

# Demonstrating New Technologies to Advance the Sustainable Growth of Air Transport

## By Boeing

The Boeing Company ecoDemonstrator program which began in 2011, accelerates development of promising new technologies that have the potential to enhance the safety, design, evaluation, production, maintenance, in-service performance, comfort, environmental efficiency, and economics of commercial airplanes. Access to flight-test airplanes off the critical path of a certification program enables engineers to “learn by doing” and make viability assessments faster. All ecoDemonstrator programs have evaluated different types of sustainable aviation fuels.

In 2016, Boeing and Embraer jointly flight tested new technologies onboard an E170 regional jet, aimed at improving airplane safety and environmental performance. The collaboration was part of a cooperation agreement to create value for both companies and their customers. The combined technical expertise of the two manufacturers accelerated the developing of improved technologies more efficiently than approaching them separately.

Technologies tested in 2016 included:

- Ice-phobic paint for ice release and reduced washing.
- Slat noise cove fillers that reduce unsteady air flows and community noise.
- Light Detection and Ranging (LIDAR) optical air data system that measures air data parameters to improve airplane performance.
- Boundary Layer Data System (BLDS) that measures air flow on laminar surfaces and improves data acquisition to reduce fuel use and emissions.
- Sustainable aviation fuels made from waste Brazilian sugar cane.

In 2018, Boeing worked with FedEx Express to gather information for nearly 40 technologies on a Boeing 777 Freighter. This program marked the first time a commercial airliner was powered with 100 per cent biofuel to reduce emissions. The fuel's higher energy density also improved performance.





Additional technologies tested in 2018 included:

- Clear air-turbulence detection.
- Ground-collision avoidance.
- Compact thrust reverser designed and manufactured by Boeing to save fuel.
- Flight-deck improvements to make operations at busy airports more efficient.
- Prototype airplane parts using approved recycled materials and additive manufacturing that reduce waste and fabrication time.

To-date, ecoDemonstrator airplanes have tested 112 technologies using a Next-Generation Boeing aircraft: 737-800 in 2012, a 787 in 2014, and a 757 in 2015; in addition to the 2016 Embraer and 2018 FedEx Express airplanes.

About one-third of the technologies tested have transitioned to production programs or in-service solutions for customers. For example, natural laminar flow winglets that improved fuel efficiency on the 2012 737-800 are now standard equipment on the 737 MAX. Another 45 per cent of the technologies have advanced in technology readiness and are still being developed.

Additional technologies are being planned for flight testing in 2019, 2020 and 2021.