PRESS RELEASE

Zero-carbon emission flights to anywhere in the world possible with just one stop

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- Aerospace Technology Institute (ATI) unveils liquid hydrogen-powered aircraft concept capable of carrying 279 passengers to San Francisco non-stop or Auckland with one stop.
- ATI-led FlyZero project forecasts highly-efficient hydrogen-powered aircraft to have superior operating economics compared to conventional aircraft from the mid-2030s onwards.
- Quotes from Business Secretary Kwasi Kwarteng, Transport Secretary Grant Shapps, Jet Zero Council CEO Emma Gilthorpe, and FlyZero project director Chris Gear below.

Passengers could one day fly anywhere in the world with no carbon emissions and just one stop on board a concept aircraft unveiled by the Aerospace Technology Institute (ATI) today.

Up to 279 passengers could fly between London and San Francisco, USA direct or Auckland, New Zealand with just one stop with the same speed and comfort as today's aircraft, revolutionising the future of air travel.

Developed by a team of aerospace and aviation experts from across the UK collaborating on the government backed FlyZero project, the concept demonstrates the huge potential of green liquid hydrogen for air travel not just regionally or in short haul flight but for global connectivity. Liquid hydrogen is a lightweight fuel, which has three times the energy of kerosene and sixty times the energy of batteries per kilogramme [1] and emits no CO2 when burned.

Realising a larger, longer range aircraft also allows the concentration of new infrastructure to fewer international airports accelerating the rollout of a global network of zero-carbon emission flights and tackling emissions from long haul flights.

FlyZero project director Chris Gear said: "At a time of global focus on tackling climate change our midsize concept sets out a truly revolutionary vision for the future of global air travel keeping families, businesses and nations connected without the carbon footprint.

"This new dawn for aviation brings with it real opportunities for the UK aerospace sector to secure market share, highly skilled jobs and inward investment while helping to meet the UK's commitments to fight climate change."

Big technological challenges exist to realise green liquid hydrogen-powered flight but there is a growing incentive and reward involved in resolving these. And with other sectors also moving towards hydrogen energy, an increased demand is expected to lead to lower supply costs. A new generation of highly efficient hydrogen-powered aircraft with low fuel costs is forecast to have superior operating economics than conventional aircraft from the mid-2030s onwards [2].

Through the development of concept aircraft FlyZero has identified the on board technologies which, together with the infrastructure and ground equipment for refuelling, require rapid development to deliver zero-carbon emission flight. These advanced technologies include wings without fuel tanks (dry wings), hydrogen tanks, cryogenic fuel systems, fuel cells and electrical power systems and hydrogen gas turbines.

In early 2022, detailed findings from the FlyZero project will be published including three final aircraft concepts (regional, narrowbody and midsize), technology roadmaps, market and economic reports and a sustainability assessment. These outputs will help shape the future of global aviation with the intention of gearing up the UK to stand at the forefront of sustainable flight in design, manufacture, technology and skills for years to come.

Business Secretary Kwasi Kwarteng said:

“These designs could define the future of aerospace and aviation. By working with industry, we are showing that truly carbon free flight could be possible, with hydrogen a front runner to replace conventional fossil fuels.

“Fuelling planes sustainably will enable the public to travel as we do now, but in a way that doesn’t damage the planet. It will not only help us to end our contribution to climate change, but also represents a huge industrial opportunity for the UK.”

Transport Secretary Grant Shapps said:
“As we build back greener, it’s crucial that we place sustainability at the heart of the aviation industry’s recovery from Covid-19.

“This pioneering design for a liquid hydrogen-powered aircraft, led by a British organisation, brings us one step closer to a future where people can continue to travel and connect, but without the carbon footprint.

“I look forward to continuing to work closely with the Jet Zero Council to support the UK’s world-leading research in this sector, which will create green jobs, help us meet our ambitious net zero targets and lead the global transition to net zero aviation.”

Jet Zero Council CEO Emma Gilthorpe said:
“The Aerospace Technology Institute’s pioneering research highlights the potential for hydrogen in realising zero-carbon global connectivity. This ground-breaking green technology looks set to play a critical role in decarbonising flight and through the work of the Jet Zero Council, the UK aviation sector is exploring all avenues to ensure we protect the benefits of flying for future generations, while cutting the carbon cost.”

FlyZero midsize aircraft concept

ATI FlyZero's midsize aircraft concept demonstrates a zero-carbon emission aircraft capable of carrying up to 279 passengers globally in just one stop is possible, and with the same speed and comfort as today's aircraft.

With a range of 5250NM, destinations including San Francisco (4664NM), Delhi (3642NM), Beijing (4414NM), Vancouver (4105NM), Mexico City (4815NM) and Rio De Janeiro (4983NM) are within reach from London. Destinations including Auckland (9911NM), Sydney (9188NM) and Honolulu (6289NM) are in reach with just one stop.

Powered by liquid hydrogen, the fuel is stored in cryogenic fuel tanks at around minus 250 degrees Celsius in the aft fuselage and two smaller 'cheek' tanks along the forward fuselage. These cheek tanks also serve to keep the aircraft balanced as the fuel burns off and eliminate the need for any additional aerodynamic structures.

The aircraft's 54-metre wingspan carries two turbofan engines powered by hydrogen combustion.

FlyZero's midsize concept would meet the demands of a unique sector of the market between single aisle and widebody aircraft operations which together account for 93% of aviation's carbon emissions [3].

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Notes to editors

About the Aerospace Technology Institute

The Aerospace Technology Institute (ATI) is at the heart of UK aerospace R&T. Working collaboratively across the UK aerospace sector and beyond, the Institute sets the national technology strategy to reflect the sector's vision and ambition, supporting a range of advanced technologies with the aim of reducing aviation's environmental impact. The ATI Programme is a joint government and industry commitment to invest £3.9 billion in research to 2026. In addition to the ATI Programme and FlyZero, the Institute also supports the supply chain through NATEP.

About FlyZero

Led by the ATI and backed by the UK Government, FlyZero is a one-of-a-kind research project aiming to realise zero-carbon emission commercial aviation by the end of the decade. The intensive 12-month strategic research programme is bringing experts together from across the UK to conduct a detailed and holistic study of the design challenges, manufacturing demands, operational requirements and market opportunity of potential zero-carbon emission aircraft concepts.

FlyZero will shape the future of global aviation with the intention of gearing up the UK to stand at the forefront of sustainable flight in design, manufacture, technology and skills for years to come.

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References

1 – *ATI FlyZero (September 2021), Primary energy source comparison and selection, September 2021 https://www.ati.org.uk/wp-content/uploads/2021/10/FZ_0_6.1-Primary-Energy-Source-Comparison-and-Selection-FINAL-230921.pdf*

2 – Based on conventional aircraft operating on a taxed blend of Kerosene and SAF with tax removed when operating with 100% SAF and accounting for a 20% improvement in fuel efficiency of new aircraft.

3 - *ICCT (October 2020) CO2 emissions from commercial aviation 2013, 2018, and 2019 https://theicct.org/sites/default/files/publications/CO2-commercial-aviation-oct2020.pdf*