

FUTURE
O-----F
FLIGHT

FUTURE
O-----F
FLIGHT



FUTURE
O-----F
FLIGHT

NASA AERONAUTICS

SUBsonic Single Aft eNginE (SUSAN) Electrofan Trade Study Overview

Ralph Jansen, NASA Glenn Research Center
June 15th, 2022 2 PM - 3:40 PM | iTEC+2022 Conference
Anaheim, California





Subsonic Single Aft eNginE (SUSAN) Electrofan

National Aeronautics and
Space Administration



SUSAN uses a 20MW class Electrified Aircraft Propulsion system to enable advanced Propulsion Airframe Integration (PAI) in transport category aircraft. Alternative fuels will be used to reduce the amount of emissions per energy used. By combining these features there is the potential to reduce aircraft emissions by 50% per passenger/mile while retaining the size, speed, and range of large regional jets.

Problem: Aircraft emissions have to be reduced by at least a factor of two, with a goal of zero emissions.

Constraint: Must use existing airport infrastructure, be flight certifiable, and be more cost effective

Solution To Be Developed: Hybrid Electric Large Aircraft

Specific Concept To Be Developed: SUSAN Electrofan



- The SUSAN Electrofan Aircraft is a subsonic regional jet transport aircraft concept which utilizes Electrified Aircraft Propulsion (EAP) to enable propulsive and aerodynamic benefits to reduce fuel usage, emissions, and cost.
- Transformative concept: single engine transport aircraft. 4 engine achieved in 1949, 3 engine in 1962, 2 engine in 1965. Five decades later we still have not achieved single engine transport
- The target market is the regional low cost carrier airline with mission specification: 180 passenger, design range of 2500 miles, economic range of 750 miles, speed of Mach 0.78.



SUSAN Electrofan is a concept to move up two technology S-curves

Reduce Energy Use Per Passenger Mile

+

Reduce Emissions/Energy Use

SUSAN Trade Study is developing a conceptual configuration combining 20MW class Electrified Aircraft Propulsion with innovative Propulsion / Airframe Integration (PAI) to reduce the amount of energy used per passenger mile can be reduced.

SUSAN will also consider alternative fuels to reduce the emissions per unit of energy. Initially sustainable aviation fuels are under consideration and in the future others may be in the trade space.

NASA + U.S. Industry have started progress on the EAP S curve

Advance Propulsion / Airframe Integration



Simply Distributed



Parallel hybrid turbofan



Alternate Lower Emission Fuels

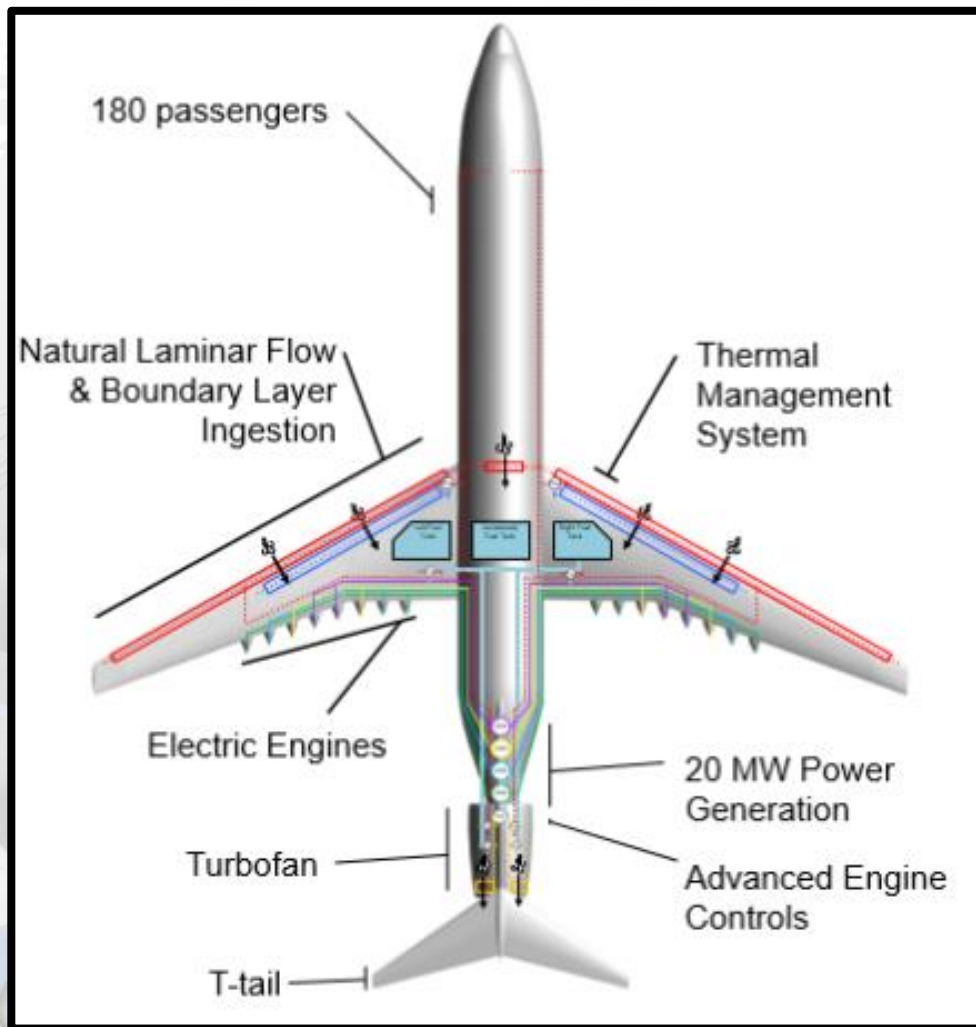
Drop In Replacement Fuels

Zero carbon fuels



SUSAN Alternate Fuel Strategy is TBD

NASA Subsonic Single Aft eNginE (SUSAN) Electrofan



Concept

Regional Low-Cost Carrier Airliner Concept (EIS 2040)

- Hybrid Electric Distributed System
- 20MW Total Power
- Single Aft Mounted Turbogenerator (BLI)

Features

Payload	180 passengers
Range (design/economic)	2500/750 miles
Speed	0.80 Mach
First Flight	TBD

Key Technologies

Distributed propulsion with airframe integration
Turbopan that both produces thrust and drives generators
Electric Motor System, Drives, Cables
Advanced batteries: metal air and others

Publications and Additional Information can be found at:

<https://www1.grc.nasa.gov/aeronautics/eap/airplane-concepts/susan/>