

# Chart of the Week

## Greenhouse gases in review

#### 15k Water supply; sewerage, waste management and remediation activities Transportation and Storage 13k Total Households 10k Other Services Industries 8k Mining Manufacturing 5k Electricity, Gas, Steam and 3k Air Conditioning Supply Construction 0k 2015Q1 2018Q1 2020Q1 2022Q1 2019Q1 2021Q1 2023Q1 2012Q1 2013Q1 2014Q1 2016Q1 2017Q1 2010Q1 2011Q1 Agriculture, Forestry and Fishing

## Global greenhouse gas emissions, millions of Mt of CO<sub>2</sub> equivalent (Q2 2012-Q2 2023)

Source: International Monetary Fund, UNFCCC

- Greenhouse gases (GHG) include not only carbon dioxide (CO<sub>2</sub>) but also methane (CH<sub>4</sub>), nitrous oxides (NOx), and others. How much various parts of the global economy generate of all the greenhouse gases can be seen in the chart above. This quarterly picture of emissions also shows the significant but still visually rather muted impact of the Covid-19 crisis in the first and second quarters (Q1 and Q2) of 2020.
- In Q2 2023, transportation and storage made up 8.4% of total GHG emissions, 74% of which pertain to road transportation. This leaves 26% of transportation's GHG emissions as stemming from shipping and aviation, and it makes aviation's share in the total comparable to that of construction in the chart above.
- Regarding the share of CO<sub>2</sub> emissions in total GHG emissions, most sectors stand at 72%, according to the Emissions Database for Global Atmospheric Research report in 2023. Aviation emissions are a combination of CO<sub>2</sub> (3.16 kg/kg fuel), H<sub>2</sub>O (1.25 kg/kg fuel) and Nitrogen Oxides (a few grams/kg fuel, depending on the engine). The heating effect of the non-CO<sub>2</sub> emissions is much more short-lived, but the aggregate climate impact could be comparable to that of CO<sub>2</sub>.
- Aviation's share of total energy-related CO<sub>2</sub> emissions in the world represented 2% in 2022, according to the International Energy Agency. Incidentally, data storage centers now also generate 2% of global CO<sub>2</sub> emissions, including all devices that make use of <u>data storage</u>.
- The need to reduce all GHG emissions is urgent as evidenced by the European Union's Copernicus Climate Change Service report that the world's average temperature stood 1.46°C above pre-industrial levels in 2023. For airlines as well as for the entire global economy to decarbonize, the use of fossil fuels must be replaced by renewable energy sources. For aviation's decarbonization, the supply of such renewable fuel (Sustainable Aviation Fuels or SAF), must increase a thousand-fold by 2050, compared to today's levels.

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1 March 2024