

Global Research Landscaping

June 2024

Hydrogen Capability Network

Securing Hydrogen development in the UK



HCN: Securing Hydrogen development in the UK

Vision: Securing competitive advantage for UK aerospace through a world leading collaborative network. Delivering a coherent approach to skills development, infrastructure and hydrogen supply to secure long-term UK capability.

Why? The strategic need & case for the UK

HCN acts on key recommendations from FlyZero to become an essential enabler of UK technology development. With other nations acting quickly and other sectors competing for hydrogen, the UK must act to consolidate the aerospace sector's approach to hydrogen and ensure that testing and development remains in the UK.





Coordinating the UK's Coordinating the approach **research** landscape around cryogenic to skills to increase cryogenics talent in Hydrogen, bridging the gap between the UK academia and industry









Coordinating the approach to **test** infrastructure & demonstration through an open access network and greater collaboration











The challenges for adopting liquid hydrogen in aviation

Aerospace needs Liquid Hydrogen to scale. We need to prove the technology. We need to enable technology development with supporting pillars for cryogenics in the UK.



Global shortage of cryogenic skills, especially with aerospace understanding



Gaps in fundamental research and enabling standards





No domestic liquefaction capability, difficult commercial case



Lack of suitable infrastructure for testing with liquid hydrogen











Zero Carbon Aviation Research Landscape





Hydrogen



5

Topics related to LH2 storage and fuel delivery

LH2 storage and fuel delivery (on aeroplane) (modelling & experimental)

Fundamental Research

- Cryogenic Hydrogen Thermofluids \bullet
 - Scope of operations and systems: •





Hydrogen

					H ₂
		J			
ost mp	Engine Shutoff Valve	HP Pump	Heat Exchanger	Eng HP Valve & Metering Unit	Fuel utilisatior
	Storage and distribution		Thermal management		Out of scope
	In scope	е			•











Scope

Covering all phases of flight including upset conditions



Molina, Martin & Carrasco Herranz, Sergio & Martin, Jorge. (2014). Agent-Based Modeling and Simulation for the Design of the Future European Air Traffic Management System: The Experience of CASSIOPEIA. Communications in Computer and Information Science. 430. 10.1007/978-3-319-07767-3_3.





7

Themes – Draft workshop reports available

Materials

modelling.

Health & Safety

• Fundamental science behind cryogenic hydrogen Health and safety

Thermofluids

• Fundamental science behind cryogenic hydrogen thermofluids – experimental and modelling

Sensing Technology

• Current landscape and aerospace applicability



• Fundamental science behind low temperature and hydrogen effects on materials. Including thermal, mechanical, chemical effects - gradients and cycling, considering experimental and



HCN Research Next Steps

Following our workshops with industry and research stakeholders we are now releasing a number of external workpackages to advance understanding of the potential opportunity





REQUESTS FOR PROPOSALS

Benchmark international capabilities

Final report on benchmarking UK capability gaps against international capability

We require external workpackages to advance to understanding of the gaps and opportunities against our identified topic.

Proposals can be across a whole topic or a subset depending on your organisations area of expertise.

Coordinated research proposal for UK to advance LH2 aircraft storage and fuel delivery fundamental research









Request for Proposals External workpackages to support HCN research proposal development

- Desk based assessment of global capabilities in a relevant topic/ sub-topic including:
 - Which organisations are active in the topic and level of maturity
 - Experimental capabilities (P, T, LH2 flow rate etc.)
 - Modelling capabilities, including V&V
 - Levels of investment
 - Gaps
- Final deliverable: summary report
 - Published on ATI website
 - Used to assess research priorities for UK
- Governance
 - Kick-off meeting followed by monthly review meetings
 - Changes in scope/ topic/ deliverable to be agreed jointly and recorded



Network



What's the opportunity?

- Desk based assessment of global capabilities in a relevant topic/ sub-topic including:
 - Which organisations are active in the topic and level of maturity
 - Experimental capabilities (P, T, LH2 flow rate etc.)
 - Modelling capabilities, including V&V
 - Levels of investment
 - Gaps
- Final deliverable; summary report
 - Published on ATI website
 - Used to assess research priorities for UK
- Governance
 - Kick-off meeting followed by monthly review meetings
 - Changes in scope/ topic/ deliverable to be agreed jointly and recorded



Network



Global Capability Mapping Timeline



Quotation Details

- Deadline for submission 12th July
- Total budget ~£250k for this activity; to cover all topics
 - Define people and resources to be used
- Specify work scope, ie which topics or sub-topics, to be covered, how the landscaping will be assessed
- Define research capability & experience
- Confirm availability of resource
- Layout approximate project plan
- Selection criteria
 - Relevant experience
 - Cost & value for money
 - Resource availability
 - Timescales
 - Relevance of proposal

Network

Next Steps

Further Information

- Webinar, presentation & tendering process report available on HCN website https://www.ati.org.uk/hydrogen/
- Ts&Cs and draft workshop reports available on request hydrogen@ati.org.uk
- Email questions to <u>hydrogen@ati.org.uk</u>
- Opportunity for further discussion on application to <u>hydrogen@ati.org.uk</u>
- FAQs to be published on HCN website <u>https://www.ati.org.uk/hydrogen/</u>

Thank You

Contact us at: <u>ati.org.uk/hydrogen</u> <u>hydrogen@ati.org.uk</u>

