Vision 2050: Assessing the Potential for Climate Neutral Growth in Aviation

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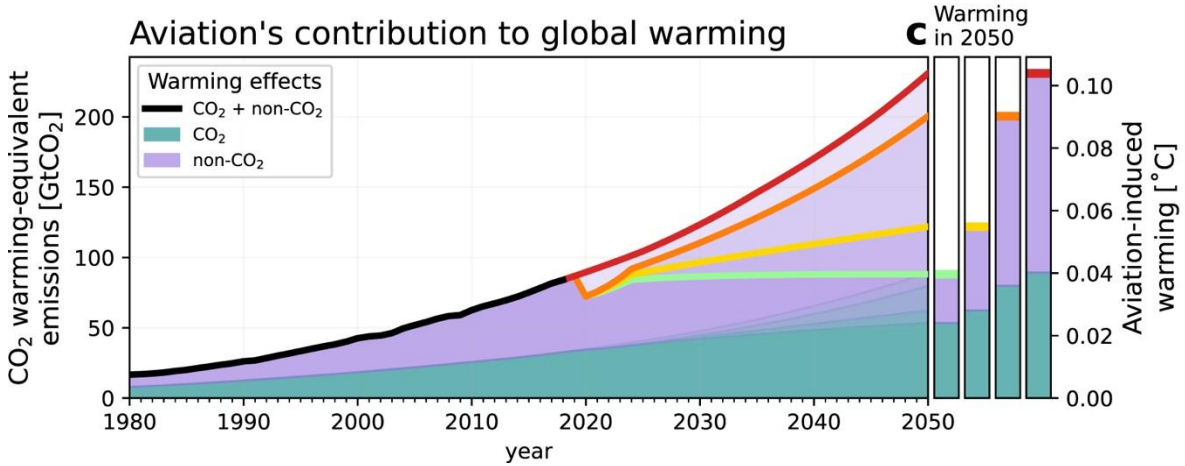
icct
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

The growing importance of non-CO_2

- Greenhouse gases (GHGs): CO_2, CH_4, N_2O
  - Lifetimes of tens to thousands of years
  - Impact driven by ***accumulation*** in the atmosphere
- Short-lived climate pollutants (SLCP): Contrails, NOx, nvPM, water vapor, and sulfate aerosols
  - Lifetimes of hours to days
  - Impact driven by ***continuing pulses*** of emissions



New research question

How can cuts to short-lived climate pollutants from global commercial aviation contribute to the Paris Agreement?

Using a Trajectory-Based Inventory to Assess Contrails

Real-world ADS-B Trajectory Flight Data

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2023 emissions inventory

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Projection of Aviation Climate Effects (PACE) model

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2023-2050 emissions (in mass) and contrail effective radiative forcing (ERF)

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Simplified climate model (FaIR)

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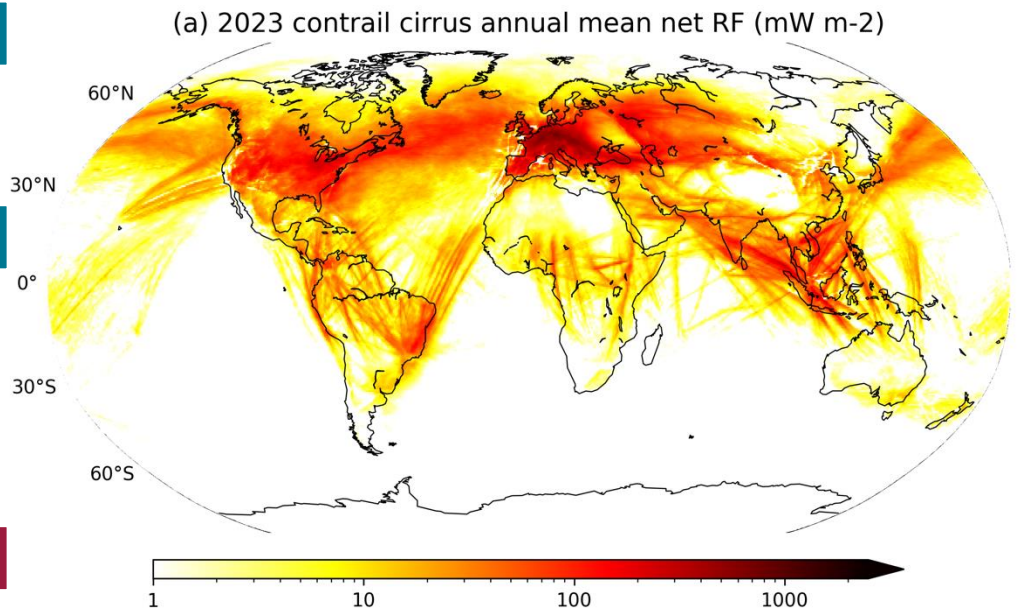
Aviation's contribution to global temperature change



Contrails cause as much warming as aviation CO_2

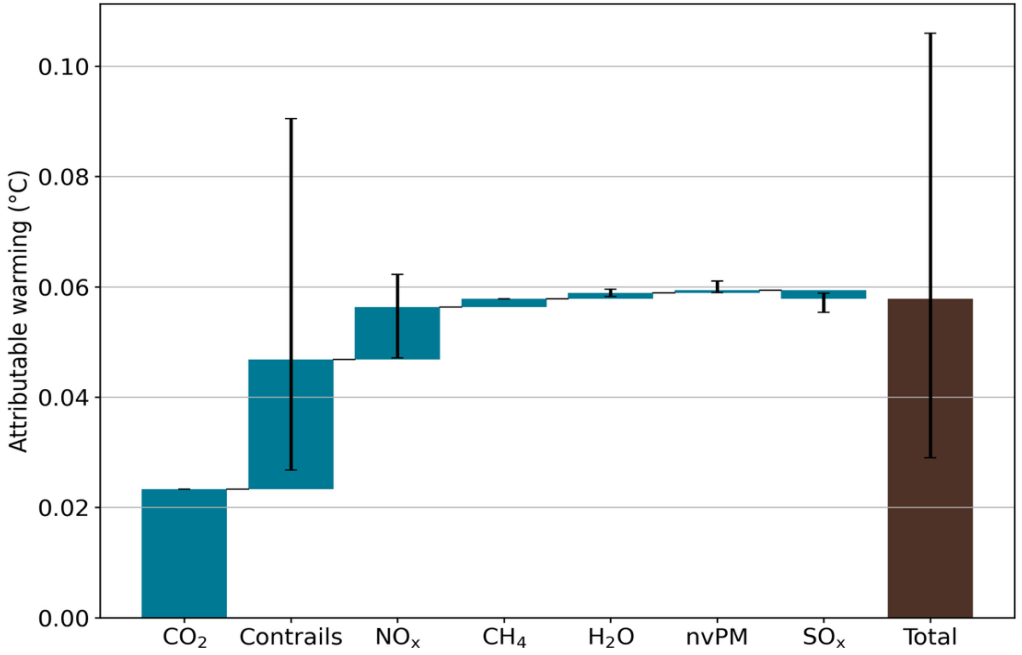
~2%

of global temperature rise is from contrails alone

>60%

of contrail impact from US, EU, and UK flights

Contrail mitigation could deliver significant near-term warming reductions via existing technology



Aviation's contribution to surface temperature change (1940-2025)

Source: ICCT Aviation Vision 2050

Key mitigation levers

Greenhouse Gases

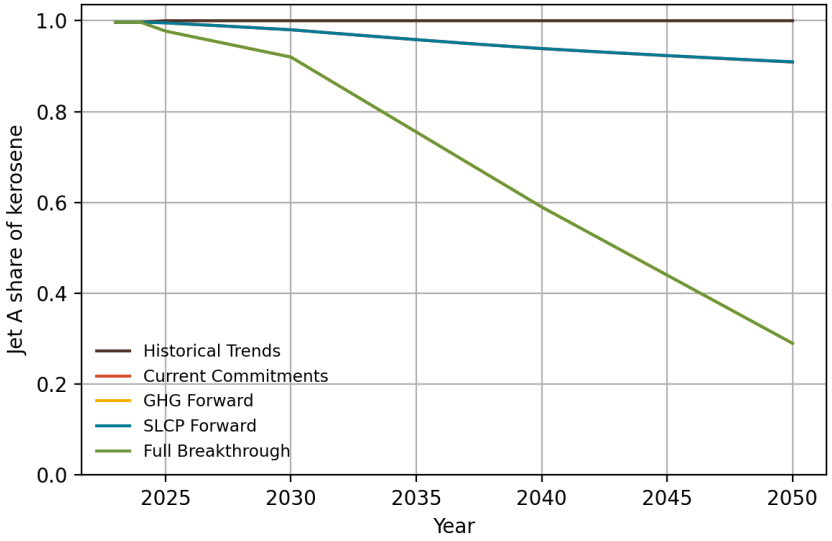
- Aircraft fuel efficiency
- Payload and traffic efficiency
- Sustainable aviation fuels (SAFs)
- Zero emission planes (ZEPs)

Short-Lived Climate Pollutants

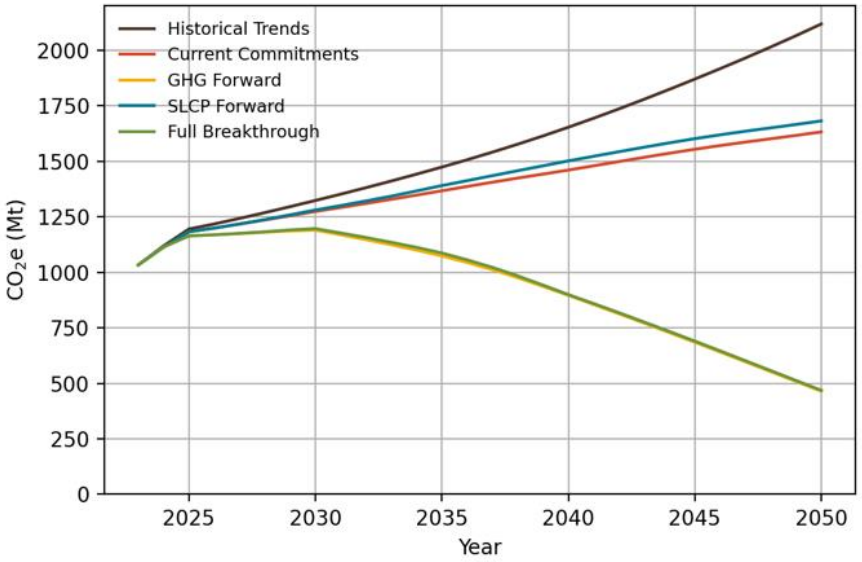
- Low-NOx/nvPM engines
- Contrail avoidance
- Hydrotreating fossil Jet A
- Sustainable aviation fuels (SAFs)

SAF Blending and GHG Emissions

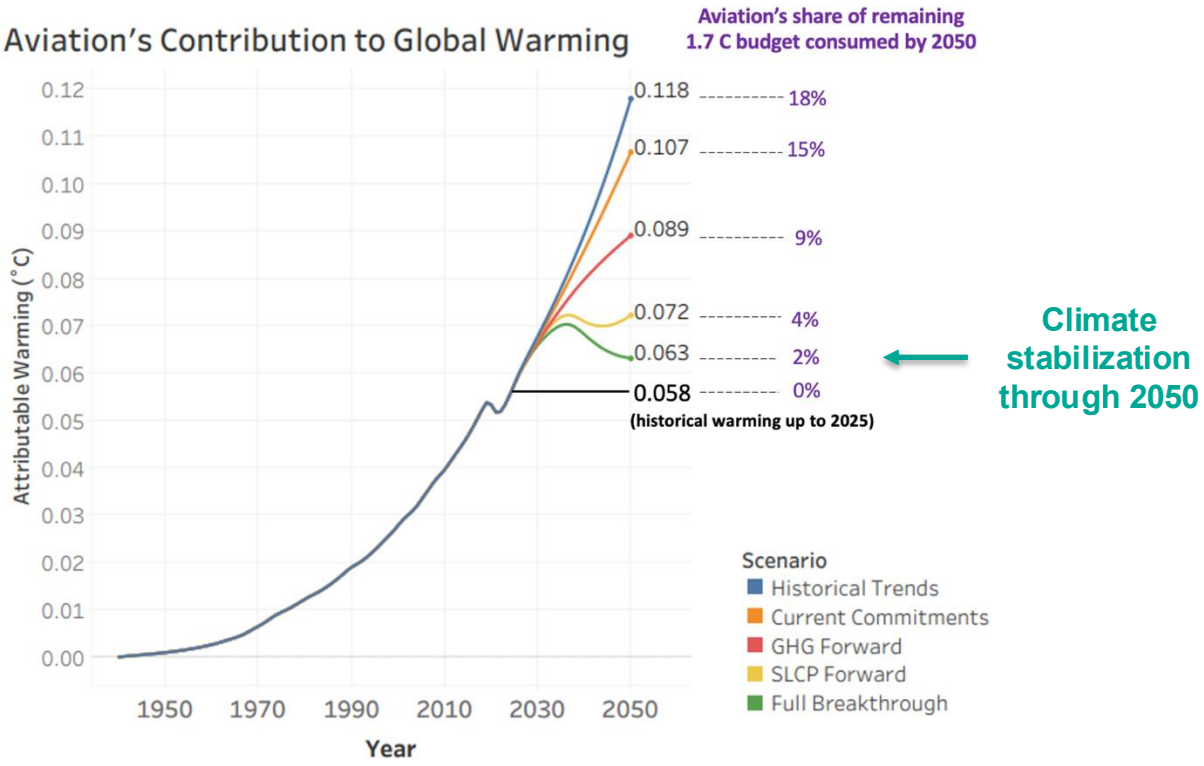
Jet A Share of Kerosene



Annual GHG Emissions



Putting it all together: Temperature Response by Scenario



Climate stabilization through 2050