

HEAVEN PROJECT COMPLETES WORLD'S FIRST PILOTED FLIGHT OF LIQUID HYDROGEN POWERED ELECTRIC AIRCRAFT

- *The hydrogen-electric 'HY4' demonstrator aircraft took off from Maribor, Slovenia, and saw safe and efficient operation throughout multiple flight tests*
- *The aircraft uses liquid hydrogen to power a hydrogen-electric fuel cell system that powered the aircraft for the entire flight*
- *The flight lays the foundation for long-range, emissions-free flight, with liquid hydrogen doubling the range of the HY4 aircraft to 1,500km, compared to using gaseous hydrogen*

Maribor Airport, Slovenia, 7 September 2023 – Project HEAVEN, a European-government-supported consortium assembled to demonstrate the feasibility of using liquid, cryogenic hydrogen in aircraft, today announced it has successfully completed the world's first piloted flight of an electric aircraft powered by liquid hydrogen. The consortium is led by H2FLY and includes the partners Air Liquide, Pipistrel Vertical Solutions, the German Aerospace Center (DLR), EKPO Fuel Cell Technologies, and Fundación Ayesa.

The day consisted of four flights powered by liquid hydrogen as part of the project's flight test campaign, including one flight that lasted for over three hours. The flights were completed with H2FLY's piloted HY4 demonstrator aircraft, fitted with a hydrogen-electric fuel cell propulsion system and cryogenically stored liquid hydrogen that powered the aircraft.

Results of the test flights indicate that using liquid hydrogen in place of gaseous hydrogen will double the maximum range of the HY4 aircraft from 750 km to 1,500 km, marking a critical step towards the delivery of emissions-free, medium- and long-haul commercial flights.

"This achievement marks a watershed moment in the use of hydrogen to power aircraft. Together with our partners, we have demonstrated the viability of liquid hydrogen to support

medium and long-range emissions-free flight,” said Professor Josef Kallo, co-founder of H2FLY.

“We are now looking ahead to scaling up our technology for regional aircraft and other applications, beginning the critical mission of decarbonizing commercial aviation,” he added.

Beside project HEAVEN, the work has been funded by the German Federal Ministry for Economic Affairs and Climate Action (BMWK), the German Federal Ministry for Digital and Transport (BMVD), and The University of Ulm.

Compared with pressurized gaseous hydrogen storage (GH2), the use of liquified, cryogenic hydrogen (LH2) enables significantly lower tank weights and volume, therefore leading to increased aircraft range and useful payload.

Pierre Crespi, Innovation Director at Air Liquide Advanced Technologies says: “Air Liquide is proud to have designed, manufactured and integrated, together with H2FLY, the liquid hydrogen tank that enabled to power the HY4 aircraft. Today’s success demonstrates the full potential of liquid hydrogen for aviation. Liquid hydrogen can be stored onboard and transported. Hydrogen is key to the energy transition and this new step proves that it’s already becoming a reality.”

Dr. Syed Asif Ansar, Head of Department Energy System Integration at the German Aerospace Center (DLR), says: “DLR boasts extensive expertise in electrified aircrafts, with a track record spanning over 15 years. Starting from the inaugural flight of the Antares DLR-H2 in 2009, consistent advancements have been made in fuel cells and their auxiliary systems. This progressive journey culminates in a significant present achievement in aviation history: the utilization of cryogenic liquified hydrogen as fuel storage for a four-seater aircraft powered by fuel cells. Collaborating with H2FLY, AirLiquide and other project members, DLR is actively engaged in projects aimed at propelling the development of CS-23 and CS-25 fuel cell powered aircraft into the next phase.”

Tine Tomažič, head of engineering and programs at Pipistrel, says: “To be a part of this magnificent team has been an honour. At Pipistrel, our aim is to be the pioneer of future flight

and playing a role on the liquid hydrogen tank integration, we, along with all the other partners involved, are able to demonstrate the success of alternative sustainable fuels, ready to power the aircraft of tomorrow.”

With the completion of the flight testing in project HEAVEN, H2FLY will focus on the path to commercialization. In June, H2FLY announced the development of its new H2F-175 fuel cell systems which will be capable of providing their full power range in flight altitudes of up to 27,000 ft, marking an important step on the path from lower altitude viability flight demonstrations to real-world commercial aircraft applications.

In 2024, H2FLY will open its Hydrogen Aviation Center at Stuttgart Airport, co-funded by the Ministry of Transport Baden Württemberg. The Center will become a focal point for the future of Europe’s aviation industry and its hydrogen economy, providing fuel cell aircraft integration facilities and liquid hydrogen infrastructure.



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About HEAVEN

Project HEAVEN is funded by the Fuel Cells and Hydrogen 2 Joint Undertaking (FCH 2 JU) under grant agreement no. 826247. The public-private partnership FCH 2 JU supports research, technology development and demonstration activities in fuel cell and hydrogen energy technologies in Europe. HEAVEN is part of the “Horizon 2020” research and innovation programme funded by the European Union as well as Spain, France, Germany and Slovenia. In addition to H2FLY, the HEAVEN consortium is made up of the following partners: Air Liquide (the designer and supplier of cryogenic tanks), Pipistrel Vertical Solutions d.o.o., a Textron Inc. (NYSE: TXT) company (which supports the integration and testing of the tank), the DLR German Aerospace Center (which supports the operation and testing of the high-performance fuel cell and system architectures), EKPO (which works on the fuel cell stack) and Fundación Ayesa (which is responsible for the cost analysis).

About Pipistrel

In 2020, Pipistrel’s Velis Electro became the world’s first, and currently only, electric aircraft to receive full type-certification from the European Union Aviation Safety Agency (EASA). This achievement followed a series of electric aircraft introductions since the company began research and development of electric propulsion in 2000. Pipistrel’s pioneering work has been recognized through awards from NASA, IDC, and other organizations. The company, which offers a family of gliders and light aircraft with both electric and combustion engines, has delivered more than 2,500 light aircraft worldwide since its founding in 1989 and additionally has both hybrid and electric propulsion models under development. For more information, visit: www.pipistrel-aircraft.com.

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