



Simulating the climate benefit of contrail reduction through targeted SAF in 2030 at Copenhagen airport

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To reduce the considerable climate effect of aviation, the ReFuelEU aviation regulation obliges all aviation fuel suppliers to provide increasing amounts of sustainable aviation fuel (SAF) to EU airports in the coming years and decades. SAF primarily reduces aviation CO₂ life-cycle emissions, but also the contrail climate effect. As SAF on average contains less aromatics, SAF-fueled aircraft emit less particulate matter, leading to lower ice crystal number concentrations with larger ice crystals in the formed contrails. In consequence, this reduces the overall contrail climate effect, as the contrails are optically thinner and less persistent. In contrast to the CO₂ emissions of a flight, which are directly proportional to the fuel use, the contrail climate effect is highly variable from flight to flight. Hence, SAF allocation to specific flights can maximise climate mitigation efforts for certain amounts of SAF, especially as long as SAF supply is limited and production capacities are still about to be scaled up.

Within the ALIGHT project, Copenhagen Airport (CPH) works towards the introduction of sustainable aviation solutions for the future. For this, one important component is knowledge on the climate-optimal SAF distribution to the flights at CPH, which we here estimate using the climate surrogate model AirClim. For the purpose, we have refined the SAF parameterisation with regard to the particulate matter reduction through SAF and use a wing span parameterisation to account for the aircraft type. The study particularly targets year 2030, as the 6% SAF mandate then is still expected to allow large climate benefits through targeted SAF use and there is still time for infrastructural adaptations. We quantify the additional climate benefit for all flights departing from CPH through targeted SAF use in those flights with the largest contrail climate effect to fuel use ratio instead of distributing it uniformly to all flights. For this, we assess the optimal SAF blending ratio, analyse various climate metrics and time horizons and cluster the flights with regard to their mean latitudes and aircraft types. The results of this study lay the ground for a complete cost-benefit analysis taking into account all aspects of infrastructure at CPH to assess practical feasibility.

