CS2 Info Day Rzeszow
Small Air Transport (SAT): Progress to date

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Small Air Transport fulfils a market segment that cannot be filled by other types of aircraft, nor can be addressed by other modes of transport. This provides route agility that is increasingly important in a fast-changing European landscape.

SAT main goal is to meet the Flightpath 2050 target "d2d 4h" challenge, improving overall European air mobility, in remote areas far from big airports or with limited or absent road and railway connections to bigger cities.

Small air transport is a stepping-stone in the roadmap of aviation decarbonisation proving the feasibility of electrification technologies for a future zero mission air transport system.
Innovative Aircraft Demonstrator Platforms (IADPs)

Large Passenger Aircraft  Regional Aircraft  Fast Rotorcraft

Integrated Technology Demonstrators (ITDs)

Airframe ITD  Engines ITD  Systems ITD

Transverse Activities (TAs)

EU Funding: ~68M€

SAT in Clean Sky 2
Clean Sky 2 SAT - Facts and Figures to date

33 GRANTS
88 Different Entities
12 COUNTRIES

SMES
RESEARCH CENTRES
UNIVERSITIES

Logos of various entities involved in Clean Sky 2 SAT project.
• **Reliable small gas turbines (turboprop)** for short range/regional aircraft (up to 19 seats), in the power range below 1800 hp (thermal).

• **Light-weight jet-fueled (Diesel cycle) piston engines** for general aviation and commuter aircraft (9 to 12 seats) in the range of 200-400 hp.

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**High power density turboprop engine.**
Up to 15% fuel eff. improvement.
Up to 10% ops. Cost reduction.
Hybrid eMAESTRO concept studies
A number of activities are currently ongoing in the frame of the Small Air Transport (SAT) transverse activity in Clean Sky 2 Programme.

- **Low Cost manufacturing Technologies**
- **Alternative Design and Manufacturing process affordable for SAT.**
- **Reduction of Recurring and operating Costs**
- **Lighter and Smart Structures.**
• More electric aircraft technology development (high voltage EPGDS, electrical landing gear, hybrid de-icing system)
• Fly by wire system and architecture (actuators, Air Data Sensors, movable surfaces)
• Affordable Future Avionic

- **FASE-LAG**
  Electro-mechanical actuation for LAnding Gear

- **REPRISE**
  Reliable Electromechanical actuator for PRLmary SurfacE with health monitoring

- **SEASIDE**
  Low Power Ice Protection Technology Integration

- **IMASAT**
  Integrated Modular Avionics

- **INDIS**
  HVDC Distribution system

- **E-BRAKE**
  Electro-Mechanical BRAKE actuation System

- **THERMAC**
  Thermal-aware Management for Modern Computing Platforms

- **MIDAS**
  Digital Probe for SAT Aircraft Air Data System

- **P180**

- **COAST**
  HONEYWELL
  (Affordable cockpit and avionics for Small Aircraft)

- **SPAIN**
  Smart Panels for SAT Aircrafts Cabin Insulation

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SAT GREEN AIRCRAFT

Low cost manufacturing technology:
- Low cost composite wing box and engine nacelle using
- Affordable small aircraft manufacturing of metallic fuselage by means.

Advanced Avionics for SAT
- Advanced avionics for small aircraft, to reduce pilot workload, paving single pilot operations.
- Affordable Fly-by-Wire architecture for small aircraft (CS23 certification rules).

Innovative High lift Device
- Improved power-plant noise.

Advanced Cabin comfort:
- Material for sound absorbing trim panels.

New generation of turboprop Engine
- New turboprop engine with reduced fuel consumption, emissions, noise and maintenance costs.

1st Design Loop Completed in 2019

Block fuel per mission:
~20% reduction vs. reference aircraft.

CO₂ emissions:
~19% reduction vs. reference aircraft.

NOx emissions:
~24-25% reduction vs. reference aircraft
**CS2 – SAT Related Thematic Topic**

Aviation is going to face the biggest revolution since 1930s.

Many challenges are in front of us...

**THT 03 - Conceptual Design of a 19 passenger Commuter Aircraft with near zero emissions**

Design of a 19 passenger commuter aircraft based on alternative propulsion concepts (electric, hybrid/electric, fuel cells, etc.) targeting near-zero CO₂ emissions.

- An analysis and literature review of the State of the Art [SoA] in the field of alternative propulsion architectures.
- A full design loop taking into consideration multiple configurations, architectures.
- Conceptual design of the aircraft, including 3D CFD aerodynamic simulations, preliminary structural design calculations.
- The quantified environmental targets and LCA for the down-selected architecture.
- The identification of scientific and technical challenges for the successful deployment of such architectures.

Three Projects have been selected and granted for funding:

- **UNIFIER 19** – Conceptual Design and LCA of 19 Pax a/c powered by a hybrid-electric powertrain with EIS2025.
- **HECARRUS** – Conceptual Design and LCA of 19 Pax a/c powered by a hybrid-electric powertrain (also integrating alternative technologies BLI) – with EIS 2030.
- **ELICA** - Conceptual Design and LCA of 19 Pax a/c powered by a hybrid or fully electric powertrain with EIS2035.
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