Radiative Forcing

Radiative Forcing ('RF')

The UN Intergovernmental Panel on Climate Change ('IPCC'), in its special report "Aviation and the Global Atmosphere", recommended that aircraft CO_2 emissions should be multiplied by a factor of between 2.0 and 4.0 – with a recommended mid-point of 2.7 – to reflect the greater climate impact of CO_2 emissions at high altitude as well as the impact of non-CO_2 emissions from aircraft engines.

More recent research indicates that the appropriate adjustment for RF is more likely to be in the range 1.9 to 2.0. Accordingly SSE's calculations are based on an RFI of 1.9 – i.e. the lower end of the range. Note also that the RF multiplier is only applied to aircraft emissions and not to emissions from surface access travel or airport buildings.

Contrails

The impact of aircraft contrails on climate change is excluded from the RF effect because there is too much scientific uncertainty to make a reliable estimate.

Contrails are created by aircraft as they fly high in thin, cold air. Water vapours from aircraft engines condense around fine sooty particles from the aircraft exhaust and freeze to form cirrus clouds, which can last for minutes or hours.

Contrail-induced clouds are too thin to reflect sunlight to any degree but ice crystals inside them can trap heat and therefore contribute to global warming.

A 2011 study[1] suggests that the net effect of aircraft contrails contributes more to global warming than all the CO_2 produced by aircraft since the Wright Brothers.

[1] *'Global radiative forcing from contrail cirrus',* Ulrike Burkhardt & Bernd Kärcher, Nature Climate Change, Vol 1, p54–58 (March 2011)