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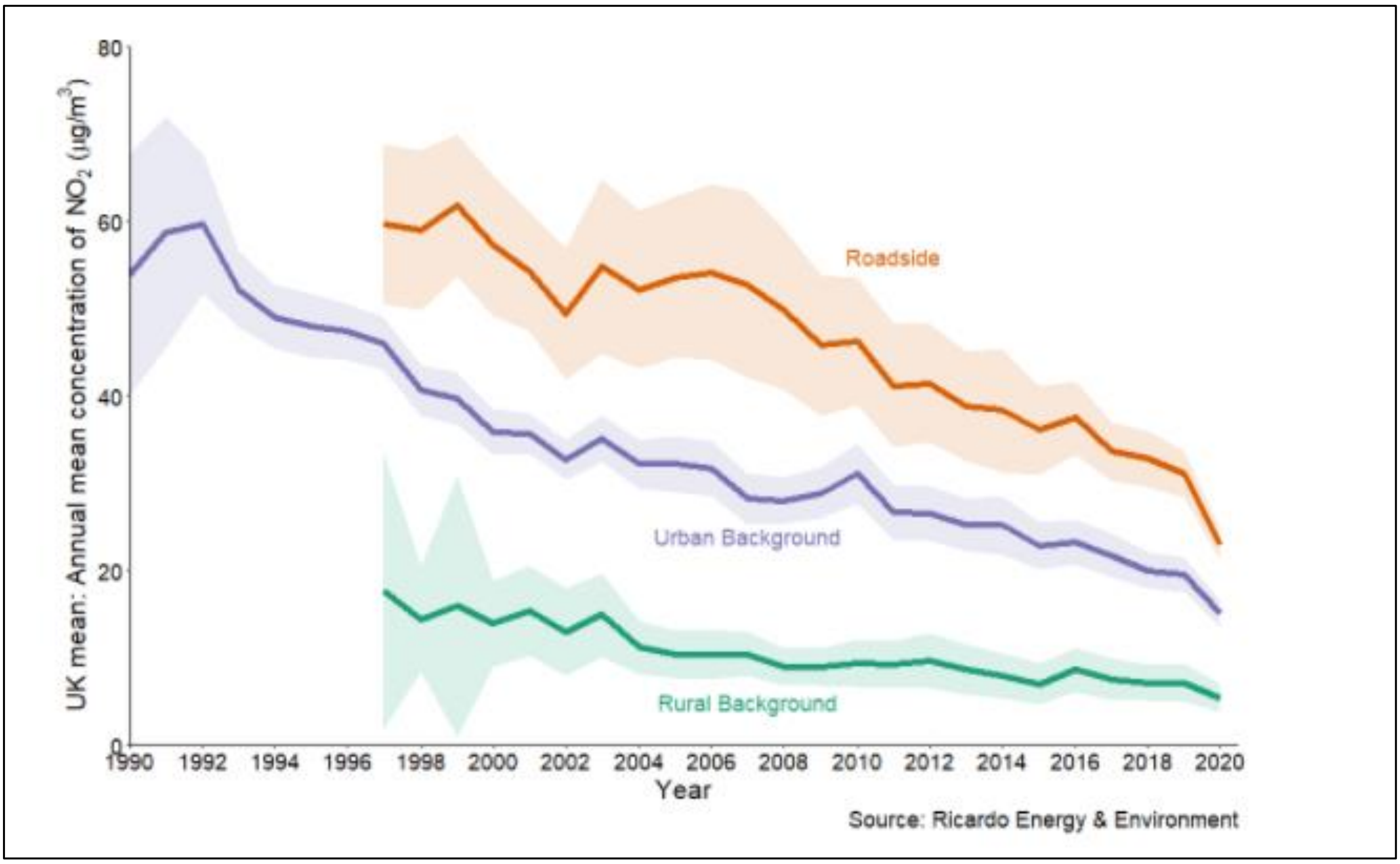
Updated: Spring 2021

Long term improvements in UK urban air quality

Urban background and roadside nitrogen dioxide (NO2) pollution has shown long-term improvements. In 2020, the lowest average annual mean concentrations since the start of the time series for both roadside and urban background monitoring sites were recorded. The time series began in 1987. Particulate matter (PM10 and PM2.5) show similar long-term improvements.

Urban background ozone pollution has an overall long-term increasing trend. There was, on average, no difference in the number of days of 'moderate' or higher pollution (including SO2) at urban pollution monitoring sites in 2020 compared with 2019. This goes against the recent trend (2015 to 2019) of an increase in days of 'moderate' or higher pollution at urban sites.

Annual mean concentrations of NO_2 in the UK, 1990 to 2020



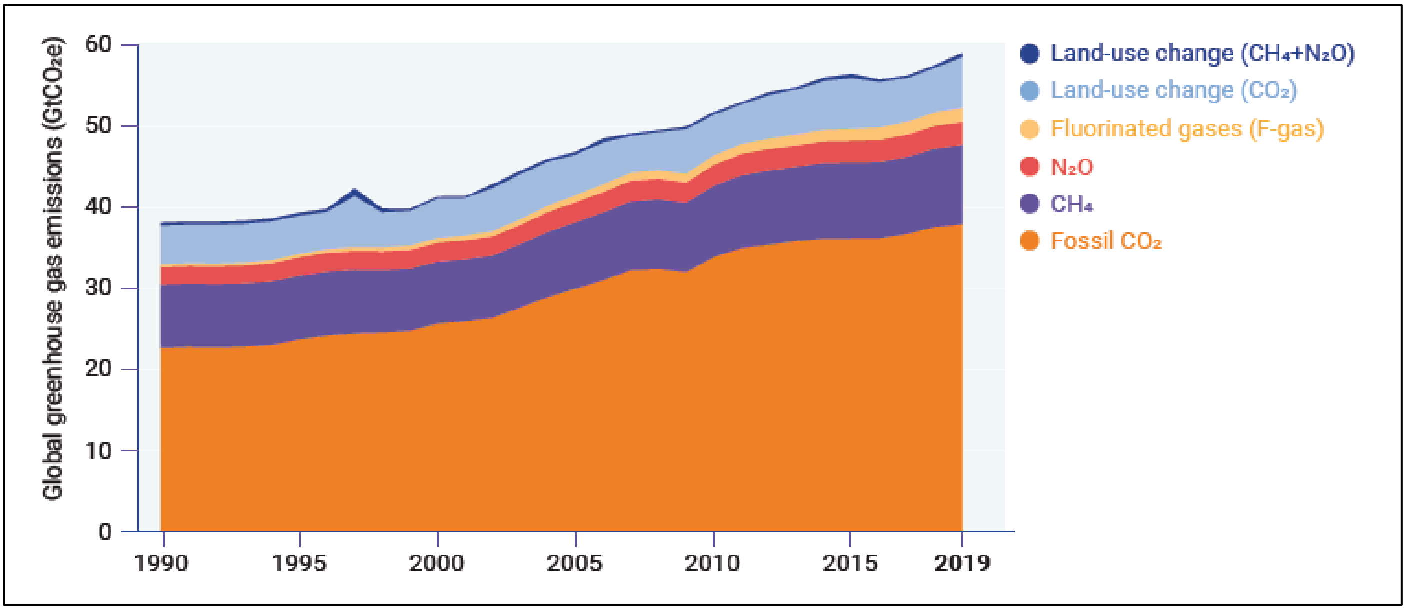
Source:
1. Air Quality Statistics Department for Environment, Food and Rural Affairs, April 2021

Increase in global greenhouse gas emissions

Since 2010, global greenhouse gas emissions (GHG) without land use change have grown at 1.3% per year on average, with preliminary data suggesting a 1.1% increase in 2019. When including the more uncertain and variable land use change emissions, global GHG emissions have grown 1.4% per year since 2010 on average, with a more rapid increase of 2.6% in 2019 due to a large increase in vegetation forest fires.

CO_2 emissions were expected to decrease by about 7% in 2020 (range: 2–12%) compared with 2019 emission levels due to coronavirus (COVID-19), with a smaller drop expected in GHG emissions as non-CO_2 is likely to be less affected. Despite this drop atmospheric concentrations of GHGs continue to rise.

Global GHG emissions from all sources – methane (CH_4), nitrogen dioxide (N_2O) and fossil carbon dioxide (CO_2).



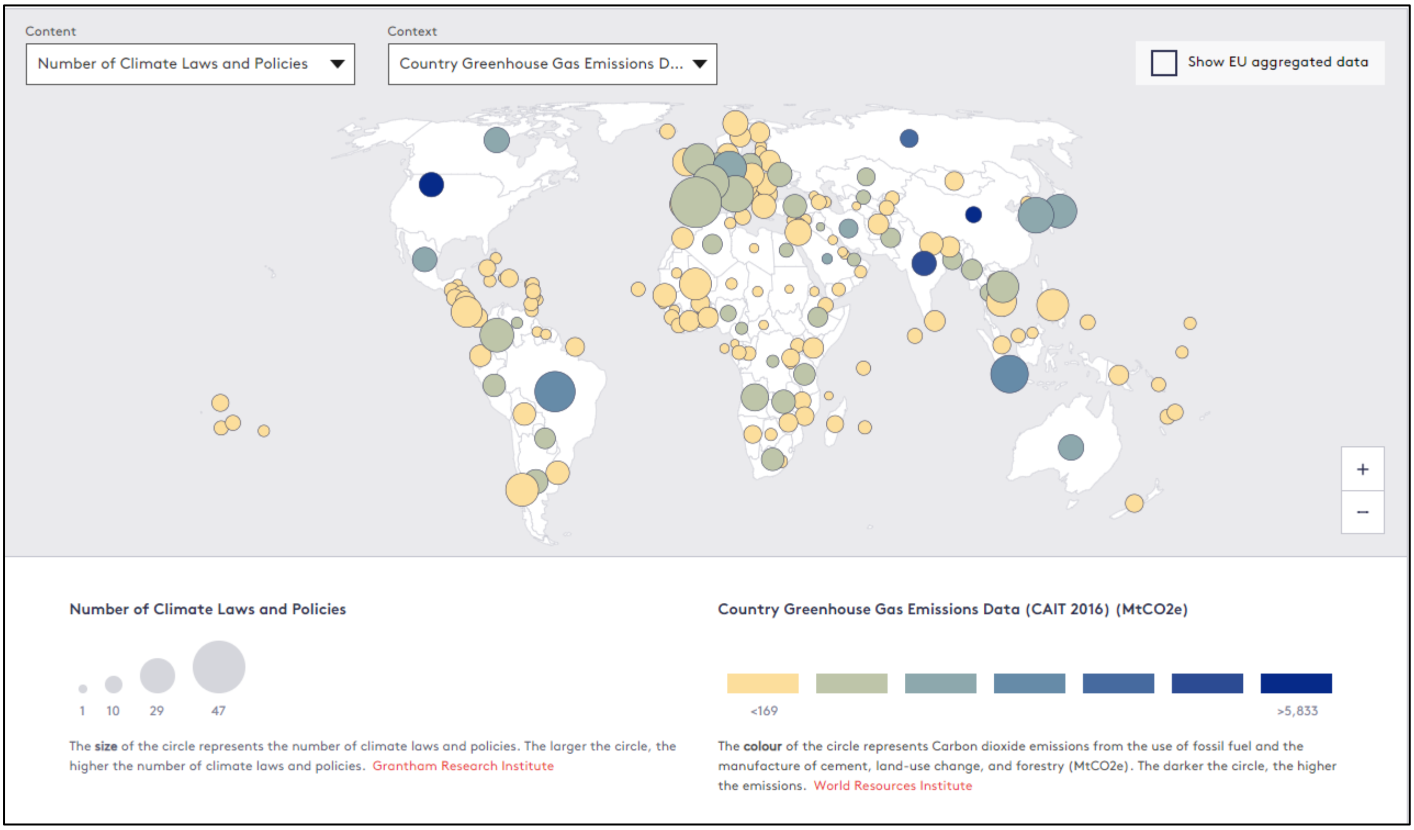
Greenhouse gases are measured in gigatonnes of carbon dioxide-equivalents ($GtCO_2e$).

Sources:
1. United Nations Environment Programme (2020). *Emissions Gap Report 2020*. Nairobi.
2. 2019 UK greenhouse gas emissions national statistics: final summary Department for Business, Energy and Industrial Strategy

Increasing number of global climate change policies and laws

There is no country in the world that does not have at least one law or policy dealing with climate change. The most prolific countries have well over 20, and globally there are 1,800 such laws. Some of them are executive orders or policies issued by governments, others are legislative acts passed by parliament. Accounting for government effectiveness and the length of time laws have been in effect, the UK and South Korea are the most comprehensive legislators among the international forum of the G20 and Spain within the Organisation for Economic Co-operation and Development.

The ‘Climate Change Laws of the World database’ covers national level climate change legislation and policies globally.



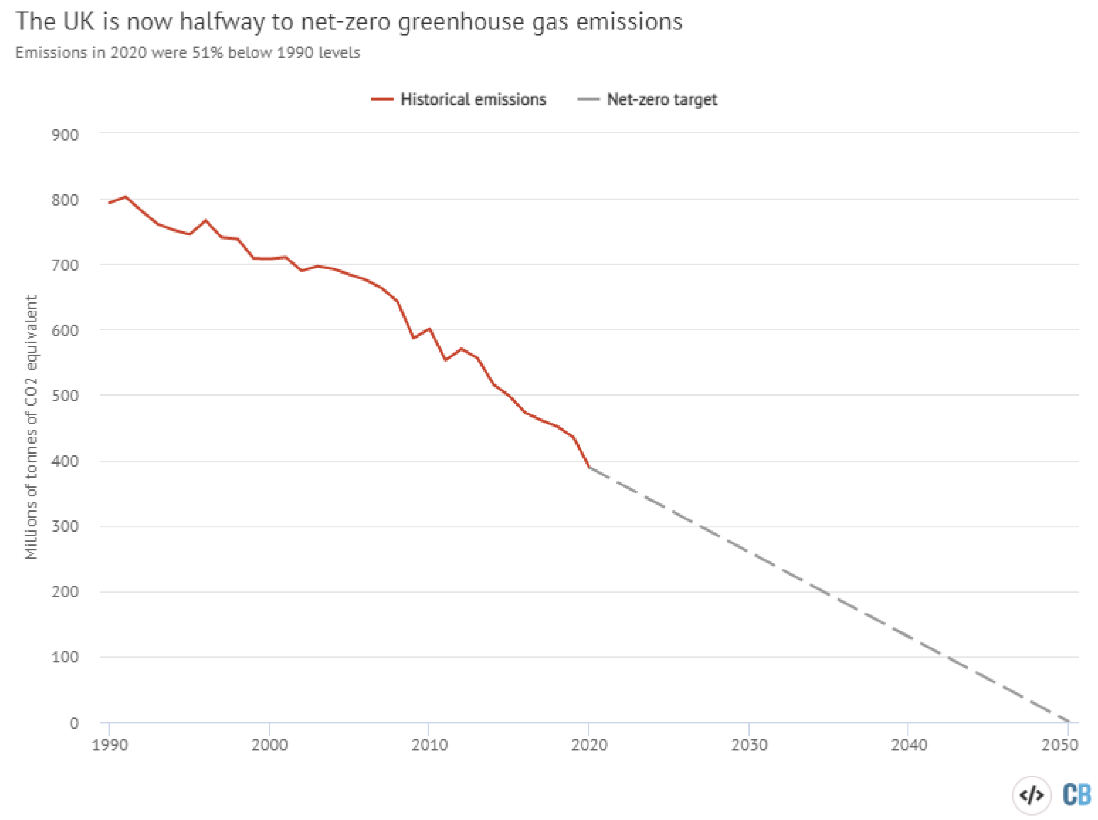
Sources:

1. Global Lessons from Climate Change Legislation and Litigation Shaikh M. Eskander, Sam Fankhauser & Joana Setzer, US National Bureau of Economic Reseach working paper. June 2020.
2. Climate Change Laws of the World database, Grantham Research Institute on Climate Change and the Environment and Sabin Center for Climate Change Law. Available at climate-laws.org

More countries are passing net zero legislation

Sweden was the first country to pass a net zero law in 2017; in June 2019, the UK passed its net zero emissions law; France, Denmark, New Zealand and Hungary also have laws to achieve net zero emissions for 2050 and China by 2060.

The UK's greenhouse gas emissions in 2020 were 51% below 1990 levels. This means the UK is now halfway to meeting its target of net zero emissions by 2050.



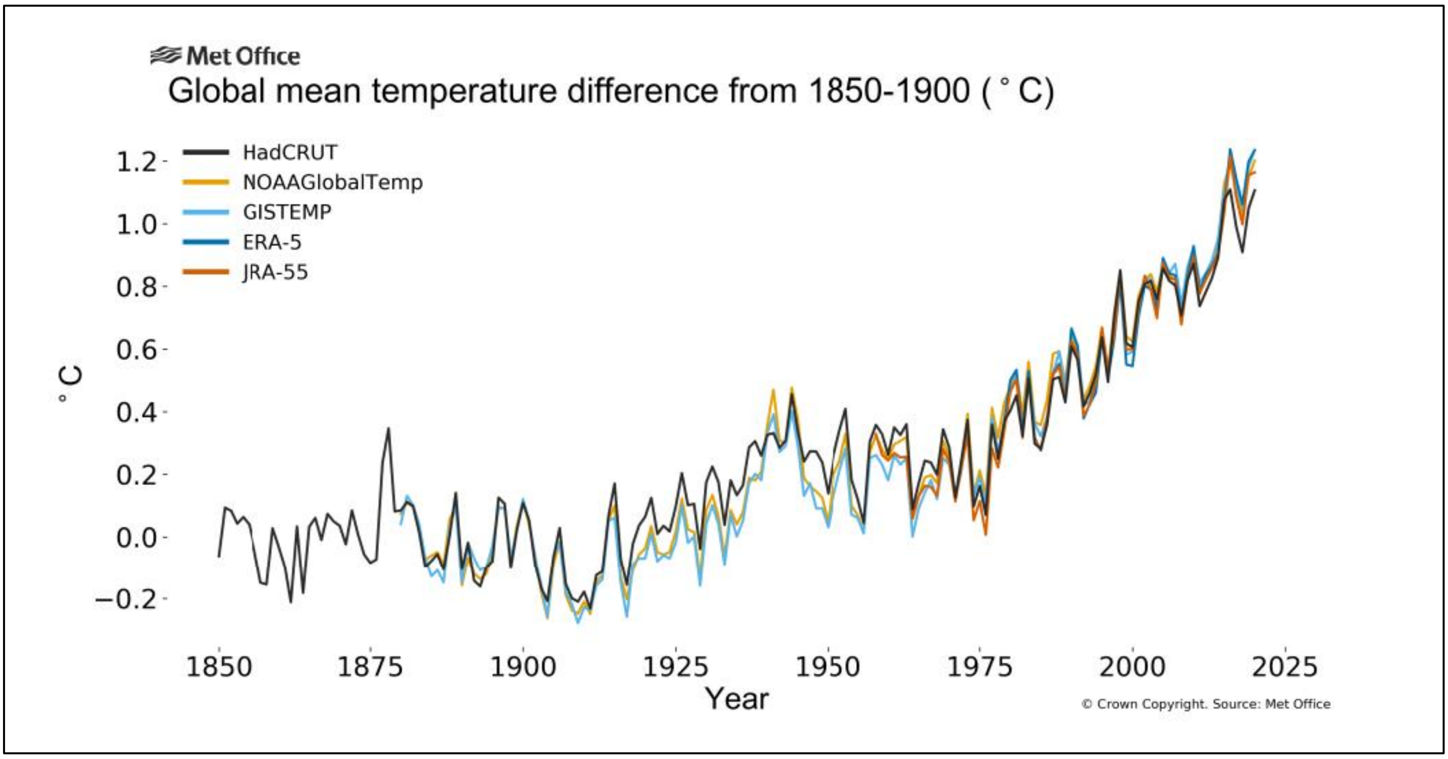
UK territorial greenhouse gas emissions 1990-2020, millions of tonnes of CO_2 equivalent, as measured in the national inventory, and the net-zero target for 2050. The inventory excludes international aviation and shipping, which the Climate Change Committee recommends should be included in the UK's target. The inventory also excludes emissions associated with the consumption of goods and services made overseas, but imported into the UK. Source: Emissions data from the UK Department for Business, Energy and Industrial Strategy (BEIS) and Carbon Brief analysis. Chart by Carbon Brief using Highcharts.

Source:
1. CarbonBrief Analysis: UK is now halfway to meeting its 'net zero emissions' target March 2021

Global mean temperatures have risen

Global mean temperature in 2020 was the second warmest on record. The past six years, including 2020, are likely to be the six warmest years. The global mean temperature for 2020 (January to October) was 1.2 ± 0.1°C above the 1850–1900 baseline, used as an approximation of pre-industrial levels.

Global annual mean temperature difference from pre-industrial conditions (1850–1900). The World Meteorological Organization assessment is based on five global temperature datasets. All five of those data sets place 2020 as second warmest for the year to date when compared to equivalent periods in the past (January to October).

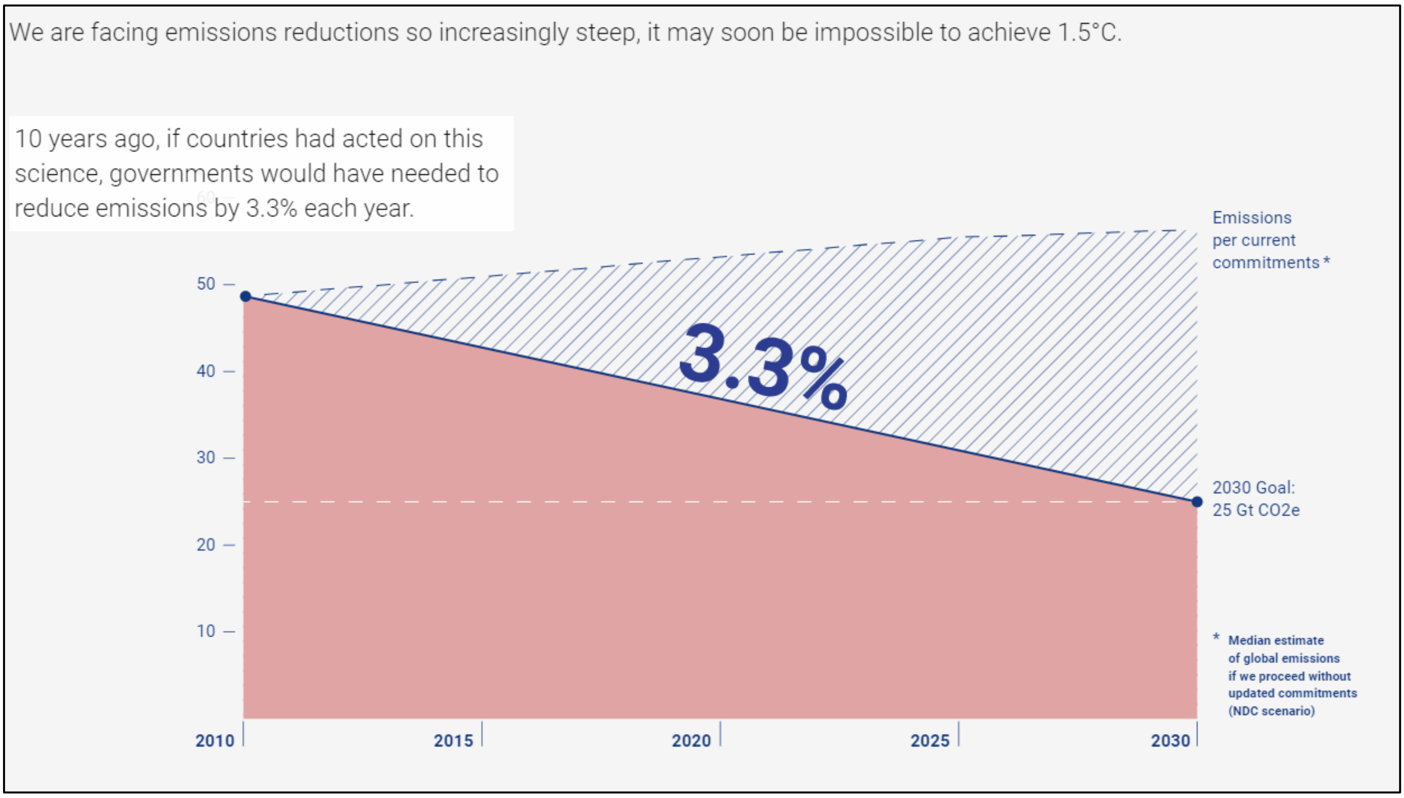


Source:
1. Provisional Report on the State of the Global Climate 2020 World Meteorological Organization, 2020

Global 2030 climate pledges are insufficient to limit warming to 2°C

Despite a brief dip in carbon dioxide emissions caused by the coronavirus (COVID-19) pandemic, the 2030 carbon emission reduction pledges, made by 184 countries under the Paris Agreement, aren't enough to limit global warming to below 2°C and pursue 1.5°C. The world is still heading for a temperature rise in excess of 3°C this century.

Achieving 1.5°C would require global emissions to reduce by 7.6% every year. Even the most ambitious national climate action plans are far short of a 7.6% reduction. The world needs a five-fold increase in collective current commitments.

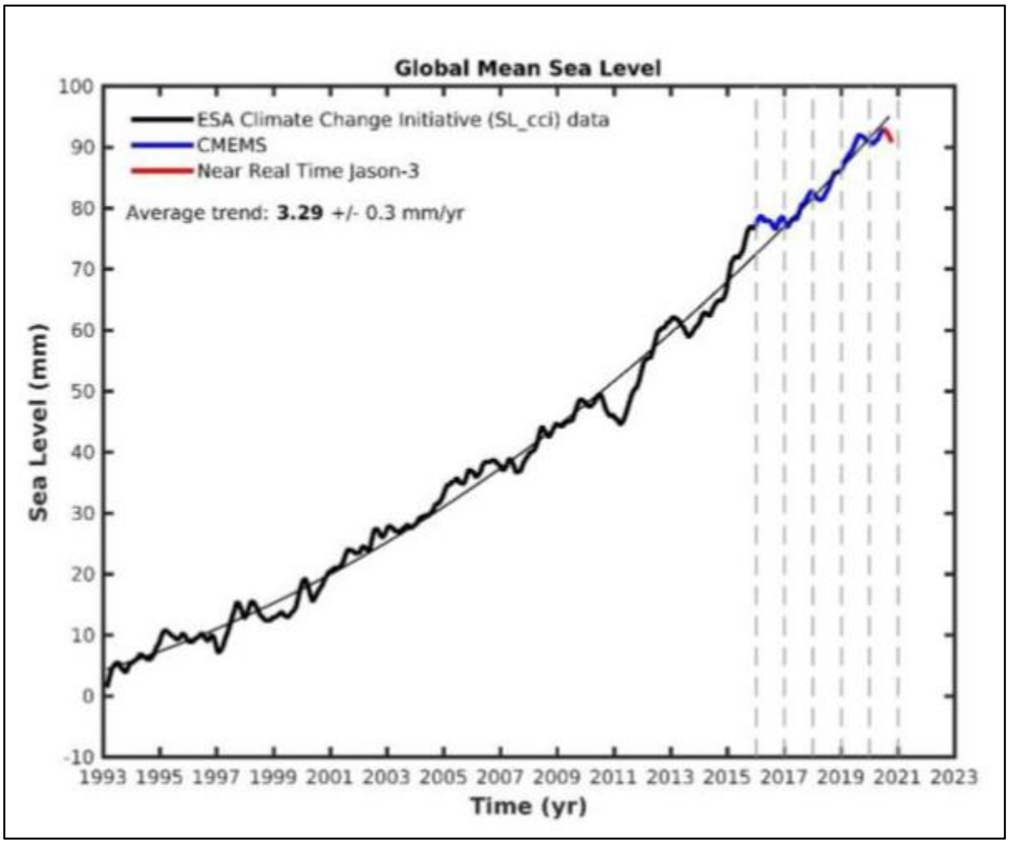


Sources:
1. United Nations Environment Programme (2020). *Emissions Gap Report 2020*. Nairobi.
2. United Nations Environnent Programme (2019). *Emissions Gap Report 2019*. Nairobi.

Average global ocean temperatures and sea levels are rising

Over 80% of the ocean area experienced at least one marine heatwave in 2020. 2019 saw the highest ocean heat content on record and the rate of warming over the past decade was higher than the long-term average, indicating continued uptake of heat from the radiative imbalance caused by greenhouse gases.

On average, since early 1993, the altimetry-based global mean rate of sea level rise amounts to 3.3 ± 0.3 mm/year. The rate has also increased over that time. A greater loss of ice mass from the ice sheets is the main cause of the accelerated rise in the global mean sea level.



Satellite altimetry-based global mean sea level for January 1993 to October 2020 (last data : 13 October 2020). Data from the European Space Agency (ESA) climate change initiative sea level project, from January 1993 to December 2015, (thick black curve); extended by the Copernicus Marine and Environment Service, CMEMS, until August 2020 (blue curve) and with near real time altimetry data from the Jason-3 mission beyond August 2020 (red curve). The thin black curve is a quadratic function that best fits the data. Vertical dashed lines mark the start of each year from 2016 to 2021.

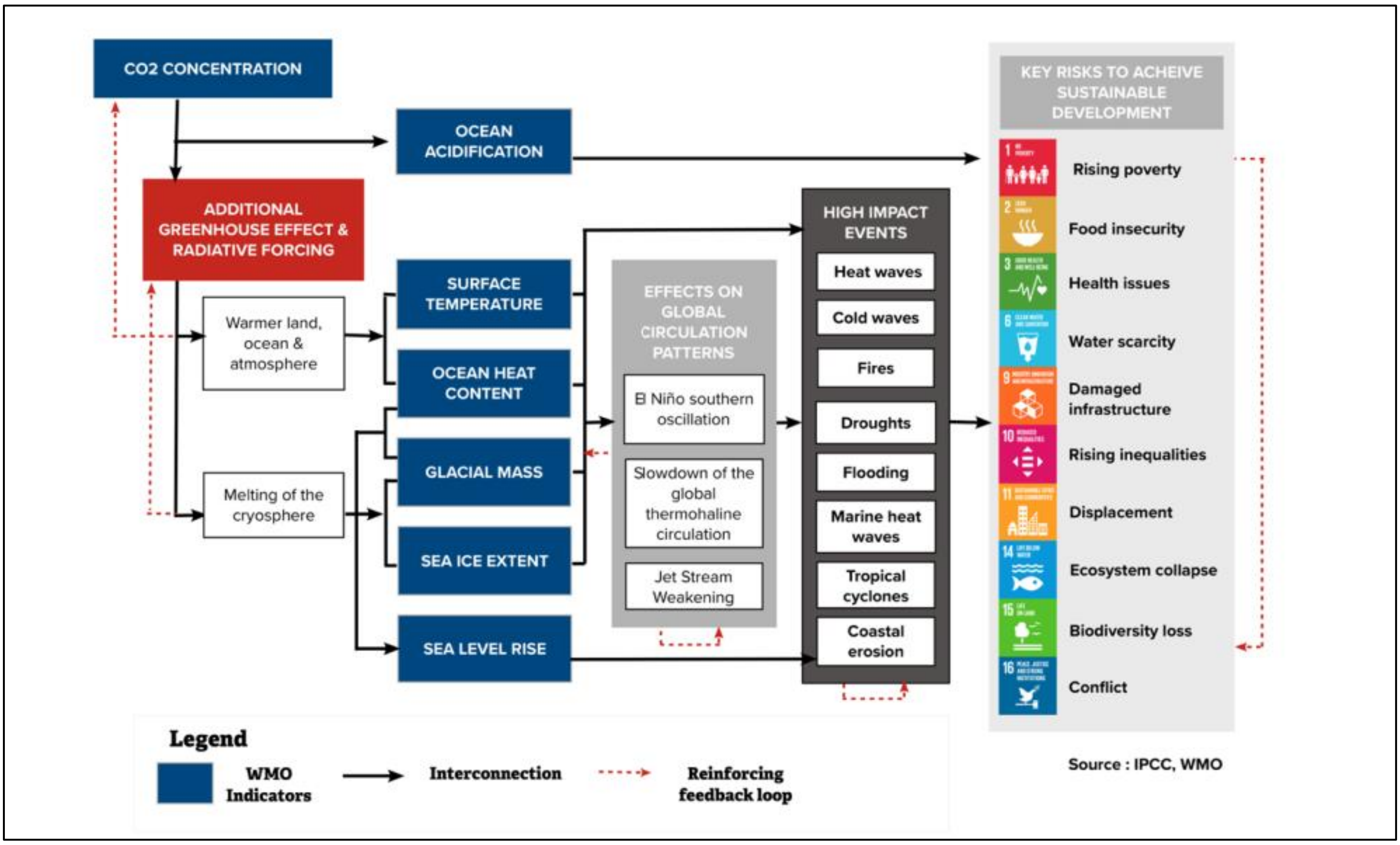
Source:
1. Provisional Report on the State of the Global Climate 2020 World Meteorological Organization

Increasing number of high impact climate and weather events affecting people

The most acute impacts of climate change are often felt during extreme meteorological events such as heavy rain and snow, droughts, heatwaves, cold waves, and storms. These can lead to or exacerbate other high impact events such as flooding, landslides, wildfires, and avalanches. In 2018, 61% of all internal displacements were triggered by weather-related disasters.

The achievement of many of the United Nations Sustainable Development Goals is put at risk by climate change causing high impact weather events.

Selected climate change related risks to the United Nations Sustainable Development Goals. Rising atmospheric carbon dioxide (CO_2) concentrations lead to cascading effects via six of the other key climate indicators. Some of these processes also have the potential to release further greenhouse gases into the atmosphere in a feedback loop that can perpetuate warming. For example, rising temperatures can thaw permafrost releasing more carbon into the atmosphere.



Sources:
1. Provisional Report on the State of the Global Climate 2020 World Meteorological Organization
2. Global Report on Internal Displacement 2019 Internal Displacement Monitoring Centre

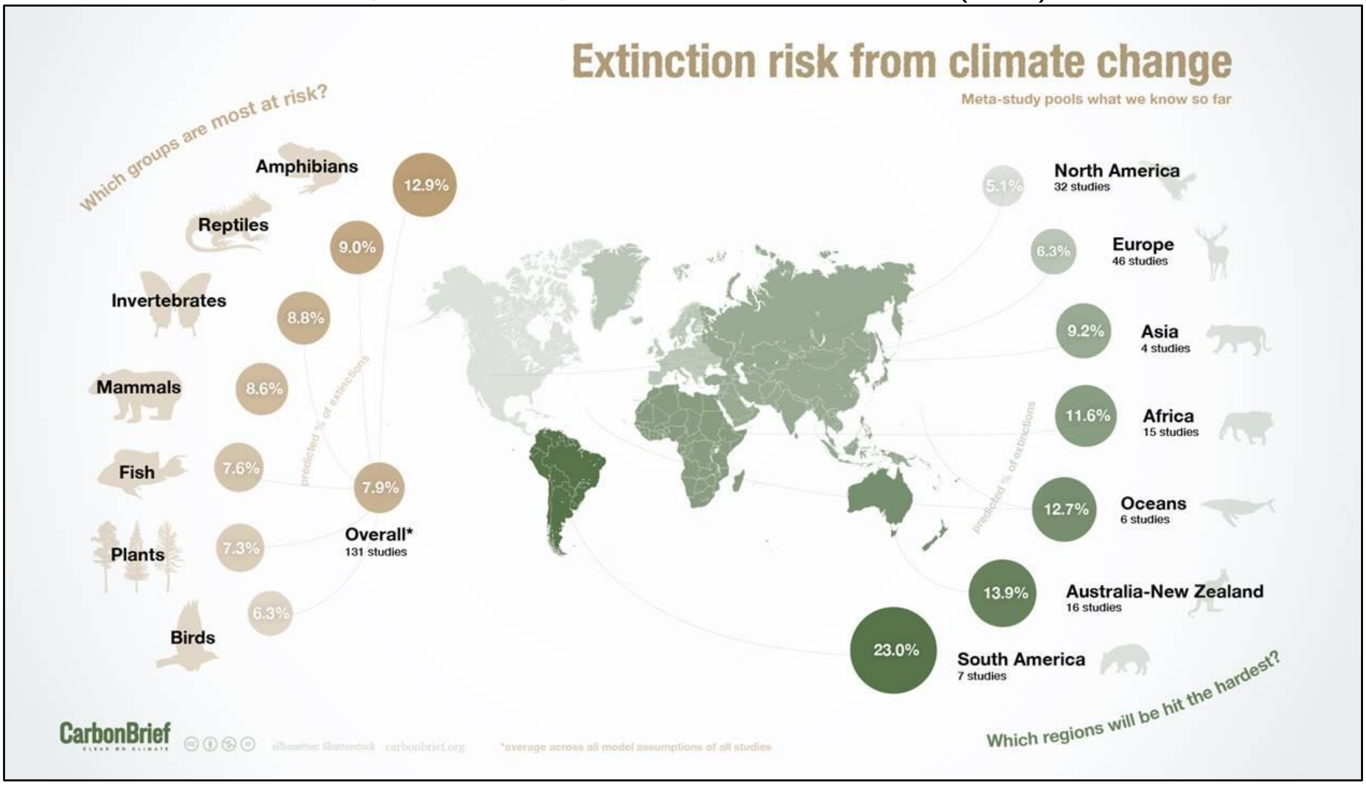
Climate change is accelerating global biodiversity loss

Climate change is currently affecting 19% of species listed as threatened on the International Union for Nature Conservation Red List of Threatened Species, increasing the likelihood of their extinction.

Results of a synthesis of published studies in order to estimate a global mean extinction rate, suggest that extinction risks will accelerate with future global temperatures, threatening up to one in six species under current policies. Extinction risks are highest in South America, Australia, and New Zealand.

Predicted extinction rates from climate change by region and group.

Credit: Rosamund Pearce, CarbonBrief, based on data from Urban (2015).



Note: Projected extinction risks are an average across all model assumptions from 131 extinction risk studies.

Sources:

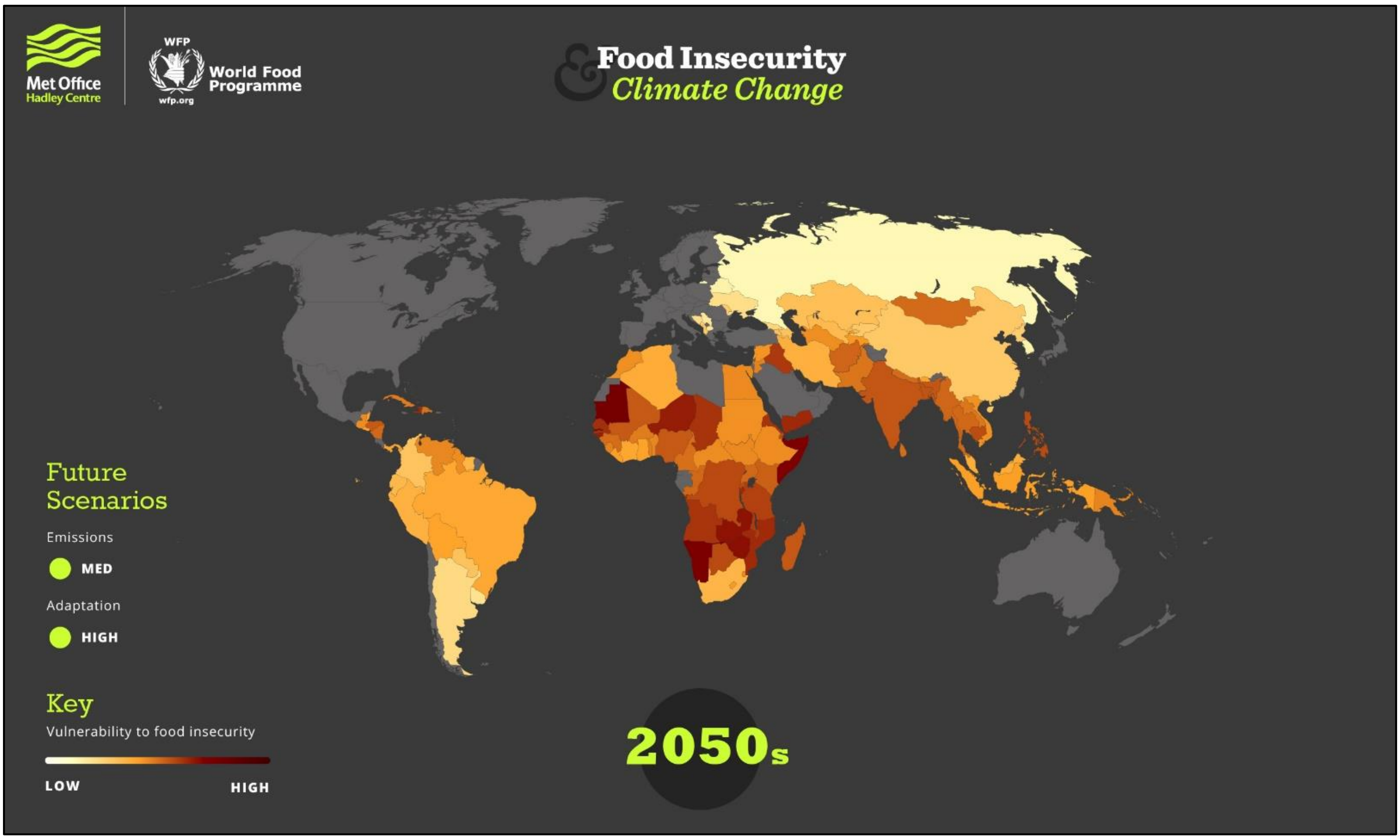
1. Species and Climate Change Issues Brief, International Union for Nature Conservation, December 2019
2. Accelerating extinction risk from climate change, Mark C. Urban *Science* 01 May 2015: Vol. 348, Issue 6234, pp. 571-573
3. Climate change threatens one in six species with extinction study finds CarbonBrief April 2015

Climate change is projected to impact on food security

It has been estimated that a 2°C rise in temperatures will add 189 million more people to the 800 million already suffering from food shortages. Climate change is expected to have impacts on all four pillars of food security – food availability, access to food, food utilisation and stability of the food supply.

As well as direct impacts of extreme weather events, climate change is expected to affect foodborne pathogens, pests, global water quality and uptake of heavy metals by plants.

Experts from the World Food Programme have worked in collaboration with Met Office climate scientists to devise a Food Insecurity and Climate Change index which allows users to explore how different scenarios of global greenhouse gas emissions and adaptation to climate change could change the geography of food insecurity in developing and least-developed countries.



Source:

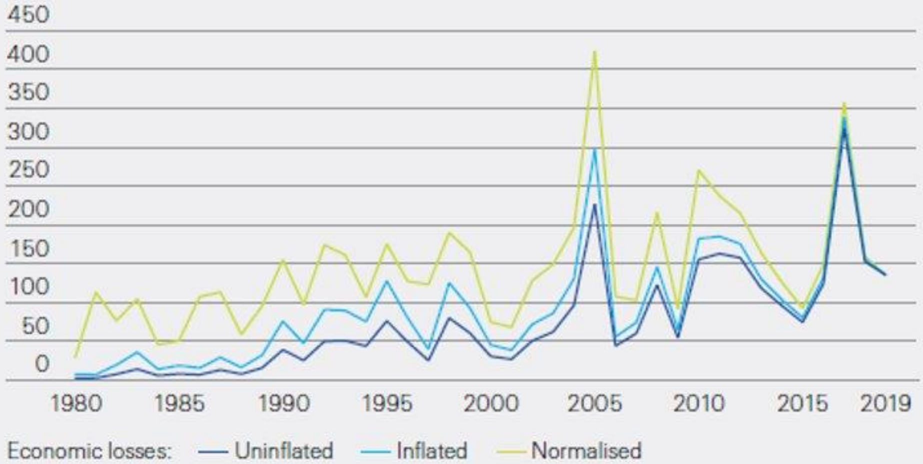
1. FAO. 2020. *Climate Change: Unpacking the buden on food safety*. Food safety and quality series No. 8. Rome. https://doi.org/10.4060/ca8185en

Fluctuating economic and insured losses from extreme weather

Economic and insured losses resulting from extreme weather events present a major threat to global resilience. Worldwide, economic losses from natural and man-made disasters in 2019 were $146 billion, lower than $176 billion in 2018 and the previous 10-year annual average of $212 billion. The global insurance industry covered $60 billion of the losses, compared with $93 billion in 2018 and $75 billion on average in the previous 10 years.

While severe weather events were still the main driver of overall losses in 2019, amplified by socio-economic developments in affected areas and climate change effects, the decrease in losses primarily stemmed from the absence of large and costly hurricanes in the United States.

Uninflated, inflated (2019 prices) and normalised economic losses from extreme weather events, 1980–2019, (USD billion)



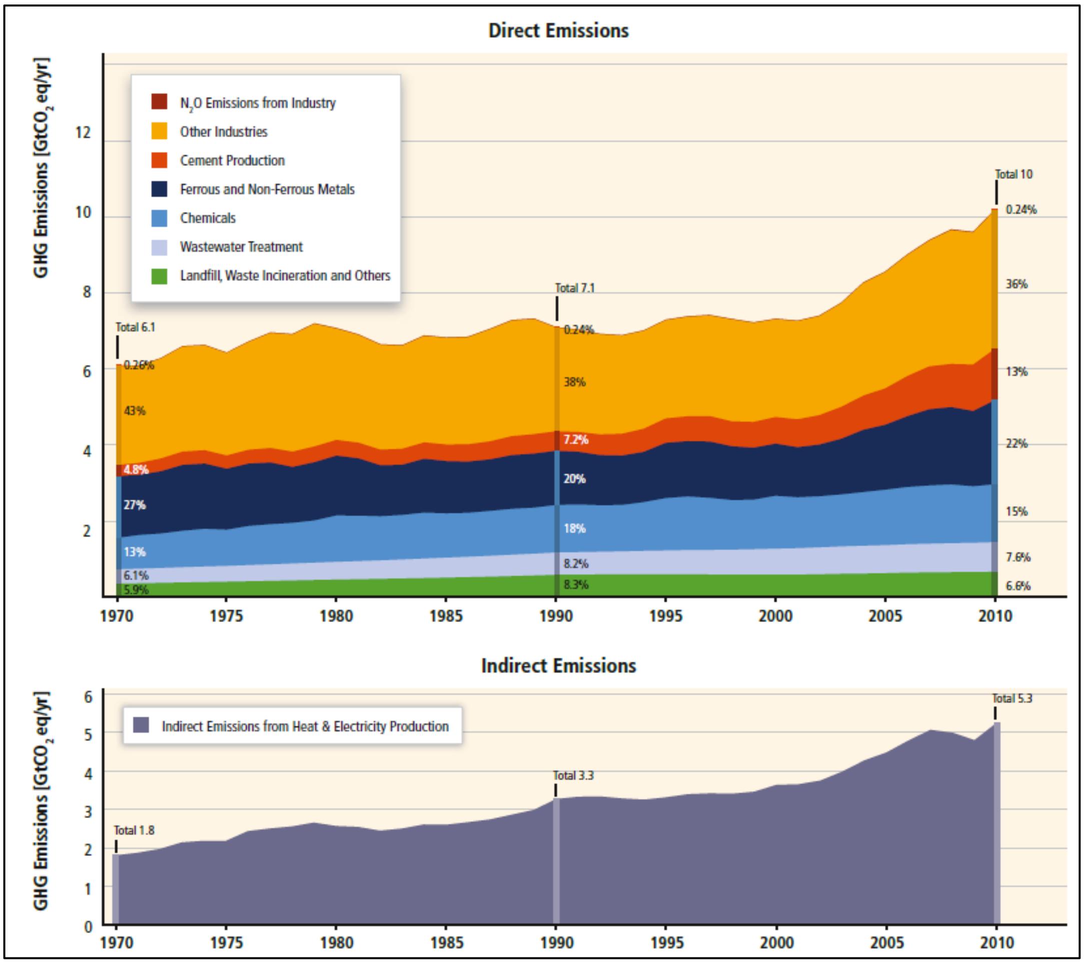
Source: Swiss Re Institute

To reflect that socio-economic factors change over time, Swiss Re attempted to ˝normalise” past losses resulting from weather-related events. Normalisation adjusts to show that an event in the past, if it were to occur at equal magnitude today, would cause more damage than in the year of occurrence due to value accumulation. A common approach is to apply real Gross Domestic Product and inflation factors to past economic losses. Using this approach, they estimate that the annual growth rate of normalised losses from global weather events between 1980 and 2019 was around 4%, still increasing but at much slower rate than shown by uninflated losses (10.9%) and also real (adjusted for inflation) losses (7.7%) over the same time period.

Source:
1. Swiss Re Institute, sigma No 2/2020

Increasing industry greenhouse gas emissions

Industry related greenhouse gas (GHG) emissions have continued to increase. Global industry and waste/wastewater GHG emissions grew from 10.37 $GtCO_2eq$ (global tonnes of carbon dioxide equivalent) in 1990 to 13.04 $GtCO_2eq$ in 2005 to 15.44 $GtCO_2eq$ in 2010. These emissions are larger than the emissions from either the buildings or transport end-use sectors and represented just over 30% of global GHG emissions in 2010.



Total global industry and waste / wastewater direct and indirect GHG emissions by source, 1970 – 2010 (GtCO2eq / yr.) (de la Rue du Can and Price, 2008; IEA, 2012a; JRC / PBL, 2013).

Source:
1. Fischedick M., J. Roy, A. Abdel-Aziz, A. Acquaye, J. M. Allwood, J.-P. Ceron, Y. Geng, H. Kheshgi, A. Lanza, D. Perczyk, L. Price, E. Santalla, C. Sheinbaum, and K. Tanaka, 2014: Industry. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

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