



IEAGHG Information Paper; 2013-IP4: Global Sulphur-dioxide emissions and their impact on Health and Climate change

A new study by the International Institute for Applied Systems Analysis (IIASA) published in *Environmental Research Letters*¹ estimates that global emissions of sulphur-dioxide from 2005 to 2011, a situation that, although promising from a pollution point of view, could have serious implications for climate.

Global sulphur-dioxide emissions have generally declined since the mid-70s but increased from 2000 to 2005. According to this study, they peaked at 33 Tg in 2006.

With regard to China the introduction of stricter emission limits and flue-gas desulphurisation for power plants has led to a significant decline in sulphur-dioxide emissions from the energy sector. Emissions from Chinese industry grew, but overall the country's total emissions stabilised. China currently represents one third of global sulphur-dioxide emissions from man-made sources.

Between 2000 and 2010, sulphur-dioxide emissions in North America and Europe continued to decrease. However, emissions in India, the second largest source in Asia, are rising, largely due to an increase in coal consumption and the absence of laws requiring flue-gas desulphurisation. In 2010 Indian sulphur-dioxide emissions exceeded those of the US and were about a third of China's total.

The implications of the change in trend in Chinese and global emissions are at least two-fold,

- For China it is important to constrain and reduce emissions of precursors of secondary particulate matter due to their health impacts;
- For the climate, sulphate aerosols act as a cooling agent and so understanding the trend and amounts of sulphate emissions is important for climate modelling.

The IIASA researchers feel that that if the trends continue, which is likely considering plans to reduce emissions from shipping², this decline in sulphur-dioxide emissions will likely result in an increase in the rate of future climate change..

The researchers plan to continue to watch for developments in Chinese industrial emissions and in India and the rest of South Asia, where only very limited legislation exists so far. The IIASA researchers are aware that Business-as-usual scenarios show that if current policies are not strengthened, South Asian sulphur-dioxide emissions will exceed those of China in about two decades. The team will also keep an eye on international shipping, the emissions of which currently make up 10% of the global total but have increased in recent decades. With the most recent decisions of IMO/MARPOL about reducing the sulphur content of fuel oil for ocean-going ships too, they should decline rapidly within a decade or two. Another important issue is monitoring implementation of low-sulphur diesel policies across the globe, especially in the developing world, because the success of reducing NOx and particulate-matter emissions from fast-growing diesel vehicle fleets depends on that.

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April 2013

1. The International Maritime Organization (IMO) has tightened up the limit for the sulphur content of fuel oil used in international shipping
2. The last decade of global anthropogenic sulfur dioxide: 2000–2011 emissions, Z Klimont, S J Smith and J Cofala 2013 *Environ. Res. Lett.* 8 014003.