

Why flying cars are no longer a flight of fantasy

Future of transport



Covid has hurt the airline sector but accelerated a revolution in the skies, writes *Harry de Quetteville*

Powered flight has been the stuff of dreams since Icarus, and the stuff of reality since the Wright Brothers took off in 1903 and travelled 120 feet. A mere 66 years later, man was on the moon, 239,000 miles away.

Advances in the half-century since have been modest by comparison, however, and we have not been back to the moon since 1972.

Now, though, air travel might be entering another gravity-defying innovation explosion. The seeds of change are being sown by destruction of business-as-usual. Covid has seen global air passenger traffic collapse, down 91pc in May compared to a year earlier; it is not expected to recover until 2024. Many airlines are not expected to survive to see that.

As the old model is shattered, a host of entrepreneurs are reimagining air travel as we know it.

Air taxis

We have been waiting for flying cars since *The Jetsons* aired in 1962. Now a swarm of them have appeared, championing multiple methods of getting airborne, from fixed wing to drone-like quadcopter. Two of the big names in the sector – Joby and Lilium – have just raised £437m and £178m respectively. Joby's four-seater aircraft opts for six rotors; Lilium's five-seater jet uses 36 motors built into a hinged wing: both are fully electric, and allow Vertical Take off and Landing.

Essentially, these are helicopter replacements. But there are two immediate advantages: on fuel, batteries will lead to savings; on safety,

multiple motors build in redundancy over the helicopter's single rotor, avoiding constant checks. Longer term, autonomy means no pilot, cutting costs still further – down in the near term, companies hope, to £2-£3 per mile. Ultimately, Uber hopes that at scale flying cars can hit less than £1.50 per mile – cheaper even than its shared vehicles on the ground.

As on the ground, Uber will not build those vehicles, instead providing support to developers. No wonder Joby, one of its partners, insists that its vehicles are the mass transportation of the future. And no wonder the biggest single investor in its \$590m (£437m) funding round this year, spending \$394m, was the world's biggest car firm, Toyota, looking perhaps for a bestselling runabout of the 2040s.

But there are still major hurdles. While prototype air taxis look ever more ready, regulation and infrastructure are certainly not.

Nonetheless, a whole industry is emerging to build infrastructure such as landing pads for so-called Urban Air Mobility vehicles. London-based Skyports designs and operates the "vertiports" needed for VTOL electric air taxis. It too has been subject to investment from traditional transport operators – in its case German rail titan Deutsche Bahn.

"Our train stations already connect different modes of public and private transportation," Boris Kuehn, managing director of Deutsche Bahn Digital Ventures, said this month. "We are currently in the process of assessing the feasibility of integrating vertiports in our train stations."

The reality is that developing new

aircraft, even modest city-hoppers, is expensive. Most air-taxi companies are burning through cash. Few will survive, but those that do will be in pole position to capitalise on a huge new market.

Today annual spending on ground-based and helicopter transport is estimated to be worth about \$1.1 trillion. Hyundai, launching its own air taxi division a year ago, suggested UAMs will be worth \$1.5 trillion within 20 years.

Electric dreams

Jet fuel is expensive and contributes to the air industry's reputation as a polluter (estimates suggest the aviation industry accounts for about 2pc of global CO₂ emissions). No wonder small is now beautiful. Even before Covid, airlines were moving away from huge, wide body aircraft towards small, fuel efficient point-to-point planes like the Airbus A321neo and the ill-fated Boeing 737 Max. The huge 747 and Airbus A380 are being mothballed. Increasingly, narrow body aircraft are doing the long haul.

That intense focus on fuel cost and emissions is good news for short-haul electric aircraft. In a standard year, half of the world's 4bn flights are sub-500 mile journeys. Electric motors provide a 75pc reduction in CO₂ emission per passenger kilometre and a 65pc reduction in noise according to Britain's Electric Aviation Group, behind a 70-seat Hybrid Electric Regional Aircraft.

Hybrid gets over batteries' principal problem – weight. In May, a modified Cessna Caravan became the world's biggest all-electric aircraft after completing a 30-minute test. But it can only carry nine passengers. Fuel simply contains far more energy per kilo than batteries. It also disappears as you burn it up, meaning aircraft get lighter. If all-electric short haul is the

goal, hybrids may bridge the gap.

The British start-up Faradair, for example, is developing both a hybrid electric model and an all-electric, which it also hopes will be airborne by 2030. At 18 seats, it is quickly convertible into all-cargo. If Lilium and Uber are working on flying cars, Faradair has been described as “the flying van” – a workhorse of the skies.

Another British company, ZeroAvia, is aiming for all electric, but ditching the batteries. Instead, it deploys a fuel cell, which mixes hydrogen with oxygen to create an electric current. The exhaust is water. ZeroAvia claims its 10-20-seat test planes will become 50-100 seater by the end of the decade.

But ditching jet fuel for electricity brings with it a host of problems. High voltages at altitude carries the risk of fire. One co-project between Airbus, Siemens and Rolls-Royce – the E-Fan X – revealed the need to rethink insulation, cables and switches. “You kind of go, ‘Ah, actually, this is going to be a lot more challenging than we thought,’” Riona Armesmith, chief project engineer for hybrid electric propulsion at Rolls-Royce, told the BBC recently.

Until recently, flying taxis seemed the stuff of rich-kids dreams – fanciful not practical. But many hundreds of millions of dollars are pouring into the sector now. The attractions are obvious – no more traffic jams – even if the regulatory pathway isn't.

As for the air industry, it is struggling to survive. Highly efficient narrow body jets are coming to dominate ever more of the long haul. But most flights are short haul. And that opens up the possibility of electric aircraft, especially those powered by hydrogen fuel-cell technology rather than heavy batteries.

Tomorrow: Part Four in our series. What does the future hold for the freight industry?



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