



HY4

HY4

Zero-emission passenger flights



HY4 – the aircraft

Passenger air travel with low noise, particulate matter or carbon dioxide – emission-free flight – is currently being transformed from a vision to a reality. The HY4 – the world's first four-seater passenger aircraft powered solely by a hydrogen fuel cell system and electric propulsion – marks a milestone on this path. Electric flight with the HY4 is silent, environmentally friendly, has greater range and is safer than its predecessors. Longstanding experience in battery, fuel cell and hydrogen technology research in the aviation and energy sectors make DLR and its partners experts in the fields of 'More Electric Aircraft' (MEA) and 'All Electric Aircraft' (AEA).

Fuel cells can be used in many areas of aviation. Common to all applications is the operation at high altitudes, at low air pressure and at low ambient temperatures. Requirements for safety and reliability are exceptionally stringent. Fuel cell systems are

being developed and investigated at the DLR Institute of Engineering Thermodynamics, in cooperation with partners in industry and research for MEA and AEA. The associated research work has been conducted using DLR basic funding and is also supported by the German National Innovation Programme for Hydrogen and Fuel Cell Technology (NIP).

The experience acquired during the last 10 years of research is now being used to design a hydrogen fuel cell system – the principal source of energy for the HY4. While earlier projects and configurations were only fitted with a pilot's seat, the new HY4 aircraft concept can carry four people. One important detail is the coupling of the low-temperature proton exchange membrane (LTPEM) fuel cell with a high-performance battery, which maximises the reliability and performance of the emission-free propulsion system.

HY4 technical data	
Wingspan	21.36 m
Length	7.4 m
Empty weight (excluding fuel cell, battery and storage system)	approx. 630 kg
Maximum weight	1500 kg
Weight of the power module with fuel tank	approx. 400 kg
Engine output	80 kW
Fuel cell/battery continuous output	45 kW/45 kW (90 kW total)
Battery capacity	approx. 21 kWh at 1°C
Maximum speed	approx. 200 km/h
Cruising speed	145 km/h
Engine output when cruising at 140 km/h	26 kW
Range	750 to 1500 km

HY4 – the vision

With more than 60 regional and international airports, Germany has a well-established, extensive network and the necessary infrastructure for the implementation of the 'electric air taxi' concept. Emission-free aircraft with sustainable electric propulsion technology (hybrid systems based on hydrogen fuel cells and batteries) could be the beginning of a fast and flexible passenger transporta-

tion system and contribute to reducing road congestion as well as encouraging the use of regional airports. The four-passenger HY4 is ideally suited for this due to its sustainable, emission-free propulsion system and 1500-kilometre range. The modular propulsion technology system also enables larger, visionary electrically propelled aircraft with up to 40 seats to be envisaged.

HY4 – the partners

Under the aegis of DLR, several partners have joined forces to make the first fuel cell passenger aircraft a reality:



Hydrogenics, as the global market leader in fuel cell technology, is contributing its knowledge.



Pipistrel, a long-standing partner of DLR, has extensive experience in aircraft construction and electrical components.



Stuttgart Airport has offered to be the home airport of the HY4 and is helping to address issues regarding the integration of electric aircraft into the air traffic system.



The preliminary work conducted for the propulsion technology being used was sponsored by the German National Innovation Programme for Hydrogen and Fuel Cell Technology (NIP).



The University of Ulm is contributing its expertise in power electronics, hybridisation and electrical propulsion technology.

H2FLY

H2Fly will operate the HY4 and will be responsible for the certification process.

Together, the partners make up a strong team with years of experience in emission-free flying, and hence offer the best prospects and high motivation for making the defined goal an achievable reality.

DLR at a glance

DLR is the national aeronautics and space research centre of the Federal Republic of Germany. Its extensive research and development work in aeronautics, space, energy, transport and security is integrated into national and international cooperative ventures. In addition to its own research, as Germany's space agency, DLR has been given responsibility by the federal government for the planning and implementation of the German space programme. DLR is also the umbrella organisation for the nation's largest project management agency.

DLR has approximately 8000 employees at 16 locations in Germany: Cologne (headquarters), Augsburg, Berlin, Bonn, Braunschweig, Bremen, Goettingen, Hamburg, Juelich, Lampoldshausen, Neustrelitz, Oberpfaffenhofen, Stade, Stuttgart, Trauen, and Weilheim. DLR also has offices in Brussels, Paris, Tokyo and Washington D.C.



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