



IEAGHG Information Paper: 2015-IP18; Impact of other GHG's and Air pollutants on the 2°C Carbon Budget

The International Institute for Applied Systems Analysis (IIASA), based in Vienna, Austria is an international scientific institute that conducts policy-oriented research into problems that are too large or too complex to be solved by a single country or academic discipline, such as Climate Change, amongst others¹. I find IIASA's work to be a very useful reference source on key climate change policy related topics.

In July 2015, IIASA published a new publication entitled: Impact of short-lived non-CO₂ mitigation on carbon budgets for stabilizing global warming in Environmental Research Letters². This research covers the topic of Non – CO₂ Greenhouse Gases (GHG's) and whether focusing on policy measures to mitigate these gases reduces the need for substantive mitigation action on CO₂ to meet the 2°C climate target. This is highly topical and there is considerable international debate and action around just this issue. For example: at COP 19 in Doha (December 2012) the US led an initiative to create the Climate and Clean Air Coalition to co-ordinate voluntary international actions to mitigate Short Lived Climate Pollutants (SLCP's) namely, methane, black carbon and HFC's. See IP20-2012: The Climate and Clean Air Coalition.

If we set out to limit global warming to any level, that level then requires CO₂ emissions to be kept to within a certain limit, which is called the carbon budget. In this study the carbon budget is set at the level required based on the 2°C climate target. The new research work by IIASA analyses the impact of short-lived air pollutants and greenhouse gas reductions³ on carbon budgets compatible with the 2°C climate target.

The Short-lived greenhouse gases and atmospheric pollutants considered in the study were: methane, hydrofluorocarbons (HFCs), black carbon or soot, and sulphates. All these gases and pollutants are anthropogenic (i.e. emitted by human activities), they contribute to climate change, but remain in the atmosphere for a much shorter time than carbon dioxide (CO₂). Some of the species considered have a strong warming effect (like methane), while others act to cool the atmosphere (sulphates⁴ and black carbon⁵) thus their overall roles in the climate system are difficult to quantify.

The study in question has looked at each pollutant and greenhouse gas and considered examines how stringently reducing each climate forcer separately would affect the size of the 2°C carbon budget.

The main results were:

- Reducing methane emissions stringently in the second half of the century could increase the size of the carbon budget for meeting the 2°C target by 2100 by about 20%. In the long term, CO₂ emissions thus still need to reach net zero.

¹ For more information on IIASA and its activities go to:

http://www.iiasa.ac.at/web/home/about/whatisiiasa/informationkit/IIASA_Overview_June2015.pdf

² Joeri Rogelj, Andy Reisinger, David L. McCollum, Reto Knutti, Keywan Riahi, Malte Meinshausen, 2015.

Mitigation choices impact carbon budget size compatible with low temperature goals. Environ. Res. Lett. 10 075003 doi:10.1088/1748-9326/10/7/075003

³ The Short lived air pollutants and greenhouse

⁴ 2013- IP4 Global Sulphur Dioxide Emissions

⁵ 2014-IP17 Black carbon – a double edged sword



- Strict controls on pollutants such as black carbon, by contrast, had only a small impact on the carbon budget of around 5%.

Overall we can conclude from this work that:

Reducing emissions of short lived air pollutants and greenhouse gases can complement CO₂ emissions reduction to meet the 2^oC carbon budget. They are definitely not a substitute for substantive CO₂ emissions reductions.

As we have highlighted before⁶ there are joint benefits for health and environment at a fraction of the cost benefits by combining climate and air pollution mitigation efforts. Another important policy message. Whereas air pollution measures alone would not reduce CO₂ emissions nor combat climate change.

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31/07/2015

⁶IEA Greenhouse Gas R& D Programme Report No. 2012-03 Emissions of Substances Other Than CO₂ from Power Plants with CCS, February 2012.