

# Aviation non-CO<sub>2</sub> effects

## Air France-KLM Statement

JULY 2022

Following the presentation of the “Fit for 55” package on 14 July 2021 by the European Commission (EC), the Air France-KLM Group welcomed the proposals and strongly supports the objectives of the European Union to be the first climate neutral continent in the world by 2050 and to reduce by -55% CO<sub>2</sub> emissions by 2030 compared to 1990.

The **Fit for 55 package is a fundamental step towards reducing CO<sub>2</sub> emissions** in Europe, which is crucial in fighting climate change. Nevertheless, the climate impact of aviation is larger than CO<sub>2</sub> emissions alone. In line with the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), chapter 10.5.2, we recognise a negative impact on climate from non-CO<sub>2</sub> effects from the aviation industry. [3] We also call to rely on the full scientific basis, explaining how CO<sub>2</sub> and non-CO<sub>2</sub> effects are not directly related and acknowledging that the uncertainty around the magnitude of non-CO<sub>2</sub> effects is still very high. Known examples of non-CO<sub>2</sub> effects include contrails, as well as other greenhouse gases such as nitrogen oxides (NO<sub>x</sub>).

### Contrail Formation

Contrails form when water vapour emissions condensate around emitted soot particles at high altitudes and under certain atmospheric and weather conditions. These clouds have a short lifetime (e.g. seconds to minutes), and therefore have very small effect on climate. Some contrails, depending on the atmospheric condition and period of the year, could become persistent contrails. With a lifetime of about 10 hours, they have a more significant climate impact. In comparison, CO<sub>2</sub> effects are measured on a 100-years basis. These effects thus act on different timescales.

### NO<sub>x</sub>: the indirect GHG

Nitrogen oxides are not GHG emissions per se, but when released by engines in the atmosphere, they have both a cooling effect by destroying methane (a GHG) and a warming effect by creating ozone which has a short-term cooling effect, but a long-time warming effect. The net effect is negative for the climate.<sup>1</sup>

### Sustainable Aviation Fuels: reducing both CO<sub>2</sub> emissions and non- CO<sub>2</sub> effects

Sustainable Aviation Fuels is recognised by the scientific community as a solution for both CO<sub>2</sub> emissions and non-CO<sub>2</sub> effects. SAFs release in average -80% of CO<sub>2</sub> and up to -100% CO<sub>2</sub> emissions.

It contains less soot particles and releases also less other greenhouse gases than fossil fuels, therefore significantly reducing contrails formation and NO<sub>x</sub> emissions. Even though science cannot assess yet the precise non-CO<sub>2</sub> effects, science already provides a solution to these effects by the use of Sustainable Aviation Fuels.

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<sup>1</sup> Penner et al. 1999; Lee et al. 2021; Naik et al. 2021

## Air France – KLM’s statement and call to action

In view of the influence that non-CO<sub>2</sub> effects, such as contrails and NO<sub>x</sub>, have on the climate, it is key that the negative impact of non-CO<sub>2</sub> effects is tackled. Therefore, it is pivotal that the following points and solutions are taken into consideration when designing policy and specific legislation for non-CO<sub>2</sub> effects:

- ✈️ Despite the high uncertainties about the size of the impacts of non-CO<sub>2</sub> effects, Air France-KLM recognises that contrails and NO<sub>x</sub> have an overall warming impact on the climate as agreed by the scientific community;
- ✈️ In order to be able to disclose a measurable impact of non-CO<sub>2</sub> effects as an airline, we urge institutions and policy makers to stimulate and conduct further research in this area. Particularly in terms of quantification of the impact and technological solutions. Good research, analysis and knowledge should form the basis for good legislation.
- ✈️ Recognize SAF as part of the solution for non-CO<sub>2</sub> effects and encouraging the use of such fuels for the aviation industry.

Air France – KLM is working together with knowledge institutions to advance technological developments to reduce non-CO<sub>2</sub> effects. Although much more research must be done, this is what we are already contributing:

- ✈️ Air France-KLM was one of the first airlines in Europe to be involved in collaboration aiming to provide specific data on climate, with a partnership with IAGOS (In Service Aircraft for Global Observing System). This partnership continues to date, but financing is required to install instrumentation on a larger fleet in order to collect a representative set of data.
- ✈️ Air France-KLM fully supports research made to better understand and predict ISSR (Ice Super Saturated Regions) and is engaged to contribute to it (contrails observations, collaboration with Maastricht Upper Area Control Centre (MUAC)<sup>2</sup>);
- ✈️ Air France-KLM is renewing its fleet to replace old aircraft by new ones responding to the highest criteria regarding NO<sub>x</sub>;
- ✈️ Air France-KLM is engaged to support the development of SAF, which has been identified as a key lever to minimise non- CO<sub>2</sub> effects;
- ✈️ Air France-KLM is investing in research through the “Conseil pour la Recherche Aéronautique Civile” (CORAC) and supports the creation of a climate chair focussing on cooperation in research and tackling the challenges non- CO<sub>2</sub> effects have on climate change;
- ✈️ Air France-KLM, as an aircraft operator, defines and implements an eco-piloting strategy that aims to include flight trajectories minimizing the creation of condensation trails.

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<sup>2</sup> <https://www.eurocontrol.int/press-release/mitigating-climate-impact-non-co2-emissions>