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Abstract

The expected climate changes force the aviation industry to reduce emissions. The fuel cell offers high efficiencies and hydrogen, as the fuel of choice, a much higher energetic value than fossil fuels. The requirements for fuel cell systems on flying platforms comprise low weight, high reliability, and insensitivity to temperature and density changes, in addition to high tilt angles. Fuel cell-powered air vehicles are only competitive where low power and high endurance are required. This is the case for small unmanned vehicles, which are already operated with suitable systems in a considerable number. As proven by prototypes based on motor gliders, manned air vehicles can also be powered only by fuel cells, but the flight performance is poor compared with their internal combustion engine equivalents. In the area of transport aircraft, the use of fuel cells as a primary power source is unrealistic. The technology is hence considered for auxiliary power sources or ground power supply. The type chosen for the recently flown and developed vehicles is almost exclusively the proton exchange membrane fuel cell. For applications in transport aircraft, the solid oxide fuel cell is also considered because of its ability for reforming kerosene, which will still be the fuel for the next decade.