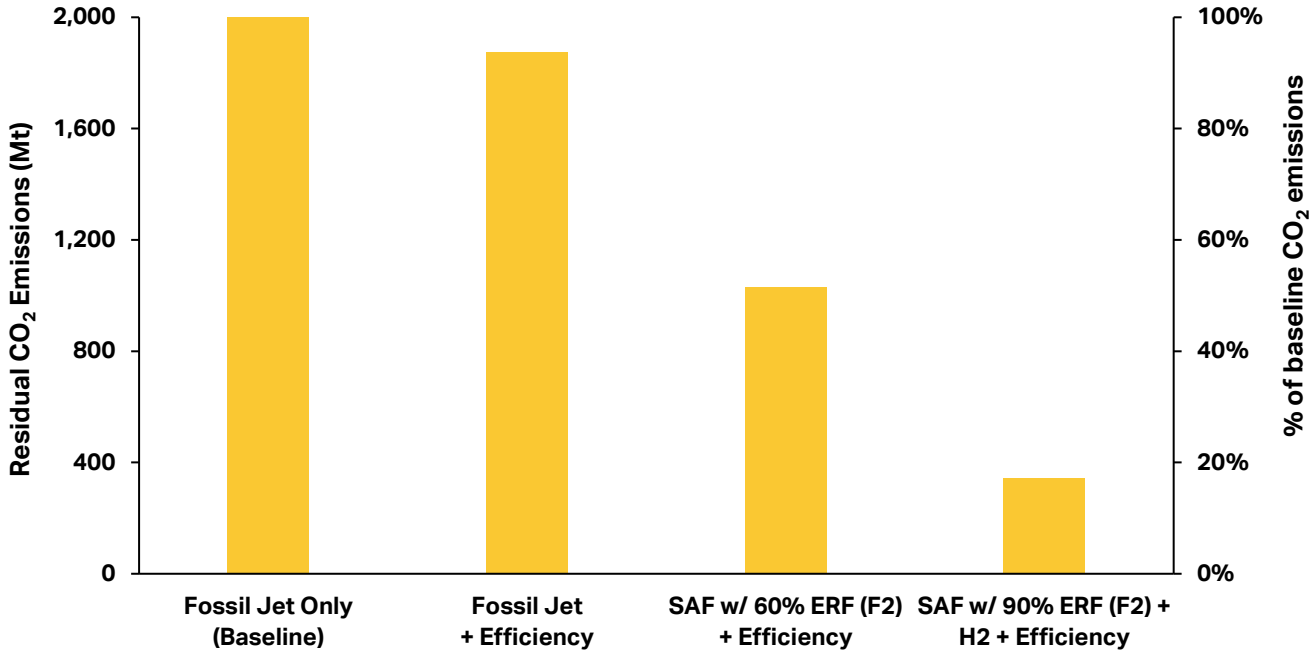
Chart of the Week

23 May 2025

Minimizing residual CO_2 emissions in 2050

Estimated residual CO_2 emissions in 2050 based on IATA Net Zero scenarios



Source: IATA Sustainability and Economics, ICAO LTAG SAF availability scenarios, Aviation Integrated Model (AIM)

- Addressing residual CO_2 emissions in air transport is imperative to reaching net-zero CO_2 emissions in 2050, as reducing and replacing existing fossil-based fuel will not address 100% of total air transport CO_2 emissions. The amount of residual emissions remaining in 2050 will depend on the extent of in-sector emissions reductions, and none more so than the use of sustainable aviation fuel (SAF). Baseline emissions, assuming no emissions reductions from any decarbonization levers like efficiency measures or use of lower carbon intensity jet fuels, would likely amount to about 1,900 Mt of CO_2 emissions in 2050.
- The lack of progress in accelerating SAF production and advancing new technologies in the air transport sector increases the necessary reliance on various market-based measures (MBMs) to address residual CO_2 emissions measures, including carbon dioxide removals (CDR) solutions such as Direct Air Capture and Storage (DACCS). However, these are also nascent markets which supply cannot be expected to compensate for insufficient scaling of in-sector solutions.
- Replacing older aircraft with future next-generation aircraft while maintaining residual fossil-fuel use would reduce the expected residual CO_2 emissions by 6%. The use of SAF (assumes ICAO's LTAG F2 scenario volumes with a 60% emission reduction factor (ERF)) combined with fleet replacement can reduce residual CO_2 emissions by nearly 50% from the baseline case. Using SAF with higher ERFs, such as Power-to-Liquids (PtL), and integrating new technologies can further drive this reduction. If SAF with 90% ERF is used, and if hydrogen aircraft could replace some narrow-body aircraft from 2030, residual CO_2 emissions in 2050 could be limited to 17% of the baseline. Developing these technologies into commercially viable solutions must be a priority today, for deployment closer to 2050 to be possible. All are likely to be in short supply, and none will be sufficient on their own.

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