

ASSESSING THE POTENTIAL CLIMATE IMPACTS OF INDUSTRIAL GASES

Professor Keith Shine FRS and Professor Eleanor Highwood

Human activity leads to the emission of many greenhouse gases that differ from carbon dioxide (CO₂) in their effects on climate. International climate policy requires the use of an 'exchange rate' to place emissions of such gases on a 'CO₂-equivalent' scale. These 'exchange rates' are calculated using 'climate emission metrics', which enable quantitative comparisons to be made of the climate impact of the emission of a given gas with respect to CO₂ emissions.

BACKGROUND

The assessment reports of the Intergovernmental Panel on Climate Change (IPCC) and the World Meteorological Organization / United Nations Environment Programme (WMO/UNEP) Scientific Assessments of Stratospheric Ozone Depletion presented the values of 'Global Warming Potential' or GWP. GWP is the metric adopted by the Kyoto Protocol to the United Nations' Framework Convention on Climate Change (UNFCCC) to allow signatories to report emissions of different greenhouse gases on a CO₂-equivalent scale, and is one of a range of possible methods for comparing the climate impact of emissions of different greenhouse gases.

OUR RESEARCH

Professor Keith Shine played a major role in the international assessments. He led the compilation of databases of an essential input to GWP calculations, namely the so-called 'radiative efficiency, or RE, for gases included in the Kyoto Protocol. He and his co-workers within and outside the Department of Meteorology developed and refined methods of calculating RE, using advanced numerical models incorporating new laboratory observations. For many industrial gases, the Reading group has presented the first published RE value, and it has helped resolve instances where results presented in the literature had been in substantive disagreement. These advances have enhanced the databases presented in international assessments. The group has also proposed alternatives to the GWP that may be more suitable for climate policy.

OUR IMPACT

The resulting GWP tables have been used in the implementation of the first commitment period of the Kyoto Protocol (2008–2012) to the UNFCCC, and in decisions and discussions on the implementation of the Kyoto Protocol's second commitment period (2013–2020), as well as in intergovernmental debate on aspects of the use of metrics in climate agreements. The work is also used within the UK Climate Change Act (2008) to calculate CO₂-equivalent emissions to assess the extent to which the UK is meeting its own commitments under this Act.



Find out more

Department of Meteorology
www.reading.ac.uk/met

For more on climate related research at the University of Reading see Walker Institute for Climate System Research
www.walker.ac.uk

HELPING FARMERS IN AFRICA AND ASIA ADAPT TO CHANGES IN WEATHER AND CLIMATE

Dr Peter Dorward, Dr Henny Osbahr and Dr Roger Stern

Our research and statistical training courses are helping farmers across Africa and Asia to analyse data on past weather and climate, to quantify and understand climate risk and to adapt farming practices to make them more resilient.

BACKGROUND

Agriculture is highly vulnerable to weather and climate, particularly in developing countries where there is often little irrigation and farmers rely on natural rainfall to water their crops. In addition, human-induced climate change is increasing temperatures, changing rainfall patterns and increasing the risks of intense rainfall, flooding and drought.

OUR RESEARCH

Researchers from the School of Agriculture, Policy and Development and the Statistical Services Centre have worked with farmers, local agricultural advisors, NGOs and governments to:

- investigate how farmers perceive climate risk, how they see their local climate changing and how this affects what they do;
- develop training courses to improve the way climate data is analysed and used for agricultural applications at the local, regional and national level;
- scale-up lessons learnt to help many hundreds of farmers.

OUR IMPACT

The approach developed by the University of Reading has changed the activities of organisations in sub-Saharan Africa and south Asia and helped thousands of smallholders to improve their decision making and livelihoods. Organisations that are using our research include Oxfam, Farm Africa, Practical Action and World Vision. For example, University of Reading staff have worked with Practical Action to integrate climate change adaptation in the Department of Agriculture, Technical and Extension Services (AGRITEX) in Zimbabwe. This included training front-line extension staff who in-turn are passing on their expertise to the smallholder farmers they work with. In Tanzania, our training courses have helped farmers assess the reliability of the rainy season. The training identified a number of adaptation options such as delaying planting until the rainy season is more established, developing water conservation measures and investigating crops that could withstand longer dry periods.

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