

DESIGN FOR  
PLANET

Design  
Council



ZEROAVIA

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Design for Planet is Design Council’s ambitious new approach to galvanise and support the UK’s 1.69 million-strong design community to address the climate crisis.

This strategic shift recognises the fundamental need to redesign our lives to save our planet, and champions the power and responsibility of designers to shape a better world.

Our Design for Planet case studies will showcase ten leaders in sustainable design from a diverse range of disciplines. They will explore the role of design as a powerful agent of change through sustainability and climate-action. We want these case studies to inspire and motivate the design community to prioritise the welfare of the planet in their own work and practises.

# ZEROAVIA

Sustainable aviation pioneers, ZeroAvia, are on a mission to speed up the world's transition to zero-emissions flight. The London and California based company have designed a new aircraft propelled by electricity from hydrogen, instead of fossil fuels, reducing short haul emissions by 95%. It completed the world's first hydrogen powered flight of a commercial grade aircraft last year – and expects its engines to be commercially available by 2024. Julian Renz, Head of Programmes at ZeroAvia, explains how innovative design has been crucial to the company's success and given wings to its vision of providing hydrogen-electric powered planes commercially.

## **Can you tell us how you came up with the idea for a hydrogen powered engine?**

When we started ZeroAvia three years ago we asked ourselves the question what can we do from a technology perspective to change emissions? The climate change impact of aviation is somewhere between five and 10%. Aviation growth grows with GDP, so as the economy is expected to grow worldwide so will aviation emissions. The only agreed solution so far is carbon offsetting, which is really a market-based mechanism, not a design-based one. We wanted to tackle the real bottleneck for sustainable aviation which is the propulsion system where you combust jet fuel. We asked ourselves what can we change so you no longer have to combust jet fuel?

The quick answer is to electrify the system just like with cars. Then the question is, where do you get the electricity from? Batteries are very heavy and heavy is not great in aviation. Therefore, we use hydrogen to generate the electricity which runs the motor. For the pilot nothing changes – he or she still uses the same throttle and the plane still flies the same way. The only thing that changes is what actually spins the propeller.

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**You've also designed a new business model to incentivise uptake of your hydrogen powered engine. Can you tell us more?**

Yes, like the existing pay-by-the-hour engine sale model, we don't sell just the engine to the airline, the airline actually pays us for every hour of operation of the engine, which incentivises us to build a very long-lasting engine. That's fairly commonplace in aviation but we're also including the fuel to further incentivise switching. Including fuel in that offer as well is quite innovative – it's not something that's traditionally done in aviation. But we do it because obviously the first question that we get from airlines is: "where exactly am I going to get the hydrogen from?" It's our job to offer that part of the ecosystem as well.

**Do you think you will face other challenges in getting people to shift from a standard engine?**

In about two years' time, we're going to start the certification process. Certification is a hurdle in itself because nobody has ever certified a hydrogen electric engine for air travel before. We think what we offer is both a greener solution, and has the potential to become cheaper over time than traditional jet engines. Just like an electric car, the maintenance of an electric system is much lower than a combustion engine system because you have less thermal cycling. Over time, as hydrogen gets cheaper for everyone using it, you can also get to a point where hydrogen will actually be cheaper than jet fuel. Once you get to that point it's not only greener; it's just a better solution. Fundamentally, that's quite exciting.





**Does this mean that we'll be able to fly guilt free in the future?**

That's very difficult to answer! Aviation brings a lot of benefits to the world and connects people, but you need to design the innovations that are required to get flying to net zero across every step of the chain. Hydrogen electricity is by no means the only solution.

You can also think about why do you even have to fly long haul? Maybe a zoom meeting is good enough. If you have to fly long haul, do you have to fly directly? Or can you fly via several short hops, and then each short hops, so that then each-short haul flight can be zero emissions?

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