

Charting a Better Flightpath: US Government Policy to Build the Clean Aviation Industry of the Future

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Good morning, Senators. My name is Brad Schallert. I am the Director of Carbon Market Governance and Aviation at World Wildlife Fund (WWF). Thank you for the opportunity to testify on the topic of aviation's impact on climate change, what this industry can and should do to reduce carbon emissions, and steps the US government can take to make sure that the flightpath of the aviation industry going forward helps us all arrive at a safe climate future.

I've worked on the issue of aviation and climate change at WWF for more than seven years. WWF's work on aviation has largely been to advocate for ambitious policies that help the sector reduce its carbon footprint. We do so at the global level, including through the UN, and at national levels in various countries, including the United States.

Background on aviation emissions and impact of the coronavirus on the sector

Prior to the impacts of the coronavirus pandemic, aviation represented 2% of US domestic carbon emissions and 10% of overall US transportation emissions. That may not seem like a lot, but if we are to consider the full impact of aviation on the climate, we need to count the special chemistry of aircraft burning jet fuel in the upper atmosphere, which creates additional level warming and at least doubles the industry's climate impact. These are often referred to as "non-CO2 effects". All industries need to make significant reductions in their emissions, given that the Intergovernmental Panel on Climate Change (IPCC) says that globally we need to reach net zero emissions by midcentury. Given long-term emissions growth projections for the sector, aviation could end up taking a quarter of the remaining carbon budget available to us if we are to keep warming below 1.5 degrees Celsius—the level that helps us avoid the worst impacts of climate change including the near total collapse of key ecosystems.

At the moment, airlines are mostly in the news because of the historic drop in air travel as a result of the coronavirus pandemic. As a consequence, emissions from the industry are down too, temporarily. Aviation industry modelers have examined various scenarios for air travel demand recovery. A key question is whether there will be significant structural changes to the industry to the extent that the growth of aviation after the recovery is slower than it would have been before Covid-19. (See Figure 1.) But in the grand scheme of things, industry experts anticipate long-term growth trends like what they did prior to the coronavirus pandemic. This underscores that we still desperately need ambitious government policies to help transform the aviation industry to emit dramatically fewer greenhouse gases.

Exhibit 2 | Five Demand Recovery Scenarios in a Highly Uncertain Future



Figure 1: These analyses represent only potential scenarios for air travel demand recovery, based on discrete data from one point in time. They should not be interpreted as forecasts. The analysis was prepared in March 2020; therefore, the likelihoods and recovery timeframes are not current. Nonetheless, the scenarios provide illustrative examples of how recovery of the airlines industry might occur and the drivers for such recovery scenarios. *Source: Boston Consulting Group: <https://www.bcg.com/publications/2020/post-covid-airline-industry-strategy.aspx>.*

A US Government policy framework to address aviation's climate impact

A comprehensive climate plan for US aviation would start with setting both near-term and long-term compliance caps on emissions for US aeroplane operators. A credible near-term target would be a 30% reduction from 2019 levels by 2035; by 2050, aviation would have to reach net zero greenhouse gas emissions (GHGs). Being net zero implies that aeroplane operators would either have to completely eliminate GHGs from their operations by 2050 or reduce their emissions to very low levels and then compensate for the remaining emissions by removing carbon from the atmosphere through biological (e.g. ecosystem restoration such as reforestation) or technological methods (e.g. directly capturing carbon from the atmosphere and storing it permanently). To meet these targets, there are four essential mitigation levers: (1) fuel efficiency; (2) shifting to other modes of transportation; (3) sustainable aviation fuels; and (4) removing carbon from the atmosphere. This testimony also considers how the US Government could approach curbing non-CO₂ climate effects. The US should also consider how to use its diplomatic resources to conduct international relations with other countries in fora such as the UN International Civil Aviation Organization (ICAO) to address emissions from aviation outside of the US. Discussion of this is not included within this testimony.

Efficiency:

The aviation industry has four main strategies by which to improve fuel efficiency: (1) replacing older aircraft with more fuel-efficient models; (2) improving operations to carry more passengers and/or freight per flight; (3) flying more directly to destinations; and (4) finding optimal flight paths and avoiding congestion near airports through advanced air traffic management.

Research and modelling show that the aviation industry could achieve up to 2.5% year on year CO₂ efficiency improvements, especially if enabled by CO₂ efficiency standards for aircraft, research & development funding for breakthrough aircraft designs, and other efficiency policies.

Shifting to other modes of transportation

Policies that give less energy intensive transportation options will decrease aviation climate emissions. These efforts could include support to modernize the US rail system, including providing grant funding for updates to America's rail infrastructure.

Sustainable aviation fuels

For the foreseeable future, aircraft will rely on liquid fuels for long-distance flights. Beyond fuel efficiency and flying less, the largest potential emission reduction opportunity is likely to be sustainable aviation fuels. For a fuel to be cleaner, it must have lower lifecycle emissions than conventional jet fuel. Alternative liquid fuels can come from a variety of diverse and sustainable feedstocks: they can be bio-based, originate from waste streams, and—most promising on a large scale—"power-to-liquid" (PtL) synthetic fuels which can be made from renewable electricity, water and carbon dioxide. As an alternative to liquid fuel, hybrid or fully electric planes may service short- and medium-haul flight routes at scale in the coming decade or two, if national governments like the United States Government provide meaningful policy incentives

These sustainable fuels are essential, but they are more expensive fossil jet fuel. To incentivize uptake of sustainable aviation fuels in the United States, we would benefit from adopting policies like a national low carbon fuel standard. To build a large and long-overdue supply of ultralow carbon fuels, Congress should pass additional subsidies and appropriate R&D funding for this

purpose, providing enhanced incentives. In this instance, ultra-low carbon fuels can be defined as having at least 60% lower lifecycle emissions than fossil jet fuel. Beyond emissions reductions, for sustainable aviation fuels to be truly sustainable they must also meet additional sustainability criteria to ensure that the production of these fuels is not exacerbating other environmental and social issues.

Carbon removal

To reach net zero emissions for aviation in 2050, carbon dioxide removal techniques that sequester carbon permanently without other adverse effects on the environment and people, will have to be part of the equation, for two reasons.

First, to achieve deep decarbonization in the aviation industry, “power-to-liquid fuels” will probably have to be a notable portion of the fuel mix by 2050. Additionally, to get the full carbon benefit of these fuels, they must be made with 100% renewable electricity and source carbon dioxide from direct air capture (DAC) systems.

Second, the aviation industry—or potentially government on behalf of the aviation industry—will need to use direct air capture systems or natural ecosystem restoration and soil carbon sequestration efforts to compensate for any residual emissions coming from their operations. The recent report from the House Select Committee on the Climate Crisis has provided a good summary of the overall policy response needed to develop a robust industry doing direct air capture: “To jumpstart a direct air capture industry in the United States, Congress should dramatically increase federal investment in carbon removal research and development; improve financial incentives for direct air capture technology; expand demonstration projects to safely store carbon below ground; and create markets for fuels made from carbon captured from the atmosphere.”

Non-CO₂ effect mitigation

While aviation’s impact on Earth’s climate is often referenced in terms of its CO₂ emissions, studies indicate that burning jet fuel at altitude induces warming beyond the greenhouse gas effect of CO₂. The science of aviation-related contrail formation and how it affects the climate is still evolving, though studies indicate that more than half of the aviation industry’s actual effect on climate may be due to non-CO₂ climate forcers. Policies that focus only on CO₂ released by aircraft are insufficient to align the industry with the Paris Agreement’s temperature goals, and therefore it is necessary to fully examine non-CO₂ effects to allow their incorporation in climate policies.

A technical working paper submitted by the International Coalition for Sustainable Aviation to the 40th Assembly of the UN International Civil Aviation Organization best summarizes mitigation approaches to address non-CO₂ effects from aviation:

While there are ways that non-CO₂ effects can be reduced, there are significant challenges. Mitigation measures for non-CO₂ effects include lowering cruise altitudes, restricting access to “climate-sensitive” airspace, or otherwise optimizing flight trajectory. Optimizing these actions (e.g., model-informed flight routes) to minimize the overall climate warming impact of the flight would benefit from funding for additional research. Aeroplane operators using PtL fuels could potentially reduce

their non-CO₂ effects as well. A 50% PtL fuel blend is estimated to reduce contrail formation (a key non-CO₂ forcer) by around 20%.

Given the complexity of non-CO₂ effect mitigation, the US Government should dedicate funding to explore how to set policies that would address non-CO₂, with a focus on how to be optimize flight trajectories to avoid “climate sensitive” airspace.

[A near term policy opportunity for Congress](#)

To date, the US Government has done very little to incentivize emissions reductions from US aviation, considering how significant the emissions reductions need to be for the sector in the US as well as globally. In the near term, however, Congress may have an opportunity to start making up for lost time: While the airlines have already received emergency support from Congress under the CARES Act, if the coronavirus pandemic continues to disrupt air travel, airlines may come back to the table for additional aid.

If Congress is going to use public funds to reboot the aviation industry, it should do so in a way that also works well for the aviation customer, the aviation worker, *and* the climate health of this and future generations. Federal financial assistance to the industry should come with conditions that protect the health of aviation workers and make sure they are able to support their families through this crisis. We also need to build back a better and cleaner industry and not spend taxpayer dollars in a way that would lock in unsustainable levels of climate emissions from the sector. Many European governments are pivoting from the coronavirus crisis to rebuild aviation in a way that lines up with their national level climate goals and their economy. The US Government should not sit on the sidelines and lose the opportunity to innovate in this sector and create the jobs required to get us there.

The US aviation sector needs to get on a sustainable flightpath now, because the climate crisis is not going away. Left unaddressed, we can expect major storms cloud ahead.

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