



## The Role of HFCs in Long Term Climate Change

There is ample evidence to show that HFCs have minimal (less than 1%) contribution to climate change at present<sup>1</sup>. Furthermore, the records show that emissions of HFCs from developed countries have slowed in recent years<sup>2,3</sup>. This is partly as a consequence of legislation (such as the 2006 Regulation and Directive in the EU<sup>4</sup>) and partly because demand has become "saturated", for example for HFC-134a in the U.S.A.<sup>2</sup>

Together with methane, ozone (in the lower atmosphere), black carbon (soot) and some other atmospheric aerosols, HFCs are "Short Lived Climate Forcers (SLCFs)", which means that, although they are greenhouse gases, their environmental lifetimes are far shorter than that of CO<sub>2</sub>, the most abundant greenhouse gas. This short term influence has led to a superficial view that reduction in SLCF emissions would have a major effect on long term climate forcing and global warming.

In a recent paper from researchers in several prestigious scientific institutes, this view has been shown to be, at best, naive<sup>5</sup>. They concluded that:

"Although long-term mitigation of methane and hydrofluorocarbons\* are integral parts of 2 °C scenarios, early action on these species mainly influences near-term temperatures and brings small benefits for limiting maximum warming relative to comparable reductions taking place later..."

and

"...Our study demonstrates the importance of coherently considering CO<sub>2</sub>–SLCF coevolutions. Failing to do so leads to strongly and consistently overestimating the effect of SLCF measures in climate stabilization scenarios. Our results reinforce that SLCF measures are to be considered complementary rather than a substitute for early and stringent CO<sub>2</sub> mitigation.

Near-term SLCF measures do not allow for more time for CO<sub>2</sub> mitigation"

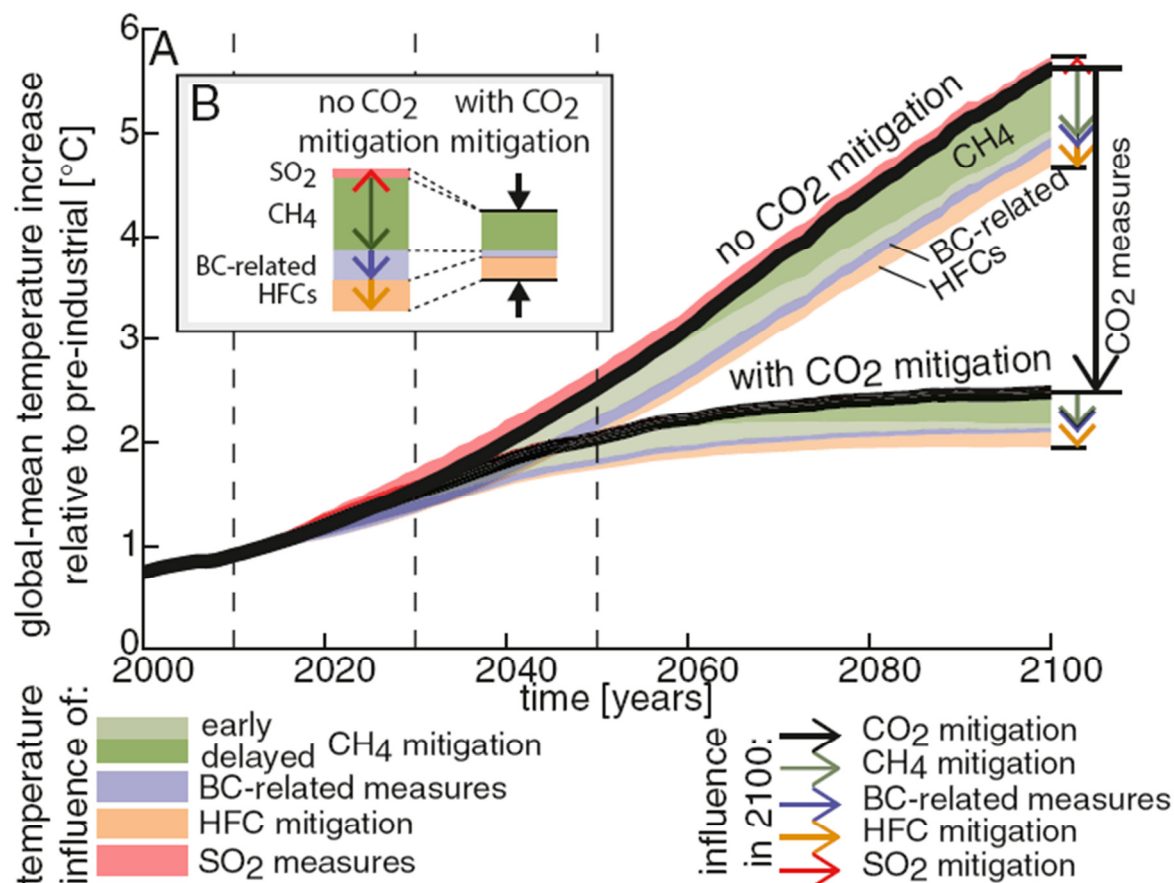
These conclusions are illustrated in the graph from the same publication reproduced below. This clearly shows the overwhelming influence of CO<sub>2</sub> on the development of future global temperatures and that the effect of the SLCFs, even when their emissions are severely reduced in the mitigation scenario, is actually quite small.

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\* Global controls on HFCs could involve a cap and reduction scheme, similar to that required by the revised European F-Gas Regulation 517/2014.

Conclusions such as this reinforce the need to minimise CO<sub>2</sub> emissions, for example by ensuring that refrigeration and thermal insulation are accomplished with the highest possible efficiency (activities in which HFCs can have a positive role in reducing an overall climate impact that includes CO<sub>2</sub> emissions).

### Influence of SLCF-CO<sub>2</sub> linkages under varying CO<sub>2</sub> mitigation.



source: Rogelj, J, et al. (2014), *Disentangling the effects of CO<sub>2</sub> and short-lived climate forcer mitigation*, *Proc. Nat. Acad. Sci.* [www.pnas.org/cgi/doi/10.1073/pnas.1415631111](http://www.pnas.org/cgi/doi/10.1073/pnas.1415631111)

CO<sub>2</sub> paths show a world “with CO<sub>2</sub> mitigation” and with “no CO<sub>2</sub> mitigation”.

Early CH<sub>4</sub> mitigation is represented by the combined light and dark green area.

HFC mitigation is shown for the lower end of “business as usual” and the adoption of early measures.

BC-related (and SO<sub>2</sub>) measures show the differences between no controls and the adoption of early measures.

## References

- 1 Fifth Assessment Report of the Intergovernmental Panel on Climate Change ([www.ipcc.ch](http://www.ipcc.ch)) - see Chapter 8, Table 8.2
- 2 National Inventories of Greenhouse Gases submitted to the United Nations Framework Convention on Climate Change ([unfccc.int](http://unfccc.int))
- 3 European Environment Agency Technical Reports No 15/2013 and 15/2014 ([www.eea.europa.eu](http://www.eea.europa.eu))
- 4 Regulation (EC) No 842/2006 of 17 May 2006 on certain fluorinated greenhouse gases and Directive 2006/40/EC of 17 May 2006 relating to emissions from air-conditioning systems in motor vehicles and amending Council Directive 70/156/EEC
- 5 Rogelj, J, Schaeffer M, Meinshausen M, Shindell D, Hare W, Klimont Z, Velders G, Amann M, Schellnhuber HJ. (2014), Disentangling the effects of CO<sub>2</sub> and short-lived climate forcer mitigation, Proc. Nat. Acad. Sci. [www.pnas.org/cgi/doi/10.1073/pnas.1415631111](http://www.pnas.org/cgi/doi/10.1073/pnas.1415631111)