



# GHG Mitigation Brief – October 2017

The IEA Greenhouse Gas R&D Programme (IEAGHG) is part of the IEA's Energy Technology Network. Its role is to assess the potential to mitigate greenhouse gas (GHG) emissions from the use of fossil fuels in the power, oil and gas and industry sectors. Further details of the activities of the IEA Greenhouse Gas R&D Programme can be found on our website: [www.ieaghg.org](http://www.ieaghg.org).

This GHG Mitigation Brief has been prepared to summarise key climate change science, policy and technology developments, identified by IEAGHG, in the last 6 months and aims to provide information for both its members and the broader community. For those requiring further information, the IEAGHG provides more detailed papers and webinars on key issues relating to greenhouse gas mitigation which can be found on its web site ([www.ieaghg.org](http://www.ieaghg.org)). Those directly relevant to this GHG Mitigation Brief some are referenced at the end of the document.

## Hat Trick of Hottest Years

Data released by US National Oceanic and Atmospheric Administration (NOAA), shows that June 2017 was the third-hottest June on record, beaten only by the two preceding Junes in 2015 and 2016<sup>1</sup>. The NOAA data shows that the combined land and sea-surface temperatures for June 2017 were 0.82°C above the 20<sup>th</sup> century average. This is the 41<sup>st</sup> consecutive June above that average.

## Weather Extremes Caused by Global Warming is Biggest Risk to Humans

Human deaths because of severe weather events in Europe could increase significantly if greenhouse gas emissions are not controlled<sup>2</sup>. Such consequences are not limited to Europe. The number of severe weather events are increasing in the USA and droughts are affecting some 34 African Nations.

## The Greenland Ice Sheet is Melting Faster than Before

The Greenland ice sheet is adding up to 1mm a year to the rise in the global average level of the oceans. It is the largest mass of ice in the northern hemisphere and, if it all melted, the average sea level would rise around the world by about seven metres (approximately 23ft). The impact of such a rise in sea level on countries like the Netherlands, or on cities like Venice and New Orleans would be catastrophic<sup>3</sup>.

## Are our Oceans Changing Irreparably?

By taking up carbon dioxide from the atmosphere, the ocean slows down global climate change. When absorbed by seawater, the greenhouse gas causes the ocean to become more acidic. Sensitive ecosystems like coral reefs are being damaged catastrophically because of ocean acidification and marine life may not be able to keep up with the changes that are occurring, with severe economic consequences<sup>4</sup>.



## Climate Change is Becoming a Defining Theme for the Global Economy

Schroders, one of the world's leading asset management companies, have developed the Climate Progress Dashboard which monitors 12 indicators to show the progress being made towards decarbonising the global economy. The dashboard compares projections made by international organisations to estimate the temperature change implied by the progress in each area. Together, they suggest we are heading for a rise closer to 4° than the 2° commitment global leaders made in Paris in 2015<sup>5</sup>.



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## ***Carbon Budget for 1.5°C will be used up in 4 years***

The Global Carbon Project, stated that CO<sub>2</sub> emissions for fossil fuel burning and cement production were 36.4Gt in 2016. Using the 2016 data and assuming no reduction in emissions it has been calculated, there are now just four years and one month left in the carbon budget for 1.5°C<sup>6</sup>.

## ***Methane and Nitrous Oxide Emissions Increasing***

The Climate and Clean Air Coalition's (CCAC) 2016 summary report shows that, despite CO<sub>2</sub> emissions peaking in the last three years<sup>7</sup>, those of methane are increasing. Many studies attribute the growth in emissions to the agricultural sector<sup>7</sup> or the increase in oil and gas production around the globe. Whilst oil and gas related emissions could be regulated and controlled, the opposite is true for agriculture. Many see the agricultural sector as one that can undermine the Paris Agreement<sup>8</sup>.

## ***Going Vegan will not Stop Global Warming***

It has been proposed that switching to a meat free diet could significantly reduce greenhouse gas emissions; however, new research shows that the ethical farming used for organic vegetable production only reduces greenhouse gas emissions by around 50%<sup>9</sup>. Moving to intense crop production and meat substitutes would significantly reduce the agricultural sectors' emissions and allow existing fields used for agriculture to go back to forests.

## ***New Ozone Depleting Gas Increasing in the Atmosphere with Impacts on Global Warming***

Rapidly increasing use of the industrial solvent (Dichloromethane or DCM). DCM is leading to the chemical accumulating in the stratosphere where it could set the recovery of the ozone layer back by 30 years, atmospheric chemists have found. DCM production is not currently controlled by the 1987 Montreal protocol. DCM also has a global warming potential of 31 higher than methane and, like HFCs, also needs to be controlled.

## ***Greenhouse Gas Emissions from the Transport Sector are Increasing***

According to the IPCC in AR5, Greenhouse Gas (GHG) emissions from the transport sector have more than doubled since 1970, and have increased at a faster rate than any other energy end-use sector to reach 7.0 Gt CO<sub>2</sub>eq in 2010; representing 23% of global greenhouse gas emissions<sup>10</sup>. Around 80% of this increase has come from road vehicles. Almost all (95% in 2010) of the world's transportation energy comes from petroleum-based fuels, largely gasoline and diesel.

## ***Biofuels – Heroes or Villains***

The use of biofuels to reduce greenhouse gas emissions from the transport sector is one proposed solution. However, research has shown that early production options (crop to bioethanol) actually have a higher carbon footprint compared to standard fossil fuels. The small volumes added to transport fuels (5-10%) are also considered too small to make significant vehicle emission reductions. Newer biofuel production technologies based on wastes show considerable promise, but they are at an early stage of development<sup>11</sup>.

## ***Are Electric Cars the Answer to Decarbonising the Transport Sector?***

The introduction of electric vehicles could curtail further increases in road transport sector emissions and significantly cut emissions from the road transport sector, potentially by as high as 5.6GT/CO<sub>2</sub> per year. This, of course, assumes that the electricity supplied comes from low carbon or carbon neutral sources (renewables, nuclear and CCS). Building new unabated fossil fuel plants to meet the growth in electricity demand resulting from electric vehicle deployment will merely transfer emissions from the transport to the power sector and will not allow the Paris target of below 2°C to be achieved<sup>12</sup>.



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## *Further Reading:*

1. [http://www.ieaghg.org/docs/General\\_Docs/Publications/Information\\_Papers/2017-IP43.pdf](http://www.ieaghg.org/docs/General_Docs/Publications/Information_Papers/2017-IP43.pdf)
2. [http://www.ieaghg.org/docs/General\\_Docs/Publications/Information\\_Papers/2017-IP48.pdf](http://www.ieaghg.org/docs/General_Docs/Publications/Information_Papers/2017-IP48.pdf)
3. [http://www.ieaghg.org/docs/General\\_Docs/Publications/Information\\_Papers/2017-IP46.pdf](http://www.ieaghg.org/docs/General_Docs/Publications/Information_Papers/2017-IP46.pdf)
4. [http://www.ieaghg.org/docs/General\\_Docs/Information\\_Papers/2017-IP55\\_Exploring\\_Ocean\\_Change.pdf](http://www.ieaghg.org/docs/General_Docs/Information_Papers/2017-IP55_Exploring_Ocean_Change.pdf)
5. <http://www.schroders.com/en/insights/economics/climate-progress-dashboard-forecasts-global-warming-of-more-than-4c/>
6. [http://www.ieaghg.org/docs/General\\_Docs/Publications/Information\\_Papers/2017-IP20.pdf](http://www.ieaghg.org/docs/General_Docs/Publications/Information_Papers/2017-IP20.pdf)
7. <http://www.ccacoalition.org/en/resources/annual-science-update-2016>
8. [http://www.ieaghg.org/docs/General\\_Docs/Publications/Information\\_Papers/2017-IP21.pdf](http://www.ieaghg.org/docs/General_Docs/Publications/Information_Papers/2017-IP21.pdf)
9. [www.carboncommentary.com/blog/2017/10/25/an-industrial-revolution-for-agriculture](http://www.carboncommentary.com/blog/2017/10/25/an-industrial-revolution-for-agriculture)
10. <https://www.ipcc.ch/report/ar5/>
11. [http://www.ieaghg.org/docs/General\\_Docs/Information\\_Papers/2017-IP49.pdf](http://www.ieaghg.org/docs/General_Docs/Information_Papers/2017-IP49.pdf)
12. [http://www.ieaghg.org/docs/General\\_Docs/Information\\_Papers/2017-IP49.pdf](http://www.ieaghg.org/docs/General_Docs/Information_Papers/2017-IP49.pdf)