An Overview of NASA Sustainable Aviation
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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.
Aviation Pillars for a Sustainable Future

Global Aviation Industry GOAL: net-zero carbon emissions by 2050

TECHNOLOGY
NASA = Primary Role

SUSTAINABLE AVIATION FUEL
NASA = Supporting Role

OPERATIONS AND INFRASTRUCTURE
NASA = Primary Role
Sustainable Flight National Partnership
Next-Generation Capability on the Path to Net-Zero Greenhouse Gas Emissions by 2050

Achieve net-zero greenhouse emissions by 2050 through 25-30% energy efficiency improvements in next-generation transports, 100% sustainable aviation fuel, and optimal trajectories.

- Advance engine efficiency and emission reduction
- Enable integrated trajectory optimization
- Advance airframe efficiency and manufacturing rate
- Enable use of 100% sustainable aviation fuels
Subsonic Transport Technologies

Ensure U.S. industry is the first to establish the new “S Curve” for the next 50 years of transports

Transonic Truss-Braced Wing
5-10% fuel burn benefit

Small Core Gas Turbine
5-10% fuel burn benefit

Electrified Aircraft Propulsion
~5% fuel burn and maintenance benefit

High-Rate Composite Manufacturing
4x-6x manufacturing rate increase
### Subsonic Transports: Integrated Technology Development

#### Model Based Systems Analysis & Engineering

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- **Sustainable Flight Demonstrator (SFD)**
  - **Flight Test**

- **AATT - Transonic Truss Braced Wing**
  - **TC Completion**
  - **Mfg Demo & Structural Test**

- **Hi-Rate Composite Aircraft Manufacturing (HiCAM)**

- **Hybrid Thermally Efficient Core (HyTEC)**
  - **Core Demonstration & Test**

- **Electrified Powertrain Flight Demonstration (EPFD)**
  - **Flight Tests**

- **AATT - Electrified Aircraft Propulsion Integrated Ground Test**
  - **TC Completion**

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**Achieve TRL 6 in time for industry product decision-making**

**Leverage the Asset — Future Spirals**

**Technology Readiness Target**
Sustainable Aviation Fuels

Enable the use of 100% sustainable aviation fuels (SAF) and reduce climate impact

Scope
• Support adoption of high-blend ratio sustainable aviation jet fuels

Benefits
• Reduced aviation environmental impact
• Reduced uncertainty for climate impact of aviation-induced cloudiness
• Improved efficiency/emissions with drop-in synthetic and biofuels

Approach
• Characterize high-blend sustainable aviation jet fuel emissions on ground and in flight
NASA AACES 2050 Studies
Advanced Aircraft Concepts for Environmental Sustainability

FY10-15 ERA N+2 for the 2020s Impact

FY09 N+3 Adv Concept Studies Target 2030-35 Impact

FY23 “N+4” AACES Studies - Explore 2020s, Demo 2030s, Impact 2040s
- 2040s Marketplace (payload/range/speed), 2050 Environmental Goals
- Alternative Energy Scenarios (LH2, LNG, Increased Electrification, 100% SAF)
- Advanced Airframes (clean energy compatible, shielding, adaptive, unconventional structures)
- Alternative propulsion (clean energy compatible, BLI, distributed propulsion, hybrid electric)
- Tools & Methods for Reduced Lifecycle Cost & Environmental Impact

RFI Released 5/19/22, RFP Fall 2022, Awards Early CY23