

Garnaut Review Submission.....Agriculture and Forestry.

From: Geoffrey Richard MOXHAM
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January 8th 2007.

Re: Biochar and Carbon Negative Agriculture and Energy.

Dear respected scientific colleagues,

It is with some definite excitement that I respectfully refer you to the url links below.

Each link gives an outline from a different view, of the compelling case for sequestering atmospheric CO₂ as agricultural charcoal (black carbon).

Some points in summary:

- This process indisputably sequesters carbon in agricultural soils for 500 to >10,000 years (Hence carbon dating).
- The sequestration is simple, scalable from broad acre industry to small farms, and involves extant technology accessible to a farm workshop.

It is currently under intensive research around the world, although Australia has been a world leader in the high technology end of cogeneration biomass pyrolysis research for >20 years (Stephen Joseph, BEST). Due to previous recalcitrant government inaction research is moving to the USA, with Cornell University, at the forefront of Biochar research. BEST pyrolysis technology has been sold to new partners, one of whom is Union Carbide (parent company: Dow). As a result of the urgency of the situation and the wish to allow free public domain access to the technology, the International Biochar Initiative (was the International Agrichar Initiative) began international conferences, the first at Terrigal, NSW, in 2007. The IBI is the current best practise oriented biochar scientific community.

<http://www.biochar-international.org/>

- Biochar concepts are familiar and user friendly, and are understood and accepted by the public with a very positive responsiveness.

- Pyrolysis gasifiers settings can be aligned to either produce grid interactive power from gas turbines, or large volumes of charcoal for agriculture (>40%), or variations in between, depending on demand. *It has been remarked (Lehmann, Cornell) that because of the unequivocal solid C sequestration as biochar, **this is the only truly carbon negative energy source.***

- Lehmann has also estimated that on a massive scale, adopted globally the process could **begin to drive the atmospheric CO₂ concentration downwards by 2030.**

- Charcoal is completely safe, is used orally in hospital emergency (VOC ingestion, snake bite etc), the health industry (detoxification, flatulence etc), unlike the escape potential for liquefied CO₂ geosequestration.
- If this all wasn't enough, there is abundant evidence and current research (Lukas Van Swieten, DPI, Aust. Wollongbar; Lehmann et al, Cornell USA) that biochar is an extraordinary microscopic soil fertility enhancer. The terra preta soils of the Amazon basin appear to be fertile some 1500 years later to the extent they are being mined. **This is a result of the carbon reef habitat, provided for the multivariate biota of the rhizosphere, by the charcoal fines (<1cm). Surrounding soils with no anthropogenic charcoal are exhausted.**
- Research is currently underway to see how much NPK fertilizer can be saved or eliminated due to the binding of nutrients within the char micropore matrix.
- Biochar exhibits resistance to nutrient leaching in high rainfall areas, but also provides resistance to desiccation in low rainfall periods, and so is being used in desert reclamation.
- Biochar at the rate of 10t/ha is shown to reduce N₂O and CH₄ emissions from agricultural land substantially (to 0 in the case of CH₄...hence success with flatulence?) Both gases are significantly worse than CO₂ as GHGs. Given how much of these gases are emitted by current agricultural practices, this alone is a significant reason to support biochar.

It is for these extremely good reasons that I am compelled to write to you to include biochar as part of your response to climate change mitigation. *Biochar appears to have at least 4 bottom lines, and is therefore an extremely viable, if not inevitable, technology, as we pass the age of easily extractible oil and coal.*

As biochar is apparently the **only truly carbon negative future fuel cycle**, I believe it is of utmost importance that you support it with a sense of urgency. It would be negligent to not include it in the IPCC mitigation package, to foster rapid research, & development, & dissemination and deployment. (R&D&D&D). Although biochar satisfies many of the Garnaut Review terms of reference, this is the quote I would refer to:

- The costs and benefits of Australia taking significant action to mitigate climate change ahead of competitor nations.

With a sympathetic Australian government, and a climate culture-change around the world, Biochar is an exciting possibility for Australia to lead the way to planetary climate stabilisation.

With the greatest sincerity,
Geoff Moxham, BSc Industrial Arts (Technology), UNSW, 1977.
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Rise portal on biomass. This site is the full quid.
<http://www.rise.org.au/info/Tech/biomass/index.html>

Going carbon negative, many links. Rick Davies
<http://www.shimbir.demon.co.uk/biocharrefs.htm>

MIT: the case for burying charcoal:
<http://www.technologyreview.com/Energy/18589/>

Nature, 2006: Putting the Carbon back: Black is the new green
<<http://www.nature.com/nature/journal/v442/n7103/full/442624a.html>>

Science: Smouldered earth: http://www.biochar-international.org/images/Science_20News.pdf

Nextterras gasifier pic: <http://www.nextterra.ca/technology/index.cfm>

Eprida corn trials pics: <http://www.eprida.com/home/index.php4>

Lukas Van Swieten's Wollongbar trial; Ag. Today Feb. 07
<http://www.dpi.nsw.gov.au/archive/agriculture-today-stories/february-2007/agrichar-trialled-wollongbar>

The ABC 11 minute video about terra preta called "Agrichar".
<http://www.abc.net.au/catalyst/stories/s2012892.htm>

Kelpie Wilson: Best lay person's introduction to terra preta.
http://www.biochar-international.org/images/Joyful_Liiving_Terra_Preta_Sept-Oct_0207.pdf

Research confirms that char added to soil boosts crop productivity.
<http://biopact.com/2007/06/research-confirms-biochar-in-soils.html>

*The BBC documentary, "The Secret of El Dorado". History of Terra Preta
<http://www.bbc.co.uk/science/horizon/2002/eldorado.shtml>

Ken Salazar has introduced a bill in the US Senate that would fund research on agrichar.
<http://biopact.com/2007/10/towards-carbon-negative-bioenergy-us.html>

Briquetted bagasse charcoal... "Cane coal" as biochar.
<http://www.bioenergylists.org/en/ARTIcharcoal>
<http://www.bioenergylists.org/en/taxonomy/term/706>