The Power of 3
Driving the future further
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Electric planes are taking flight

Overview

In October 2018 the UN warned that the rate of climate change is more rapid than expected and that urgent, unprecedented changes are necessary to reduce the risks of extreme heat, drought, floods and poverty globally – including cutting carbon pollution 45% by 2030.

While consensus on the issue is lacking, there's no doubt that aviation is a significant and growing contributor to climate change. Indeed, in 2018 air transport accounted for 2 per cent of man-generated carbon emissions. And, with the number of air passengers expected to almost double by 2036 to 7.8 billion per year, its impact can only increase substantially.

However, says Pacific Standard Magazine, replacing fuel-guzzling planes with electric ones could put a real dent in global emissions:

> *Electric aviation, long stymied by the limitations of battery technology, is finally taking off: battery-powered air taxis, passenger drones, autonomous aircraft, and even passenger planes are all under development by aerospace and aviation companies around the globe."*

But, says wired.com, achieving this aim means designing electric motors with the right power-to-weight ratio to take off and defy gravity once airborne. And, as with electric vehicles before them, both range and power demands are hindering the development of all-electric planes.

"The similarities between commercial airplanes and automobiles are striking. It's all about safe and efficient transportation using the latest technology and the best fuel efficiency."

~ Alan Mulally (former CEO, Boeing & Ford Motor Company)

VTOLs

Electric vertical take-off and landing craft (eVTOLs) that accommodate two to five passengers (or the equivalent weight in cargo) are already in development, with 300+ entities – including NASA, Boeing and Airbus – investing in this sector. Germany's Volocoptor (***issue 10***), for example, has an agreement with Dubai's Roads and Transportation Authority to regularly test autonomous air taxis there.

Meanwhile, work on Uber's 'flying taxi' service (***issue 19***) continues apace. Dallas and Los Angeles will be the first two launch cities, with Japan, France, Brazil, Australia and India being considered for third spot. Although Uber's plan to cram city skies with electric taxis is barely more than nascent, the company has already convened two summits and signed up numerous partners to assist it.

Image courtesy of Uber.

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Airbus E-Fan X hybrid electric flight demonstrator

Short-term

Icy conditions, heavy winds and rugged, mountainous terrain notwithstanding, Norway boasts some of the busiest flight routes in Europe. And, despite being western Europe's largest exporter of oil and gas, its stated aim is that of being 'Powered by nature'. Ergo, Norway plans to lead the way in the market for electric planes, initially with small aircraft on relatively short hops. That said, the country's largest carrier, Norwegian Air, like other major airlines, won't go there until the technology matures and the commercial machines of today are replaced by fully proven electric airliners.

Elsewhere (and part-funded by the UK government), Rolls Royce – the aerospace, power and defence company, not Rolls Royce Motors – is entering the fray as part of the 'Accelerating the Electrification of Flight' (ACCEL) project, a joint venture between it, electric motor manufacturer YASA and aviation company Electroflight. They plan to develop the world's fastest electric aircraft by next year, using the experience to go on and build an electric passenger jet.

Meanwhile, British-based budget airline EasyJet, in partnership with US start-up Wright Electric, has promised a fleet of electric planes to cover short-haul routes as soon as 2030.

Longer-term

Having announced it will cease production of the A380, its 'super-jumbo flying palace' (the second most iconic aircraft to be retired after the Concorde), Airbus has embarked on another ambitious project.

In partnership with Siemens and Rolls Royce (and with financial support from the UK government), Airbus is developing the pioneering Airbus E-Fan X hybrid-electric flight demonstrator, the next step in an electrification journey that began with the all-electric, battery-powered, two-seater E-Fan. Since then Airbus has produced the hybrid E-Fan 1.2, which combined a 60 kW motor with a combustion engine. While these were major achievements in their own right, the steps between each were incremental, whereas the E-Fan X is by comparison a huge leap forward.

Key to that leap are rapid advances in battery and fuel-cell technology. Each of the industry partners will focus on developing certain parts for the E-Fan X, with manufacturing to begin this year. Airbus will be responsible for overall integration of the electric motor into the test aircraft, with ground testing to follow.

Boeing too is developing hybrid-electric aircraft technology for journeys of 500 miles or less and capacity for up to nine passengers, while its venture capital arm, HorizonX, has invested in aerospace and manufacturing start-ups that include Zunum Aero, the latter promising delivery of its first electric aircraft in the early 2020s.

Mid-century

As with the revolutionary Concorde of the 20th century, conceptualised way before the technology caught up, the commercial electric planes plying the skies in years to come are already on the drawing board, many awaiting better battery technology to make them a reality.

And those battery improvements are emerging almost as fast as the aircraft designs themselves. With so many plane and engine manufacturers investing in electric aviation, the goal is to replace conventional systems by 2050, reducing emissions, noise and travel costs in the process.

And finally ...

UK-based Astigan Ltd's A3 High Altitude Pseudo Satellite (HAPS) is bringing map-making into the 21st century. An unmanned solar-powered aircraft, it will fly at an altitude of 67,000 feet (~20,500 metres) – nearly twice the cruising height of a commercial airliner – for up to 90 days, bridging the gap between aerial and satellite surveys for more accurate, higher-resolution map-making and other applications. Using HAPS, existing maps can be updated and geospatial databases created for areas where conventional surveys are unviable. It could even monitor transient events like shifts in the ice caps or oil spills in real time, and benefit areas such as smart cities and autonomous vehicles, which rely on accurate 3D mapping.

Which Perth-based company is developing next-gen battery technology?

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