Electrified Aircraft Propulsion – a 60,000 ft Perspective

	UAS	UAM	Small A/C	RJ	Single Aisle	Twin Aisle
Implementation Status	 All electric vehicles in operation	  All electric or hybrid applications being developed		  Potential for hybrid or turbo-electric within 10 years		 Significant progress needed for practical implementation
NASA Role	NASA research not needed	NASA focus on informing standards, regulations & design tools **Small Vehicle EAP** ***Energy & cost-efficient, shorter-range aviation***		NASA focus on enabling technologies, demonstrating benefits, addressing safety needs **Transport Scale EAP** ***Energy & cost efficient, transport aviation***		Still too long term – not yet a NASA focus

Leverage learning at smaller size to inform scale-up

Fundamental challenges span range of sizes

The Aviation Carbon Reduction Challenge

- By 2050, an estimated 10 billion passengers will fly each year a distance of 22 trillion revenue passenger kilometres.
- With today's fleet and operational efficiency, this activity would require over 620 megatonnes (Mt) of fuel and generate close to 2000 Mt of CO_2.
- Imagine enabling the same level of demand while reducing net CO_2 emissions to zero by 2050.

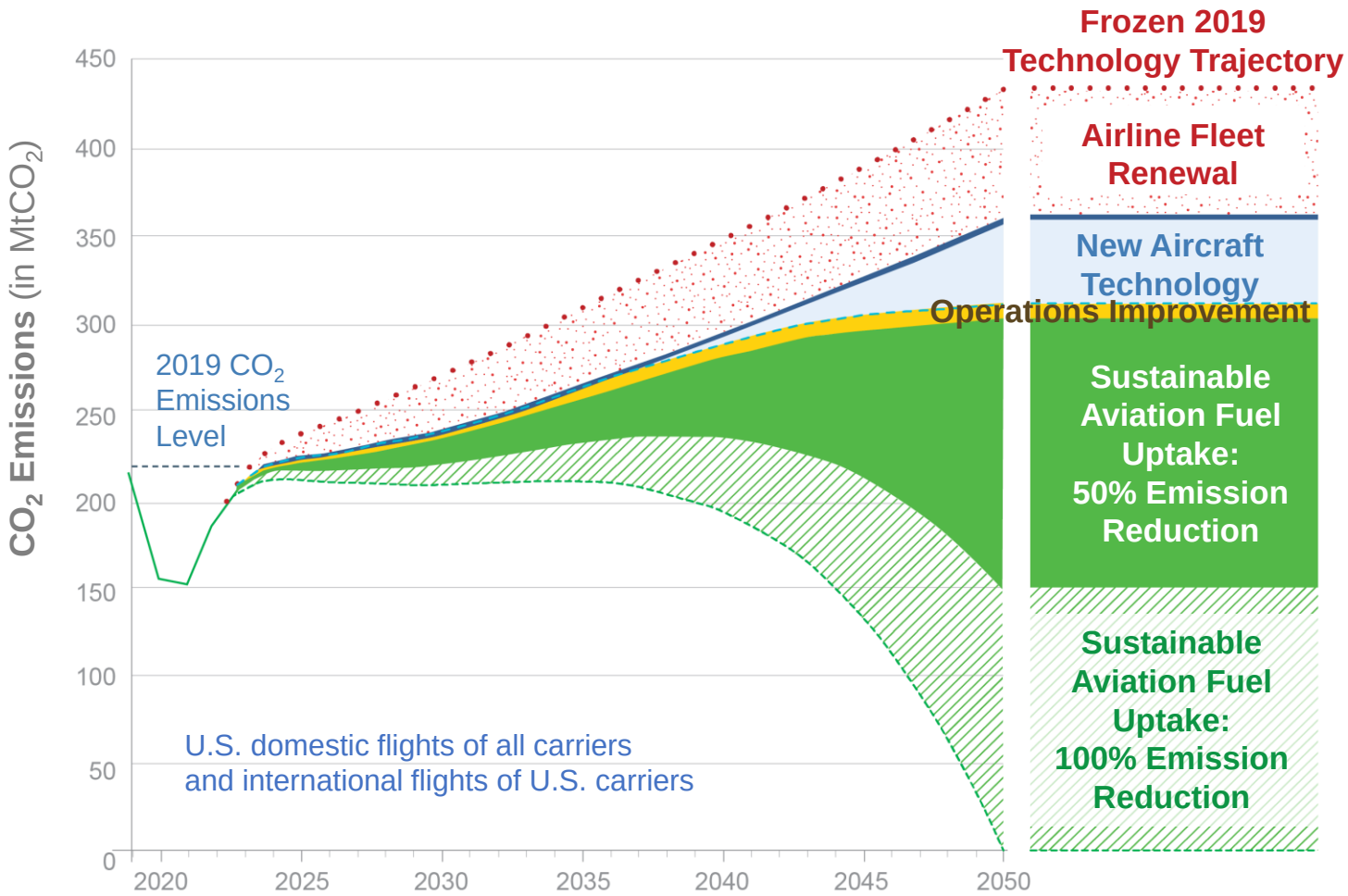
Meeting the challenge is the opportunity for the United States to lead the world in innovation and reductions in CO_2 aviation emissions, and to maintain economic competitiveness in a critical export industry ($6 trillion-plus market over the next 20 years).

U.S. Aviation Climate Action Plan

Global Context for Sustainable Aviation

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

U.S. Aviation Climate Action Plan is aligned with
- U.S. economy-wide goal
- International Civil Aviation Organization
- Air Transport Action Group

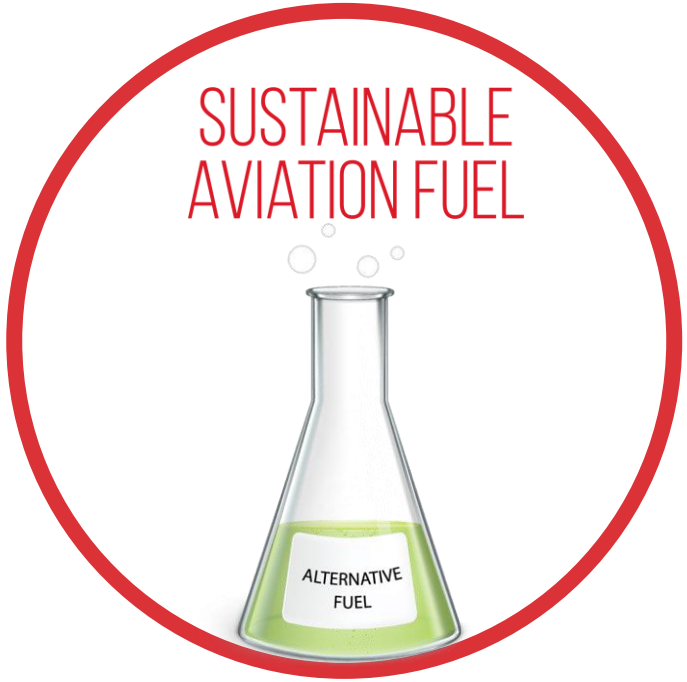


The U.S. is working with the global community to achieve net-zero greenhouse gas emissions by 2050 using a common basket of measures.

Aviation Pillars for a Sustainable Future

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

NASA = Primary Role



NASA = Supporting Role

NASA = Primary Role

NASA Aeronautics – Vision for Aviation in the 21st Century

ARMD continues to evolve and execute the Aeronautics Strategy *https://www.nasa.gov/aeroresearch/strategy*

6 Strategic Thrusts

- Safe, Efficient Growth in Global Operations
- Safe, Quiet, and Affordable Vertical Lift Air Vehicles
- Innovation in Commercial Supersonic Aircraft
- In-Time System-Wide Safety Assurance
- Ultra-Efficient Subsonic Transports
- Assured Autonomy for Aviation Transformation

U.S. leadership for a new era of flight

Advanced Air Mobility Mission

Safe, sustainable, affordable, and accessible aviation for transformational local and intraregional missions

University Leadership Initiative (ULI) Engaging the University Commun

5 rounds of solicitations
$157M of awards

Seeking & awarding proposals addressing all Strategic Thrusts and Special Topics

- 23 awards with 64 universities
- 7 HBCUs and 10 other MSIs
- 406 proposals submitted
- 280 different proposing Principal Investigators
- 3189 team members
- 20–50 students per team

In ULI, the universities take the lead, build their own teams, and set their own research path.