Aviation Sustainability

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Abstract

Air transportation is essential in moving people and cargo across the globe, but there is increasing recognition in the industry about the negative impact of aviation on the environment. Studies show that commercial aviation is responsible for 2.4% of global carbon emissions (Wright, 2019). Aircraft manufacturers and airlines are taking actions to reduce their carbon footprint by investing in environmental projects including forest conservation, capturing and reusing methane gas emitted from landfills, and developing fuel-efficient engines, biofuels, and electric aircraft.

The United Nations created the first global carbon offsetting scheme named CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation), which will enable aviation to cut its CO_2 emissions by 2.5 billion tons between 2020 and 2035 through US$40 billion investment in regulated, carbon reduction projects in other sectors. The International Airline Trading Association (IATA) created the "Four Pillars" principle, namely technology, operations, infrastructure and economic measures for airlines to achieve carbon-neutral growth by 2020.
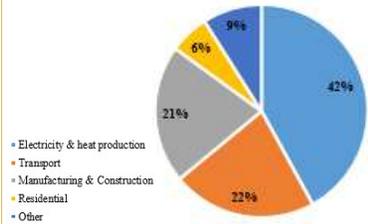
Keywords

Sustainability, Aviation, CORSIA, Emission Trading System (ETS), Carbon offsets, net zero carbon emissions, biofuels, IATA, flight shaming
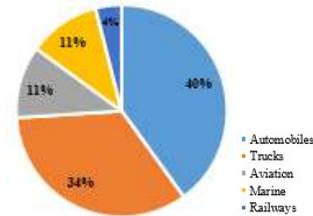
Issue

Aviation contributes 2.4% to global CO2 emissions (Wright, 2019).

CO2 Emissions by Economic Sector

- Electricity & heat production
- Transport
- Manufacturing & Construction
- Residential
- Other

CO2 Emissions by Transport Sector

- Automobiles
- Trucks
- Aviation
- Marine
- Railways

Source: Airbus Appraiser & Investor Forum, 2019

Flight Shame Revealed
Swiss Bank UBS 6,000 people survey:
27% reduced the flight numbers they took due to environment concern

Source: Reuters, 2019

Solutions

- New and more efficient technology
  - Sustainable alternative fuel and biofuels
  - New engines and airframes
- Improved operations and infrastructures
- Global offsets, such as planting trees, plastic free, recycling
- Electric aircraft can reduce CO_2

CORSIA

Carbon Offsetting Reduction Scheme for International Aviation

- Mitigate CO_2 emissions
- Started on January 1st, 2020
- All carriers are required to report their CO_2 emissions annually

Expected to Mitigate → **2.5 billion tons of CO_2 between 2021 and 2035**

Source: IATA, 2019

ETS

Emission Trading System in Europe
Airlines pay to reduce carbon emissions

- **Reduced emissions on European flights by more than 8 million tons, 40% per flight**

IATA "Four Pillars"

Technology
- Sustainable alternative fuels
- New airframe and engine
- Retrofits

Operations
- More efficient flight procedures
- Operation weight reduction

Infrastructure
- More efficient air traffic management systems
- More efficient equipment and airport infrastructure

Economic Measures
- Global offset mechanism
- Positive economic incentives

Some Airlines Becoming more Eco-Friendly

Improved Technology

Cathay Pacific A340 recycling

British Airways A380 at LHR

Cathay Pacific A350 Biofuel
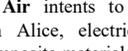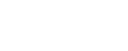
Iberia A330 & A320 at MAD

Cathay Pacific A350 at HKG

CAPE Air intents to order Eviation Alice, electric and 95% composite materials built

Flight Shaming and Issues to Solutions

Skeptics
- Doubt if emission reductions are:
  - Permanent
  - Overestimated
- Airline emissions occur immediately, but offsets take time
- New engines might create less CO_2 but create more trails
- Greta Thunberg effect

Optimists
- Positive on aviation initiatives
- Believe future technology, such as electric aircraft will solve CO_2 issue