Innovation for clean hydrogen growth

Innovate UK - Knowledge Transfer Network

10th February 2022

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ktn-uk.org/energy/hydrogen/

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Innovation rarely just happens

It happens as a consequence of coordinated collaboration between:

- Business
- Government
- Research

This is where **Innovate UK KTN** comes in.

Innovate UK KTN
Connecting for Positive Change

Innovate UK KTN exists to **connect** innovators with new partners and new **opportunities** beyond their existing thinking - **accelerating ambitious ideas into real-world solutions**

Innovate UK KTN connects ideas, people and communities **to drive innovation that changes lives**

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The Future. Faster

As a network partner of Innovate UK

KTN combines expertise across the technology economy with the ability to cross boundaries.

Connecting with KTN can lead to potential collaborations, horizon-expanding events and innovation insights relevant to your needs.

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The Innovate UK group

Department for Business, Energy & Industrial Strategy

UK Research and Innovation

Fund

Innovate UK

Connect

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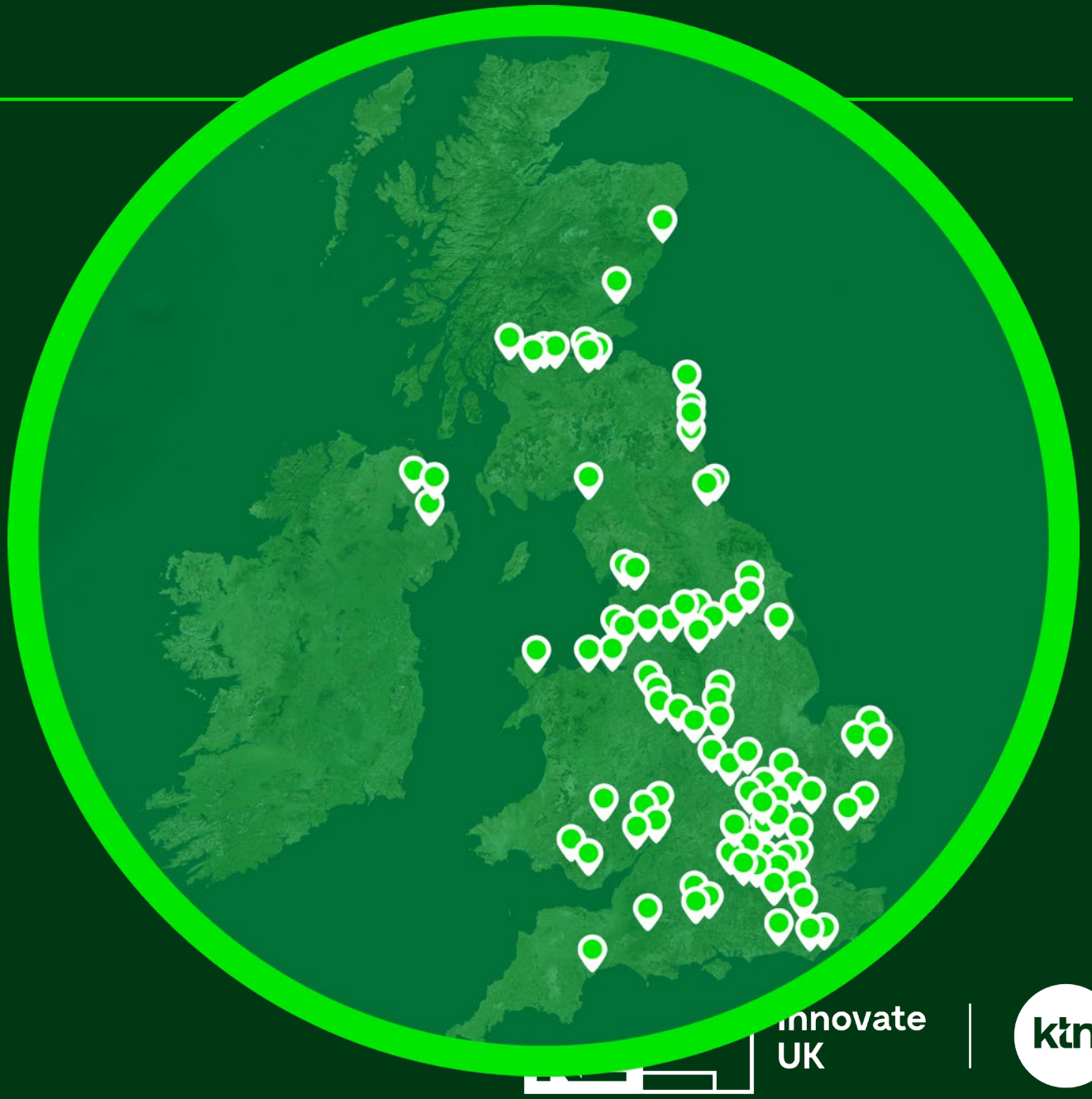
Where we are

200 colleagues based across the UK, including 30 KTAs

Offices in Edinburgh, London and Harwell



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KTN's Network

46,229

Unique Organisations

72%

Small

15%

Medium

13%

Large

234,478

Innovators

Access to all Universities across the UK

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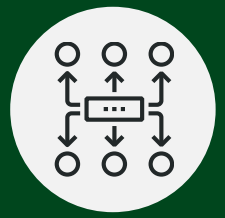
What Innovate KTN do – Growth Through Innovation



Connecting

Finding valuable partners

Project consortium building

Supply Chain Knowledge

Driving new connections

Articulating challenges

Finding creative solutions

Funding

Awareness and dissemination

Public and private finance

Advice – project scope

Advice – proposal mentoring

Project - follow-up

Influencing

Promoting Industry needs

Informing policy makers

Informing strategy

Communicating trends and market drivers

Supporting

Intelligence on trends and markets

Business Planning support

Success stories / raising profile

Navigating

Navigating the innovation support landscape

Promoting coherent strategy and approach

Engaging wider stakeholders

Curation of innovation resources

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Hydrogen Innovation Network

Purpose:

- To create a non-competitive advisory group to pool knowledge from existing hydrogen communities to validate views on the current challenges to enabling local clean hydrogen ***uptake*** at scale and cost and to find innovative solutions to those challenges.

Focus:

- Build deep knowledge around the strengths (and weaknesses) in UK capability to deliver a hydrogen economy in key and emerging sectors (Output: KTN Capability Map)
- Provide a validated viewpoint on the innovation challenges that are holding back deployment/ adoption in emerging markets/ sectors
- Identify solutions for innovation challenges to enable hydrogen production in emerging sectors and in emerging clusters (KTN Innovation Exchange).

Hydrogen Landscape and Network focus

Production

- SMR of natural gas (Blue)
- Nuclear
- Electrolysis (Green)
- Gasification
- Biohydrogen
- Other processes

Transport & Storage

- Ammonia
- Fuel Cell
- Gas Network Infrastructure
- Shipping & Ports Infrastructure
- Tanks
- Chemical Storage (other than Ammonia)

Demand (Use)

- Heating (domestic sites, industry sites,
- Heating (industrial processes)
- Highway Vehicles & Refuelling Stations
- HGVs
- Off Highway Road Transport
- Marine
- Aviation
- Rail
- Feedstock for industry
- Integration

Innovation (R&D through deployment) / Infrastructure/ Policy / Business Models/ Standards & Regulation/ Public Awareness & Adoption/ Local & National Strategy

Some highlights

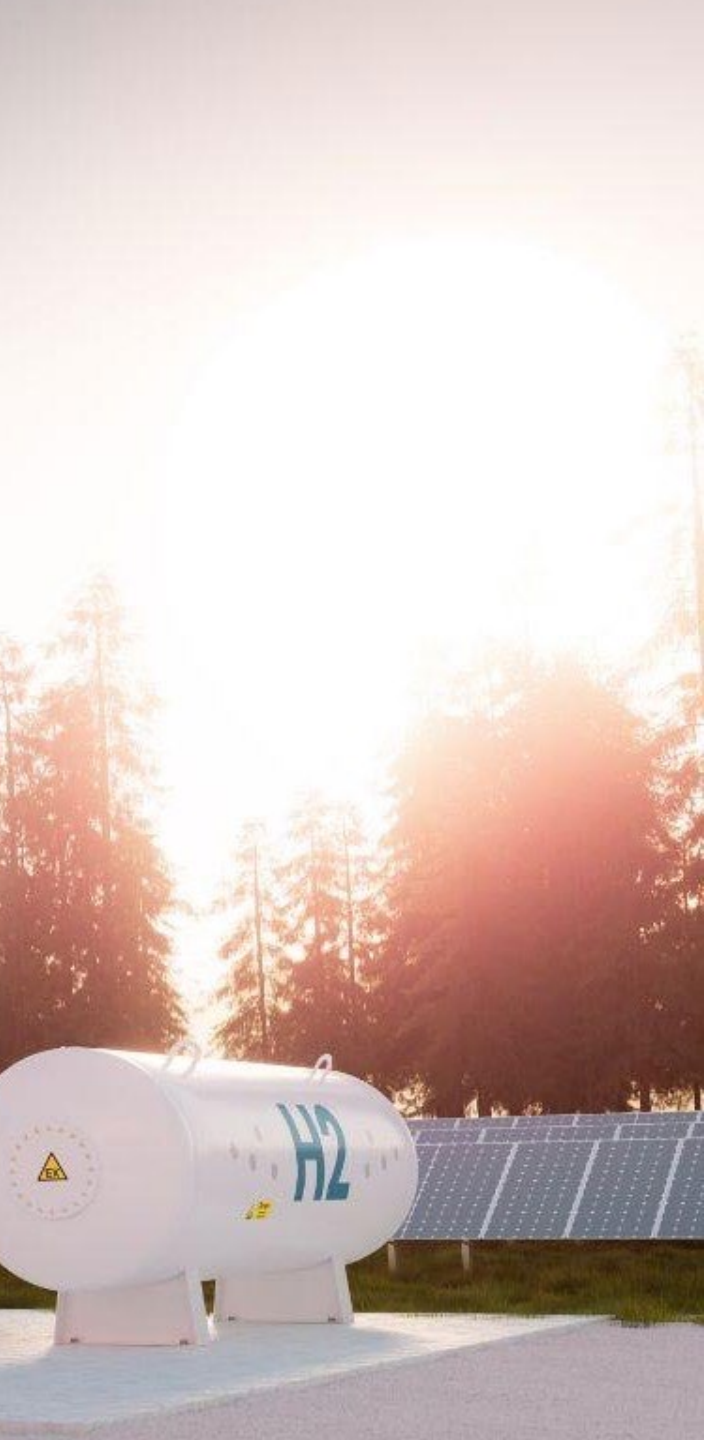
- Help in development and as a panellist for Teesside University ‘Pitch your hydrogen project’ day

- End-to-End materials for hydrogen workshop with the Henry Royce Institute and help facilitating their CSR bid

- 2 webinars and a workshop for the Canadian SIN on hydrogen blending standards – More to follow in 2022

- Off Highway webinar and workshop, jointly run with the Cross Sector Battery Systems Network, across construction, agriculture and defence

- Scoping and briefing workshop for Tees Valley Hydrogen Transport Hub competition



UK-Canada-US Hydrogen Blending Standards Development

- Workshop attendees included BEIS, DNV, GHD, EPSRC, American Gas Association, California Utilities Commission, Enbridge Gas, Fortis British Columbia, Innovate UK, Johnson Matthey, Pale Blue Dot energy, Progressive Energy, Protium, Scottish Hydrogen & Fuel Cell Association, HSE

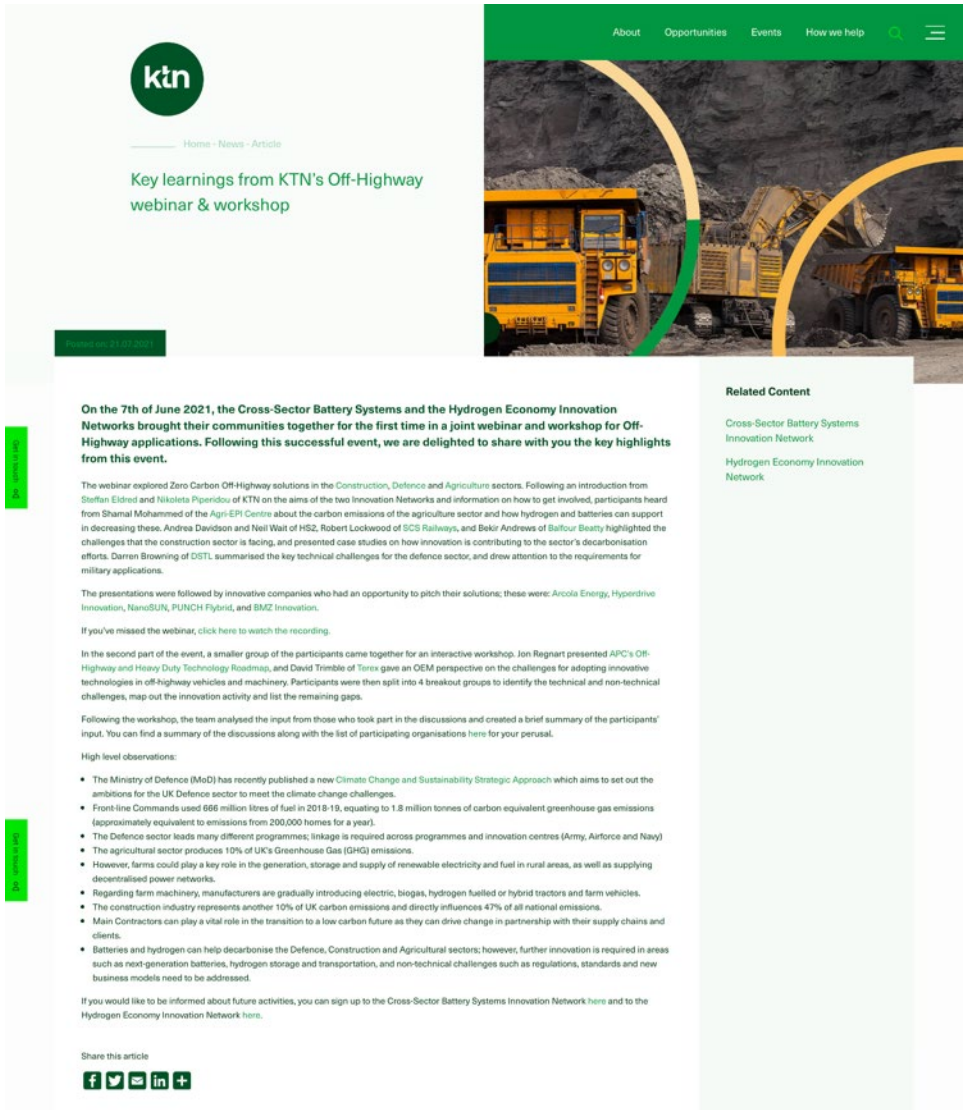
- Further details and summary report: https://ktn-uk.org/events/accelerating-to-net-zero-with-hydrogen-blending-standards-development-in-the-uk-canada-and-the-us/

- Follow up 15th Feb 2022: https://ktn-uk.org/events/hydrogen-blending-standards-uk-canada-us-knowledge-sharing-and-collaboration-building/

ktn Innovation Networks

Articles

Key learnings from KTN's Off-Highway event



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Key learnings from KTN's Off-Highway webinar & workshop

Posted on: 21.07.2021

On the 7th of June 2021, the Cross-Sector Battery Systems and the Hydrogen Economy Innovation Networks brought their communities together for the first time in a joint webinar and workshop for Off-Highway applications. Following this successful event, we are delighted to share with you the key highlights from this event.

The webinar explored Zero Carbon Off-Highway solutions in the Construction, Defence and Agriculture sectors. Following an introduction from Steffan Eldred and Nikoleta Piperidou of KTN on the aims of the two Innovation Networks and information on how to get involved, participants heard from Shamal Mohammed of the Agri-EPI Centre about the carbon emissions of the agriculture sector and how hydrogen and batteries can support in decreasing these. Andrea Davidson and Neil Wait of HS2, Robert Lockwood of SCS Railways, and Bekir Andrews of Balfour Beatty highlighted the challenges that the construction sector is facing, and presented case studies on how innovation is contributing to the sector's decarbonisation efforts. Darren Browning of DSTL summarised the key technical challenges for the defence sector, and drew attention to the requirements for military applications.

The presentations were followed by innovative companies who had an opportunity to pitch their solutions; these were: Arcola Energy, Hyperdrive Innovation, NanoSUN, PUNCH Flybrid, and BMZ Innovation.

If you've missed the webinar, click here to watch the recording.

In the second part of the event, a smaller group of the participants came together for an interactive workshop. Jon Regnart presented APC's Off-Highway and Heavy Duty Technology Roadmap, and David Trimble of Terex gave an OEM perspective on the challenges for adopting innovative technologies in off-highway vehicles and machinery. Participants were then split into 4 breakout groups to identify the technical and non-technical challenges, map out the innovation activity and list the remaining gaps.

Following the workshop, the team analysed the input from those who took part in the discussions and created a brief summary of the participants' input. You can find a summary of the discussions along with the list of participating organisations here for your perusal.

High level observations:

- The Ministry of Defence (MoD) has recently published a new Climate Change and Sustainability Strategic Approach which aims to set out the ambitions for the UK Defence sector to meet the climate change challenges.
- Front-line Commands used 666 million litres of fuel in 2018-19, equating to 1.8 million tonnes of carbon equivalent greenhouse gas emissions (approximately equivalent to emissions from 200,000 homes for a year).
- The Defence sector leads many different programmes; linkage is required across programmes and innovation centres (Army, Airforce and Navy)
- The agricultural sector produces 10% of UK's Greenhouse Gas (GHG) emissions.
- However, farms could play a key role in the generation, storage and supply of renewable electricity and fuel in rural areas, as well as supplying decentralised power networks.
- Regarding farm machinery, manufacturers are gradually introducing electric, biogas, hydrogen fuelled or hybrid tractors and farm vehicles.
- The construction industry represents another 10% of UK carbon emissions and directly influences 47% of all national emissions.
- Main Contractors can play a vital role in the transition to a low carbon future as they can drive change in partnership with their supply chains and clients.
- Batteries and hydrogen can help decarbonise the Defence, Construction and Agricultural sectors; however, further innovation is required in areas such as next-generation batteries, hydrogen storage and transportation, and non-technical challenges such as regulations, standards and new business models need to be addressed.

If you would like to be informed about future activities, you can sign up to the Cross-Sector Battery Systems Innovation Network here and to the Hydrogen Economy Innovation Network here.

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Cross-Sector Battery Systems Innovation Network

Hydrogen Economy Innovation Network

KTN's perspective

on the Government's Hydrogen Strategy 2021

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KTN's perspective on the Government's Hydrogen Strategy 2021

Posted on: 25.08.2021

KTN runs the Hydrogen Economy Innovation Network, and the development of the hydrogen economy has relevance for several of the sectors KTN operates in. The team has responded to the release of the Hydrogen Strategy in this article, examining some of the complex issues inherent in the adoption of low carbon hydrogen and highlighting where you need to take part in relevant consultations.

The release of the UK government's Hydrogen Strategy, which demonstrates that low carbon hydrogen has a significant role to play in achieving Net Zero, has been much anticipated. It makes clear that the UK government is serious about the investment required to tackle the challenge.

KTN agrees that the UK has the 'vision, resources and know how' to rapidly develop the hydrogen economy, with the commitment to finalise the design of the UK standard for low carbon hydrogen production, in collaboration with industry, by early 2022. The consultation for the Hydrogen Standard is now open.

A twin track approach

KTN agrees that we need to grow the supply and demand for hydrogen simultaneously, which may require a twin track approach in the short to medium term. 'Blue' hydrogen production can be scaled up significantly by 2030 and will help to establish the infrastructure and demand for hydrogen whilst 'green' hydrogen production is demonstrated at scale, reducing production costs.

However, as much as blue hydrogen is a stepping stone, we believe that there should be greater focus on green hydrogen to bring forward timescales to scale up green hydrogen production. It is imperative that a measurable definition for low carbon hydrogen is outlined as soon as possible. We welcome the commitment to launch the £240m Net Zero Hydrogen Fund early next year.

KTN agrees that further support for research and innovation is required to enable the hydrogen economy. The recent £60m Low Carbon Hydrogen Supply 2 Competition is welcome but KTN believes there is further scope to invest in R&D and innovation associated with the engineering design, scale up and production of novel catalysts and materials to enable the UK to meet the 5GW by 2030 hydrogen target and beyond.

Steffan Eldred, KTN Hydrogen Economy Innovation Network Lead, commented: *"Our network has been looking forward to the release of this strategy for many months, so we are glad it has arrived and can now start to influence the rapidly developing hydrogen economy. Support for low carbon hydrogen features throughout, but we would like to see more haste and finance apportioned to speeding up truly green hydrogen production and uptake; something our network was founded upon."*

The business model

The cost of hydrogen relative to existing high carbon fuels is mentioned early on in the strategy document and there is no doubt that this poses a considerable barrier to adoption of hydrogen. We welcome the launch of the 'Design of a business model for low carbon hydrogen' consultation which describes how the government will help to overcome the cost difference associated with producing hydrogen compared with high carbon fuels. This support will be essential to establish the hydrogen sector.

Jenni McDonnell MBE, KTN Thermal Energy lead, said *"I was encouraged to see hydrogen for heating homes mentioned in the Strategy. The decarbonisation of heat in the UK will require support for heat pumps, heat networks, and low carbon gas such as hydrogen. The "Prospering from the energy revolution" programme supported the development of local energy systems which integrate multiple energy vectors to meet demand, showing that renewable power and hydrogen can both be part of the solution. How these energy systems develop and what proportion is supplied by hydrogen versus renewable power will be decided by the local needs and resources."*

The distribution network

The Strategy recognises the need to support the development of hydrogen distribution networks and storage, whether they be regional or national, but the government is relying on private investment to fund the initial 'growth' of those networks. This may be reasonable for localised cluster projects but could prove to be a barrier to the adoption of hydrogen for heating in homes. We welcome the review of the existing infrastructure but would like to see more capital investment to de-risk the supply of hydrogen to a range of different consumers, not only the industrial clusters.

Simon Buckley, KTN Zero Emission Mobility Lead, commented *" Along with other documents such as the Transport Decarbonisation Plan this begins to set the scene for how we decarbonise some of the hard to abate sectors such as maritime, aviation, and potentially HGVs. KTN played a core role in collaboration and partnership building across the zero emission road freight competition where H2, Electric Road Systems and Battery Electric are all being trialled; outcomes from this will help plan the future energy vectors needed for this particular market. Production of hydrogen is energy intensive so we need to make sure we are using it for the right sectors and use cases."*

The export opportunities and funding support

The Strategy outlines the opportunities for international collaboration and the desire to take a leading role globally. In March 2021 KTN worked with the British Consulate General in Vancouver and the UK Science and Innovation Network in Canada and the US to deliver 2 webinars and a virtual workshop. Aimed at industry, regulatory, policy and academic leaders from the UK, Canada and the US, the event allowed delegates to share their expertise around hydrogen blending standards development and identify gaps where UK-Canada-US collaboration would be helpful. KTN was also a key part of the facilitation in the recent Department for Transport and Innovate UK hydrogen transport hub competition which focused on green hydrogen uptake. KTN supported 85% of the competition winners by connecting partners for positive change, and played a role in finding companies who could offer mobile refuelling. The Innovation Network will continue to support collaboration both in the UK and internationally to help unlock the export opportunities.

There is considerable activity in this area and it's worth noting that in August, the government announced the following support for hydrogen;

- Consultation on the new £240m Net Zero Hydrogen Fund due to open early 2022. Designing the Net Zero Hydrogen Fund.
- £95m Industrial Fuel Switching 2 competition which includes fuel switching to hydrogen for industrial sites (part of £1bn Net Zero Innovation Portfolio) and is due to open in autumn 2021.
- Red Diesel Replacement (RDR) competition is providing £40m of grant funding to develop and demonstrate low carbon alternatives to red diesel for the construction and mining and quarrying sectors to help these sectors to decarbonise. Phase 1 of the competition is launching in September 2021 with an aim to develop component technologies across three innovation lots. Register your interest in attending the Stakeholder Engagement Events or in applying for the competition here.

About KTN Hydrogen Economy Innovation Network

KTN Hydrogen Economy Innovation Network is funded by the UK government to work with the burgeoning hydrogen sector to find innovative solutions and approaches across regions, clusters and communities to help accelerate hydrogen innovation. The Innovation Network continues to support solutions that enable local clean hydrogen uptake at scale and cost and to find innovative solutions to those challenges described in the Strategy.

Related Content

KTN Hydrogen Economy Innovation Network

Contact Steffan Eldred, KTN Hydrogen Economy Innovation Network Lead

Contact Jenni McDonnell MBE, KTN Thermal Energy lead

Contact Simon Buckley, KTN Zero Emission Mobility Lead

Members Marketing Campaign

2215 members

Coming Soon:

HydroGenerally

Podcast

In Development:

End user

Directory

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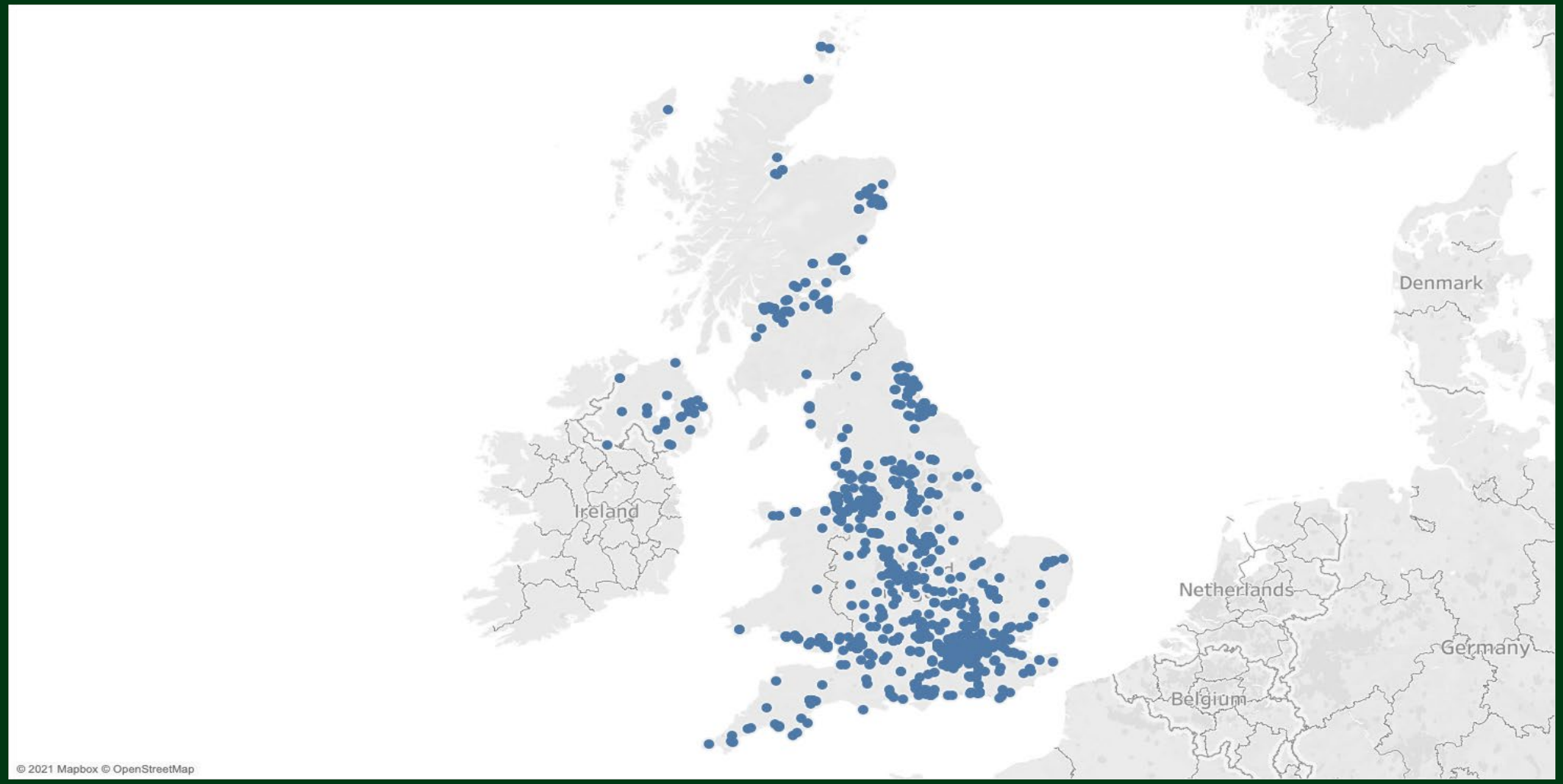
Innovation Network Community – *2,215 network members*



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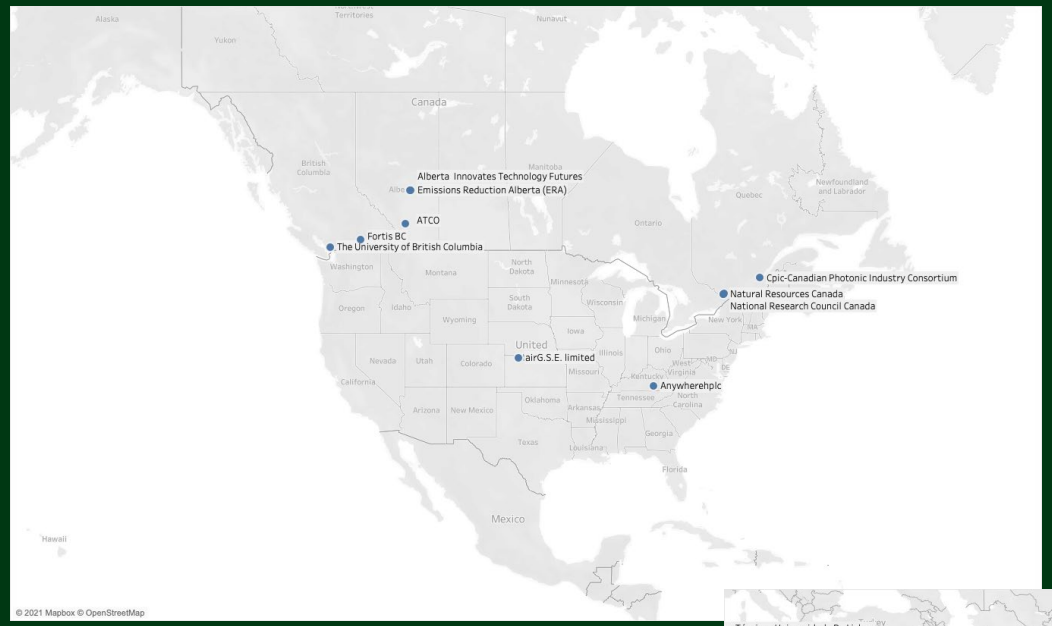
Wider reach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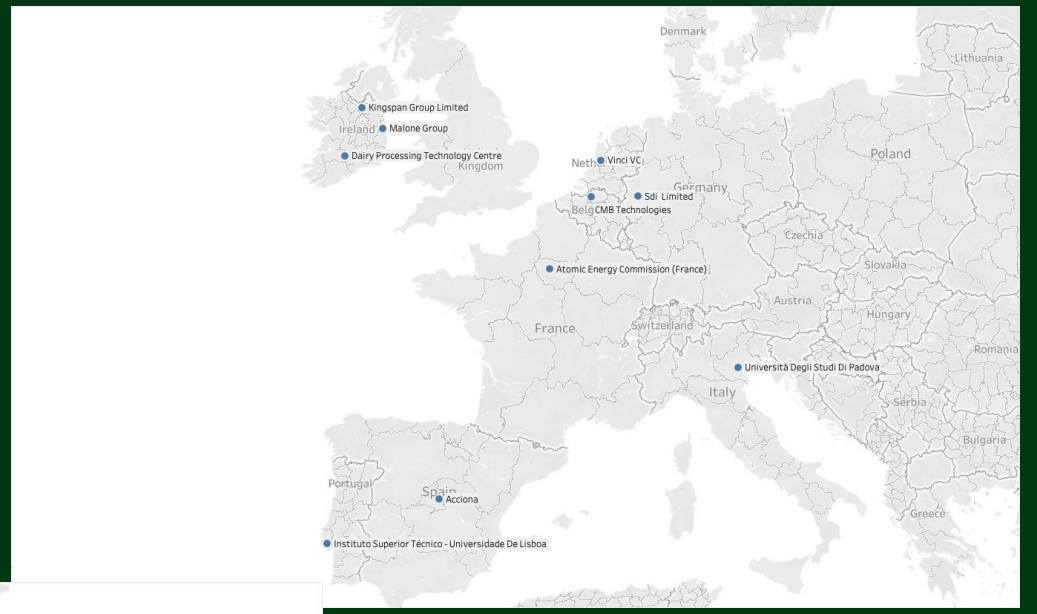
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Thank you!

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