



Project Introduction

This project will transform how waste heat is managed on aircraft by successfully demonstrating a novel NASA patent-pending aircraft waste heat recovery and recycling system. The objective is to remove low grade waste heat that is generated throughout high power composite body aircraft while improving overall vehicle performance.

Anticipated Benefits

Electric aircraft, small core turbofans, etc., are increasingly limited in performance due to thermal management challenges. The benefits that could result in 5 to 10 years are up to 16% fuel burn benefit in transport aircraft and it enables a new class of high power electric aircraft propulsion within 10 to 20 years. Additionally, other new classes of aircraft become possible by incorporating integrated small core, tail cone thruster, laminar flow control, and high voltage powertrain for system mass, noise, emissions, and fuel reduction for single-aisle and larger aircraft.

Project Closeout - Executive Summary

GRC considers this technology to be ready for adoption within the Aeronautics program/project portfolio. The GRC Aeronautics Directorate will support the accomplishment of this objective.



FY17 GRC – TREES - Thermal Recovery Energy Efficient System

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Primary U.S. Work Locations and Key Partners



Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Center Independent Research & Development: GRC IRAD

Project Management

Project Manager:

Gary A Horsham

Principal Investigator:

Rodger Dyson

Co-Investigators:

David E Ashpis
Ralph Jansen
Albert Juhasz
Gerald Hill

Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, OH
Air Force Research Laboratory	Supporting Organization	U.S. Government	
GE Aviation	Supporting Organization	Industry	
GE Global Research	Supporting Organization	Industry	
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, VA

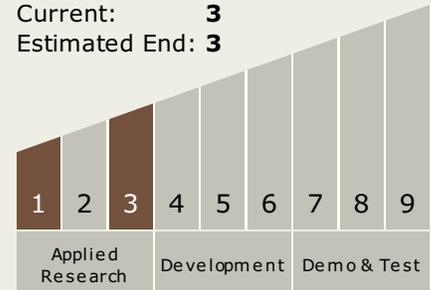


Primary U.S. Work Locations

Ohio

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- Aeronautics (TA 15)
 - └ Transition to Low-Carbon Propulsion (TA 15.4)
 - └ Initial Introduction of Alternative Propulsion Systems (TA 15.4.2)

Other/Cross-cutting:

- In-Space Propulsion Technologies (TA 2)
 - └ Non-Chemical Propulsion (TA 2.2)
 - └ Thermal Propulsion (TA 2.2.3)
 - └ Supporting Technologies (TA 2.4)
 - └ Propellant Storage and Transfer (TA 2.4.2)
 - └ Heat Rejection (TA 2.4.4)
 - └ Power (TA 2.4.5)

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Technology Areas (cont.)

- Thermal Management Systems (TA 14)
 - └ Cryogenic Systems (TA 14.1)
 - └ Passive Thermal Control (TA 14.1.1)
 - └ Active Thermal Control (TA 14.1.2)
 - └ Thermal Control Systems (TA 14.2)
 - └ Heat Acquisition (TA 14.2.1)
 - └ Heat Transport (TA 14.2.2)
 - └ Heat Rejection and Energy Storage (TA 14.2.3)

- Aeronautics (TA 15)
 - └ Safe, Efficient, Growth in Global Aviation (TA 15.1)
 - └ Improved Efficiency and Hazard Reduction within NextGen Operational Domains (TA 15.1.1)
 - └ Ultra-Efficient Commercial Vehicles (TA 15.3)
 - └ Achieve Community Goals for Improved Vehicle Efficiency and Environmental Performance Beyond 2035 (TA 15.3.3)



Target Destinations

Earth, The Moon, Mars

Supported Mission

Type

Planned Mission (Pull)