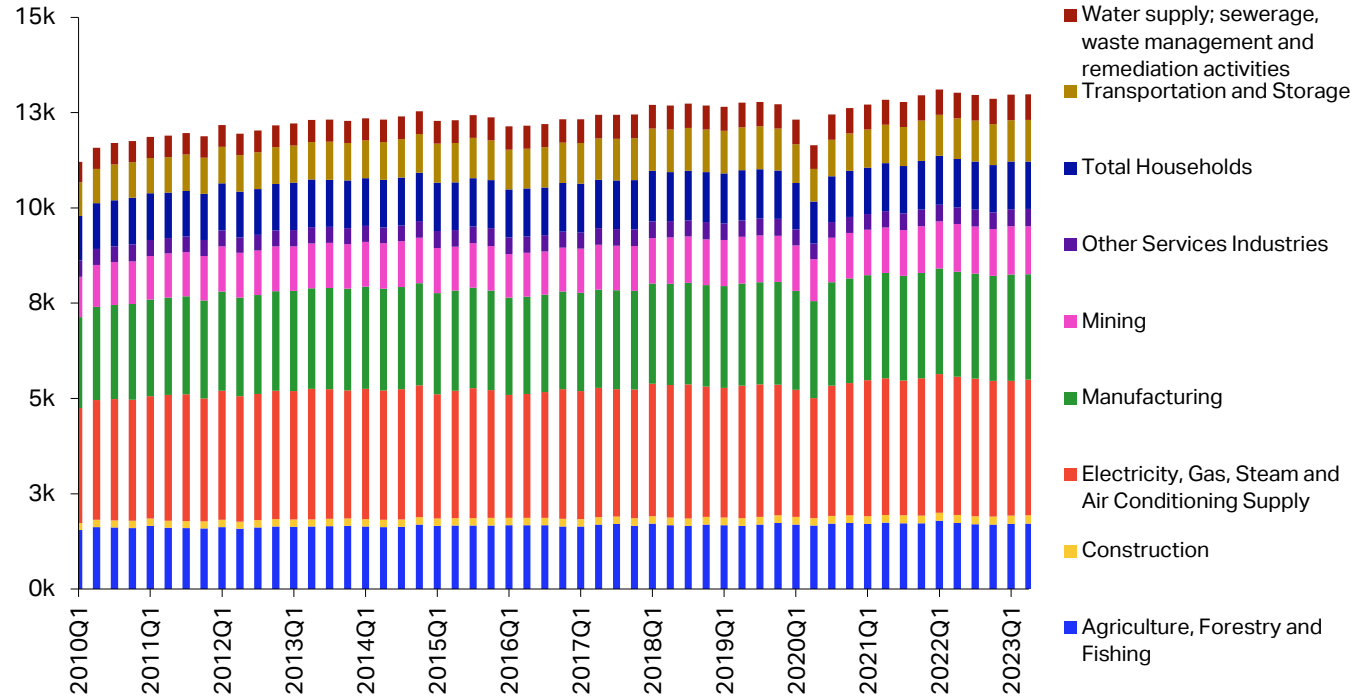
Chart of the Week

1 March 2024

Greenhouse gases in review

Global greenhouse gas emissions, millions of Mt of CO_2 equivalent (Q2 2012-Q2 2023)



Source: International Monetary Fund, UNFCCC

- Greenhouse gases (GHG) include not only carbon dioxide (CO_2) but also methane (CH_4), 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_2 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_2 (3.16 kg/kg fuel), H_2O (1.25 kg/kg fuel) and Nitrogen Oxides (a few grams/kg fuel, depending on the engine). The heating effect of the non-CO_2 emissions is much more short-lived, but the aggregate climate impact could be comparable to that of CO_2.
- Aviation's share of total energy-related CO_2 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_2 emissions, including all devices that make use of data storage.
- 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.

IATA Sustainability & Economics
economics@iata.org