ENABLEH2 Session EASN

Presentation 1:
Enabling Cryogenic Hydrogen-Based CO_2-free Air Transport (ENABLEH2)

Presenter – Dr Vishal Sethi
Senior Lecturer in Gas Turbine Combustion and Environmental Impact, Cranfield University

Flightpath 2050 very ambitiously targets 75% CO_2 and 90% NOx emissions reductions, relative to year 2000. It is highly unlikely that these targets will be met with carbon containing fuels, despite large research efforts on advanced, and in many cases disruptive, airframe and propulsion technologies, even when coupled with improved asset and life cycle management procedures. LH_2 has long been seen as a technically feasible fuel for a fully sustainable aviation future yet its use is still subject to widespread scepticism.

ENABLEH2 is a recently launched European H2020 R&I project which will revitalise the enthusiasm in liquid hydrogen research for civil aviation. It will demonstrate that switching to hydrogen is feasible and complements research into advanced airframes, propulsion systems and air transport operations. Combined, these technologies can more than meet the ambitious long-term environmental and sustainability targets for civil aviation.

ENABLEH2 is maturing critical technologies for LH_2 based propulsion to achieve zero mission-level CO_2 and ultra-low NOx emissions, with long term safety and sustainability. The project includes experimental and numerical work for two key enabling technologies: H_2 micromix combustion and fuel system heat management. These technologies are being evaluated and analysed for competing aircraft scenarios; one advanced short-medium range aircraft and one long range aircraft, both featuring distributed turbo-electric propulsion systems. The study will include mission energy efficiency and life cycle CO_2 and economic studies of the technologies under various fuel price and emissions taxation scenarios. ENABLEH2 will also deliver a comprehensive safety audit characterising and mitigating hazards in order to support integration and acceptance of LH_2.

This introductory presentation for the ENABLEH2 session will provide overviews of the strategic importance and expected impacts of the ENABLEH2 project, the overall work scope and partners and the role of a dedicated ENABLEH2 industry advisory board. A brief introduction of the subsequent presentations for the session will also be provided namely:

1. Hydrogen – A Clean Fuel: “Ultra-low NO_X Hydrogen Micromix Combustion Systems for LH_2-fuelled aircraft”

2. Benefits of ENABLEH2 Numerical and Experimental Hydrogen Micromix Combustion Research for the Stationary Gas Turbine Industry

3. Hydrogen – Enabling a Safe Fuel: “Safety Challenges and Opportunities for LH_2-fuelled aircraft and Supporting Infrastructure”

4. Integration of Cryogenic Hydrogen Fuel and Propulsion Systems for Commercial Aviation

5. Hydrogen – A Technically Feasible and Sustainable Fuel: “Technology Evaluation of LH_2-Fuelled Aircraft”