H2F-175 evo

H2F-175 evo is developing a high-performance fuel cell system with more than 175 kW for operation at high altitude.

Four partners

The consortium led by H2FLY: research and aviation industry, from system development to power electronics.

30 months

From June 2026 to November 2028 the system takes shape: from component design to the performance demonstration on the test bench.

Down to component level

Compressor, humidification, cooling and media routing are redesigned and optimised for weight.

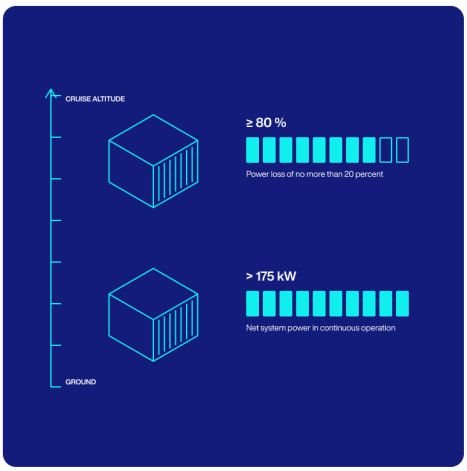
Federally funded

H2F-175 evo is part of the aviation research programme LuFo Klima VII-1.

THE CHALLENGE

For hydrogen-electric propulsion to be used in aircraft, fuel cell systems must become significantly lighter. Today's systems are too heavy for aviation – at the expense of payload and range. Small adjustments are not enough; fundamental advances down to component level are needed. On top of this comes operation at cruise altitude: how LT-PEM fuel cells behave at low ambient pressure has so far been little studied. This limits power, efficiency and service life in flight operation.





THE PROJECT GOAL

H2F-175 evo is developing a highly integrated, weight-optimised fuel cell system for aviation with a net system power of more than 175 kW in continuous operation. To achieve this, the modular architecture and subsystems are optimised and the operating window for pressure, current density and temperature is extended. The second goal is operation at high altitude: power loss at low air pressure is to be limited to a maximum of 20 percent. Two further building blocks complement this: a compact, scalable high-power switching technology and a further development of integrated modular avionics (IMA).

HOW THE CONSORTIUM WORKS

Four partners work together in H2F-175 evo along the chain component – complete system – avionics.

The partners first derive the requirements and redesign key components of the fuel cell system, including compressor, humidification, cooling and media routing. Preliminary tests on single cells, short stacks and an existing system provide the data basis for system control and for operating strategies at low pressure. The new components are verified under aviation-relevant conditions and then integrated into a complete system whose performance is demonstrated on the test bench. In parallel, the power switches are selected, connected to the IMA control and validated in test series.

PARTNERS AND FOCUS AREAS

H2FLY

Development of the highly integrated fuel cell system with weight-optimised components for the anode, cathode and thermal systems and new control concepts, plus verification in tests, including at low ambient pressure

German Aerospace Center (DLR)

Investigation of fuel cell operation under altitude conditions in the altitude chamber and on the UpLift altitude test platform, strategies against degradation at altitude, alternative humidification concepts and catalytic oxidation of the purge gas for greater hydrogen safety

Diehl Aerospace

Development of an IMA-controlled, compact and scalable technology for safely switching the system power: selection of suitable power switches, build of a functional prototype and joint tests with H2FLY on the fuel cell test infrastructure

Fraunhofer IISB

Development of lightweight power electronics for fuel cell systems with high power density: an aviation-grade semiconductor-based high-voltage DC circuit breaker and a bidirectional DC/DC converter between high and low voltage

FUNDING

H2F-175 evo is funded under the seventh national civil aviation research programme Klima (LuFo Klima VII-1, KTF). Grant number 20M2424.

Supported by:

Federal Ministry for Economic Affairs and Energy

on the basis of a decision by the German Bundestag