Greenwashing Fact Sheet Series

"Greenwashing" is misinformation presented by an organisation in order to mislead others about the environmental impact of its current or future activities.

Globally, the aviation industry plans to triple in size by 2050. If this happens, we could see aviation fuel consumption and therefore greenhouse gas (GHG) emissions double by 2050. Governments, lobbied by the industry, use unrealistic distracting promises of technological solutions to greenwash this growth. They also use economic growth and job arguments to justify subsidies and tax breaks for airports, airlines, manufacturers and fossil fuel companies. In this series of Fact Sheets, we examine these claims and debunk common myths and misconceptions.

Fact Sheet 3 - Hydrogen Flight

There are plans to use hydrogen as a power source for aircraft instead of kerosene. It could either be burned in a jet engine or used to feed a fuel cell to generate electricity to power a propeller. It is produced from other energy sources, has a significant energy loss during the process and is usually stored in liquid form at −253 °C.

WHAT THE AVIATION INDUSTRY TELLS YOU

Happening soon
New aircraft propelled by hydrogen could enter into service by 2035.

Zero emissions
When burned or used in a fuel cell, hydrogen does not produce any CO_2, only water.

Government support required
Public money is needed for funding for hydrogen aircraft development and to subsidise hydrogen production.

WHAT THEY ***DON'T*** TELL YOU

Too late
If it happens, it will come much too late to tackle the climate emergency.

Not for medium and long-haul flights
Hydrogen will not be viable for medium and long-haul flights before 2050. Until then, only the regional and short-haul market should be targeted, a large part of which can be substituted by road or rail.

Not zero emissions
Hydrogen-powered aircraft will not have zero emissions, even if hydrogen is produced from renewable electricity, because it will still emit NO_x and generate contrail cirrus that have a higher climate impact than CO_2 today.

Huge energy consumption
The deployment of "green" hydrogen in aviation would require huge quantities of renewable electricity, which would deprive other sectors needing to decarbonise.

Success not assured
Hydrogen-powered aircraft exist only on paper. Before it becomes a reality, many problems must be solved, especially in the field of safety, and new technologies must be developed.

Financial support from governments means taxpayers pay
...most of whom never fly.

Airbus studied hydrogen aircraft in the 2000s but shelved their plans in 2010 due to technical issues[1] that are yet to be resolved. In 2020, they then announced their intention to restart development of new hydrogen aircraft that could enter into service in 2035. They are studying four concept aircraft and will select one by 2025[2,3]. Other manufacturers are also developing small hydrogen aircraft that may be certified in the 2020s.

HYDROGEN AIRCRAFT UNABLE TO MEET CLIMATE TARGETS IN TIME AND QUANTITY

Even if the aggressive schedule announced by Airbus in 2020 is met, it will be too late for the climate. According to the United Nations Environment Program (UNEP), worldwide GHG emissions must be reduced by 55% by 2030 and 90% by 2050 in order to not exceed the globally agreed 1.5°C heating limit[4]. The design of a whole range of aircraft and the conversion of the fleet to hydrogen would start too late and take too long to meet this goal. Aircraft have a typical lifetime of 25 years.

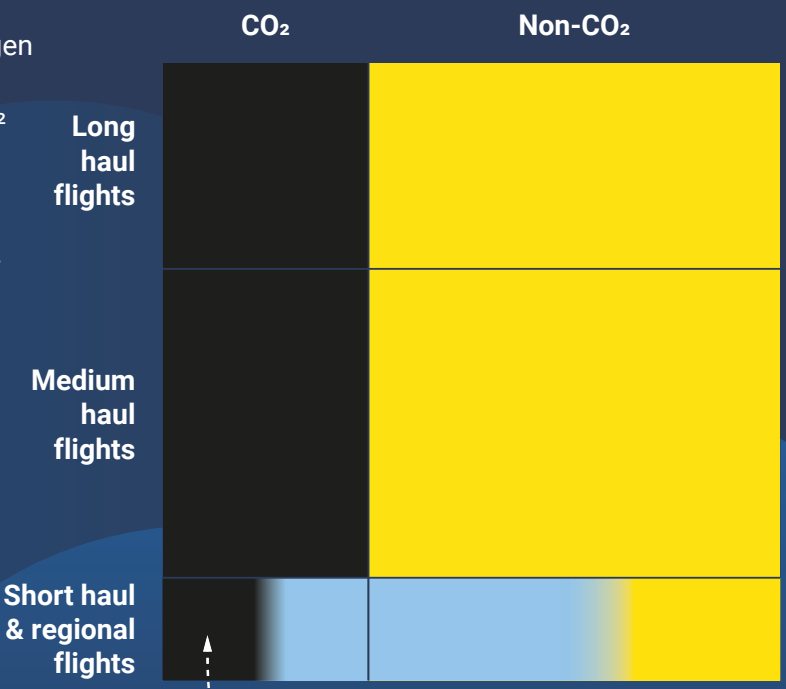
According to a report produced by the European Commission (EC) in collaboration with key industry partners, hydrogen would be best suited for regional and short- to medium-haul flights. For long-haul flights, which contribute about one third of aviation emissions, hydrogen would not economically compete with synthetic fuels before 2050[5]. By then, for that segment, the industry plans to rely upon alternative jet fuels (biofuels and e-fuels - see Fact Sheets 4 and 5). More recently, Airbus stated that a medium-haul aircraft would not be available before 2050, so, before that time hydrogen could potentially displace less than 20% of CO_2 emissions[6].

Hydrogen's potential to mitigate the climate impact of aviation is less than 10% of its total impact by 2050

stay-grounded.org

STAY GROUNDED

The technical challenge of designing and building hydrogen-powered aircraft, of meeting safety requirements and of supplying hydrogen both to planes and to airports makes it highly improbable that we will see hydrogen-powered medium and long haul flights before 2050. On the shorter flights where hydrogen might be used, CO_2 emissions would not be fully reduced until all the hydrogen was sourced from 100% renewable electricity. And the non-CO_2 impacts would only be partially addressed, as hydrogen-powered engines would still emit NO_x and produce contrails.



Sources:
Stay Grounded (2020):
https://bit.ly/factsheetClimateImpact

CleanSky2&FCH (2020):
https://bit.ly/report-hydrogen

HYDROGEN WOULD STILL HAVE SIGNIFICANT NON-CO_2 IMPACTS

The EC report takes into account the CO_2 as well as the non-CO_2 impact of aviation on climate, NO_x, water vapour and contrails, considering that the total impact is 3.1 times that of CO_2 alone (see also Fact Sheet on non-CO_2)[7]. It estimates that the total climate impact could be reduced by only 50-75% versus kerosene if hydrogen is burned in turbines and 75-90% if it is used in fuel cells. But this is still highly hypothetical.

PRODUCING GREEN HYDROGEN WOULD REQUIRE HUGE RENEWABLE ELECTRICITY RESOURCES

Hydrogen aircraft are part of a new economy of hydrogen aiming at replacing fossil fuels where electricity is not a possible alternative.
In order to be "carbon-free", hydrogen needs to be produced with renewable electricity (green hydrogen > see infobox).

The challenge is that the energy requirements are huge and will exceed production capacities needed to:

- Replace coal and gas in power plants that supply the electric grid
- Help satisfy new demand for electricity (cars, heating, data, etc.)
- Replace today's grey hydrogen (produced from fossil fuels) used for industrial processes (e.g. fertiliser production)
- Satisfy new demand for hydrogen for trucks, ships...
- Satisfy new demand for hydrogen for production of e-fuels for aviation

In a scenario where 40% of the airline fleet would be converted to liquid hydrogen in 2050 and the rest of the fleet would use e-fuels, the resulting electricity demand would be equal to the current total worldwide electricity production and about four times the production of renewable electricity in 2018[8]. As demand for electricity grows so does the risk that renewable electricity supply will not be able to match it, which will increase the risk of using non-renewable power.

FINANCIAL SUPPORT FROM GOVERNMENTS IS UNJUSTIFIED: THE POLLUTER SHOULD PAY

Airbus says "*support from governments will be key to meet their ambitious objectives with increased funding for research and technology, digitalisation and mechanisms that encourage the use of sustainable fuels and accelerate the renewal of aircraft fleets*"[9].

However: given that most taxpayers rarely or never fly[10] it would be unfair for them to subsidise research and development, particularly as the commercial success of hydrogen is uncertain; timescales are lengthy; and any significant deployment of hydrogen aircraft would be a waste of limited renewable energy resources.

GREY, BLUE AND GREEN HYDROGEN

This colour code refers to different production methods:

- **Grey Hydrogen = produced from methane or coal (both fossil fuels)**
- **Blue Hydrogen = Grey Hydrogen combined with Carbon Capture & Storage (CCS)**
- **Green Hydrogen = produced (via electrolysis) from water via renewable electricity**

In 2018, the vast majority of the hydrogen production was "grey", accounting for 2% of total global CO_2 emissions. Only 0.5% of the production was "green", and a tiny amount was "blue"[11]. "Blue" hydrogen is unproven at scale, and ultimately still involves the use of fossil fuel and may produce more carbon emissions than simply using "grey" hydrogen[12].

Today, hydrogen is mostly used by industry, for oil refining and for producing ammonia fertilisers. But many sectors, including aviation, are exploring its potential to support clean energy transitions and a new hydrogen economy is being projected.

As new uses for hydrogen develop, there is a major concern that the oil and gas sector will continue with business as usual in order to fulfill new hydrogen demand by extracting it from fossil hydrocarbons, rather than leaving it in the ground.

SUCCESS IS FAR FROM ASSURED

Hydrogen flight is unproven, with many technical and safety aspects yet to be understood. There is some skepticism even within the aviation industry. Boeing is not following Airbus[13] and engine manufacturers have expressed reservations[14]. Even Airbus have admitted that hydrogen will not be widely used in planes before 2050, stating that only regional 50-100 seaters would be ready for hydrogen in the 2030s, a small market with a small share of current CO_2 emissions[15]. If airlines transition to using a large amount of such aircraft, this will substantially affect their operations and the design of airport infrastructure (e.g. runways, gates, terminals, fuelling and maintenance requirements). It would therefore be sensible to halt aviation expansion plans until we know to what extent hydrogen aircraft will be used.

While the development of new technologies and fuels may be helpful, it cannot be an excuse to delay emissions reductions that are needed NOW to mitigate the climate crisis. The only way to effectively reduce aviation emissions is to reduce air travel. To achieve this, we need effective regulations to limit air traffic.

In our Degrowth of Aviation[16] report, we lay out how a set of measures could lead to a just reduction of aviation. In our Just Transition[17] paper, we present the idea of how a conversion of the aviation industry can guarantee security for the livelihood of workers.

END NOTES & LITERATURE

[1] BBC News (2010): https://bit.ly/bbc-hydrogen
[2] Airbus (2020): https://bit.ly/airbus-zero
[3] Airbus (2020): https://bit.ly/AirbusPod
[4] UNEP (2019): https://bit.ly/UNEP-EmissionGap, p. 15
[5] CleanSky2&FCH (2020): https://bit.ly/report-hydrogen
[6] Reuters (2021): https://bit.ly/hydrogen-limits
[7] Stay Grounded (2020): https://bit.ly/factsheetClimateImpact
[8] CleanSky2&FCH (2020): https://bit.ly/report-hydrogen
[9] Airbus (2020): https://bit.ly/airbus-zero
[10] Gössling, S. et al. (2020): https://bit.ly/Goessling-Global-Aviation
[11] IEA (2021): https://bit.ly/IEA-hydrogen
[12] Howarth, R. et al (2021): https://bit.ly/3AZRyqi
[13] Simple flying (2021): https://bit.ly/Boeing-NoHydrogen
[14] France TV (2020): https://bit.ly/interview-petitcolin
[15] Reuters (2021): https://bit.ly/hydrogen-limits
[16] Stay Grounded (2019): http://bit.ly/DegAvR
[17] Stay Grounded (2021): https://bit.ly/JustTransitionAviation

Neustiftgasse 36
1070 Vienna, Austria
www.stay-grounded.org
info@stay-grounded.org

For donations please visit:
stay-grounded.org/donation/

STAY GROUNDED