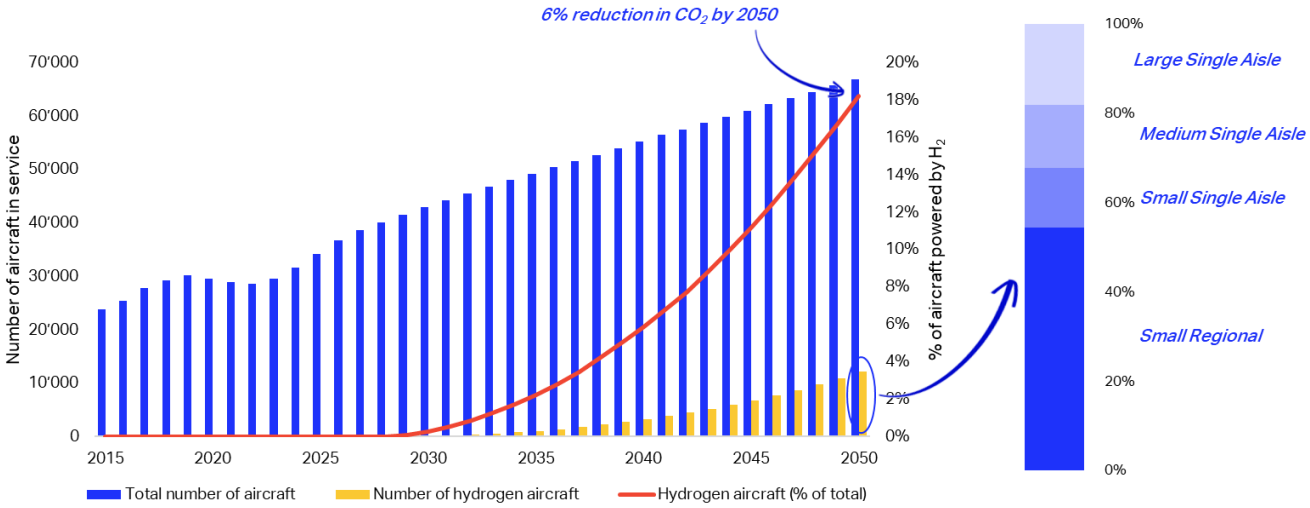
Chart of the Week

22 November 2024

Evolution of hydrogen aircraft fleet to 2050

A "regional first" strategy



Source: IATA Sustainability and Economics

- Hydrogen-powered aircraft, currently in development, will be a solution for eliminating operational CO_2 emissions from aviation. The life cycle GHG impact depends on the source of the hydrogen, which delivers maximum emissions reductions when hydrogen is made from water and renewable energy (green hydrogen).
- According to one of the IATA Net Zero Roadmap technology scenarios, hydrogen could represent 18% of the fleet by 2050, dominated by regional aircraft. This could reduce global aviation CO_2 emissions by 6% by 2050.
- In this scenario. the hydrogen aircraft fleet would be dominated by small regional aircraft (30-69 seats), representing 54% of the fleet in 2050, followed by large single-aisle (18% of the total), medium single aisle (14%) and small single-aisle (13%)[1]. These aircraft could reduce CO_2 emissions from the global regional fleet by 53% by 2050.
- While IATA has assumed a "regional first" strategy for introducing hydrogen aircraft into the market, other studies have explored "mid-sized" or "wide body" first strategies. No manufacturer today is considering building a wide-body hydrogen aircraft soon, however, such a strategy could significantly increase the emissions reduction potential of hydrogen aircraft. For example, FlyZero estimated that a "mid-sized" first hydrogen aircraft strategy could reduce CO_2 emissions by as much as 45% by 2050. Another study suggests that replacing 4.2% of the fleet with wide-body hydrogen aircraft in 2050 could cut CO_2 emissions by 10% and minimize the number of airport retrofits required[2].
- The impact that hydrogen aircraft will have in 2050 will depend on the size of the aircraft, its range, the entry into service date, and the rate of penetration into the market.

IATA Sustainability & Economics

economics@iata.org

[1] The definitions in terms of range and seat number of each aircraft category can be found in the IATA Technology Roadmaps, P15

[2] "Market Forecast and Strategy", FlyZero (ATI), 2022 and "A market introduction of hydrogen propulsion for first generation civil airlines", ISABE, Panetis et al. 2024