

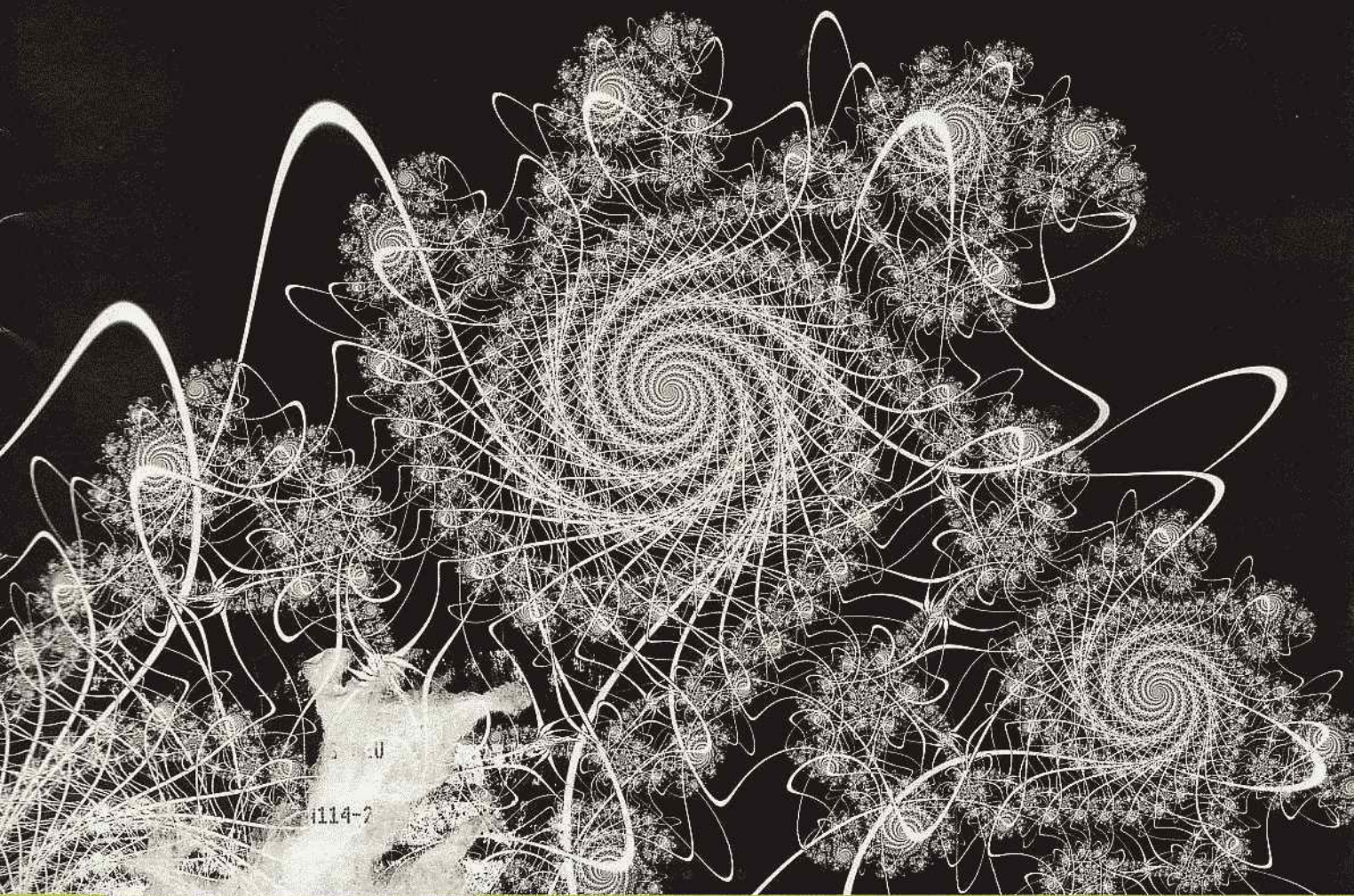
SCIENCE AND TECHNOLOGY NEWS | THE WEEK'S BEST IDEAS | US JOBS IN SCIENCE

# NewScientist

March 10-16, 2007

## Fractal universe

Supergalaxies that are shaking cosmology



### CARBON OFFSETTING

Pollution buster or green fraud?

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# Look, no footprint

Can you really  
cleanse your carbon  
sins by paying for a  
few faraway trees  
or solar panels?  
Fred Pearce finds out

IT WAS a night for partying. Fireworks fizzed across the sky as half a million people celebrated Brisbane's annual Riverfestival last September. Then came a deafening roar. An Australian air force F1-11 swooped over the revellers, leaving behind a stream of flame hot enough to be felt below. Within a second it was gone, and cheers went up as the DJ announced the completion of the highlight of the evening, a "dump and burn".

The aircraft had jettisoned most of its fuel into the sky and ignited it. Later, the festival organisers announced that 300 trees had been planted outside the city to soak up the estimated 68 tonnes of greenhouse gases released by the stunt: dump, burn and offset.

That tree-planting was a small part of one of the fastest-growing businesses in the world: the sale of promises to remove carbon dioxide from the atmosphere, often at bargain-basement prices, by planting forests or investing in renewable-energy projects. Some see carbon offsetting as the ultimate guilt-free solution to global warming, but *New Scientist* has found that this market in environmental

SHAWN HALL/GETTY IMAGES

absolution is remarkably unregulated and secretive, which leaves it open to deception and fraud. While we found no impropriety, the lack of transparency means it is often impossible to be sure that money invested in carbon offsetting makes the difference that is claimed for it.

There are two kinds of offset. Official offsets – sanctioned under the Kyoto protocol – allow governments and companies to earn carbon credits that can be traded on markets such as the Chicago Climate Exchange. Most such projects are carried out in developing countries under the protocol's "clean development mechanism". They have their detractors, but they are at least controlled by tight rules and a complex bureaucracy aimed at preventing fraud.

Then there is the burgeoning unofficial sector – an army of charitable and profit-making bodies that charge a fee to organise offsets on your behalf. This sector cannot confer Kyoto credits and is not bound by the protocol's rules, yet it is the route that many companies have chosen so they can make claims about their green credentials. It has also opened the door to private individuals who want to offset their emissions.

Though still much smaller than the Kyoto sector, which has so far committed to offset 740 million tonnes of CO<sub>2</sub>, voluntary offsets have grown from 3 million tonnes in 2004 to somewhere between 20 and 50 million tonnes in 2006. In all, more than 30 organisations across the developed world now sell voluntary offsets. Simply go online, calculate your emissions from flying, running your car or running your life, and cleanse your environmental sins at the click of a mouse.

## How much CO<sub>2</sub>?

Buying offsets may assuage your guilt, but does it actually work? The answer is a resounding maybe. According to a study by offsets expert Mark Trexler for environment group Clean Air-Cool Planet, based in New Hampshire: "There are no widely accepted standards as to what qualifies as an offset. Almost anyone can offer to sell you almost anything and claim that this purchase will make you carbon neutral."

What's more, says Trexler, "many retail offset marketers provide little information about where the money is being spent or what criteria are used to select the reductions they sell." Most do not make clear that the offset will usually accrue only over many years, during the growing period of the tree or the

working life of the energy project your money went towards. This is unlike Kyoto projects, which have strict time criteria. Few offer customers the chance to invest in specific projects and follow their progress. Among other things, this leads to the possibility that offsets might be sold more than once, says Trexler. In February, Amsterdam-based lobby group Transnational Institute went as far as to claim that offsets companies engaged in "Enron-style accounting".

The uncertainty starts at the first click, as you try to establish how much CO<sub>2</sub> you are responsible for. I chose a random set of online calculators and plugged in the details of my return flight from London to Brisbane. I picked The CarbonNeutral Company, based in London; Climate Care, based in Oxford, UK; and German offsetter Atmosfair. Surely they could agree on the emissions? They couldn't. The calculators produced figures ranging from 1.8 tonnes of CO<sub>2</sub> with CarbonNeutral through 5.4 tonnes with Climate Care to a staggering 12.5 tonnes with Atmosfair.

To be fair, there are good reasons why the numbers disagree. Aircraft emissions are

exactly what share of the aircraft emissions you as a passenger are responsible for. Climate Care assumes 100 per cent seat occupancy, but others plump for a more typical 80 per cent. For long-haul flights, Climate Care also ascribes 10 per cent of emissions to freight rather than passengers, further reducing your share of the emissions.

There is also a big difference in price. Atmosfair charges £13 to offset a tonne of CO<sub>2</sub>, while Climate Care and CarbonNeutral both claim to do the same job for around £7.50. The end result is that, to offset my flights to Brisbane and back, I could pay £165 to Atmosfair, £40 to Climate Care or a bargain £13.30 to CarbonNeutral. The companies say their prices are a fair reflection of the cost of their projects, but it is hard not to conclude they are competing on price.

Is it better to pay more or to pay less? It's hard to say. The truth is that you cannot know at the time of purchase whether your investment will reap an environmental dividend, since most offset projects only deliver returns over many decades. You are effectively buying offset futures.

# "Is it better to pay more or less for offsets? It's hard to say"

complex, and their impact on the atmosphere even more so. CO<sub>2</sub> emissions from flights are easy to calculate: burning a tonne of aircraft fuel produces 3.15 tonnes of CO<sub>2</sub>. However, aircraft also emit nitrogen oxides and water vapour. The water can make contrails that form heat-trapping clouds. The nitrogen oxides create ozone, a greenhouse gas, but one that sometimes destroys another, methane. All these reactions vary with temperature, altitude and whether it is day or night.

So the offset companies generally try to integrate all these emissions from aircraft into a single measure of warming, calculated as the equivalent of so many tonnes of CO<sub>2</sub>. There is an ongoing scientific debate about how to do this, however. In 1999 the Intergovernmental Panel on Climate Change agreed on a multiplier of 2.7. More recent research suggests a figure of 1.9. The offset organisations have yet to agree. Atmosfair multiplies by 3; Climate Care by 2. CarbonNeutral goes on actual CO<sub>2</sub> alone.

Nor is that the end of the differences between offsetters. Each takes its own view of

Take tree plantations, which account for most of the voluntary offset money spent so far, greening an estimated 4 million hectares. Brisbane's F1-11 released its emissions in less than a second, but the trees planted to offset it will reabsorb CO<sub>2</sub> only gradually, over about three decades – if all goes well. And it may not go well. All around Brisbane at that time, trees were dying in Australia's worst drought in 1000 years. It is anyone's guess whether the offset trees will fare better.

The uncertainty over tree planting was dramatically highlighted when rock group Coldplay vowed to offset emissions from the production of their 2002 album *A Rush of Blood to the Head*. They paid for 10,000 mango trees to be planted in India. Accounts differ, but something went badly wrong and around 4000 of the trees died.

Even successful tree projects do not live forever. Eventually they die, rot and yield up their carbon. Read the small print and offset companies mostly promise to maintain their forests for 99 years. There is a certain logic to this. It is roughly equivalent to the amount ▶

# Buyer beware

of time an average molecule of CO<sub>2</sub> released into the air will last before it is reabsorbed by nature. The result of the offset, then, is not to negate the emission so much as time-shift it. Rather than hanging round in the atmosphere through this century, that tonne of offset CO<sub>2</sub> will instead inhabit the next.

This is problematic. It is just possible that by the 22nd century the concentration of CO<sub>2</sub> in the atmosphere will be lower than today, in which case this time-shift will have been useful. More likely the offset CO<sub>2</sub> will be released back into an atmosphere already choked with the gas, giving an extra push to global warming. Future generations may not thank us for our forest offsets.

## Making matters worse

There are other concerns about forest schemes. They may dry out soils or release methane, negating the gains from stored CO<sub>2</sub>. Outside the tropics, dark forest canopy often absorbs more heat than the growing timber can offset and so in fact exacerbates global warming. Large forest projects also have a nasty habit of creating social conflict by turving poor people off their land.

It is perhaps no wonder that most offset companies are now getting out of the trees business. Whatever the theoretical benefits of tree planting, they say, the burdens of long-term monitoring and verification, and the potential for disputes, are just too great.

So what are the alternatives? For most offset companies, plan B is to invest in green energy projects such as wind turbines, solar panels, and energy-efficient light bulbs and cooking stoves. "Funding energy projects is intuitively better [than forests] because it stops pollution, rather than soaking it up later, and you are contributing to a wider move

Six questions you should ask an offset company before handing over your cash:

- Do your offsets result from specific projects, and what are they?
- How long will it take for the project to offset my emissions?
- Can I follow the progress of the offsets I invest in and read reports of independent verifiers?
- Do your projects meet the Gold Standard?
- Can you prove that the projects in your portfolio would not have happened without you?
- Can you show you are not selling offsets more than once, or that I am not subsidising others to meet legal obligations?

For a directory of offsetters, see [www.cleanclear-coolplanet.org/ConsumersGuidetoCarbonOffsets.pdf](http://www.cleanclear-coolplanet.org/ConsumersGuidetoCarbonOffsets.pdf)

away from fossil fuels," says Mike Buick of Climate Care.

However, these projects raise their own set of dilemmas. Most critical is the question of "additionality". In other words, has the project really added something to what would have happened anyway? If so, how much?

Many countries are already reducing their reliance on fossil fuels and adopting energy efficiency as a matter of course, so offsetters have to demonstrate that what they are doing is additional to that. If they are installing solar panels in an Indian village, say, they need to show that this would not have happened without their intervention. They also have to produce a plausible calculation showing how much wood or fossil fuel the villagers would have burned without the panels.

The trouble is that nobody can be sure about the future. Even apparently copper-bottomed additionality can spring a leak. In 2005, for example, Climate Care funded the distribution of free energy-efficient light

bulbs in a slum in Cape Town, South Africa, and sold the offset emissions. Yet a few months later, power company Eskom responded to blackouts with an energy-saving programme that involved distributing similar bulbs in the same township.

"Disagreements over additionality underlie most disputes about the quality of offsets," says Trexler. So it's no wonder that a consortium of environmental groups, including WWF, has now set up a certification scheme called the Gold Standard, which aims to verify claims of additionality. But while it has made inroads in the official Kyoto sector, a simplified version for the voluntary sector has not yet attracted many applicants.

One sensible test applied by the Gold Standard is to ask if the offset project makes economic sense in its own right, regardless of environmental benefits. If not, then the chances are it would not have happened, and therefore qualifies as additional. But this means that the projects where it is easiest to demonstrate additionality are also the most expensive, and so probably the least cost-effective: fewer tonnes of CO<sub>2</sub> will be saved for every dollar spent.

An alternative approach is to find cost-effective projects that are stuck on the starting blocks for want of capital. Climate Care funds many such small-scale energy projects among poor communities in developing countries. "If the people don't have capital and you can put it in, then additionality is clear," says Buick, citing in particular spending on cleaner-burning cooking stoves in India.

Yet even these schemes are controversial. Many governments in the developing world worry about the probity of letting rich nations carrying out carbon offsetting in their countries – they call it CO<sub>2</sub> colonialism. One day soon, countries like India, China and Brazil will probably have to accept their own limits on emissions. At that point, they may discover that the easiest, cheapest offset options have already been used up by western companies.

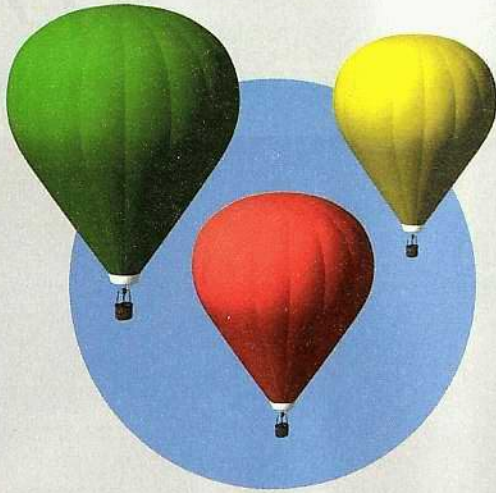
For that reason and others, many offsetters want to fund projects closer to home. Here the logic of additionality becomes even more difficult. The question is: can you claim additionality if you offset in countries that are already legally bound to reduce emissions under the Kyoto protocol? You would think not, yet many offsetters do precisely that. CarbonNeutral, for instance, has forestry projects in the UK and Germany and funds a wind farm in New Zealand. CO<sub>2</sub> Balance, based in Somerset, UK, buys land in the UK and France on which to plant trees. The Woodland

AVERAGE PER CAPITA CO<sub>2</sub> EMISSIONS (TONNES PER YEAR)



BUSINESS AS USUAL

11.1 tonnes of CO<sub>2</sub> would fill three hot air balloons



WHERE THE CO<sub>2</sub> COMES FROM

- 4.68 tonnes: Goods and services (clothing, waste disposal, street lighting, recycling, consumer durables, etc)
- 0.36 tonnes: Flights
- 0.48 tonnes: Household construction and maintenance
- 0.47 tonnes: Household electricity consumption
- 0.79 tonnes: Household gas consumption
- 1.03 tonnes: Car travel
- 3.25 tonnes: Food production and transport

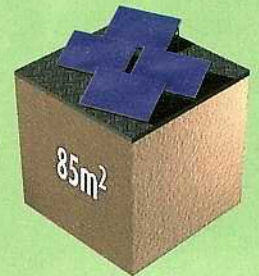


OFFSETTING

1 tree planted in the rainy tropics removes about 22 kilograms of CO<sub>2</sub> from the atmosphere each year so to offset 11.1 tonnes of CO<sub>2</sub> you would have to plant 505 trees in the tropics



1 energy-efficient light bulb saves about 100kg of CO<sub>2</sub> in its lifetime (8000 hours of use) so to offset 11.1 tonnes of CO<sub>2</sub> you would have to install 111 energy-efficient bulbs



1 square metre of solar panel saves about 130kg of CO<sub>2</sub> per year so to offset 11.1 tonnes of CO<sub>2</sub> you would have to install 85m<sup>2</sup> of solar panels

Trust also funds tree planting in the UK by selling offsets. The danger in this is that governments with Kyoto obligations will claim these voluntary offsets as part of their official efforts to reduce emissions, so that the voluntary sector ends up doing the work of the official one using private money that was invested in good faith.

That's not to suggest that these projects are illegitimate or deceitful. The Kyoto protocol includes a mechanism called joint implementation, which allows Kyoto countries to invest in others' offset projects. Even so, it's difficult to guarantee additionality in such schemes. To avoid confusion, some offsetters do not fund

projects in countries with legally binding Kyoto targets. Climate Care for one has called on governments with Kyoto targets not to count voluntary offset projects as part of their compliance activity.

What does seem fair criticism is that efforts to portray offsets as simple, quick fixes pose serious questions of both commercial and ecological legitimacy. Sceptics argue there is no substitute for cutting emissions. For them, "dump, burn and offset" is the worst possible outcome. In February a radical group called London Rising Tide occupied the office of

CarbonNeutral, accusing the company of creating a "smokescreen" behind which corporations will be able to keep increasing emissions. That is a political judgement rather than a scientific one – as far as the climate is concerned, a tonne of CO<sub>2</sub> pulled out of the atmosphere is as good as a tonne of CO<sub>2</sub> that never entered it – but the group still has a point. Buying an offset implies a degree of certainty that we do not have.

At the very least there is an urgent need for regulation so that – as British environment secretary David Miliband put it when announcing plans for oversight of voluntary offsets – "people can be sure that the way they offset is actually making a difference." ●