



# Sustainable Flight Demonstrator (SFD)

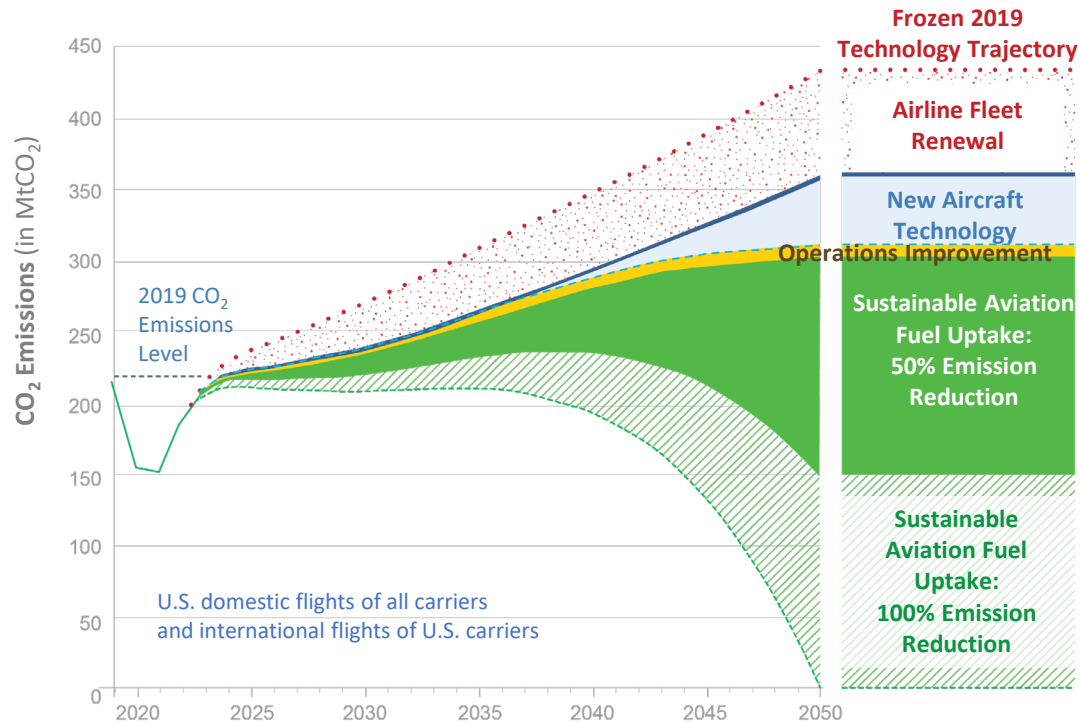
Brent Cobleigh, Project Manager



# U.S. Aviation Climate Action Plan



U.S. aviation goal is to achieve net-zero greenhouse gas emissions by 2050.

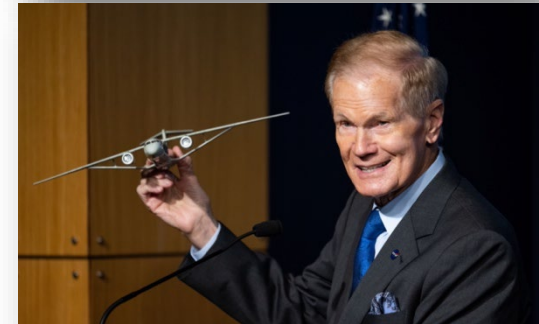


The U.S. is working with the global community to achieve net-zero greenhouse gas emissions by 2050 using a common basket of measures.

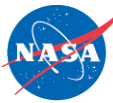
# Industry Partner selected through Competitive Proposals



- Propose an advanced single-aisle airframe design that will have significant reductions in CO<sub>2</sub> emissions
  - Vision System (product they would like to manufacture in 2030s)
  - Demonstrator (research aircraft that will mature high risk technologies for Vision System)
- Selected Proposal was awarded a Funded Space Act Agreement
  - Boeing Company for their Transonic Truss Braced Wing
  - Industry led, NASA supported
  - NASA providing \$425M and Boeing providing over \$700M (2023-2029)
- Timeline
  - PDR 2024
  - CDR 2026
  - First flight in late 2028

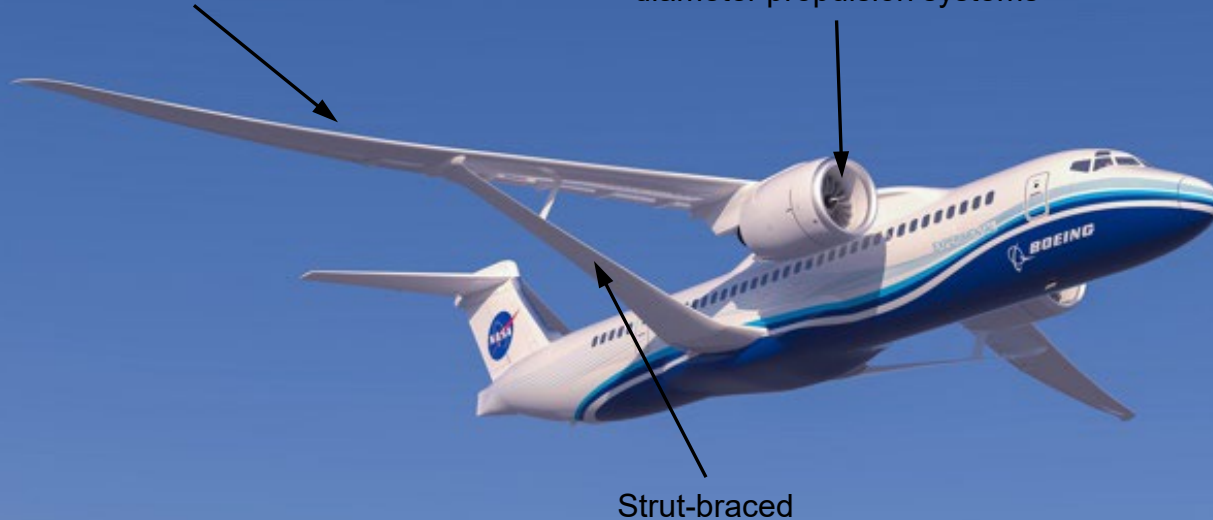


# Boeing Transonic Truss-Braced Wing (TTBW)



Ultra-thin, high aspect  
ratio wings

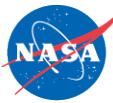
High-wing allows larger  
diameter propulsion systems



Strut-braced

When combined with expected advancements in propulsion systems, materials and systems architecture, the TTBW configuration could reduce fuel consumption and emissions up to 30% relative to today's most efficient single-aisle airplanes.

TTBW has been jointly studied by NASA and Boeing for ~15 years



- Major testing support using NASA facilities/capabilities
  - **High speed wind tunnel testing**
  - **Structural testing** of wing components
  - **Piloted simulation**
  - **Flight test operations**
  - **Acoustic testing**
- NASA technical support for Boeing-led Integrated Product Teams
  - Systems engineering, computational fluid dynamics, simulation and analysis, acoustics analysis, aerodynamics, aeroelastics, structural design, flight controls, instrumentation
  - Other Subject Matter Experts to help resolve concerns/issues that arise

**Boeing will lead the aircraft design and development. NASA will not write requirements or direct the design but will work jointly to make the partnership successful.**

# Sustainable Flight National Partnership Benefits



Small Core Gas Turbine for  
5%-10% fuel burn benefit  
(HyTEC Project)

Electrified Aircraft Propulsion for  
~5% fuel burn and maintenance  
benefit  
(EPFD & AATT Projects)

Sustainable Aviation Fuels for  
reduced lifecycle carbon  
emissions  
(AATT Project)



Transonic Truss-Braced Wing  
for 5%-10% fuel burn benefit  
(AATT Project)

High-Rate Composites for  
4-6x manufacturing rate increase  
(HiCAM Project)

Integrated Trajectory Optimization  
for 1%-2% reduction in fuel  
required and minimization of  
contrail formation  
(ATM-X Project)

Fully integrated & flight validated Transonic Truss-  
Braced Wing for reduced commercialization risk  
(SFD Project)



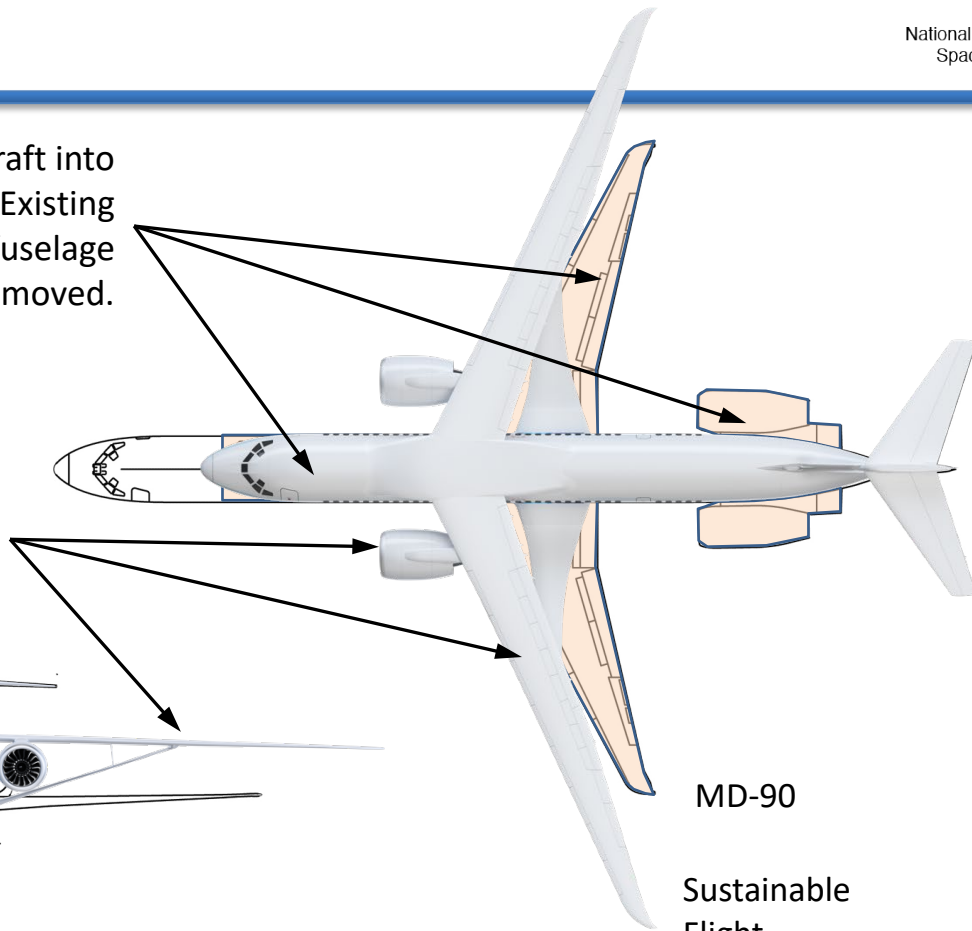
# QUESTIONS

# SFD Demonstrator Design



Boeing will modify MD-90 aircraft into the SFD Demonstrator aircraft. Existing wings, aft engines, and fuselage sections will be removed.

SFD modification includes addition of Transonic Truss-Braced Wing and subsystems, modern turbo-fan engines, and instrumentation.



MD-90

Sustainable  
Flight  
Demonstrator