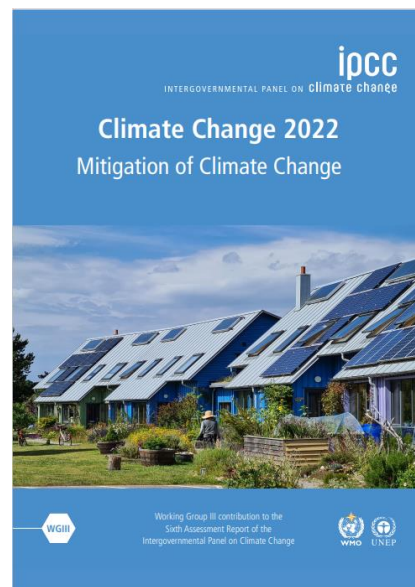


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Part Three of a Trilogy: IPCC releases key climate mitigation report

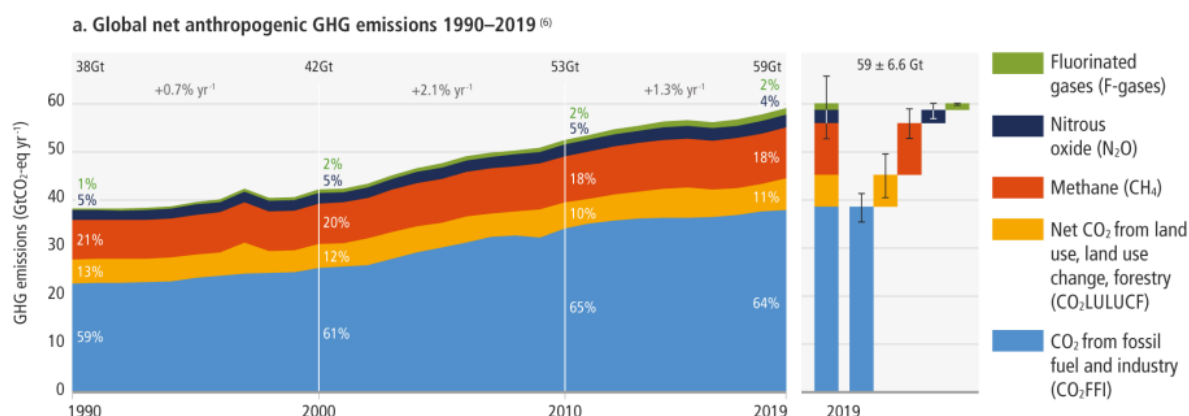
On 4 April 2022, Working Group III of the United Nations Intergovernmental Panel on Climate Change (IPCC) released its much anticipated contribution to the Sixth Assessment Report, ***Climate Change 2022: Mitigation of Climate Change***.

The third report in the trilogy follows the publication of the ***Impacts, Adaptation and Vulnerability*** report in February 2022 and the ***Physical Science Basis*** of climate change report in August 2021. **This latest report assesses global progress on climate change mitigation and pledges and considers sources of emissions.** It further describes developments in emissions reductions and mitigation efforts. This is a comprehensive report, drafted by 278 authors, 354 contributing authors from 65 countries reviewing over 18,000 scientific papers, and generating over 59,000 review comments.



The report tells us that average annual greenhouse gas (GHG) emissions were at their highest levels in human history in the last decade (i.e., 2010-2019), albeit at a lower growth rate than the previous decade (i.e., 2000-2009). During the same period, global GHG emissions grew by 12% and global carbon dioxide emissions by 13% (footnote 41). The report considers the greenhouse gases of fluorinated gases, nitrous oxide, methane, net carbon dioxide from land use, land use change and forestry, as well as carbon dioxide from fossil fuel and industry, as shown in the figure below. This also shows that the largest growth in absolute emissions was from carbon dioxide from fossil fuels and industry, followed by methane. Methane emissions received considerable attention at the 26th Conference of Parties (COP26) of the UN Framework Convention on Climate Change COP26 held in November 2021.

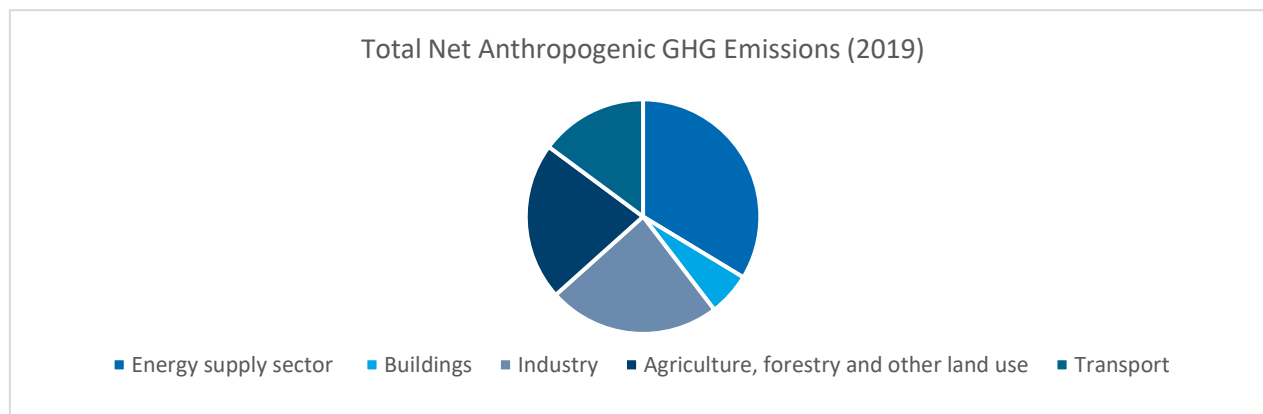
Global net anthropogenic emissions have continued to rise across all major groups of greenhouse gases.



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A key takeaway from this latest report is that **achieving the Paris Agreement targets of 1.5°C or 2°C requires “rapid and deep and in most cases immediate GHG emission reductions in all sectors”**. In 2019, the breakdown of total net anthropogenic (i.e., human-induced) greenhouse gas emissions are shown in the figure below. The energy supply sector was the largest contributor (34%), followed by industry (22%) and transport (15%) (B2.1).



(Source: Adapted from AR6 WG11.)

The report considers a number of future emissions pathways. In the global modelled pathways limiting climate change to 1.5°C with no or minimal overshoot or to 2°C with immediate action, it is projected that global GHG emissions will peak between 2020 and 2025, with rapid and deep emissions reduction in 2030, 2040 and 2050 (C.1). However, the authors point out that unless policies beyond those implemented at the end of 2020 are strengthened, GHG emissions will rise after 2025 leading to a median of 3.2°C by 2100. (ibid)

The authors note that limiting climate change to 2°C or less will result in “a substantial amount of fossil fuels unburned and could strand considerable fossil fuel infrastructure” (C.4.4). Carbon capture and storage (CCS), dependent on availability, may allow fossil fuels to be used longer and to reduce stranded assets (ibid). CCS is presented as an emissions reduction option for emissions from large-scale, fossil based energy and industry sources so long as geological storage is available (C.4.6). The authors note that “*technical geological CO₂ storage capacity is estimated to be on the order of 1000 gigatonnes of CO₂, which is more than the CO₂ storage requirements through to 2100 to limit global warming to 1.5°C*” (ibid).

Mitigation strategies considered include transitioning from fossil fuels without CCS to very low- or zero-carbon energy sources (e.g., renewables or fossil fuels without CCS) to very low-or zero carbon energy sources, such as renewables or fossil fuels with CCS, demand side measures and improving efficiency, reducing non-CO₂ emissions, and deploying carbon dioxide removal (CDR) methods to counterbalance residual GHG emissions (C.3). CDR is defined in the report as human-induced activities which extract CO₂ from the atmosphere and then store it in geological, terrestrial or ocean resources, or in products (C11.1). The authors further state that CDR will need to be deployed to “*counterbalance hard-to-abate residual emissions...if net zero CO₂ or GHG emissions are to be achieved*” (C.11).

The report cites cost decreases over the last decade of several low emissions technologies, including an 85% drop in the unit cost of solar energy, a 55% decrease in the unit cost of wind, and an 85% decrease in the unit cost of lithium-ion batteries (B.4.1). However, the report notes that “*In comparison to modular small-unit size technologies, the empirical record shows that multiple larger-scale mitigation technologies, with fewer opportunities for learning, have seen minimal cost reductions and their adoption has grown slowly*” (B.4.3).

The report refers to the shipping sector, acknowledging that efficiency improvements in vessel design, mass reduction and propulsion system improvements can provide some mitigation potential but state that “additional CO₂ emissions mitigation technologies for aviation and shipping will be required” (C.8.4). The report further states digitalisation’s contribution to climate mitigation, acknowledging the value of digital technologies (e.g., sensors, robotics, Internet of Things) for improvements in energy management and efficiency, but cautioning mitigation gains may be reduced or counterbalanced by demand for goods and services due to use of digital devices (B.4.3).