



The cover image is adapted from a figure by Myles Allen and co-authors on page 56 that shows various CO₂ emission paths each consistent with total cumulative emissions of 1 trillion tonnes of carbon.

Cover design by Karen Moore

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The Macmillan Building, 4 Crinan St
London N1 9XW, UK
Tel: +44 (0) 20 7833 4000
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SUFFICIENT CERTAINTY

Many argue that emissions targets should be the lynchpin of a global climate deal, but other than the goal of 'avoiding dangerous climate change', there is little agreement on what exactly we should be aiming for. The US delegation offered hope of progress at the first round of UN climate talks in Bonn, Germany, last month, where they committed to 'make up for lost time'. But this was quickly eclipsed by disagreements over how far and fast countries could go in reducing their emissions.

Much of the niggling over numbers can be put down to political wrangling, but there remains the issue of how exactly temperatures will rise with emissions. While the best estimates suggest this is 3 °C for a doubling of atmospheric CO₂ concentrations, it could be as high as 6 °C or more (see page 59). This calls into question whether even the most stringent mitigation scenarios being proposed for the upcoming negotiations in Copenhagen truly represent an acceptable attempt to avert the risk of dangerous climate change.

Though the European Union defines warming of more than 2 °C above pre-industrial temperatures as unacceptable, others such as NASA's James Hansen argue this should be 1.5 °C unless we are willing to suffer serious impacts. So should we aim to stabilize atmospheric CO₂ concentrations below 450 parts per million, as advised by economist Nicolas Stern in his latest book (see page 62) or at 350 parts per million, as recommended by Hansen?

And how would either translate into near- and long-term emissions targets? Would targets alone even be sufficient? Perhaps not, unless they are set within the context of an overall carbon budget, argue Myles Allen of Oxford University and others in this issue (see page 56). Their latest research suggests that to keep warming below 2 °C, we will need to limit cumulative CO₂ emissions to 1 trillion tonnes — twice that emitted since the pre-industrial era — as well as having shorter-term targets that require imminent political action.

If negotiators in Copenhagen agreed to such a strategy, it would be commendable and would undoubtedly bring us closer to limiting peak warming. But as with targets, carbon budgets are subject to uncertainty, and the warming from 1 trillion tonnes of carbon could be much larger than anticipated.

With just seven months to go — and only a few weeks of official meetings left — until the deadline to agree a successor to the Kyoto Protocol, now more than ever policymakers need scientific advice on climate change. On a policy-relevant timescale, the question of how sensitive the climate system is to greenhouse gases is likely to remain unanswered.

But absolute certainty is not a prerequisite for action. Dangerous climate change is going to be hard to avoid, and strong action taken in Copenhagen can only bring us closer to achieving that common goal.

OLIVE HEFFERNAN, EDITOR

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