included transfers of technologies from Ukraine to Saudi Arabia. It was **ultimately cancelled in 2019**, Ukraine's officials citing changes in the plans of its Saudi partners… Meanwhile, according to recent (unconfirmed) press reports, **France would like to pitch its Dassault's Rafale for Ukraine's upcoming fighter jets competition.** The contract is said to be worth €7.5bn and to include up to 42 Western-built aircraft. The US are expected to offer both the F-16 by Lockheed Martin and the twin-engine F/A-18 E/F by Boeing. In any case, Ukraine will have to carefully navigate the coming years to retain both **its autonomy, its homeland security, its defense partnerships, and its valuable aerospace expertise**, a precious source of jobs and foreign currencies….

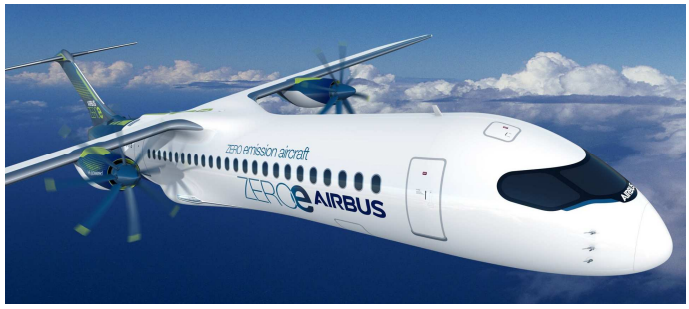
WORLD: Turboprop baby boom?

In the shadow of Airbus, Boeing and Embraer, stand two other global OEM, focusing on commercial turboprop jets: the **Italian-French ATR, and the Canadian De Havilland (DHC),** which brought back the Q400/Dash-8 segment from Bombardier in 2018. Both companies are **specialized in small-medium turbo prop jets**, particularly suited for **regional flights**. De Havilland **Dash 8-400** can carry up to 90 passengers and provides a 2,040km range, while **ATR 42-600 and 72-600** can accommodate up to 46/76 passengers for 1,404km of range. With a lower range and passenger capacity than their turbofan regional counterparts, over which Embraer reigns supreme, **De Havilland and ATR highlight their lower operating cost and versatility**, as they need shorter runways, and can be operated and supported more easily.

While regional aviation was able to recover more quickly from the COVID-19 crisis, especially as domestic flights have started to pick up while international flights remain desperately grounded, the players in the sector suffered severe blows in 2020. **ATR only delivered 10 aircraft in 2020**, a drop by 85% form 68 units in 2019, while securing an additional 6 firm orders, keeping its **backlog at a strong 176 orders**. **DHC delivered an overall 11 aircraft** but its **backlog only adds up to 17 aircraft**. To provide the best response to the troubles ahead, **both companies released in the past weeks documents outlining their corporate strategy to recover from the crisis**.

De Havilland in the first place has faced a bleak number of orders (17) for its Dash 8, of which's production it took over at the end of 2018 from Bombardier, who sold its Q400 commercial aviation program for $250mn to Longview Aviation Capital, the holding company which owns DHC. **The Canadian company subsequently decided to halt the production of its aircraft once its small backlog has rolled out, waiting for the pandemic to pass, and resume manufacturing when demand recovers**, as management remains confident about the **usefulness of the type** in the post pandemic market. Meanwhile, the Toronto-based company will focus on its **customer service network to reduce operating costs,** as well as develop **upgrades for the aircraft, especially regarding cabin features.** Due to its very recent rebirth (although originally founded back in 1928, the company was respawned by the holding Longview Aviation Capital in 2019, to gather all the commercial aviation licenses and projects held in the holding), **DHC has not yet been able to fully benefit from the full synergy potential with other programs from Longview Aviation Capital's portfolio,** but it could soon start to develop successful and sustainable partnerships, helping to mutualize costs and risks, management says.

ATR on the other hand provides a more optimistic outlook thanks to its extensive backlog, and so despite freefalling sales in 2020, the company, of which Leonardo and Airbus each own a half, also announced on Mar. 17th a series of measures it would adopt to improve its resilience to the current aviation crisis. It stands on three pillars. **First is the implementation of incremental improvements**, to reduce operating costs and improve operability. Second is the bet on the **development of regional, short-distance freighters,** like the ATR72 cargo version ATR recently delivered to FedEx. Third is the **expansion of the Short Take Off and Landing variant of the ATR42-600**, which will be able to access airstrips between 800 and 1,000m, giving ATR's customer access to previously unreachable airports. Scott Hamilton and Judson Rollins from *Leeham News* highlight that the **heavy investments in sustainable engines which Airbus is currently undergoing may prove to be a decisive advantage for ATR, as sustainable propulsion systems are likely to become game changers** in the sector of regional commercial aviation, which is more suited for alternative propulsion systems, as it does not require the same level of energy efficiency compared to longer haul flights. The dilemma here is that **Airbus would have reportedly frozen any 90-Seats project** from ATR, waiting for a credible electric-powered alternative to step in as part of its ZeroE initiative.



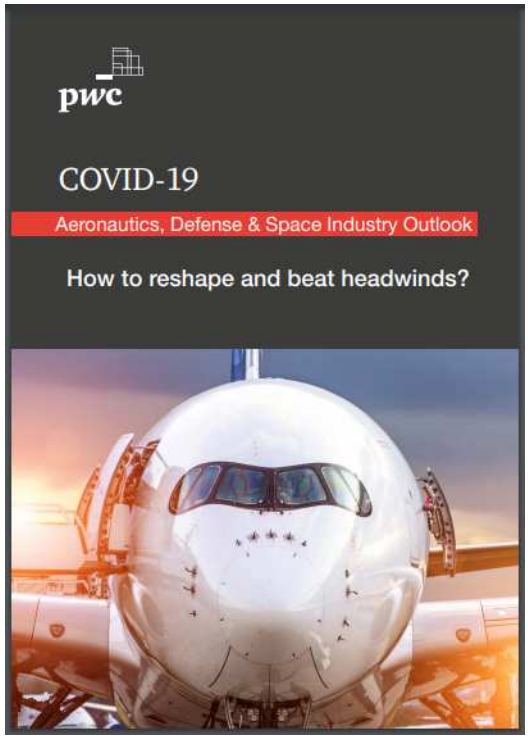
Beside the situation of ATR and DHC, **the market for regional turbo prop commercial jets may be at a turning point**. Indeed, as *Leeham* analysts highlight, **the frames on which ATR and DHC rely date back to +30 years**, as not only are the two aircraft still suitable for the current aviation market, but also because the small size of the market make it **difficult for a company to engage in the development of a brand new airframe from scratch**. However, **two new players are reportedly interested in entering this segment**, which may radically shift the market. **Embraer on the one hand has been known to be looking to develop a new turboprop engine, which would probably be mounted on Embraer's E-jet frame**. According to Aviation Week, "*entry into service for the notionally termed E3 is targeted for 2027, with the provision that follow-on variants could potentially incorporate hybrid-electric propulsion systems*".The Brazilian airframer has yet to **find a partner**,

since the failure of its cooperation with Boeing (cf *The Bulletin #516*). According to **Addison Schonland**, analyst at the consultancy AirInsight, **Saab could be the perfect match**, as the Swedish company as a lot of experience on turboprops, and is already jointly working with Embraer on the F-39E program... However? The right choice of the powerplant (GE? Rolls Royce? Hybrid-Electric?) remains the elephant in the room, Schonland adds. The Chinese **Xi'an Aircraft Industrial corporation (AVIC) has also been developing a regional turbo prop jet called MA700 and which was presented in 2013**. Expected to accommodate up to 85 passengers over 1,700km, its first flight was **scheduled in 2020 and had to be pushed back**. While this new airplane is not expected to bring significant breakthrough technologies on the market, it could still capture an important share of China's domestic regional flights market. Beyond Embraer and AVIC, another turbo prop option comes from the **latest Ilyushin Il-114-300, which performed its maiden flight on Dec. 16th 2020 and is expected to begin deliveries in 2023**. It includes composite material making it more efficient. Demand for the future Russian turbo prop remains uncertain, as Russian airlines, especially Aeroflot who still operate Dash 8-200s, -300s, and -400s do not seem hurried to replace their turbo prop fleet. However, as Addison Schonland points out, both China and Russia are big countries with **huge distances that cannot be train focused**, leaving room for strong regional aircraft demand… Other Finally, let's mention the **Indonesian 19-seat N219 regional turboprop, developed by PTDI and the National Institute of Aeronautics & Space** (LAPAN). It received domestic flight certification in Dec. 2020 and essentially targets the domestic island-hoping market.

In the longer run, turbo prop aviation may become the **first segment to use fully electric powered engines**, as the shorter flights and less energy intensive engines are more suitable to battery capacities. It is likely to **start first on smaller capacity segment, with airplanes up to 20 seats**, with many companies developing all-electric or hybrid aircraft suitable at first for very short distance flights. Among project standing out are **19-passenger electric aircraft from Swedish startup Heart Aerospace called ES-19**, which is expected to be ready by 2026. **Italian manufacturer Tecnam is also developing a similar project where it would convert a 9-seat P2012 piston twin to operate on batteries**, with motor unit provided by Rolls Royce. This project, for which many airlines operating very short flights have already expressed their interest (Heart Aerospace announced letters of interest for a total of 147 aircraft) could cut the bottom of the customer base of larger regional turbo prop companies. Meanwhile, Aviation Wekk also reports that Startup company Universal Hydrogen has partnered with fuel-cell producer Plug Power and electric-motor developer MagniX to develop a 2-megawatt zero-emissions power train for retrofitting into 40-60-seat regional turboprops, beginning with the De Havilland Canada Dash 8-Q300. Experimental flights are expected to begin in 2023, and supplemental type certification and entry into service are due by 2025. In addition to the Dash 8, Universal Hydrogen plans to offer the conversion for the ATR 42 and 72 regional turboprops.

PUBLICATION

"How to reshape and beat head winds?" (PwC- 2020/02/02)



Early last month, the French aerospace & defense practice of the consulting firm PricewaterhouseCoopers (PwC) published a forecast for 2021, discussing how the aerospace industry players could improve their resilience and take opportunity from the sector's crisis to bounce back. Mr. **Matthieu Lemasso**n, Michael Brilhault and Olivier Joffet especially highlight the **need for airlines to improve their agility and proactivity**, as the crisis blurs the sector's perspectives, and players need to be quick on their feet to develop corporate strategies tailored to an unpredictable context.

While the question of the economic impact of the crisis has been extensively discussed, and various recovery scenarios are considered, the report highlights that **the sector's perspectives are hard to read**. To this day, "*Fleet planning processes have shrunk from a 12 to 18-month horizon to less than four weeks in some cases and cost per trip has temporarily replaced cost per seat as a key metric in aircraft deployment decisions*". Passenger demands remains difficult to predict. Asked about future post-pandemic traffic trends, Mr Lemasson forecast the **importance of domestic flights and visits to friends and relatives as the main motive for travel**, while the recovery of international long-haul flights, in which a large share of passengers travel for business-related reason, is difficult to predict, due to **long lasting changing habits from the crisis, especially regarding remote working.** Large and small corporations have realized that expensive business travel was not always a "sine qua non" for efficient international sales and marketing.