Burn, bury, bargain with it: biochar ticks the green boxes

Paddy Manning, *Sydney Morning Herald, May 30, 2009*

Have your say: Will biochar make a difference?

What unites Malcolm Turnbull, Tim Flannery and James Lovelock? Enthusiasm for biochar: a most intriguing solution to global warming and possible boon for investors.

Biochar—charcoal-like residue of biomass (agricultural or council waste) after pyrolysis (combustion at 400-550 degrees, without oxygen), has the potential to pull large amounts of carbon dioxide out of the atmosphere.

There is no commercial biochar production in Australia yet but there is palpable excitement; about 200 people attended a biochar conference on the Gold Coast last week. Others were turned away.

According to Philip Sutton and David Spratt's *Climate Code Red*, published last year, when Joe Herbertson of sustainability consultancy Crucible Carbon first read about biochar technology "hairs went up on the back of my neck. This is the best news on climate change I've ever heard."

Crucible Carbon is the unlisted, private company Malcolm Turnbull championed this year when launching his Green Carbon Initiative, saying biochar was a "win-win" for jobs, the environment and agriculture given its potential to absorb 100 million tonnes of carbon dioxide every year, or 20 per cent of the country's total.

Heady stuff. Crucible Carbon is chaired and co-owned by Herbertson, former head of BHP Billiton's corporate research labs in Newcastle. Crucible is developing its own pyrolysis unit and focusing on potential renewable, baseload energy for regional towns—as well as selling renewable energy certificates—from the biogas byproduct.

The company has received more than $300,000 of grant funding since it was founded in 2007 and is exploring opportunities to raise up to $12 million in early-stage capital—a combination of debt and equity is most likely—from wealthy individuals and trade partners.

If successful, money raised will fund a commercial-scale pyrolysis unit to generate about three megawatts of electricity from 24,000 dry tons of biomass, plus 8000 tons of biochar—and 3-year payback for investors.

Crucible is technology partner in Rainbow Bee Eater project (named after the bird) in Western Australia's wheat belt, backed by prominent farmer Ian Stanley, and WA Agriculture Department. The project aims to convert agricultural residues and woody crops into biochar and renewable energy. About $1.5 million was invested in the project in the past 18 months, by, among others, miner Alumina Ltd, interested to offset emissions using biochar.

Alumina believes 20 million tonnes of carbon dioxide a year can be stored using biochar by 2020. In January, chief executive John Bevan, said he was "not aware of any other potential large scale mitigation option that can commence capturing and storing carbon this way within several years."

Stanley says field trials applying biochar to wheat crops are already demonstrating the agricultural benefits.

Just one example. Lukas van Zwieten, of NSW Dept. of Primary Industries and Energy, helped organise last week's biochar conference and presented a paper showing the greatest potential market for biochar was as a soil amendment, valued at between $100 and $1000 a ton.

That's a big range, which just shows it's early days. Char can improve the efficiency of fertilisers, and also be a physical amendment to soil. Its value depends heavily on the type of application—type of biomass used as feedstock, soil applied to, crop being grown etc.

The department extrapolated from a one-tenth scale trial to conclude a pyrolysis unit processing four dry tonnes an hour of waste from a chicken facility (mainly manure and sawdust) yields 2.3 megawatts an hour of electricity, saleable to the grid for $750,000 a year (assuming a $40/MWh price). Renewable energy certificates can be sold for another $1 million (assuming a $55/MWh price).

The unit also produces 12,000 tons of biochar a year worth—this is the big part—up to $6.4 million based on the extra sweet corn and fava bean yield after application of biochar in department trial. The productivity increase was substantial—almost double, in some cases.

The trial used a pyrolysis unit made by BEST Energies, the most established Australian company in the field.

BEST is also raising money to build an $8-$10 million commercial-scale plant with backers including Transfield Services. The plant will turn green waste from Sydney councils into electricity and biochar.

BEST director Adriana Downie told GBIZ the most exciting potential for biochar is to be "carbon negative," but emissions trading schemes in Australia skew the application of the technology towards renewable energy generation, because there is no recognition of carbon sequestered using biochar.

In Canberra, Downie pushed for recognition of carbon offsets for biochar in draft the Carbon Pollution Reduction Scheme, and Australia's position in climate negotiators at next week's pre-Copenhagen meeting in Bonn.

International Biochar Initiative is lobbying the same globally. In an letter to the initiative last year, Flannery, the environmental campaigner and former Australian of the Year, said biochar "may represent the single most important initiative for humanity's environmental future".

In a recent *New Scientist* interview, the British scientist and conservationist James Lovelock—after summarily dismissing the efficacy of carbon trading initiatives, renewable energy and carbon sequestration—was effusive: "There is one way we could save ourselves and that is through the massive burial of charcoal.

"The biosphere pumps out 550 gigatons of carbon yearly; we put in only 30 gigatons. Ninety-nine per cent of the carbon that is fixed by plants is released back into the atmosphere within a year or so.

"What we can do is [get] farmers to burn their crop waste at very low oxygen levels to turn it into charcoal, which the farmer then ploughs into the field. A little carbon dioxide is released but the bulk of it is converted to carbon.

"This is the one thing we can do that will make a difference, but I bet they won't do it."

But maybe we will.

paddy.manning@fairfaxmedia.com.au