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Here is the simple mathematical reason why large scale carbon offsets can't work

By George Monbiot. Published in the Guardian, 17th July 2009

Well at least that clears up the mystery. Over the past year I've been fretting over an intractable contradiction. The government has promised spectacular cuts in greenhouse gas emissions. It is also pushing through new roads and runways, approving coal-burning power stations, bailing out motor manufacturers and ditching its regulations for low-carbon homes. How can these policies be reconciled?

We will find out tomorrow, when it publishes a series of papers on carbon reduction. According to a person who has read the drafts, the new policies will include buying up to 50% of the reduction from abroad. If this is true, it means that the UK will not cut its greenhouse gases by 80% by 2050, as the government promised. It means it will cut them by 40%. Offsetting half our emissions (which means paying other countries to cut them on our behalf) makes a mockery of the government's climate change programme.

The figure might have changed between the draft and final documents, but let's take it at face value for the moment, to see what happens when rich nations offload their obligations. What I am about to explain is the simple mathematical reason why any largescale programme of offsets is unjust, contradictory and ultimately impossible.

Last week the G8 summit adopted the UK's two key targets: it proposed that developed countries should reduce their greenhouse gases by 80% by 2050 to prevent more than two degrees of global warming(1). This meant that it also adopted the UK's key contradiction, as there is no connection between these two aims. An 80% cut is very unlikely to prevent two degrees of warming; in fact it's not even the right measure, as I'll explain later on. But let's work out what happens if the other rich nations adopt both the UK's targets and its draft approach to carbon offsets.

Please bear with me on this: the point is an important one. There are some figures involved, but I'll use only the most basic arithmetic, which anyone with a calculator can reproduce.

The G8 didn't explain what it meant by "developed countries", but I'll assume it was referring to the nations listed in Annex 1 of the Kyoto Protocol: in other words, those which have promised to limit their greenhouse gases by 2012. (If it meant the OECD nations, the results are very similar). To keep this simple and consistent, I'll consider just the carbon emissions from burning fossil fuels, as listed by US Energy Information Administration(2). It doesn't publish figures for Monaco and Lichtenstein, but we can forgive that. The 38 remaining Annex 1 countries produce 14982 million tonnes of CO₂, or 51% of global emissions. Were they to do as the UK proposes, cutting this total by 80% and

offsetting half of it, they would have to buy reductions equal to 20.5% of the world's total carbon production.

This means that other countries would need to cut 42% of their emissions just to absorb our carbon offsets. But the G8 has also adopted another of the UK's targets: a global cut of 50% by 2050. Fifty per cent of world production is 14598mt. If the Annex 1 countries reduce their emissions by 80% (including offsets), they will trim global output by 11986 million tonnes. The other countries must therefore find further cuts of 2612mt. Added to the offsets they've sold, this means that their total obligation is 8581 million tonnes, or 60% of their current emissions.

So here's the outcome. The rich nations, if they follow the UK's presumed lead, will cut their carbon pollution by 40%. The poorer nations will cut their carbon pollution by 60%.

If global justice means anything, the rich countries must make deeper cuts than the poor. We have the most to cut and can best afford to forego opportunities for development. If nations like the UK cannot make deep reductions, no one can. We could, as I showed in my book *Heat*, reduce emissions by 90% without seriously damaging our quality of life(3). But this carries a political price. Business must be asked to write off sunk costs, people must be asked to make minor changes in the way they live. This country appears to be doing what it has done throughout colonial and post-colonial history: dumping its political problems overseas, rather than confronting them at home.

Befuddled yet? I haven't explained the half of it. As the G8 leaders know, a global cut of 50% offers only a faint-to-non-existent chance of meeting their ultimate objective: preventing more than two degrees of warming. In its latest summary of climate science, published in 2007, the Intergovernmental Panel on Climate Change suggested that a high chance of preventing more than two degrees of warming requires a global cut of 85% by 2050(4). In drafting the climate change act, the UK government promised to keep matching the target to the science. It has already raised its cut from 60% to 80% by 2050. If it sticks to its promise it will have to raise it again.

Global average CO2 emissions are 4.48 tonnes per person per year. Cutting the world total by 85% means reducing this to 0.672t. Average per capita output in the 38 Annex 1 countries is 9.98 tonnes: to hit this target they must cut their emissions by 93.3% by 2050. If the rich persist in offsetting 50% of this cut, the poorer countries would have to reduce their emissions by 6989mt to absorb our offsets. To meet a global average of 0.672t, they would also need to chop their own output by a further 10838mt. This means a total cut of 17827mt, or 125% of their current emissions. I hope you have spotted the flaw.

In fact, even the IPCC's proposal has been superseded. Two recent papers in *Nature* show that the measure which counts is not the proportion of current emissions produced on a certain date, but the total amount of greenhouse gases we release(5,6). An 85% cut by 2050 could produce completely different outcomes. If most of the cut took place at the beginning of the period, our cumulative emissions would be quite low. If, as the US Waxman-Markey bill proposes, it takes place towards the end, they would be much higher. To deliver a high chance of preventing two degrees of warming, we would need to cut global emissions by something like 10% by the end of next year and 25% by 2012 (7). This is a challenge that no government is yet prepared to accept.

Carbon offsetting makes sense if you are seeking a global cut of 5% between now and forever. It is the cheapest and quickest way of achieving an insignificant reduction. But as soon as you seek substantial cuts, it becomes an unfair, impossible nonsense, the equivalent of pulling yourself off the ground by your whiskers. Yes, let us help poorer nations to reduce deforestation and clean up pollution. But let us not pretend that it lets us off the hook.

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