

FT REPORT - BUSINESS & THE ENVIRONMENT 2008: Innovative plans may be key to greener future

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With carbon markets worth more than €40bn (\$63bn) and investment in clean energy in 2007 reaching almost \$150bn, it is no wonder people are dreaming up all sorts of ways to cash in on the current vogue for the environment.

The carbon market is one area that has generated a lot of hot air. For example, Environmental Power Corp of the US says it produces "energy that transcends conventional notions of what is possible". Or put another way, the loss-making company collects turkey, cow and pig dung and burns the methane produced to generate electricity. This not only produces revenue from the electricity but also carbon credits because methane is a greenhouse gas that is 21 times as potent as CO₂.

Another idea for generating carbon credits has hit stormy waters. A couple of US companies want to "seed" the ocean with iron filings. Iron is a key nutrient for phytoplankton - micro-organisms that "fix" CO₂ from the atmosphere and store the carbon in their exoskeletons. Seeding would encourage plankton growth, and while some are eaten, a large proportion sink to the bottom of the ocean, sequestering the carbon for thousands of years.

Russ George, CEO of Planktos, a company that was hoping to seed an area of ocean west of the Galapagos, said that just 10,000 tonnes of iron could sequester 1bn tonnes of CO₂. There are many areas of uncertainty over the plan and Mr George, a high profile advocate of ocean fertilisation, says "a highly effective disinformation campaign waged by anti-offset crusaders" has prevented the company from raising capital for ocean trials and forced it to "postpone indefinitely" its plans. However, a few weeks after Planktos' move, a rival but lower-profile company, Climos, raised \$3.5m for a similar project.

The high oil price has focused minds on cutting fuel consumption, but one area that has largely been ignored is now coming under increasing scrutiny - the shipping industry. Emissions from ships are estimated to be about 4 per cent, or twice the figure for the embattled aviation industry, and the International Maritime Organisation predicts that emissions will rise by 72 per cent by 2020 if nothing is done.

A German company has come up with a solution: kites. Skysails has developed a giant kite that attaches to the front of a ship and helps to pull it along. The company says it can reduce fuel costs by between 10 per cent and 35 per cent, depending on wind

conditions, as well as reducing emissions of CO₂ and SO₂, which is a big issue for shipping because it uses dirtier fuel than other forms of transport.

Biofuels have come in for criticism over their sustainability, but there are a number of "second-generation" technologies that could get round this, including creating biofuel from algae. This unlikely source of fuel has many advantages - it is fast-growing and a highly efficient converter of sunlight into energy, making it 30 times as productive as current oilseed crops per acre, according to analysts New Energy Finance. There is even talk of boosting yields by combining algae production with another nascent technology - carbon capture from power stations. CO₂ from power stations can be pumped into the ponds where the algae grows - the algae take the CO₂ from the flue gases and use it to grow more quickly.

Another area that will have widespread applications in cutting emissions is nanotechnology. A nanometre is a billionth of a metre and at the nanoscale, materials behave differently than they do at the "bulk" scale. Nanotechnology offers a range of environmental improvements in fields ranging from insulation, where "paint-on" insulation is being developed, to solar power.

In solar power, silicon-based photo-voltaic cells are the current basis for most electricity generation. Nanotechnology enables thin-film solar panels, which are flexible, unlike silicon PV cells, and can be "printed" in a process similar to printing newspapers. This would slash the cost of production and make solar far more cost-competitive with conventional energy generation.

Carbon nanotubes, which are 100 times as strong as steel and only one sixth of the weight, could eventually replace carbon fibre as a composite filler and have the potential to transform the energy efficiency of any vehicle by making it both lighter and stronger.

While wind technology is the most mature area of renewable technology, even here there are innovations. Companies in China and the US are planning to produce wind turbines that use magnetic levitation (maglev) technology, previously only seen in futuristic monorail networks. The maglev reduces friction, allows turbines to operate at lower wind speeds and cuts costs, the manufacturers claim.

The potential of marine energy is at least as great as that of the wind sector, but while most of the technological advances in wind are to do with the size of the turbines (maglev apart), in the marine arena everything is still up for grabs. Neil Kermod, managing director of the European Marine Energy Centre in Orkney, says that if you compare it to aviation, "we are where the Wright brothers were - there is an awfully long way to go".

There are currently more than 50 wave concepts on offer, he says, ranging from buoys that convert energy as they bob up and down (Wavebob), to Pelamis Wave Power's Pelamis device, which looks not unlike an ocean-going intercity train and converts wave energy to electricity using hydraulic rams as the separate "carriages" linked by hinged joints move up and down in the waves.

