



March 11, 2009 12:18am AEDT

## Carbon hopes push case for charcoal

Scientists are optimistic about the potential of biochar, writes Jill Rowbotham | *March 11, 2009*

Article from: [The Australian](#)

**MALCOLM Turnbull's name will be blessed forever by many scientists and bio-businesspeople after he thrust into the spotlight the technology that produces charcoal-based fertiliser.**

As the Government battles to find acceptance for its emissions trading scheme, the Opposition Leader argues the Government's climate change effort came to a dead halt when it signed the Kyoto Protocol. Prominent among his initiatives to cut Australia's annual 570 million tonnes of carbon dioxide equivalent emissions is revisiting the merits of carbon sequestration's poor relative, charcoal, also called biochar.

Turnbull's most prominent pronouncements, which began in late January, have been greeted with jubilation by English geologist and naturalised Australian Chris Turney, who holds the chair of physical geography at the University of Exeter.

"We are seeing quite significant climate change already and the longer we wait (to act) the worse it will be," Turney says. "We need to get something out there that will suck carbon out of the atmosphere. Now is the time."

Biochar is plant material or waste that has been smouldered; that is, reduced to ash by cooking at low heat, a process called slow pyrolysis. The method minimises carbon emissions (those produced can be used to fuel the plant), and maximises the all-important carbon capture; that is, retention of carbon within the material being treated.

Applied to soil, biochar takes a staggeringly long time to degrade and release the carbon -- conservative estimates are hundreds of years and run to thousands -- and it enhances the ability of the soil to hang on to fertilisers applied with it.

In a world where biochar manufacture was widespread, for example, waste land would be reforested and the trees would suck in carbon as they grew. Forests reach a point where they emit as much carbon as they draw out, so to forestall that the trees would be felled as soon as mature and converted to biochar. The waste land would be replanted, establishing a virtuous cycle.

A giant leap forward for fast-tracking the technology would be its inclusion on the list of carbon offsets recognised under Kyoto. Micronesia has requested the UN Framework Convention on Climate Change consider biochar as a fast-start strategy for mitigation. That puts it on the draft agenda for December's UNFCCC talks in Copenhagen.

Similarly, at home, there is not yet official recognition of biochar's potential. This is because bio-carbons are included in the federal Government's Carbon Pollution Reduction Scheme regime under agriculture, which is not going to be considered until 2015, so there is no incentive to manufacture it now.

Nevertheless, research in universities and at CSIRO continues apace and in 2006 the International Biochar Initiative was formed to support the cause. Its first international conference was held in Australia a year later. In October the Australian and New Zealand Biochar Researchers Network was launched and its website came online in January. The group's first get-together, the Asia-Pacific Regional conference, will be held at Queensland Gold Coast in May.

Turney is a biochar booster, courtesy of his work on climate change. His credentials in that debate are well-established. His latest book, *Ice, Mud and Blood: Lessons from Climates Past*, published last year, boasts good reviews as well as a catchy title. In an era when good communicators are highly prized, he is run off his feet.

He is also a director of a new company called Carbonscape, which set up a microwave-powered kiln in Blenheim, in New Zealand's South Island, in October last year and has begun producing biochar commercially. Scientist and global warming activist Tim Flannery has just joined the board.

Turney's beef about the carbon sequestration debate is that while some technologies offer the promise of reducing new emissions, biochar use would take back from the atmosphere some of the 200 billion tonnes of carbon that have been accumulating there since the start of the industrial revolution. The stove the Carbonscape directors call the Black Phantom can fix up to one tonne of carbon a day.

Other local companies working to establish and popularise biochar include Best Energies, at Somersby on the Central Coast of NSW, and Crucible Carbon, in Newcastle, but you don't have to be on the commercial side to be a proponent.

James Cook University's Michael Bird, an environmental geochemist and Federation fellow, is a vocal proponent. "Imagine a simple, scaleable technology based on natural materials that can generate energy, sequester carbon, increase soil fertility and decrease nutrient run-off and that's the potential of biochar," Bird says.

When Bird talks about scaleability, he means the technology can be engineered for any size operation, from that of a single farmer to a large industrial plant. This ease of adaptability for multiple users and purposes is a great strength.

Best Energies began operating its pilot plant at Somersby at the end of 2006, producing its version of biochar, Agrichar, and has collaborated on trials with the NSW Department of Primary Industries. Bird is impressed with this progress.

"A few months ago I wrote to the Queensland Premier saying NSW is way ahead of the game in biochar, and we should be doing something too," he says.

Already demand for the company's product from university laboratories outstrips supply. Technical manager Adriana Downie says the company is ready for large-scale commercial trials but lacks a backer. Despite being owned by a US-based consortium, it needs new sources of finance. "We have done a lot in proving the technology," Downie says. "Now we need a commercial-scale pyrolysis plant to demonstrate the technology on that level."

There is plenty more to know about biochar, including that it is not a homogenous product and not all biochars will benefit all soils. Results will vary depending on feedstocks and the soils into which they are tilled.

"Biochar is a broad term, ranging from stuff that's mainly still plants to the fine stuff," Bird says.

There is range of Agrichars. For example, one is made from council green waste and a healthy dollop of what is politely called biosolids, sewerage sludge.

Other research, being undertaken by University of NSW visiting professor Stephen Joseph with Paul Munroe funded by Joseph's US-backed company Anthroterra, is looking for a way to produce a mix of biomass, such as green waste and manure, with clay and minerals. This is heated at low temperatures via a process called torrefaction. "I had a gut feeling I could do it at even lower temperatures than pyrolysis, and if you can do it at low temperatures with waste heat all the costs come down," Joseph says.

Joseph founded the forerunner to Best Energies and sold out 3 1/2 years ago. He is also vice-chairman of the IBI. He and eminent soil bio-geochemist Johannes Lehmann, of Cornell University, have co-edited a new book, *Biochar for Environmental Management*, which will be published next month.

Lehmann is a world leader in the study of the highly fertile soils found in sites of pre-Columbian Indian occupation in the Amazon. Called terra preta, dark earth, they contain much more carbon than the soils around them. They are partly composed of a charcoal-like substance, giving rise to the theory the ancients were engaged in deliberately fertilising the ground.

Now scientists hope to work out how they did it. "It's not just the fact that we are fixing carbon -- at one level you could take carbon and put it back in the coalmines -- but you can put it back into the soil," Turney says.

"All over the world soils are relatively impoverished, so that's what's rather nice, that you can get these other benefits as well."

But the main game is saving the atmosphere. Turney hammers the urgent theme: "We have have to buy ourselves some time and get carbon levels down."

---

*Copyright 2009 News Limited. All times AEDT (GMT + 11).*