

## The Boeing ecoDemonstrator Program

Boeing launched the ecoDemonstrator program in 2012 to enable aviation's relentless pursuit to improve efficiency, minimize its environmental footprint and enhance safety. With successive airplane platforms, the ecoDemonstrator program takes promising technologies out of laboratories and puts them through rigorous testing in an operational environment. Over the past decade, the program has helped to solve real-world challenges for airlines, passengers and the environment even as testing results further inspired Boeing to intensify its commitments to enhance sustainability and safety for its products and services.

Boeing has committed that all commercial airplanes it delivers will be certified for the capability to fly using 100% sustainable aviation fuel by 2030. This move supports the civil aviation industry's commitment to achieve net zero carbon emissions by 2050. The company's confidence in reaching these goals is based partially on the success of many flight tests by the ecoDemonstrator program.

### History

Nine flagship airplanes have served as flying test beds for the ecoDemonstrator program including the 2022 program. In 2023, Boeing expanded the program with "Explorer" airplanes that will focus on short term testing of an individual technology. The first ecoDemonstrator Explorer is a Boeing 787-10 Dreamliner which will support operational efficiency testing with four countries in June. Over the last decade, engineers and scientists at Boeing and its ecoDemonstrator partners expanded their scope of research beyond enhancing safety and operational efficiency to assess new features, services and approaches that can improve the entire aviation ecosystem.

From the first ecoDemonstrator in 2012 through this year's effort, the ecoDemonstrator program will have evaluated about 250 technologies. Projects include

technologies that reduce fuel use, emissions and noise, and incorporate more sustainable materials. ecoDemonstrator platforms have also tested cabin amenities that improve the passenger experience — features such as smart galleys and UV disinfection – in addition to products that increase schedule reliability and the efficiency of airline fleets and crews.

Newly delivered Boeing airplanes as well as many in today's global fleet include a number of technologies that were evaluated and proven on the ecoDemonstrator program, such as;

- More aerodynamically efficient winglets on the 737 MAX.
- iPad apps that provide real-time weather and other information to pilots, enabling them to improve fuel efficiency and reduce emissions.
- Custom approach path information to lower community noise.
- Flight deck touch-screen displays and a camera system on the 777X that will enhance safety by helping pilots avoid ground obstacles.

The ecoDemonstrator program has significantly benefitted the industry as a whole as Boeing has tested and further developed aggressive goals to increase the use of sustainable aviation fuel. SAF reduces life-cycle CO<sub>2</sub> emissions by up to 80%, with the potential to eliminate emissions in the future.

The 2018 Boeing ecoDemonstrator program, in partnership with FedEx Express, made history by conducting the world's first commercial airliner test flight flown on 100% sustainable fuel in both engines. In recent years, each test-bed airplane has flown on the highest approved blend of sustainable aviation fuel (SAF) available, reinforcing the value of sustainable fuel and providing data for the industry and partners.

In 2021, the program launched a multi-year partnership with the National Aeronautics and Space Administration (NASA) to collect and analyze data on SAF emissions. That same year, Boeing and NASA began [ground testing](#) on engine particle and trace gas emissions with [various blends of SAF](#) on an Alaska Airlines 737-9, conducted alongside a demonstration flight with 100% SAF in one engine. Last year, NASA and Boeing continued [ground emissions testing](#) with SAF on a Boeing-owned 777-200ER (Extended Range) and a 787-10, as reported in [Aviation Week](#).

A dedicated team of engineers and specialists works year-round on the ecoDemonstrator program, which is part of the Boeing Commercial Airplanes Product Development organization. That team collaborates with technologists throughout Boeing and the industry on the selection process, which can start years before the technology is on the airplane. Together, the team and technologists focus on a singular motto — “innovate, collaborate, accelerate” — to ensure they’re supporting one another and the constant evolution of new ideas.

The Boeing ecoDemonstrator program collaborates extensively with customers, suppliers, government agencies, academia and other stakeholders. Here’s a list of ecoDemonstrator platforms and some key partners:

- 2012: American Airlines 737-800
- 2014: Boeing 787-8 Dreamliner
- 2015: TUI 757
- 2016: Embraer E170
- 2018: FedEx 777 Freighter
- 2019 Boeing 777-200
- 2020: Etihad Airways 787-10
- 2021: Alaska Airlines 737-9
- 2022-2024: Boeing 777-200ER

## **2022 Technologies & Partnerships**

In 2023, the Boeing ecoDemonstrator program will leverage a 777-200ER to test 19 new technologies, including:

- Sustainable wall panels in the cargo hold that are made of 40% recycled carbon fiber and 60% resin made from a bio-based feedstock
- A fiber optic fuel quantity sensor compatible with 100% SAF
- An Electronic Flight Bag application featuring Smart Airport Maps, a component of Jeppesen FliteDeck Pro, which reduces operational costs and supports safe taxi operations with the depiction of contextual airport data
- For all flight tests, the airplane will fly on the highest available blend of SAF locally

More information about the 2022 ecoDemonstrator program and previous flying test-bed airplanes can be found at [boeing.com/ecoDemonstrator](https://www.boeing.com/ecoDemonstrator), and Boeing's sustainability commitments and partnerships at <https://www.boeing.com/principles/sustainability>.

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