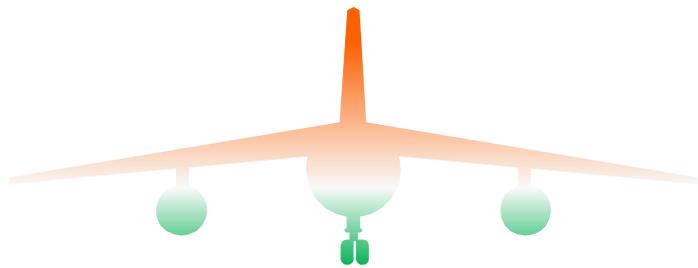
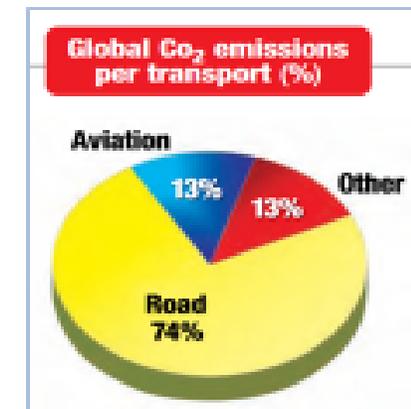
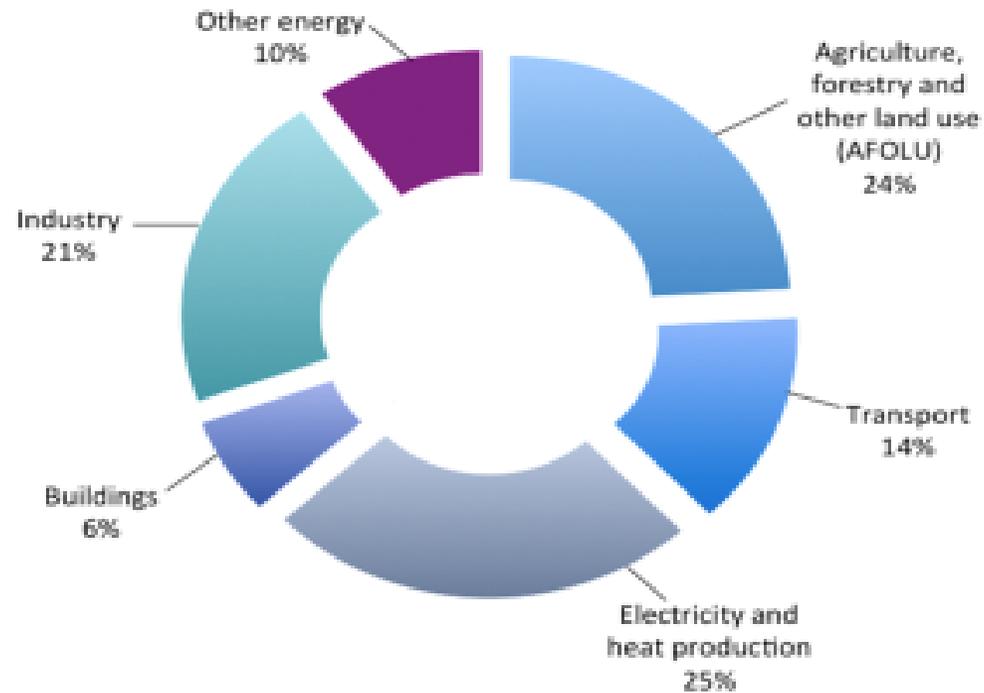
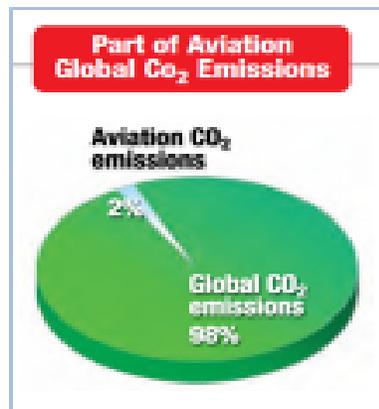


# SUSTAINABLE AVIATION FUELS: FUTURE OF CIVL AVIATION



**EKTA AGRAWAL**  
**ASSISTANT DIRECTOR**  
**DGCA INDIA**

# AVIATION AND ENVIRONMENT

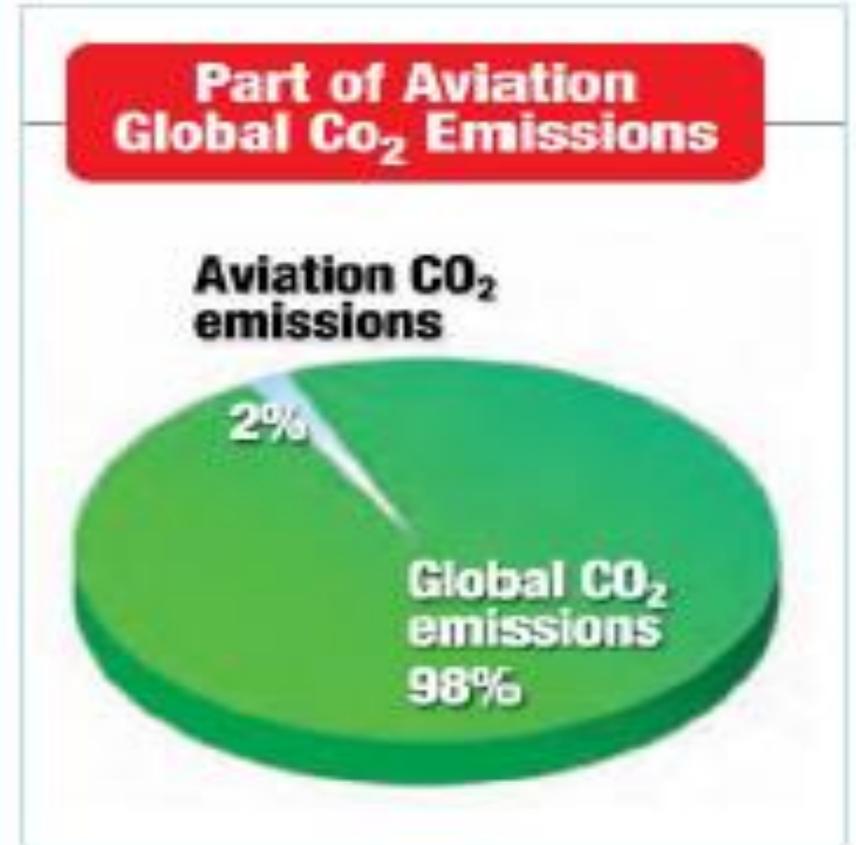


- As per the most recent data aviation contributes to 2.5% of overall CO<sub>2</sub> emission globally.

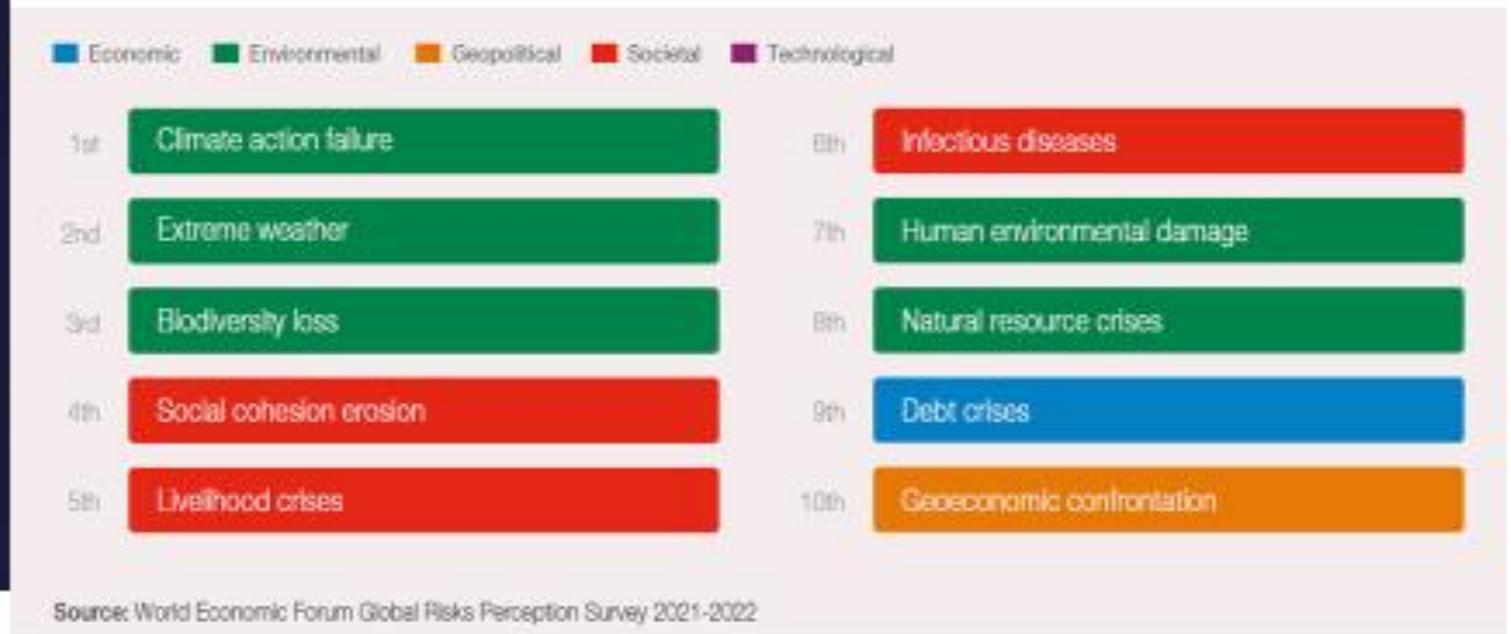
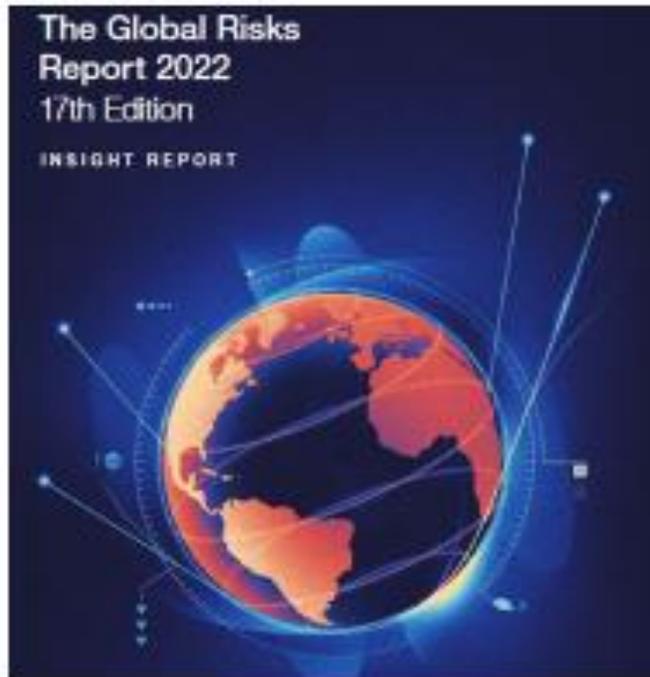


# AVIATION & THE ENVIRONMENT

IPCC produced a Special Report on the “**Aviation and the Global Atmosphere**” under which **Carbon dioxide (CO<sub>2</sub>)** was considered as the principal greenhouse gas and concluded that **Aviation** represents approximately 2 to 3% of the total annual global CO<sub>2</sub> emissions from human activities and has impacts on climate from its non-CO<sub>2</sub> emissions (e.g. NO<sub>x</sub>, particles).



# GLOBAL RISKS



# IMPACT OF CLIMATE CHANGE ON AVIATION

## Precipitation Change

- Disruptions to operations (e.g. airfield flooding, ground subsidence)
- Reduction in airport throughput
- Inundation of transport access (passengers and staff)
- Loss of local utilities provision (e.g. power)

## Wind changes

- Convective weather: disruptions to operations
- Convective weather: route extensions
- Jet stream: potential increase in en-route turbulence
- Crosswinds: reduction in capacity

## Extreme events

- Disruptions to operations
- Disruption to ground transport access
- Disruption to supply of utilities

## Temperature changes

- Changes in aircraft performance

## Sea-Level Rise

- Loss of airport capacity
- Impacts on en-route capacity due to lack of ground capacity
- Loss of ground transport access



# ICAO ASPIRATIONAL GOALS

- ❖ ICAO adopted the following Aspirational Goals in 2010:
  - 2% improvement in fuel efficiency per year from 2009 until 2020,
  - Carbon Neutral Growth from 2020 onwards, and
  - Long term aspiration goal on net zero emissions (in progress)
- ❖ In order to achieve ICAO's aspirational goal of Carbon Neutral Growth (CNG), concept of a global market-based measure was adopted in ICAO General Assembly meetings
- ❖ ICAO member States agreed to implement a Global Market-based measure (GMBM) to compensate post-2020 emissions growth from international aviation in 38<sup>th</sup> Assembly of ICAO in October, 2013

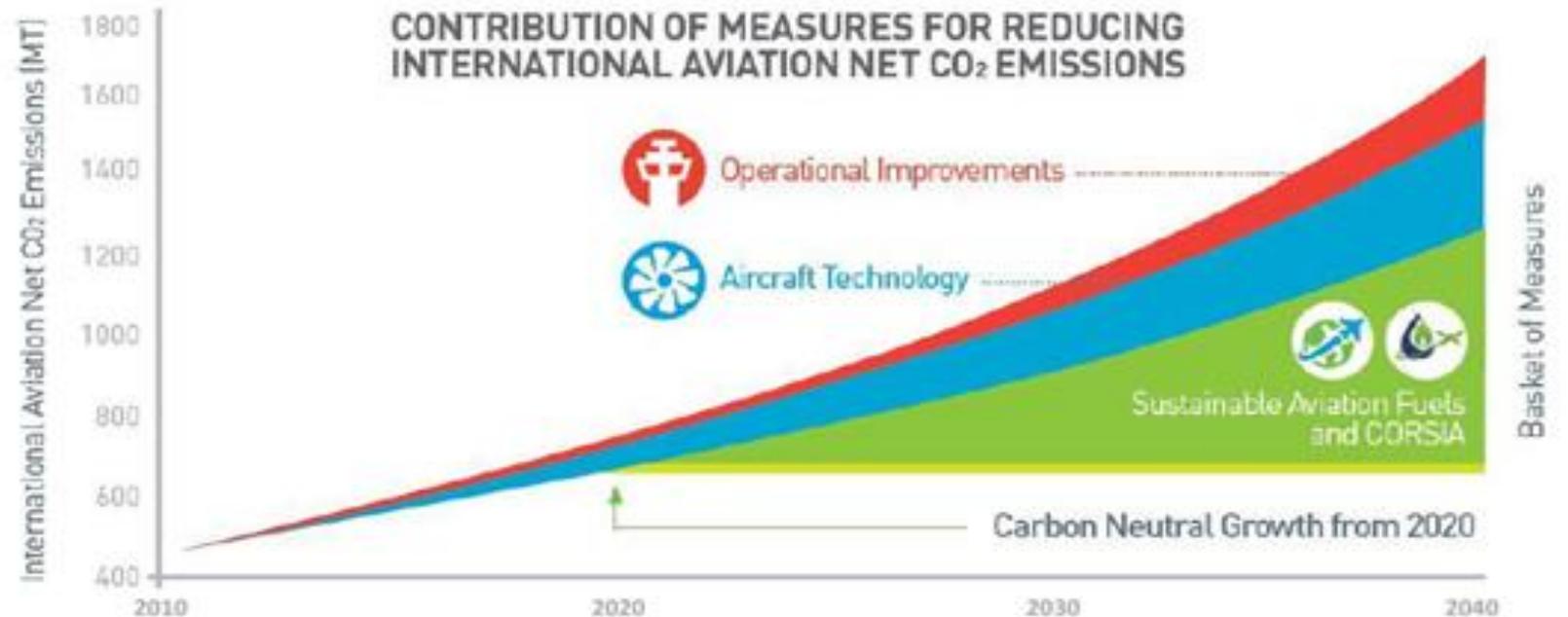
# CORSIA

CORSIA was adopted through Assembly Resolution 39-3

The **first global MBM scheme** for any industry sector

To achieve ICAO's global aspirational goal of carbon neutral growth from 2020 (CNG 2020), CORSIA is **one complementary element in the basket of measures** to:

- aircraft technology
- operational improvements
- sustainable aviation fuels

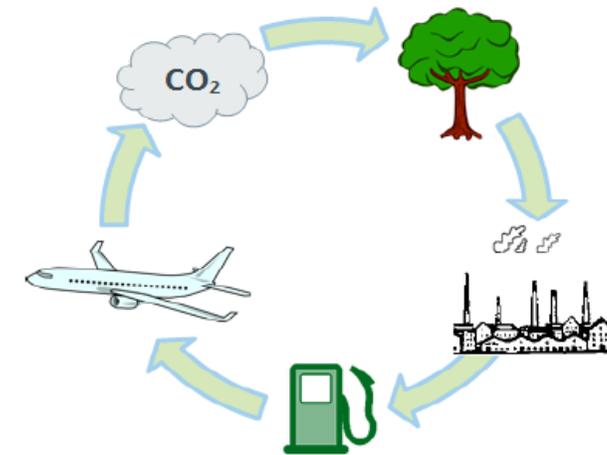


# SUSTAINABLE AVIATION FUELS

## What are Sustainable Aviation Fuels (SAF)?

- Must meet the same safety standards as current aviation fuels
- “Drop-in” fuels : fuels that are fully compatible with existing aircraft and fuel-supply systems
- In addition to safety standards, SAF needs to meet **Sustainability Criteria** (e.g. minimum CO<sub>2</sub> reductions on a life cycle basis)

Example: *Fuels made from biomass*



CO<sub>2</sub> emitted by combustion is up-taken by plant growth

# CORSIA ELIGIBLE FUELS

- ❖ Aeroplane Operators may claim emissions reductions from the use of CORSIA eligible fuels that meet the CORSIA Sustainability Criteria as defined within the ICAO Document entitled “CORSIA Sustainability Criteria for CORSIA eligible Fuels” available on the ICAO CORSIA website.
- ❖ CORSIA eligible fuels (CEF) include both Sustainable Aviation Fuels (SAF) and Lower Carbon Aviation Fuels (LCF).
- ❖ The emissions reductions will be proportional to the life cycle emissions benefits of the alternative fuels used
- ❖ CEF has to meet 12 eligibility criteria for the economic operators mainly pertain to documentation management system, auditing, non-compliance, monitoring and reviewing system, transparency, and risk management as well as approved under Sustainability Certification Scheme.

# CORSIA ELIGIBLE FUELS

**Five ICAO documents comprise the CORSIA implementation element for CEF, and they define the procedures and requirements needed for CEF consideration under CORSIA:**

- ❖ CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes**
- ❖ CORSIA Approved Sustainability Certification Schemes**
- ❖ Sustainability Criteria for CORSIA Eligible Fuels**
- ❖ Default Life Cycle Emissions Values for CORSIA Eligible Fuels**
- ❖ CORSIA Methodology for Calculating Actual Life Cycle Emissions Values**

# DEVELOPMENTS MADE: SUSTAINABLE AVIATION FUELS

- ❖ Biofuel produced from Jatropha seeds by Indian Institute of Technology – blended in ratio of 1:4 (SAF:ATF) was used in one engine of Bombardier Q 400 aircraft for 01 hour flight from Dehradun to Delhi in August, 2018
- ❖ Engine performance was satisfactory and parameters were within limits
- ❖ Bureau of Indian Standard (BSI) – issued Indian Standard for Bio-jet ATF IS:17081 in January 2019
- ❖ Scaling up of production is under active consideration

# DEVELOPMENTS MADE: SUSTAINABLE AVIATION FUELS

- ❖ Ministry of Petroleum & Natural gas had constituted a committee to explore and take forward the production of SAF in the country to promote the use of clean fuel in aviation.
- ❖ Committee has group of experts wherein DGCA was also the member.
- ❖ Final approved report is awaited

# BIOFUEL DEMONSTRATION FLIGHT



## RECENT DEVELOPMENT

DGCA has granted approval to M/s Indigo to carry out its first international ferry flight with 10% blended fuel.

The flight is scheduled tomorrow i.e. 17<sup>th</sup> Feb 2022 from Toulouse to Delhi

# CHALLENGES AHEAD

Though SAF is the only alternative, as of now, to reduce carbon emissions from aviation, however, use of SAF is also associated with lot of challenges:

**Price:** Presently, the price of SAF is 2 to 3 times higher than the normal ATF which leads to an additional financial burden on cash crunch airlines

**Availability:** As of now, SAF is produced only at laboratory level which is not sufficient. We need sufficient volume to replace at least 1 - 2% of ATF to start with

**Certification Standards:** Showing compliance to the certification standards for any aviation fuels is a paramount requirement. Further, it must also comply with the sustainability criteria in order to be considered for international purposes.

# CONCLUSION

Sustainable aviation fuel is the most feasible option to decarbonize air travel in India and globally for the next 15–20 years without altering the design of the aircraft

Scaling up of refineries to cater the demand of SAF is the need of the hour and will also bring the price at par with normal ATF

We should also focus on international certification standards and sustainability criteria for development so that our industry is benefitted both in domestic and international aviation



**1. Human colonization on Mars**



**2. Making earth a better place to all life**

WHICH ONE WOULD YOU CHOOSE

?

