# Deutsche Aircraft D328eco

**The Deutsche Aircraft D328eco is a new 38-40 seat turboprop based on the Do328 platform. Now, sustainable aviation fuel (SAF) compatible and economical PW127XT-S engines equate to low cash operating costs and meaningful green credentials. For operators developing new route networks, its size and performance mitigate against risk, meaning the turboprop is good for the balance books.**

The D328eco is a next generation turboprop developed by Deutsche Aircraft, scheduled for entry into service (EIS) in 2026. The aircraft is a stretched and derivative version of the legacy Dornier Do328 33-seat turboprop that was produced from 1991 to 2000. More than 200 were built, including a jet version that totalled 110 units.

The D328eco can be configured to accommodate 38 or 40 passengers, depending on the chosen interior layout. It also features advanced PW127XT-S conventional turboprop engines with better performance and maintenance goals, and a flightdeck designed for potential single pilot operations (SPO).

Operating a stage length of 200nm, the D328eco has lower cash operating costs (COC) than regional jets (RJ). A typical 75-seat turboprop will yield up to a 20% reduction in fuel burn compared to a 75-seat RJ. This benefit increases to 40% in favour of the turboprop, with improvements in new technology.

"There are no small turboprops or RJs with 40 seats currently in production," explains chief commercial officer at Deutsche Aircraft, Nico Buchholz. "The D328eco will have a state-of-the-art cockpit and passenger cabin. The aircraft is good for passengers, the environment and the operator's balance sheet. The small advance aircraft theme will be like when other types such as the 787 and A350 were released to the market. You know what happened to other types when the A220 came along."

Other aircraft in this category size include the Saab 340, Saab 2000, and the Dash 8-100/-200/-300. In 2022 none of these aircraft are being produced despite sizable fleet numbers.

There are about 200 active Saab 340 aircraft and about 28 Saab 2000 aircraft in service. Other aircraft active in this category include the Dash 8-100/-200/-300 family of aircraft totalling about 320 in-service examples.

The ATR 42 has a seating capacity of 40-52 passengers, and is currently manufactured by Airbus and Leonardo S.p.A. The high-wing turboprop is powered by the Pratt and Whitney Canada PW120 family of engines. The ATR 42 has been described by some as the D328eco's closest competitor, despite the aircraft having more seats.

According to Buchholz, profitability can still be achieved earlier with a smaller aircraft. The D328eco's trip cost is estimated to be the lowest of any in-production aircraft, while it mitigates against risk with the lowest breakeven load-factor. With a 38- and 40-seat configuration operators do not need to discount fares to fill seats or cater to declining yields. At 20% bigger, the next-size aircraft increases economic risk.

At 100% load factor, the D328eco can cover 98% of existing turboprop services. 95% of all RJs are operated by aircraft with fewer than 75 seats. The D328eco is therefore an economic alternative.

The D328eco has a maximum cruise speed of 324kTas, translating to a 7.3% increase in speed compared to in-service turboprops; and a 3.8-17.5% higher speed compared to common, out-of-production turboprops that include the Dash 8-300 and Fokker 50.

High altitude and speed mean the D328eco is an ideal replacement for many ageing RJs. The type can also be operated from short runways and perform at lower flight levels (FL).

The original 30-seat Do328 had an excellent reputation for the low level of noise in the passenger cabin that compared favourably to a RJ. It is expected that the contemporary design will inherit the previous aircraft's low noise characteristics.

The D328eco has an operating empty weight (OEW) of 22,377lbs, a maximum zero fuel weight (MZFW) of 31,636lbs, and a maximum take-off weight (MTOW) 34,525lbs *(see table, page 4)*. With a maximum payload of 9,260lbs the D328eco has a range of 400nm. Loaded with 40 passengers weighing 214lbs each, the aircraft will have a range of 560nm.

Operating out of Berlin or London at a load factor of 75%, the aircraft has a 1,150nm range, sufficient to reach most


*With its D328eco program, Deutsche Aircraft is working on an aircraft in the under 40-seat market, that will achieve near carbon neutrality. The aircraft that is scheduled to be certified in 2026 will be able to use 100% H2-SAF (PtL) on top of any other certified sustainable aviation fuel and regular kerosene.*

## D328 TECHNICAL SPECIFICATIONS

| Specification parameter | |
|---|---|
| Operational empty weight (OEW) | 22,377lbs/10,150Kg |
| Maximum zero fuel weight (MZFW) | 31,636lbs/14,350Kg |
| Maximum take off weight (MTOW) | 34,525lbs/15,660Kg |
| Maximum landing weight (MLW) | 33,420lbs/15,160Kg |
| Maximum payload at typical OEW | 9,260lbs/4,200Kg |
| Fuel capacity (fuel density 0.80 kg/l) | 7,970lbs/3,615Kg |
| **Fuel Consumpton** | |
| 200nm block fuel (40 passengers) | 1,089lbs/494Kg |
| 300nm block fuel (40 passengers) | 1,468lbs/666Kg |
| 500nm block fule (40 passengers) | 2,237lbs/1,015Kg |
| Maximium cruise speed | 600 km/h/324 kTas |

parts of Europe. The aircraft is suited to point to point (P-to-P) routes and can also be operated on feeder-networks.

The ability to operate above 25,000 feet is unique among all in-production turboprops. The D328eco has a 30,000 ft high-altitude capability that improves access to shorter routings and reduces trip energy requirements. Further reduction of energy consumption compared to lower-level operations yields an extra 4-8% in fuel savings.

Deutsche Aircraft will also update the flightdeck avionics, making it ready for a possible transition into SOP. The cockpit design reduces pilot workload and increases efficiency.

## PW127XT-S

Deutsche Aircraft selected the PW127XT-S to power the D328eco. The engine will be an additional model in the XT series, delivering a significant improvement in operating costs and sustainability. The PW127XT-S will be developed according to the D328eco timeline.

"We have worked closely with the D328eco team over a number of years to develop the best engine option for the aircraft," says Maria Della Posta, president of Pratt & Whitney Canada. "The PW127XT-S provides airlines with 40% more time on-wing, a 20% reduction in maintenance costs with only two scheduled events over 10 years, and a 3% improvement in specific fuel consumption. We support Deutsche Aircraft's vision of building a green aviation company, and we are confident that the PW127XT-S is the ideal match for the D328eco."

Pratt and Whitney Canada have developed a customised engine maintenance programme for the PW127XT family of engines. The programme can be tailored for every environment, mission type, including operator experience level. The personalised Fleet Management Programme (FMP) for the PW127XT family enable customers to maximise engine on-wing time.

Under international standard atmospheric (ISA) conditions, nil winds and including reserves, fuel flow is 1,100lb per hour; assuming 95% MTOW at FL270. Block fuel for a 200nm flight, and carrying 40 passengers is 1,089lbs. Assuming the same criteria, block fuel for 300nm will total 1,468lbs and 2,237lbs for a 500nm flight.

## ECO

The D328eco will be compatible for certified sustainable aviation fuel (SAF) usage. Deutsche Aircraft and South African chemical and energy company Sasol ecoFT, recently signed a memorandum of understanding (MoU) to advance the power-to-liquid (PtL) process for producing PtL-SAF for aviation.

PtL-SAF is a scalable and long-term solution to minimize the carbon dioxide ($CO_2$) footprint of aviation. The process uses $CO_2$ captured from the atmosphere, and hydrogen, produced with green energy, to produce a synthetic fuel. PtL-SAF will have similar characteristics to regular kerosene. PtL-SAF fuel contains fewer aromatics and sulphur, improving local air quality.

"The D328eco is more efficient than a jet. This means whatever we burn, for example SAF or PtL-SAF, the D328eco burns less," says Buchholz.

Deutsche Aircraft and Sasol will not only work on technology and production aspects of H2-SAF (PtL), but also aim at a certification for this type of fuel to be used as drop-in or non-drop-in jet fuel.

As a first step of their partnership Sasol ecoFT and Deutsche Aircraft will explore the compatibility of materials and system components with blended synthetic fuels produced through Sasol's FT technology currently applied in its existing coal to liquid (CtL) process. The priority of this aspect of the project is to expedite the certification of more sustainable PtL-SAF options.

## Markets

In 2022 the turboprop fleet totalled 1,950 examples. By 2041 there will be a requirement for 2,450 new aircraft including 1,500 replacements and 710 to match growth.

It is thought that over the next 20 years 35% of new turboprops will be needed to service new routes. Most of the new routes will be located in the Asia Pacific region, including China. Large cities within China are connected by a high-speed train network. However, once outside the major conurbations large areas of the country will be reliant on small turboprop aircraft. Over the next 10 years it is estimated that 150 new airports will be built. Turboprops are replacing boats in many other Asia Pacific regions. Improving economies will also increase the demand for air travel.

North America will be another key market because connectivity has declined as many small regional aircraft fleets have been retired. Domestic traffic has declined by more than 30% in the past 20 years. There are about 900 small jets in the region and many are more than15 years old. Turboprops with improved economics and reduced fuel burn are therefore expected to be needed as replacements.

SOP operations will improve airline profits, and help relieve the acute pilot shortage in the area.

Reducing $CO_2$ emissions is a key requirement in Europe. Research suggests that $CO_2$ emissions can be reduced by 33% if turboprops replaced RJs. For 200nm-300nm sectors, 325,000 tonnes of $CO_2$ could be saved annually by immediately switching types. There is significant potental in new P-to-P routes from Eastern Europe to Central Asia.

Some of the busiest turboprop routes in the world are located in Latin America and the Caribbean. Under 500nm, 45% of Brazilian domestic routes are operated by turboprops, and it is likely the type will be significant for new route development. In Colombia 34% of airports are only served by turboprop aircraft. AC