeping the nutrients in their surroundings, as well as providing a home for numerous other living creatures.

Harvesting crops for biofuel removes the above-ground biological material and burns it elsewhere. Experience with existing monocrop systems (e.g. maize, wheat, etc.) shows that the lost material must be replaced by artificial fertilisers. The result is an agricultural wasteland which requires large energy inputs (currently from fossil fuels).

3. Woodsmoke is carcinogenic.

Who is to guarantee that all biomass burners are equipped with flue gas washers to remove dangerous chemicals? Natural does not equate to safe (think Deadly Nightshade). Millions of poor women in the third world die from lung cancer, after squatting over wood burning cookers for most of their lives.

Info: Switzerland requires all wood-fired central heating systems to be fitted with filters to reduce fine-particulate emissions: a known cause of asthma and allergies. The environmental department has not yet concerned itself with the other 4000-odd chemicals released in biomass burning.

4. Economics.

Biodiesel is currently produced on a large scale in Switzerland and some other European countries. The major production is based on pressing oil out of rapeseed, and recycling cooking oil from McDonald's (TM). The fossil fuel energy and fertiliser inputs required to grow the rape plants is greater than the energy derived from the oil. The system only works for farmers (who run their tractors on the biodiesel) due to government subsidies, and is therefore not sustainable.

Similar arguments apply to ethanol produced by fermentation, although this system is more economical than rapeseed, and could even make a profit in some circumstances (Brazil?).

The Germans have developed a system which converts the entire biomass (which can be any sort of vegetable matter) into biodiesel using a chemical process (Syngas). This system is economical, especially in large-scale refinery-type plants. Up to 60% of Germany's motor fuel requirements could be produced using land currently set aside under the EU CAP system. The Germans plan to invest 4 Billion Euros in these large-scale plants.

The environmental result would be just as catastrophic as described above.

CONCLUSION

In more than one sense, humans are carbon-based lifeforms. Even if humanity could make a decision to eliminate fossil fuel power plants, it would take decades of work by 1000's of engineers to build the required replacements: nuclear, solar thermal, hydro-electric and distributed micro-generation plants (e.g. Wind, solar-voltaic, minihydro).

The problem of vehicular transport remains. The only practical way of powering vehicles with equivalent performance to existing internal combustion engines is by using liquid fuels.

Liquid fuel means hydrocarbons. The world will never run out of carbon or hydrogen. After the end of the current Oil Age, one can imagine a system which uses large-scale solar energy to make synthetic hydrocarbon liquid fuels to power the world's vehicles. Ensuring good fuel economy, using existing technology, could limit carbon dioxide emissions to a sustainable level.

The human race is the dominant large animal group on Planet Earth. Mastery of the planetary landmass, however, brings the inevitable responsibility for its upkeep. Future generations will have to manage their carbon dioxide emissions in order to maintain the world climate at a comfortably human temperature, averting the next Ice Age, which would completely destroy western (i.e. northern) civilisation.

Long term, the survival of humanity depends on the presence of a productive healthy biosphere which filters our emissions.

Epilogue

According to an excellent article by Peter Dietze:

‘Little Warming with new Global Carbon Cycle Model’, available at www.john-daly.com/carbon.htm, **humanity** is currently emitting around **7 Gigatons** (Gt) of carbon into the atmosphere annually from fossil sources. A further estimated **1 Gigaton** of carbon is being produced by the burning down of tropical rainforests.

The **biosphere** emits roughly **200 Gigatons** of carbon annually, therefore human activity is **boosting the planetary carbon cycle** by around **3.5%**, and has been doing this since the beginning of the 19th century.

Even though the amount of carbon emission was at a low level in 1800 and has steadily increased over the intervening 200 years, a large amount of carbon has been added to the biosphere from all fossil fuel sources.

The current biosphere, according to scientific estimates, contains:

Land	: 700 Gt of biomass
Oceans	: 800 Gt of biomass
Total	: 1500 Gt of biomass

Since the beginning of the industrial age, fossil fuels have added a total of :

300 Gt to the various carbon cycles.

Some of this extra CO₂ has been dissolved in the oceanic waters, some has been washed out over land and chemically neutralised.

Some currently indeterminate but huge amount, however, has been used by the planetary biological system to increase the total living biomass by a significant number of Gigatons.

The current biosphere is absorbing annually:

Land	: 110 Gt carbon bio-absorption
Oceans	: 90 Gt carbon bio-absorption
Total	: 200 Gt carbon bio-absorption

source:

http://www.geology.iastate.edu/gccourse/chem/gases/gases_lecture_new.html

What are the consequences of this acceleration of the carbon cycle?

1. The current atmospheric carbon cycle is running at a higher rate than it would have done, without human carbon emissions.

2. The current biosphere is capable of absorbing most of the current CO₂ emissions from all sources. (If this were not the case, then the amount of CO₂ in the atmosphere would be increasing more rapidly than is observed.)

3. In the most dramatic scenario, with no human carbon emissions from fossil fuels (a situation which must arise when all fossil reserves have been exhausted), the biosphere will continue its work of absorbing CO₂ from the atmosphere at a high rate, until the planetary system reaches a new state of equilibrium.

4. The total amount of CO₂ in the atmosphere will be reduced from current levels by a significant amount, and the planetary climate will become generally cooler.

5. The perverse result of humanity's fossil fuel burning over the past centuries is that future generations will be obliged to burn large amounts of carbon to avoid the effects of **global cooling**, until the biosphere and the burning carbon cycle have been reduced to a sustainable level.

Alternatively, as the production of cement releases huge amounts of CO₂ into the atmosphere, governments will probably have to stipulate that all megacity buildings must be built using concrete. This system would use fossil carbon in limestone as a substitute for fossil fuel CO₂ emissions.

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