HORIZON 2020

CLIMATE ASSESSMENT OF INNOVATIVE MITIGATION STRATEGIES TOWARDS OPERATIONAL IMPROVEMENTS IN AVIATION

Results in Brief

Not only fuel: towards a net zero aviation industry

Operational improvements in-flight and on the ground could substantially mitigate the aviation sector's climate impact, both CO2-related and not.

TRANSPORT AND MOBILITY

CLIMATE CHANGE AND ENVIRONMENT

© heychli/stock.adobe.com

In 2022, the aviation sector accounted for 2 % of global energy-related CO2 emissions. The sector also contributes to non-CO2 impacts at high altitudes including nitrogen oxides, water vapour and particulate matter, which could have a significant climate effect.

The European Green Deal enshrines Europe's ambition for climate neutrality by 2050. In this context, FlightPath 2050 targets a 75 % reduction in CO2 emissions and a 90 % reduction in NOx emissions by the aviation sector. The EU-funded ClimOP project developed a semi-quantitative framework to compare the climate impact mitigation potential of different operational measures, taking non-CO2 effects into account.

Climate impact mitigation strategies via operational improvements

ClimOP set well-defined criteria in evaluating operational improvements suitable for detailed investigation and modelling. These comprised: the scientific relevance, feasibility of modelling, technological maturity, favourable cost/benefit ratio and expert advice of the ClimOP Advisory Board. “Stakeholder insight regarding the maturity and operational feasibility of the measures helped reduce the initial list of more than 40 measures down to eight to be studied in detail,” states project coordinator Alessandra Tedeschi of Deep Blue.

The operational improvements covered topics including free routing and wind-optimised flight planning, strategic network planning, energy-efficient infrastructure upgrades and electrification of ground vehicles. ClimOP comprehensively assessed these against a variety of key performance indicators.

The results were summarised in eight cards which illustrate climate, operational and economic impact through graphics while also noting maturity level, benefits and challenges to implementation. The project identified actions by stakeholders that would support implementation of the climate impact mitigation strategies such as improving the quality of atmospheric data and predictions available to airlines and air navigation service providers.

Overall, the results showed that in-flight operational improvements are more effective in mitigating climate impact than ground operations but the latter generally have less impact on the aviation industry and a higher maturity level.

“The ClimOP project also investigated possible climate impact mitigation strategies that integrate multiple operational improvements with regulations and policies that could enable these improvements,” adds Tedeschi. Three were evaluated in detail: the concept of ‘climate-charged airspaces’, referring to a temporary climate charge for airlines that operate in highly climate-sensitive areas; inclusion of non-CO2 impacts in the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and the EU emissions trading system; and sustainable taxiing.

ClimOP fills important gaps and sheds new light on climate impact mitigation

“Some studies have quantitatively compared pairs of operational measures or broader qualitative comparisons of several mitigation options. ClimOP was unique in its development of a semi-quantitative framework to compare the climate impact mitigation potential of different operational measures. In addition, prior to ClimOP,

non-CO2 impacts were primarily considered within the research environment. ClimOP helped raise awareness of their importance among aviation stakeholders and a broader audience while enhancing our scientific understanding of operational improvements that include non-CO2 impacts," notes Tedeschi.

While energy-related climate impact mitigation approaches including sustainable aviation fuels, hydrogen and electric aircraft receive substantial attention, these technologies could take years to decades to mature and have a sustainable supply chain. ClimOP has shown that aviation can readily mitigate its climate impact with feasible operational improvements in the short- to midterm.

Keywords

ClimOP, climate, aviation, operational improvements, CO2, climate impact mitigation, emissions, climate-charged airspaces, CORSIA, FlightPath

Discover other articles in the same domain of application

The sustainable city of the future is compact

Protecting and restoring Europe's blue carbon ecosystems

Taking the circular path to sustainable clothing and fishing industries

EU Missions to address climate change in cities and regions

Project Information

ClimOP

Grant agreement ID: 875503

Project website

DOI
10.3030/875503

Project closed

EC signature date
11 December 2019

Start date
1 January 2020

End date
30 June 2023

Funded under
SOCIETAL CHALLENGES - Smart, Green And Integrated Transport

Total cost
€ 3 064 272,50

EU contribution
€ 3 064 272,50

Coordinated by
DEEP BLUE SRL
Italy

Last update: 24 November 2023