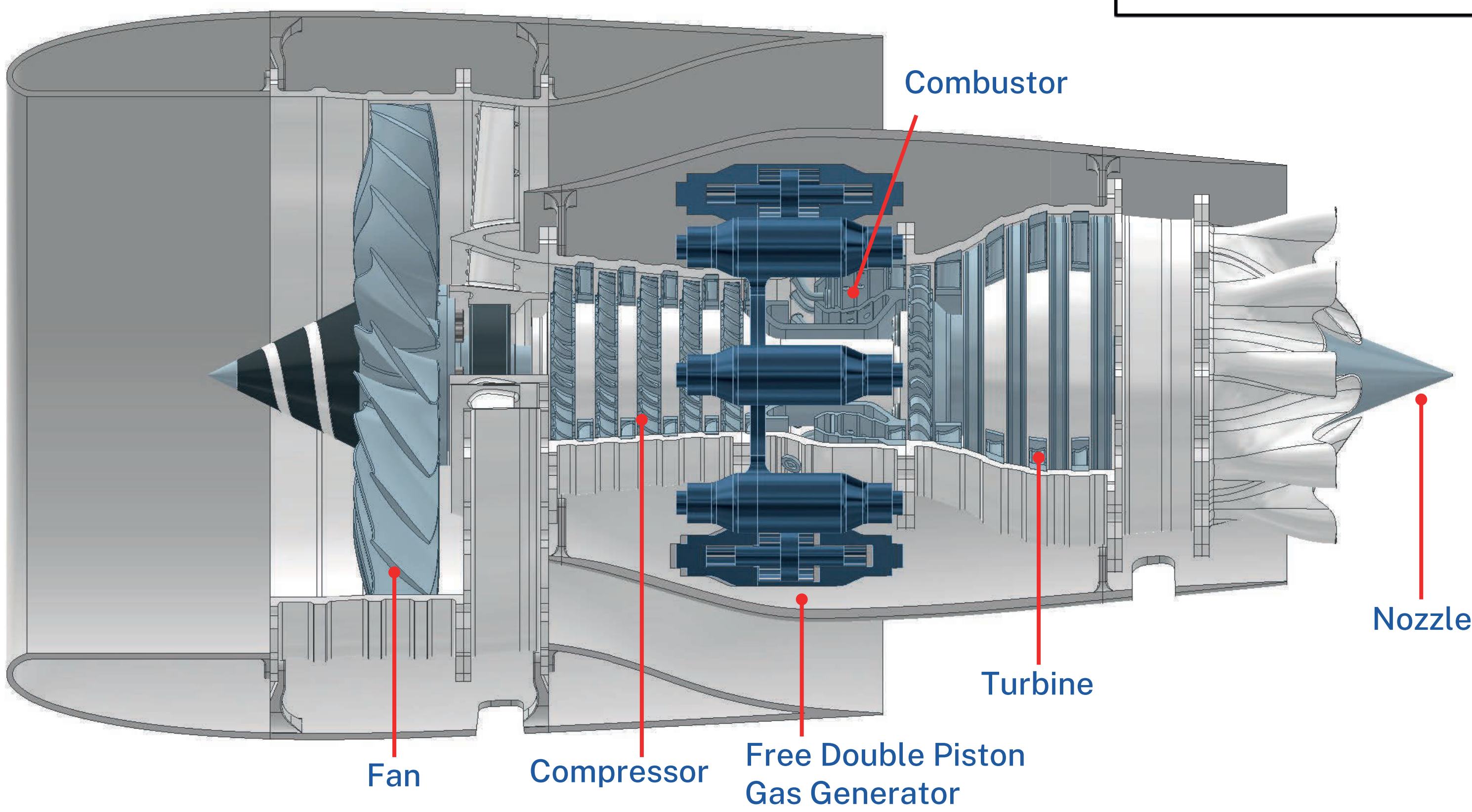
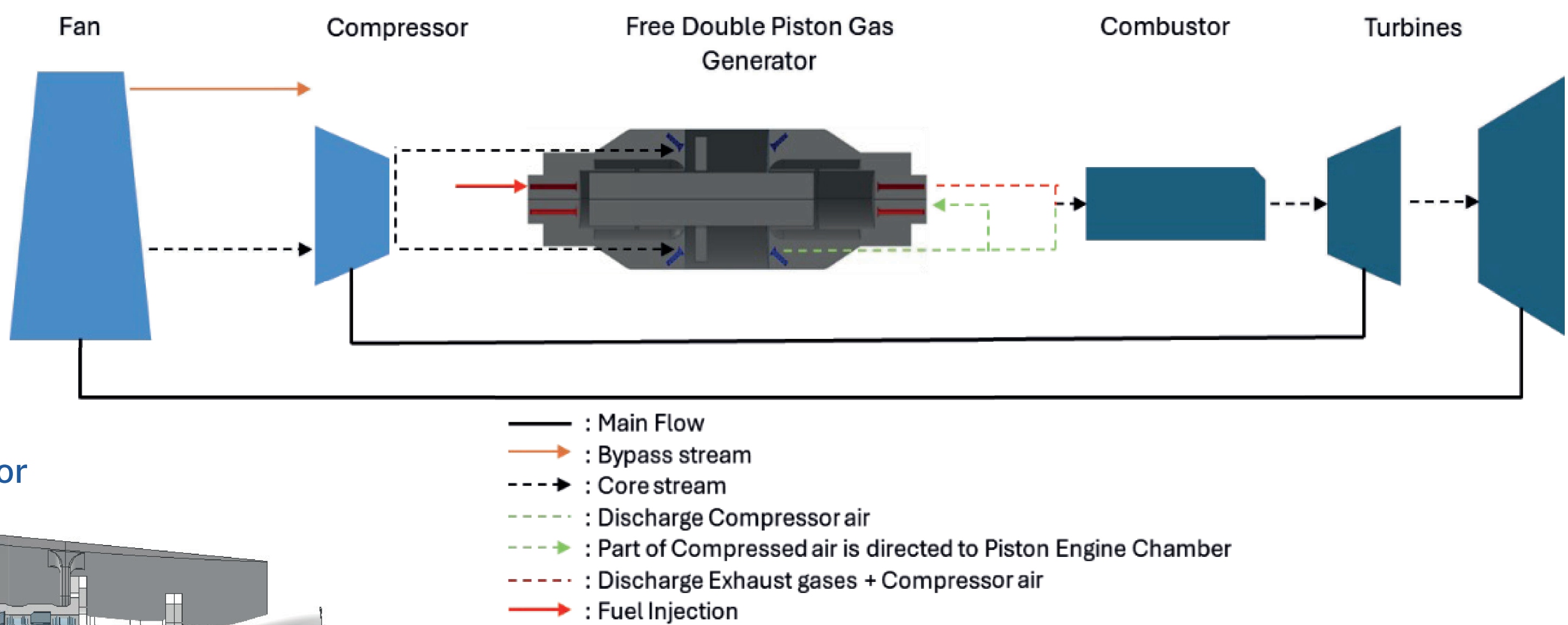


FDP-CCE Thermal Management System Approach



Konstantinos Fotis^a, Vasileios Karaikos^b, Maria Dimitriadou^b, Zinon Vlahostergios^{a,*}, Dimitrios Misirlis^c, Kyros Yakinthos^b

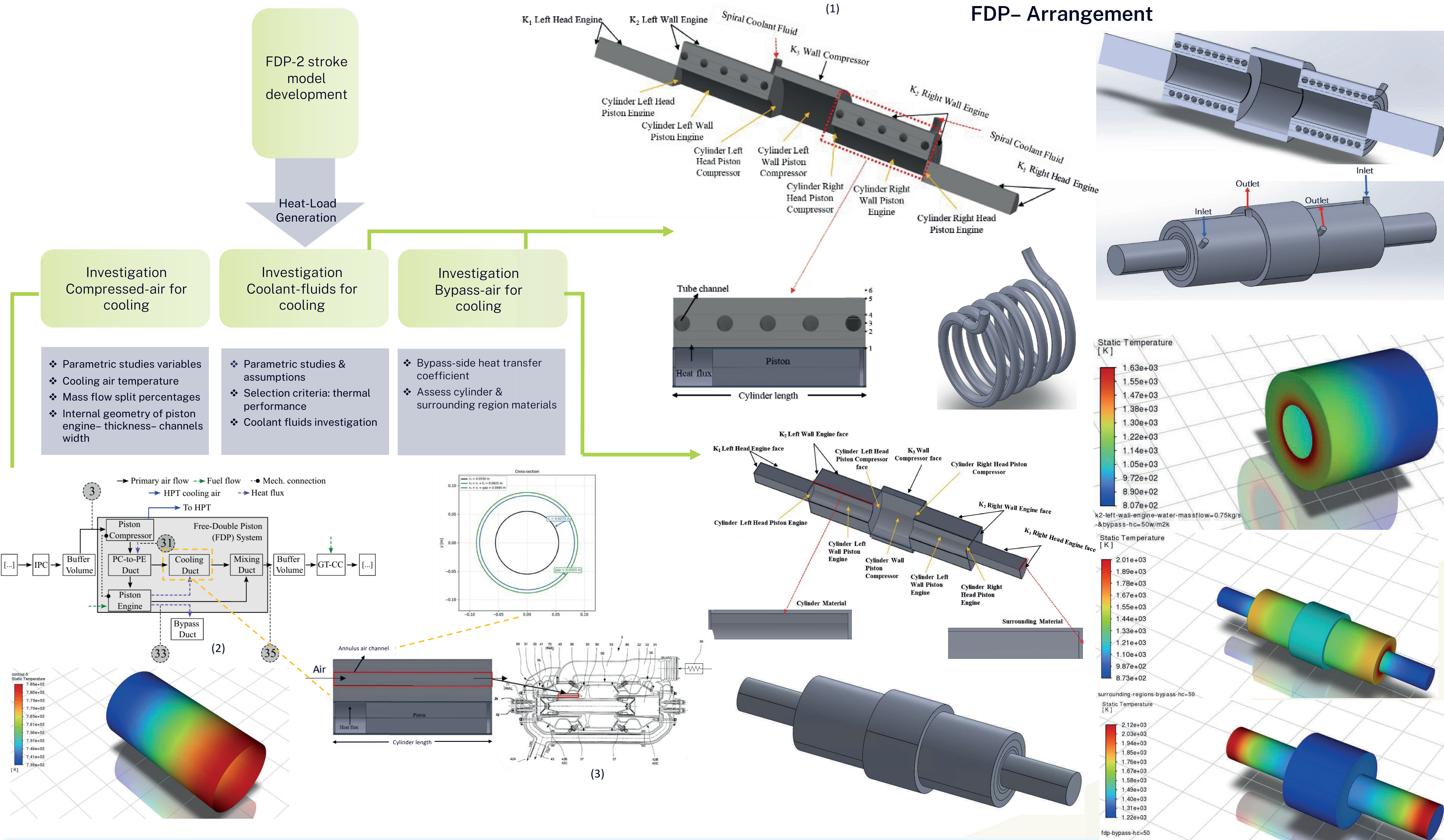
a) Laboratory of Fluid Mechanics and Hydrodynamic Machines, Dept. of Production and Management Engineering, Democritus University of Thrace
b) Laboratory of Fluid Mechanics and Turbomachinery, Dept. of Mechanical Engineering, Aristotle University of Thessaloniki
c) Dept. of Mechanical Engineering, International Hellenic University
zvlachos@pme.duth.gr



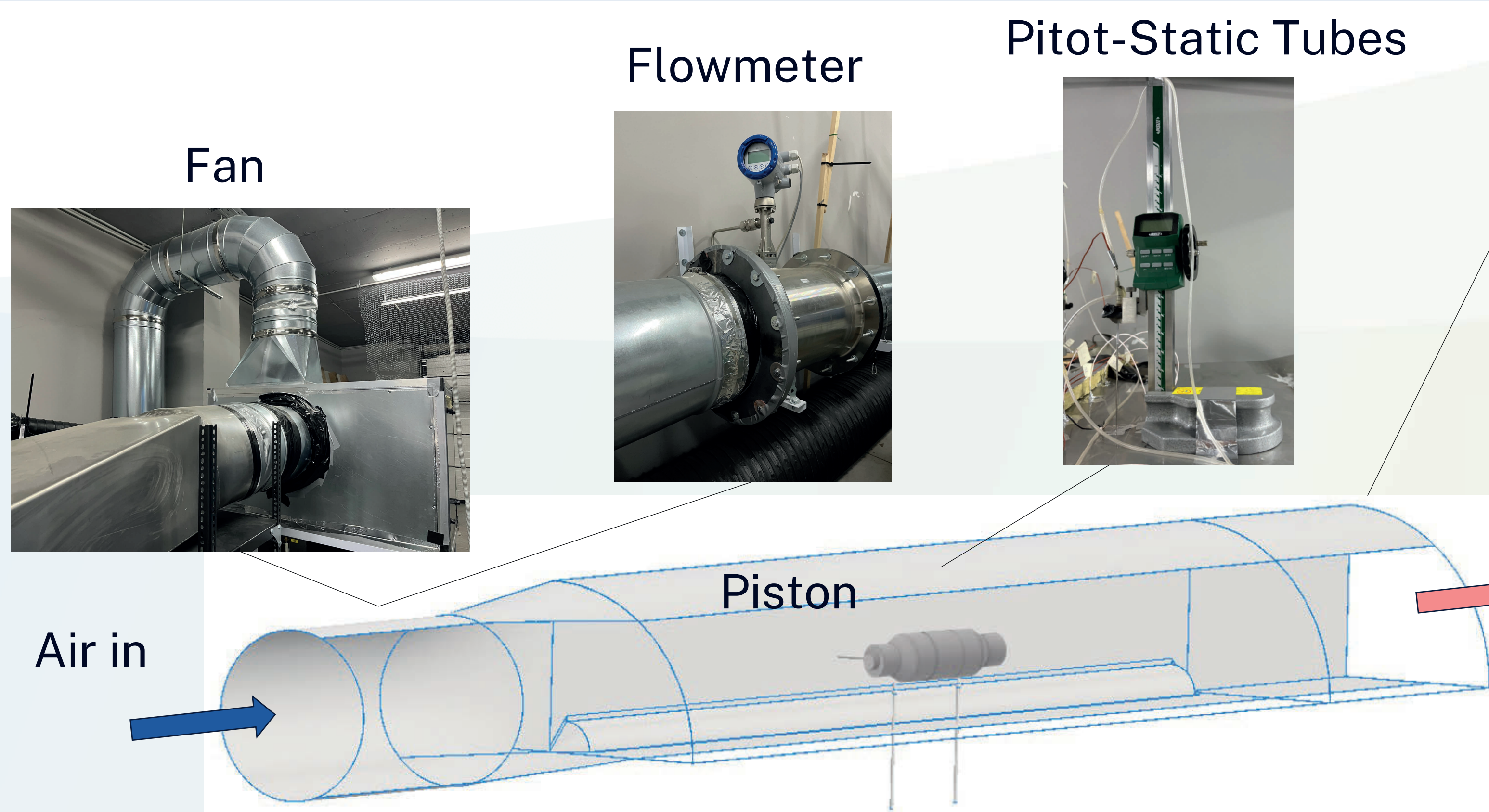
Key Outcomes: CCE Free Double-Piston

- No mechanical losses connected to the crankshaft and gear box
- Reduced lubrication needs and vibrations
- More compact piston system & lower weight
- Decrease in fuel consumption and CO₂ emissions

Computational and Analytical Models



Experimental Model



Experimental set up (initial concept)

- Velocity and pressure measurements will be performed using pressure probes for flow field analysis and identification of key flow structures.
- Various FDP models will be mounted and investigated to assess and optimize their installation.
- Experimental measurements will be used for the further assessment of relevant CFD computations.

References

1. Fotis K, Karaikos V, Vlahostergios Z, Misirlis D, Yakinthos K., Investigation of a Hybrid Cooling System for the Free-Double-Piston Engine Concept. ASME. J. Turbomach. Month 2026.
2. Lin Y-H, Uhl G, Winter F, Lessis A, Witzgall F, Seitz A. Engine Design Study for Free Double Piston Integrated Composite Cycle Engine. Aerospace. 2026; 13(4):354.
3. MTU (2021) / S. Kaiser, O. Schmitz and H. Klingels, "Aero Engine Concepts Beyond 2030: Part 2 – The Free-Piston Composite Cycle Engine," J. Eng. Gas Turbines Power, vol. 143, no. 2, p. 021002, 2021.

Contact
Kyros Yakinthos
Aristotle University of Thessaloniki
Thessaloniki, Greece
e-mail: kyak@auth.gr
Tel: +302310996411



MINIMAL has received funding from the European Union under the Horizon Europe grant agreement No. 101056863 and from the UK Research and Innovation (UKRI) under contract No. 10040930, 10053292 and 10039071. Views and opinions expressed are, however, those of the authors only and do not necessarily reflect those of the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the European Union nor CINEA can be held responsible for them.