HYDROGEN: A FUEL FOR TRANSPORT AND ENERGY STORAGE

Institution of MECHANICAL ENGINEERS

1 June 2016
Institution of Mechanical Engineers,
One Birdcage Walk, London

Process Division
Seminar

KEY SPEAKERS INCLUDE:

Richard Bruce,
Head,
Office of Low Emissions Vehicles (OLEV)

Professor Nilay Shah,
Professor of Process Systems Engineering, Faculty of Engineering, Department of Chemical Engineering,
Imperial College London

Jon Saltmarsh,
Head of Technical Energy Analysis,
Department for Energy and Climate Change

Robin Hayles,
Sustainable Fuel Development Manager,
Hyundai

Dennis Hayte,
Vice President, Government and External Programmes,
Intelligent Energy;
Chairman,
UK Hydrogen and Fuel Cell Association;
Deputy Chairman,
Hydrogen London

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OFFER ENDS 18 MARCH 2016
TERMS AND CONDITIONS APPLY

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THE HYDROGEN AND FUEL CELL RESEARCH HUB

HYDROGEN LONDON

More details available at
www.imeche.org/hydrogen2016

HYDROGEN: A FUEL FOR TRANSPORT AND ENERGY STORAGE

1 June 2016,
One Birdcage Walk, Institution of Mechanical Engineers, London

TRANSFORMING THE ENERGY AND TRANSPORT SECTORS.

As hydrogen projects gather pace across the transport sector and beyond, leading industry figures will analyse barriers and opportunities, determining the future scope for hydrogen.

Whilst some remain sceptical about the role hydrogen can play, leading automotive OEMs are investing in the production of hydrogen fuel cell vehicles and the IEA 2015 hydrogen and fuel cell roadmap estimates that the global market will potentially be in the hundreds of billions by 2050.

This timely event will bring together experts from across the industry to discuss the future of hydrogen – its barriers and limits, as well as its potential to transform the energy and transport sectors. From generation and storage to fuel cell vehicles and city-wide emissions reduction strategies, this technical seminar will consider the positions from sceptic to enthusiast to find a realistic way forward in this polarised sector.

Who Should Attend

- Operational Management Engineers
- Process Engineers
- Mechanical Engineers
- Project Managers
- Risk Managers
- Control and Instrumentation Engineers
- Technical Directors
- Heads of Climate Change/Energy/Sustainability

KEY TAKEAWAYS:

- **Insight from the Office of Low Emissions Vehicles and the Department for Energy and Climate Change** into UK government policy and strategy
- Hear from **automotive EOM's and their future strategy**
- Benefit from the **opportunity to hear from automotive OEMs** and their future strategy in relation to hydrogen fuel cells
- Discover **solutions** to **generation**, **storage** and **transportation challenges**
- Build a **clear picture of the infrastructure required** and how this can be achieved nationally
- **Network with industry peers** and share the secrets to success

ORGANISING COMMITTEE

John Phillips, Chair, Oil, Gas and Chemical Committee, Institution of Mechanical Engineers

Professor James Turner, Professor of Engines and Energy Systems, University of Bath

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PROGRAMME

WEDNESDAY 1ST JUNE 2016

08:30 — **REGISTRATION AND REFRESHMENTS**

09:00 — **CHAIR'S OPENING REMARKS**
John Phillips, Chair, Oil, Gas and Chemical Committee, Institution of Mechanical Engineers

09:15 — **KEYNOTE: ASSESSING THE FUTURE OF TRANSPORT POLICY, CARBON REDUCTION AND CLEAN AIR TARGETS**
Richard Bruce, Head, Office of Low Emissions Vehicles (OLEV)

- Clarifying UK Government strategy: options for transport energy policy 2020 and beyond
- Understanding the importance of alternative fuels: drivers for change
- Anticipating the role hydrogen may have in meeting EU 2020 greenhouse gas emissions reduction targets
- What government investment is expected in hydrogen

09:45 — **EXAMINING THE RELATIONSHIP BETWEEN HYDROGEN, ELECTRICITY AND NATURAL GAS: HYDROGEN'S ROLE IN ENERGY STORAGE SYSTEMS**
Ian Arbon, Owner, Engineered Solutions

- Understanding the impact of hydrogen availability on both the transport and energy industries
- Matching engineering challenges to energy solutions: battery, hydrogen or both?
- Hydrogen as an energy carrier to balance the grid: converting and storing excess energy from renewable sources

10:10 — **QUESTION AND ANSWER SESSION**

10:20 — **WHY HYDROGEN? UNDERSTANDING THE CURRENT FRAMEWORK AND POTENTIAL FOR HYDROGEN**
David Hart, Director, E4tech
Ewan Swaffield, Low Carbon Vehicles Policy Manager, Transport Scotland
Simona Webb, Hydrogen London Programme Manager, Greater London Authority

- Getting to grips with what hydrogen can and can't achieve
- Outlining the current picture for hydrogen as a fuel for transport
- Considering the barriers to large-scale roll out
- Assessing the competition: viable alternative low-carbon fuels

11:00 — **NETWORKING REFRESHMENT BREAK**

11:30 CASE STUDY — **STORING RENEWABLE ENERGY IN THE GAS GRID**
Graham Cooley, Chief Executive Officer, ITM Power

11:55 — **INFRASTRUCTURE FOR HYDROGEN RE-FUELLING STATIONS**
Ben Madden, Director, Element Energy

- Assessing the costs vs requirements
- What comes first – car manufacture or infrastructure development?
- Station designs and refuelling procedures: 350 vs 700 bar
- Considering safety requirements and communicating hazards to consumers
- Hydrogen metering and monitoring: ensuring accurate dispensing and preventing contamination
- Opportunities to modify existing infrastructure: what to do when space is scarce

12:20 — **QUESTION AND ANSWER SESSION**

12:30 PANEL DISCUSSION — **CHALLENGES AND OPPORTUNITIES IN HYDROGEN GENERATION**
Professor Nilay Shah, Professor of Process Systems Engineering, Faculty of Engineering, Department of Chemical Engineering, Imperial College London
David Hurren, Business Unit Manager, SP&S Business Unit, Air Liquide UK Ltd
Graham Cooley, Chief Executive Officer, ITM Power
Dr Hamish Nichol, Innovation Manager for Hydrogen, BOC UK & Ireland

- Centralised production vs production at point-of-use: considering the pros and cons
- Costing different processes in energy, environmental and financial terms from wells to wheels
- Assessing the viability of fuel production processes: are renewable, carbon neutral processes achievable?
- Opportunities in accessing pipelined hydrogen

13:10 — **NETWORKING LUNCH**

For the most up-to-date and detailed programme for the event, please visit www.imeche.org/hydrogen2016

- This programme is subject to change.
- The Institution is not responsible for the views or opinions expressed by individual speakers.

PROGRAMME

WEDNESDAY 1ST JUNE 2016 (CONT.)

14:00 CASE STUDY

HYDROGEN IN ABERDEEN: APPLICATION IN BUSES AND BEYOND

Mark Munday, Technical Director, First UK Bus

- Understanding council aims to reduce emissions through transport and the wider hydrogen strategy
- Real costs of implementation and projected maintenance costs
- Conducting a viability assessment: what is the route to becoming commercially viable?

14:25 CASE STUDY

HYDROGEN IN LONDON

Paul Beyer, Engineering Manager Surface Transport, Transport For London

14:50

QUESTION AND ANSWER SESSION

15:00 PANEL DISCUSSION

EXPLORING THE SCOPE FOR FUEL CELL APPLICATIONS: PASSENGER AND COMMERCIAL VEHICLES AND BEYOND

Dennis Hayter, Vice President, Government and External Programmes, Intelligent Energy; Chairman, UK Hydrogen and Fuel Cell Association; Deputy Chairman, Hydrogen London
Robin Hayles, Sustainable Fuel Development Manager, Hyundai
Jon Hunt, Manager, Toyota and Lexus Fleet Marketing, Toyota (GB) PLC
Thomas Brachmann, Chief Project Engineer, Honda R&D Europe

15:40

NETWORKING REFRESHMENT BREAK

16:10

EXPLORING THE POTENTIAL FOR HYDROGEN AS A DUAL FUEL TO REDUCE CARBON EMISSIONS IN COMMERCIAL VEHICLES

Paul Turner, Technical Director, Revolve Technologies

- Understanding the potential environmental impact of diesel carbon emission displacement in larger vehicle fleets
- Exploring the technicalities of how hydrogen can be used without spark ignition in a diesel engine
- Why compression and not spark ignition?
- Using dual fuel as a complementary technology to fuel cells

16:35 PANEL DISCUSSION

DETERMINING THE LIKELY SCOPE AND FOCUS FOR HYDROGEN IN EMISSIONS REDUCTION FOR 2020 AND BEYOND: MANAGING EXPECTATIONS AND ANTICIPATING MARKET OPPORTUNITIES

Paul Turner, Technical Director, Revolve Technologies

David Hart, Director, E4tech

Jon Saltmarsh, Head of Technical Energy Analysis, Department for Energy and Climate Change (DECC)

Nigel Holmes, CEO, Scottish Hydrogen and Fuel Cell Association (SHFCA)

James Turner, Professor of Engines and Energy Systems, Department of Mechanical Engineering, University of Bath

- Considering alternative transport applications
- Potential for decarbonising the gas grid
- Hydrogen's role in inter-seasonal heat and energy storage
- Determining which areas are best to transfer to hydrogen
- Envisaging a realistic future timeline for future implementation of a hydrogen strategy
- Communicating the case for hydrogen to industry

17:15

CHAIR'S CLOSING REMARKS

17:30

END OF SEMINAR

For the most up-to-date and detailed programme for the event, please visit www.imeche.org/hydrogen2016

- This programme is subject to change.
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SPEAKERS AND CONTRIBUTORS

KEYNOTE SPEAKER

RICHARD BRUCE
HEAD, OFFICE OF LOW EMISSIONS VEHICLES (OLEV)

Richard Bruce has been head of the UK's Office of Low Emissions Vehicles (OLEV) since 2012. OLEV is a cross-Government team comprising people and funding from the Departments for Transport (DfT); Business, Innovation and Skills (BIS); and Energy and Climate Change (DECC). OLEV's role is to support the early market for ultra low emission vehicles, maximising the benefits from this transition for the UK economy and taking forward the Government's policy of reducing transport emissions to address concerns over carbon, air quality and energy security. OLEV was responsible for around £400m of Government expenditure up to 2015 and has been allocated a further £500m for the 2015-20 period.

CHAIR

JOHN PHILLIPS
CHAIR, OIL, GAS AND CHEMICAL COMMITTEE, THE INSTITUTION OF MECHANICAL ENGINEERS

John Phillips started his career as a student apprentice with Rolls-Royce, Bristol Engine Division in 1969. Following graduation from Bath University he joined the Development Test department responsible for the sea level and high altitude testing of aero gas turbines. In 1976 John moved to Davy Powergas in London as a machinery engineer in the oil, gas and petrochemical industry responsible for fluid machinery for onshore and offshore plants. He subsequently worked in a similar capacity for McDermott and M.W.Kellogg before moving to Air Products at Walton-on-Thames in 1989 to take on the role of Machinery Design Manager. John retired from his position at Air Products as Global Manager, Cryo Systems Machinery in 2015.

SPEAKERS

PROFESSOR NILAY SHAH,
PROFESSOR OF PROCESS SYSTEMS ENGINEERING, FACULTY OF ENGINEERING, DEPARTMENT OF CHEMICAL ENGINEERING, IMPERIAL COLLEGE LONDON

Nilay Shah's research interests include the application of process modelling and mathematical/systems engineering techniques to analyse and optimise complex, spatially- and temporally-explicit low-carbon energy systems, including hydrogen infrastructures, carbon capture and storage systems, urban energy systems and bioenergy systems. He is also interested in devising process systems engineering methods for complex systems such as large-scale supply chains and biorenewable processes, and in the application of model-based methods for plant safety assessment and risk analysis. He has published widely in these areas and is particularly interested in the transfer of technology from academia to industry.

JON SALTMARSH
HEAD OF TECHNICAL ENERGY ANALYSIS, DEPARTMENT FOR ENERGY AND CLIMATE CHANGE

Jon Saltmarsh is currently Head of Technical Energy Analysis at the Department for Energy and Climate Change (DECC). His role involves gathering evidence to underpin the UK Government's policies on reducing demand for energy, principally through energy efficiency and the use of locally generated, low carbon sources of energy. One of his particular interests is the use of hydrogen as a low carbon energy vector. Prior to joining DECC, he ran a number of cutting edge technology development programmes providing low carbon alternatives to traditionally highly energy intensive activities. They included solar powered unmanned aircraft and innovative simulation systems for military training.

EWAN SWAFFIELD
LOW CARBON VEHICLES POLICY MANAGER, TRANSPORT SCOTLAND

Ewan Swaffield has, since graduating with a degree in philosophy, had experience of working in the private, public and 3rd sectors. His civil service roles have featured both policy and delivery areas, including energy, transport and zero waste. Aside from a short spell in justice (he learned his lesson after that!), these have had a common thread of environmental and sustainability issues running through them. That suits Ewan's personal interest in technology and sustainability issues, particularly around transport, energy and resource use. He relishes the challenges and learning that working in this area brings enjoys working across traditional boundaries and with a range of stakeholders, on projects which have a positive effect in the real world. Ewan is currently with Transport Scotland's low carbon vehicle team, which is part of the Agency's policy unit that oversees wider sustainable transport policy for Scotland on behalf of Ministers. The team is involved with all aspects of technologies and other changes that can lessen the harmful impacts of transport. The team's work is driven by climate change targets; improving local air quality; exploiting renewable energy system synergies; seeking economic benefits from change; and also promoting the equality benefits that become more tangible with enlightened transport policy.

SPEAKERS

NIGEL HOLMES
CHIEF EXECUTIVE OF THE SCOTTISH HYDROGEN AND FUEL CELL ASSOCIATION (SHFCA)

Nigel Holmes is CEO of SHFCA, the trade association for development and deployment of hydrogen and fuel cell technologies in Scotland. SHFCA is recognised as one of the most active hydrogen & fuel cell industry associations in Europe. SHFCA now has over 75 members, mostly based in Scotland but with an increasing number of members based overseas. Nigel also represents SHFCA member interests on the Renewable Industry Advisory Group (RIAG), and is a steering group member for both the Scottish Transport Emissions Partnership.

DR GRAHAM COOLEY
CHIEF EXECUTIVE OFFICER, ITM POWER

Graham Cooley joined ITM Power as CEO in 2009. Before that Graham was Business Development Manager in National Power plc and spent 11 years in the power industry developing energy storage and generation technologies. Before joining ITM Power Graham was CEO of Sensortec Ltd, founding CEO of Metalysis Ltd, a spin out of Cambridge University and founding CEO of Antenova Ltd.

PROFESSOR JAMES TURNER
PROFESSOR OF ENGINES AND ENERGY SYSTEMS, UNIVERSITY OF BATH

James Turner is Professor of Engines and Energy Systems at the University of Bath. He spent over 21 years working at Lotus Engineering, latterly being Chief Engineer for Powertrain Research, in which role he worked on many novel engine, transmission and fuel concepts. He has published almost 100 papers and book chapters in this field.

One of his main areas of interest is renewable energy in transport, with particular emphasis on the use of and possibilities afforded by alcohol fuels. He presently has a research stream running on the balance of plant for hydrogen fuel cells.

BOOKING FORM

EVENT CODE: S6341

EARLY BIRD ENDS 18 MARCH 2016

HYDROGEN: A FUEL FOR TRANSPORT AND ENERGY STORAGE

1 June 2016, Institution of Mechanical Engineers, London

www.imeche.org/hydrogen2016

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Member, Institution of Mechanical Engineers	£290.00 + VAT	£340.00 + VAT	£
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ICC, Birmingham

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www.imeche.org/midlandsengineeringdinner

13 April 2016
Institution of Mechanical Engineers, London

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www.imeche.org/mechanicalsealing

7–8 June 2016
Institution of Mechanical Engineers, London

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