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Hydrogen and Fuel Cells: benefits, status, and how Councils can get involved

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Agenda

- Energy Generation and Supply Knowledge Transfer Network (EGS KTN)
- UK Hydrogen and Fuel Cell Association (UK HFCA)
- Benefits of Hydrogen and Fuel Cells
- Overall Trends
- National Activities
- Local Activities
- Funding Opportunities - Small Business Research Initiative (SBRI)

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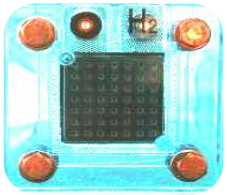
EG&S KTN: coverage

- Offshore Wind
- Carbon Abatement Technologies
  - Large Power Stations
- Nuclear
- Maximising Oil & Gas Resources
- Wave & Tidal
- Fuel Cells & Hydrogen
- Future & Emerging Opportunities

… over 4,500 members







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EG&S KTN: Activities

Events: Stimulating access to funding

Joint EG&S KTN and EU Energy Focus webinar on the FCH JU 2013 Call, December 2013

Fuel Cell Manufacturing Competition Scoping Workshop, September 2013

Joint TSB, SHFCA and EG&S KTN workshop on "Fuel Cell Manufacturing and Supply Chain", August 2013

Joint TSB, EG&S KTN and RCUK workshop on "Outstanding Business and Research Challenges for Hydrogen", May 2013

Events: Exploring specific themes

Power to Gas: New Opportunities - webinar, 20th February 2014

Fuel Cell Material Handling: U.S. success and European growth, November 2013

Expanding your reach into energy – we can help you:

Find new partners / build new relationships

Gain deeper understanding of challenges and opportunities and how you can respond

Access new funding

Facilitating on-line collaboration

Focus work groups to support new Calls and provide a focus for specific interests / activities

Private groups to allow sharing and exchange

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UK HFCA: coverage

- Representing the UK Hydrogen and Fuel cell industry.
- Accelerating the commercialization of fuel cell and hydrogen energy.
- Helping fuel cells and hydrogen energy to become a key component of a low carbon economy – reducing greenhouse gases, enhancing energy security and delivering 'green collar' jobs.

We cover:

- All fuel cell types and applications;
- The full fuel cell supply chain (from research into material science through to systems integration and distribution);
- Hydrogen production and storage;
- Hydrogen infrastructure; and
- Other issues around the delivery, storage and use of associated fuels.


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BOC
Member of The Linde Group
AIR PRODUCTS
Rolls-Royce
UPS SYSTEMS PLC
amec
University of ULSTER
ITM POWER
Energy Storage | Clean Fuel
acal energy
Clean affordable power
Intelligent Energy
AIR LIQUIDE
Science & Technology Facilities Council
cella energy
e·on
Johnson Matthey
Bronkhorst® UK
Manchester Metropolitan University
Waste2Tricity
arcola energy
AFC energy plc
UNIVERSITY OF BIRMINGHAM FUEL CELLS GROUP
Valeswood Fuel Cells
The University of Nottingham
Auriga Energy Limited
GASTEC at CRE
MMI
WMG Innovative Solutions
CATAPULT
Newcastle University
cenex

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Fuel cells and hydrogen energy are:

- ✓ Contributing to a global low carbon economy;
- ✓ Improving urban air quality and the health of urban populations;
- ✓ Contributing to the alleviation of fuel poverty through superior efficiency relative to conventional technologies (particularly in CHP mode);
- ✓ Enhancing energy security by allowing a wider choice of fuels, extending the life of fossil fuels and optimising renewable energy sources;
- ✓ Helping to overcome the intermittency of renewables and deliver improved power management; and
- ✓ Delivering secure and affordable power systems for remote communities, eliminating demand for the use of conventional diesel generators.

……in transport, power and heat

….at a range of scales

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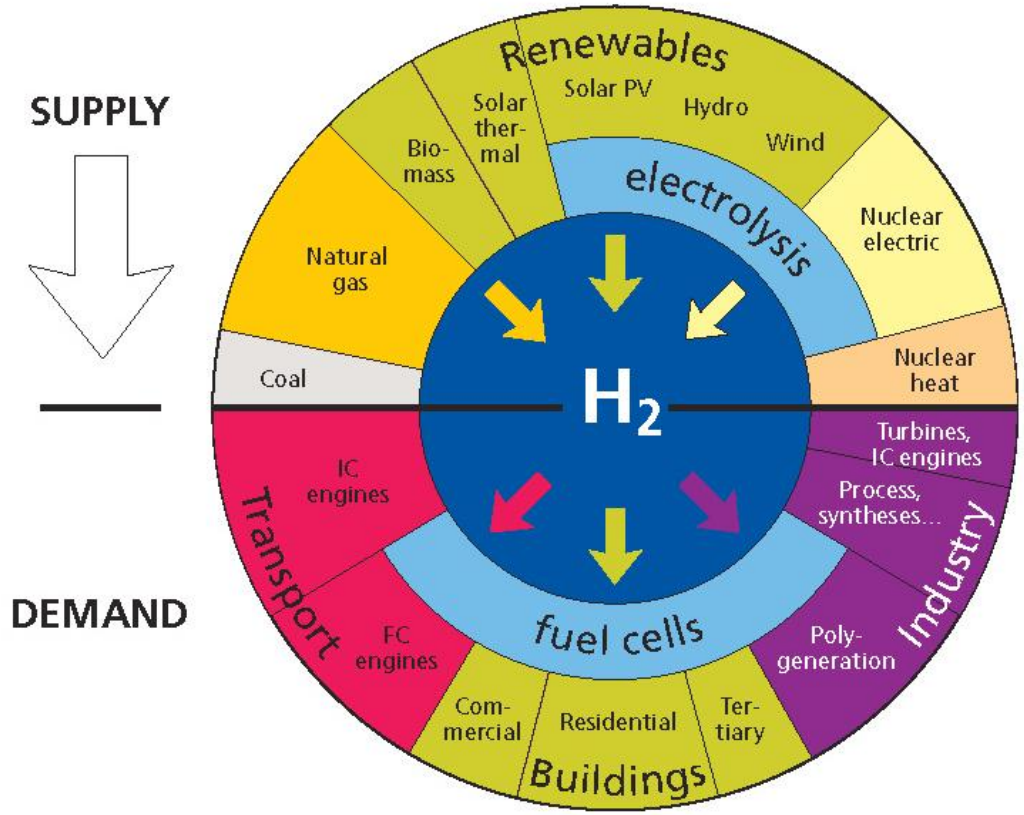

Fuel cells and hydrogen: Opportunities and activity across the energy and transport landscape

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Overall trends (1)

- The European fuel cell and hydrogen industry has seen annual turnover increase by 10% over the past five years[1].
- The global fuel cell and hydrogen energy market is projected to be worth over $15 billion by 2017[2], growing to $180 billion in 2050[3]
- Revenues in the fuel cell sector are projected to grow at a rate of 26% annually over the next decade[3]

Sources: 1.Fuel Cell and Hydrogen Joint Undertaking, Trends in Investment, jobs and turnover in the Fuel cells and Hydrogen sector, 2013

2. Pike Research, 2012.

3. Partnership for Advancing the Transition to Hydrogen (PATH), 2012.

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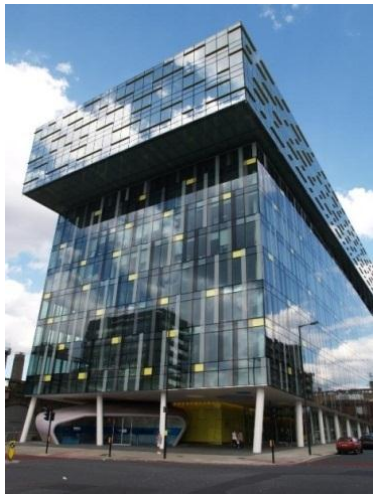
Overall trends (2)

- System numbers: 220% growth in 2012, to over 78,000 systems; dominated by portable chargers for consumer electronics (2/3) followed by stationary (1/3)
- Europe accounting for 25-30% of total
- MW shipped: 60% growth in 2012, to over 174 MW in total
- Dominated by large scale stationary in global terms, but transport in Europe.



Source: Fuel Cell Today Industry Review 2012.

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UK H_2 Mobility

UK activities: national (1)

- Phase 1 completed in March 2013
- Phase 2 developing a detailed business case and specific actions for participants to commit to.
- Key findings of Phase 1:
  - Over one and a half million hydrogen powered vehicles could be on UK roads by 2030
  - An initial roll-out of 65 stations would provide sufficient coverage in line with early vehicle sales, with the network growing in line with the number of FCEVs on the road to provide 1,150 sites by 2030.
  - FCEVs could reduce UK annual total vehicle CO_2 emissions by three million tonnes in 2030. Replacing diesel vehicles with FCEVs could also save £100-£200million per year in the cost of damage to air quality caused by vehicle emissions by 2050.

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UK activities: national (2)

UK Hydrogen Capabilities Online Map

- 15 Refuelling stations
- 9 Large scale hydrogen production facilities
- >30 Leading hydrogen research organisations
- 6 TSB Demonstration Projects
- The map will evolve as infrastructure grows

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Local Engagement (1a)

The Aberdeen Hydrogen Project

- The European Union's largest integrated renewable hydrogen project.
- Enabling greater development of renewable energy (by easing grid constraints)
- Fuelling Europe's largest fleet of hydrogen fuel cell buses, in the city of Aberdeen.

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Local Engagement (1b)

The Aberdeen Hydrogen Project

- Partners: SSE, BOC, Van Hool, FirstGroup, Stagecoach, Scotland Gas Networks (SGN), Element Energy, the Scottish Government, Scottish Enterprise, the UK's Technology Strategy Board, Aberdeen City Council, and the Aberdeen Renewable Energy Group (AREG)
- Funding of £20m provided by: the European Union, the Scottish Government, Scottish Enterprise; the UK Technology Strategy Board (TSB), SSE Low carbon Networks Fund, SGN Innovation funds, Aberdeen City Council, and the bus companies.

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Local Engagement (2)

The Bristol Hydrogen Ferry Project

- Prototype Hydrogen powered Fuel Cell passenger boat for Bristol
- A regular passenger service between landing stages around the City
- First commercial fuel cell boat in the UK
- Partners: Bristol City Council, Auriga Energy, Bristol Packet Boats and No 7 Boats
- Sponsorship from Bristol Council of £225,000
- Project highlighted as one of the city's "green" projects in bid to win European Green Capital in 2015.

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Local Engagement (3a)

The Swindon Hydrogen Project

- First phase: the UK's first open-access, state-of-the-art hydrogen refuelling station
- Joint public-private partnership between Honda, Forward Swindon and BOC
- Operated by BOC, and based at the Honda plant in Swindon
- Second phase: TSB part-funded project to assess the potential for integrating the different technologies involved in hydrogen-powered transport to the way in which the vehicles can be used and refuelled in day-to-day working

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Local Engagement (3b)

The Swindon Hydrogen Project

- Partners: BOC's Revolve Technologies, Swindon Commercial Services Ltd (SCS), Commercial Group, Briggs Equipment, Honda and ACAL Energy
- Economic Strategy for Swindon: On-going commitment to the hydrogen sector, with plans to build an additional re-fuelling station and a CHP scheme, potentially integrating commercial and residential developments.

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Local Engagement (4)

The Greater Manchester Hydrogen Partnership

- Set up in 2012 to develop a network of hydrogen fuel cell stakeholders to bring together knowledge and skills to improve Greater Manchester's capacity to address the challenges of grid demand, energy security and ability to create a lower carbon economy.
- Will help drive forward Greater Manchester's Energy Plan, which outlines how the region's approach to energy will enable Greater Manchester to meet an ambitious target of a 48% cut in CO_2 emissions by 2020.

GREATER MANCHESTER HYDROGEN PARTNERSHIP

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Local Engagement (5)

The London Hydrogen Network Expansion (LHNE) project

- The UK's first hydrogen powered transport system across London and the South East
- State-of-the-art fast-fill 700 bar hydrogen fuelling
- Co-funded by a grant from the Technology Strategy Board
- Partners: Air Products, Cenex, Commercial Group, Element Energy, Heathrow Airport Ltd and Revolve Technologies Ltd
- The Mayor of London and the Greater London Authority playing a supporting role in the project

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Funding Opportunities - Small Business Research Initiative (SBRI) (1)

- The SBRI programme uses the power of government procurement to drive innovation. It provides opportunities for innovative companies to engage with the public sector to solve specific problems.
- Competitions for new technologies and ideas are run on specific topics and aim to engage a broad range of organisations.

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Funding Opportunities - Small Business Research Initiative (SBRI) (2)

- SBRI enables the public sector to engage with industry during the early stages of development, supporting projects through the stages of feasibility and prototyping.
- The Government announced its intention in its 2013 Budget to expand the use of SBRI among key departments five-fold. The value of contracts made available through this route will increase from £40 million in 2012-13 to over £100 million in 2013-14, and over £200 million in 2014-15.

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A new way to get involved: 'Delivering a low carbon Britain through hydrogen and fuel cells: opportunities for local government'

- an On-line Collaborative Group to support local government in its efforts to generate green jobs, increase energy efficiency and reduce carbon through engagement with hydrogen and fuel cells.
- Set up by the Fuel Cell and Hydrogen Group of the Energy Generation and Supply KTN
- Will:
  - ✓ highlight the potential of hydrogen and fuel cells in localised energy and transport systems;
  - ✓ identify funding opportunities; and
  - ✓ Facilitate the development of mutually beneficial partnerships between local authorities, hydrogen and fuel cell organisations and others.

You can find more and register at: https://connect.innovateuk.org/web/on-line-collaborative-group-between-local-authorities-and-fuel-cells-and-hydrogen-sector

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Summary

- Fuel Cell and Hydrogen are game-changing solutions delivering carbon, efficiency and energy security benefits across a range of applications
- Deployment is growing rapidly and the UK is well positioned
- UK H2Mobility will develop a hydrogen refuelling infrastructure across the UK
- Pioneering local engagement can be seen in Aberdeen, Bristol, Swindon, Manchester and London
- Various support mechanisms are available. More details can be found via the new KTN collaboration group

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For more information:

Energy Generation and Supply KTN
https://connect.innovateuk.org/web/energyktn

UK Hydrogen and Fuel Cell Association
http://www.ukhfca.co.uk

Small Business Research Initiative (SBRI)
https://www.innovateuk.org/-/sbri

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