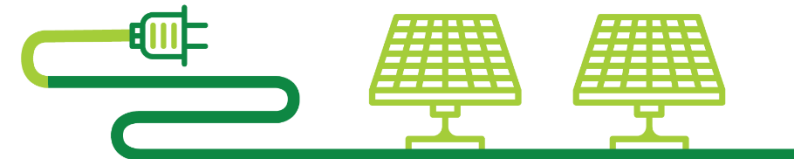


AVIATION CO₂ REDUCTIONS



STOCKTAKING SEMINAR

TECHNOLOGY · OPERATIONS · SUSTAINABLE AVIATION FUELS



Novel aircraft technological concepts

Bobby Sethi,

Deputy Director of Research - School of
Aerospace, Transport and Manufacturing –
Cranfield University



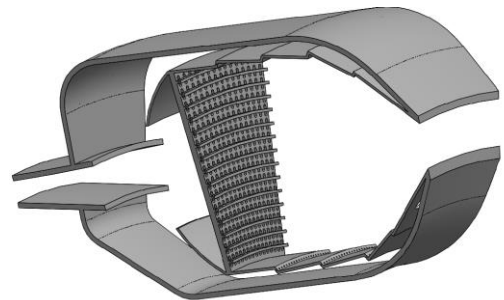
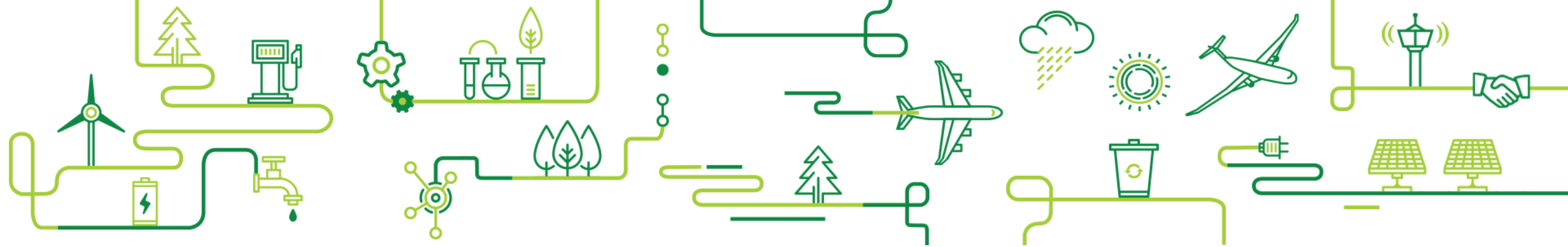


Enabling Cryogenic Hydrogen-Based CO₂-free Air Transport (ENABLEH2)

Dr Bobby Sethi

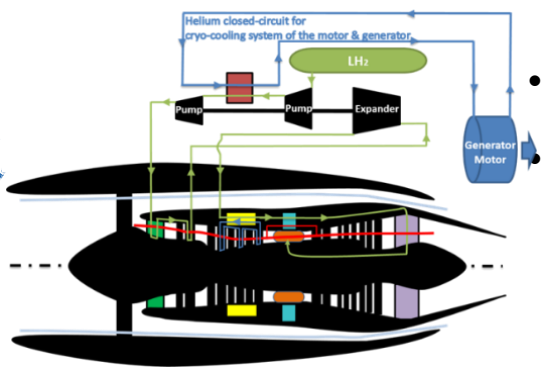
ENABLEH2 Project Coordinator
Senior Lecturer in Gas Turbine Combustion and Environmental Impact
Propulsion Engineering Centre
School of Aerospace, Transport and Manufacturing
Cranfield University





ENABLEH2 – Project Overview

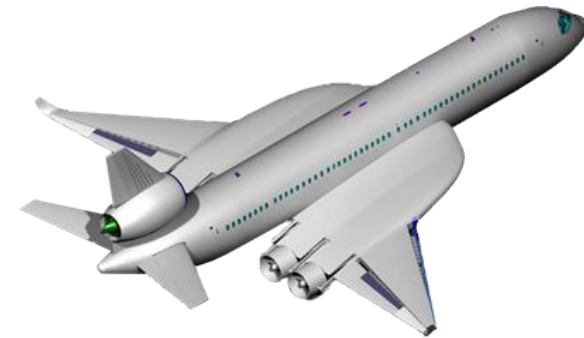
- EU H2020 Project ~4M€, 20+ Key Civil Aviation Stakeholders (partners + industry advisory board members)
- Maturing key enabling technologies for LH₂ which will contribute to decarbonising civil aviation (TRL 2 – TRL4):
 1. Hydrogen micromix combustion – ultra low NO_x
 2. Fuel system heat management – exploiting LH₂'s formidable heat sink potential
 3. Technology evaluation – Technoeconomic Environmental Risk Assessment (TERA)
- Addressing key challenges/scepticism – economic viability and safety
- Establishing roadmaps for the introduction of LH₂





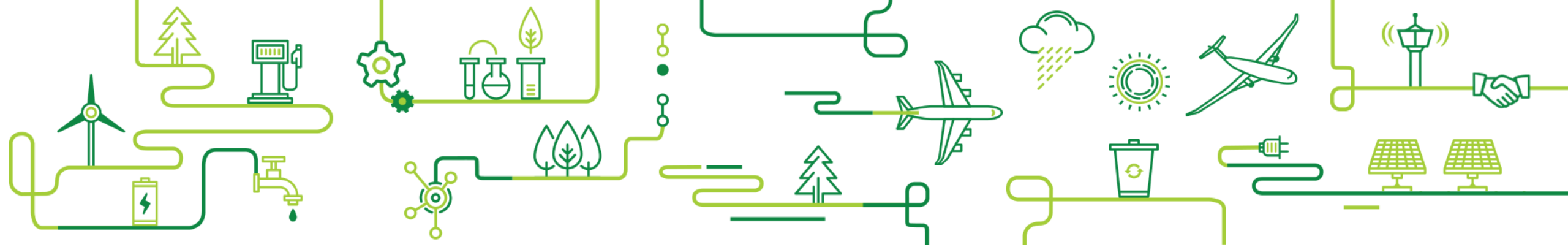
ENABLEH2 – Enabling Research Strands for LH₂

- Ensuring safety with hydrogen-fuelled aviation
- Decarbonisation of power generation
- Hydrogen production, liquefaction and distribution
- Airport infrastructure and aircraft fuelling systems for LH₂
- Design of aircraft fuel systems for LH₂
- Propulsion systems using hydrogen as fuel (including TEDP options)
- Combustor design and emissions reduction with hydrogen
- New commercial aircraft designs for LH₂
- Aircraft operation and maintenance with LH₂ fuel
- Aircraft economics with LH₂ v. alternative fuels
- Environmental impact research, and assessment of hydrogen v. alternative fuels
- Integration of research funding and timeframes



SAFRAN Group, Isikveren and Turnbull





Project Consortium



Industry Advisory Board



Thank you!

Website: (www.enableh2.eu)

Social Media: (Twitter: @Enableh_2)



Enabling Cryogenic Hydrogen-Based CO₂-free Air Transport (ENABLEH2)



Main Challenges

Costs

- LH₂ production and liquefaction
- Design and manufacturing of new LH₂-fuelled aircraft
- Airport infrastructure development

Technical

- Ultra-low NOx combustor design
- Design of aircraft fuel systems for LH₂
- Propulsion systems using hydrogen as fuel
- New commercial aircraft designs for LH₂

 CO₂ reductions per flight **100%**

 Level of finance required **↑↑*1**

 Timeframe **~2040*2**

 Main challenges **(see left)**

¹ Justified considering the environmental and employment benefits

² Not fully optimised

Thank You



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Montréal

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(APAC) Sub-office
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