

Assessing the potential climate impacts of industrial gases

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Summary

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.

How is University of Reading research contributing?

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 for 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.

What impact has our research had?

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 to 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...

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- www.met.reading.ac.uk