

# A pledge for immediate action

Drastic measures aimed at reducing carbon emissions must be taken now to avoid the devastating effects of global warming on our future.

It is now widely accepted that global warming is attributable to human activity<sup>1</sup>. Burning of fossil fuels has raised the concentration of CO<sub>2</sub> in the atmosphere from 280 ppm before the industrial revolution to 387 ppm in 2008<sup>2</sup>. Together with the emission of other greenhouse gases (GHGs), this has already caused a temperature rise of 0.75 °C since 1900. According to recent studies, the effects of this temperature rise can already be observed in physical and biological systems<sup>3</sup>.

If temperatures keep rising, the 2007 report of the Intergovernmental Panel on Climate Change predicts devastating consequences for our planet and human societies by the end of the twenty-first century<sup>1</sup>. Even if GHG concentrations were kept constant at the present level, the global average temperature will still rise by about another degree before stabilizing<sup>1</sup>. To prevent an increase by more than two degrees — the level considered dangerous by the European Union — global emissions should peak within the next decade and then plummet<sup>1</sup>. As growing economies like China and India are unlikely to start reducing their emissions very soon, drastic action in Europe and United States must be taken immediately.

With a world economy solidly based on fossil fuels, reaching international agreements on cutting GHG emissions is certainly complicated. In this respect, the recent European Union agreement to reduce emissions by 20% (from 1990 values) by 2020 has to be seen as a positive result. Disappointingly, although the target should be reached primarily through a 'pay to pollute' system, many free allowances have been given to protect the interests of large polluting industries<sup>4</sup> — not to mention the option to offset the required cuts by funding projects in the developing world.

The need for drastic measures was captured in an open letter sent to Michelle and Barack Obama by James Hansen — head of the NASA Goddard Institute for Space Studies — at the end of 2008<sup>5</sup>. Hansen suggests three main action points, namely, the introduction of a carbon tax, a moratorium on coal plants that do not incorporate capture and storage facilities and the accelerated development of fourth-generation nuclear plants. His views may



Tackling global warming will require international and strong political action, for example in the form of carbon taxes, to develop alternative clean technologies.

be considered as extreme by some, but they reflect the urgent need for concrete solutions.

The positive aspects of a carbon tax can be appreciated by considering that simple changes in consumer behaviour, like driving less or using more efficient cars, and reducing electricity or heating wastes can have a huge impact on carbon emissions. Sadly, it is unlikely that consumers will choose a less comfortable lifestyle, particularly if the effects of their behaviour are not immediately visible. Creating awareness is certainly necessary, but is unlikely to lead to concrete results unless a low-carbon-emission lifestyle is coerced. Introducing a carbon tax may not raise politicians' popularity. In this context, Hansen's proposals to distribute the dividends among the public may make it more acceptable. But in any case the emergency of the situation requires effective, not popular, choices.

As for banning coal and pushing for nuclear power, these points should be seen in the wider context of creating carbon-free energy sources. It is realistic to imagine that in the next few decades, CO<sub>2</sub>-clean

technologies like carbon capture and storage, or renewable sources like wind and solar will supply most of our energy. But if scientific and technological developments proceed at the present speed it will take too long before these technologies can have a significant impact on reducing emissions. As Cronin Vining suggests in his commentary on thermoelectrics<sup>6</sup>, the climate crisis demands a serious evaluation of the possible strategies to obtain immediate results. Although picking a winner would be simplistic and dangerous in the long term, R&D should focus on accelerating the development of a portfolio that can guarantee enough green energy within the next few years, even at the expense of less-promising routes. Within this context, although banning coal may be unrealistic in the short term, it should be considered that while it remains a cheap option, the incentive to accelerate the development of alternative sources will remain limited.

Ultimately what is needed is strong political leadership, and the recent election of Barack Obama as President of the United States — now second to China for GHG emissions but still the largest energy user — has raised high expectations for drastic changes. Although his mandate has just started, his declared intention to tackle global warming by giving science a prominent role in determining future policies — as confirmed by the appointments of Steven Chu as secretary of energy and of John Holdren as chief scientific advisor — has already put an end to an eight-year denial of scientific evidence and effectively no action to combat global warming during the Bush administration.

In 2009 it is crucial that much effort focuses on reaching an international agreement on cutting emissions at the UN conference in Copenhagen. Missing such an opportunity would be foolish and could have devastating effects. □

## References

1. [http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr\\_spm.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf)
2. <http://www.esrl.noaa.gov/gmd/ccgg/trends>
3. Rosenzweig, C. *et al.* *Nature* **453**, 353–358 (2008).
4. <http://www.guardian.co.uk/environment/2008/dec/13/carbonemissions-emissionstrading>
5. [http://www.columbia.edu/%7Ejeh1/mailings/20081229\\_DearMichelleAndBarack.pdf](http://www.columbia.edu/%7Ejeh1/mailings/20081229_DearMichelleAndBarack.pdf)
6. Vining, C. B. *Nature Mater.* **8**, 83–85 (2009).