

event report

HEAT & SHIFT 2011 Cambridge, United Kingdom

24-25 NOVEMBER 2011



Efficient buildings, smart grids and future automation were key topics

Cambridge's Murray Edwards College played host to this year's annual HEAT and SHIFT conferences that were organised by CIR Strategy – a strategy consultancy established in 2001 that offers opportunity prioritisation and market entry focus and works closely with the Cambridge technology cluster as well as operating internationally. The events are in their fifth and fourth years (HEAT and SHIFT, respectively) and covered a broad range of topics, with an emphasis on the work of local and national operations to reduce UK emissions through efficient connected buildings (HEAT) and various changes to the automotive landscape (SHIFT).

It was refreshing to visit an event where fuel cells were not the primary focus but instead one of several solutions to future energy and carbon challenges in the building and automotive industries. The two events gave a strong feel for the climate in which fuel cells, and indeed other energy solutions, will have to excel, and the technological, financial and behavioural challenges that will have to be met in order for them to succeed.

HEAT 2011

The first of the two days focused on reducing emissions through the introduction of efficient buildings including the integration of micro-CHP (combined heat and power) solutions and networking by smart grids. Four sessions covered the following areas: generation and storage; platform technologies; metering

connectivity and consumer insights; policy for growth and carbon reduction. Although focus was given to solar for energy generation, domestic fuel cells are equally applicable to the future energy landscape HEAT discussed.

Chairman Graham Ford opened the day by stating some of the challenges the UK construction market faces; house deposit requirements have increased five-fold in the last four years – how will new technologies make houses more affordable?

Investment

Genevieve Maltais-Boisvert of investment firm Novusmodus highlighted how investment in renewables is being driven by EU 2020 emissions targets and the desire of investors to see an investment horizon of six years or less. There is a funding gap in meeting these EU targets – someone must meet it. Investment may come from utilities, private equity, corporate funding or public markets. During 2011 there has been (according to Novusmodus) £122 million of UK low carbon funding, £18 million of which was dedicated to fuel cells. This is a significant drop from 2010's £424 million and is a reflection of the current volatility of the European economy. The low carbon economy must be made attractive to investors through the implementation of stable regulation and innovative financing models. Changes to supply measures require substantial funding but investments into energy efficiency and behavioural change are less expensive and still play a critical role in reducing carbon emissions.

The Solar Landscape

Solar Century spoke of the recently announced cuts to solar PV in the UK feed-in tariff (FIT) and how it is likely to affect the currently booming solar industry. Although the amendments to the FIT will remove up to 90% of the UK solar market, Commercial Director Alan South did not dispute their introduction, as solar has seen 500% CAGR under the FIT and accounted for 98% of use in the last quarter. Rather he condemned how sudden the announcement had been – changes are to take place from 12th December, just six weeks after the announcement. The solar industry is still reeling from this, but as technology costs continue to decrease interest will remain regardless of the FIT. The use of microinverters such as those manufactured by Enecsys allow consumers to maximise the potential harvest of PV panels and install just one or two panels if they desire. Despite this, many of the smaller UK solar start-ups are likely to be lost as a result of the changes and poor economic climate. This does, however open the door to healthy competition in what has become a monopolised market. Domestic fuel cells make for a weather-independent alternative and Ceramic Fuel Cells Limited and E.ON UK will be commercially launching a domestic SOFC eligible for the FIT in 2015.

Efficient Buildings and the Internet of Things

An opportunity exists for new buildings to integrate low carbon and energy efficiency solutions directly. Breathing Buildings focuses on designing buildings to capitalise on natural air flow and ventilation and produce innovative ventilation mixing stacks for roofs that allow for natural ventilation during winter. Connecting buildings together through the medium of a smart grid is seen as a crucial part of balancing future energy supply by many stakeholders and is part of a far wider technological and societal move towards 'the internet of things', as explained by online real-time data feed management platform Pachube's founder Usman Haque. The internet of things is the principle of a widening array of objects producing open data that can be aggregated and valorised by an application. Smart grids embody this principle: continuous metering of individual resources allows the grid to effectively and autonomously manage the resources at both demand and supply sides. For such a complex system to work many devices with varying ways of working must be able to interface through a common platform. One effort that aims to facilitate this is home metering systems provider AlertMe's Open System Gateway initiative (OSGi), which will hold a wide range of API (application programming interfaces) and effectively act as a translator for the different devices.

Innovative Funding: the Green Deal

The day ended as it began with the Cabinet Office, DECC (UK Department of Energy and Climate Change) and regulator Ofgem (UK Office of the Gas and Electricity Markets) all discussing the importance of innovative funding and consumer behavioural insight. DECC's recently announced Green Deal policy aims to tackle emissions from homes by offering homeowners a package of energy efficiency measures that they may implement at no up-front charge. The savings made on the home's energy bill by use of the measures pay back the capital the Green Deal invests over a period of up to 25 years. It is, in essence, an interest-free loan.

Conclusion – HEAT

Energy use is a habitual behaviour that is largely unconscious and impervious to information; the key to transforming energy usage will be through system autonomy and taking the onus away from the consumer. Funding the reform of energy will depend on the establishment of long term contracts and cannot be an instantaneous change, rather a steady transition.

SHIFT 2011

The second day of the event turned the focus towards sustainable and energy efficient future transportation. Four sessions covered: performance and paradigms; current and future platform technologies; body manufacturing; policy for transport choice, freedom, growth and carbon reduction.

The day opened with a somewhat sobering reminder from Oxford University Professor Peter Dobson that although conventional petrol and diesel engines are only approximately 25–35% efficient at present, advancements in injection engine design could raise efficiency to 50–55% and see the internal combustion engine (ICE) continue to reign for some time, up to another thirty years according to Infineum. It is unfortunately irrefutable that although many automakers are investing in alternative drivetrains, they will continue to primarily support ICE for as long as possible as it is what is known and represents solid and reliable profit.

Extending the Life of the ICE

The development of almost all low-carbon drivetrain solutions are a response to global regulatory demands in the reduction of carbon emissions. If the ICE is to remain prominent for some time then as much work as possible must be done to reduce its carbon impact. Lotus Engineering's Dr Jamie Turner suggests the use of alternative fuels as a way to achieve this. An increasing number of modern engines are flex-fuel, allowing them to process E85 fuels – a fuel blend of up to 85% ethanol, popular in areas where corn is abundant. Dr Turner has discovered that GEM fuels (ternary blends of gasoline, ethanol and methanol) of up to 56% methanol run almost perfectly in flex-fuel engines with lower emissions than conventional fuels and E85. High-methanol GEM blends could serve as a drop-in low-carbon solution for many of the cars on the road today.

Alternative Drivetrains and Start-ups

Start-up automotive companies are in a unique position to innovate in commercialising alternative drivetrain concepts in ways larger automakers may not consider, as they are free of an existing business infrastructure created from decades of work with ICE. One such company is UK-based Riversimple.

Riversimple presents both a new car and a new automotive business model. The car (pictured) is a small, two-seater, carbon fibre body city car powered by a 6 kW Horizon PEMFC stack with a 32 litre 350 bar hydrogen tank, a top speed of 50 mph and a 240 mile range. In its design it is to today's market what the Smart was ten years ago. The Riversimple is one of only a handful of FCEV that are designed around being an FCEV (most are retrofits to an existing chassis) and is one of the smallest,



but what sets it apart most is the accompanying business model. Project leader Hugo Spowers explained how the company has aimed to move away from focusing on individual profit centres within the organisation and instead have the entire business backcasting from a common goal of making the car as efficient and economical as possible.

Lease Schemes

Riversimple has no intention of selling its cars; it is moving away from the conventional model of car ownership to one of lease. An owner pays a monthly tariff, much as with a mobile phone, which includes the overheads of the vehicle as well as a fuel quota. Such a system removes the investment hurdle for the consumer; no large capital sum needs to be paid and if the customer changes their mind they can simply end their contract. This makes the technology accessible to a wide range of people, particularly as cheaper tariffs emerge for second and third hand vehicles. It also keeps profits centralised for Riversimple as it will operate the car's fuelling stations. This means that if upcoming trials in Leicester, Shropshire and Herefordshire prove to be successful, Riversimple cars would become available on an area-by-area basis.

Such approaches are inspirational but for the world's established automakers such as Jaguar Landrover (JLR) the working environment is one influenced heavily by existing shareholders and is less accommodating of radical change. Despite this we have seen some major automakers such as Honda, Daimler and GM utilising lease schemes to introduce their pre-commercial FCEV and this approach may be used in launching first generation commercial vehicles from 2015.

Consumer Demands and Accessing Markets

Consumers are not willing to pay a significant premium for benefits that are not immediately tangible to them, particularly given the current economy. This point was raised by JLR in the context of them needing to develop BEV batteries that are cheaper and offer longer ranges in order to increase desirability but it is a more widespread point and one that lends itself to the establishment of manufacturer-led lease models for alternative drivetrain vehicles; removing consumer capital expenditure should attract customers. In the arena of traditional sales the luxury car market is a niche that alternative drivetrain car manufacturers should look to capitalise on; JLR has seen considerable interest in its top of the line Range_e BEV Range Rover Evoque. In accessing the mid-range car markets several presenters spoke of the need to use innovative materials to lighten body weight, thus reducing power demand and allowing for the use of lower power, cheaper fuel cells and batteries. Riversimple and plug-in hybrid UK start-up Axon have used carbon fibre and University of Coventry FCEV spinout Microcab has opted for folded anodised aluminium. These are by no means the only options and there are likely to be many innovations in this area in the coming years.

Driving Down Cost: Fuel Cells

Platinum loading is seen by many as a prohibitive expense in the development of FCEV. However, Johnson Matthey Fuel Cells (JMFC) Director Martin Green informed the audience that platinum only represents approximately 5% of total current FCEV cost. Expense comes through the use of new technologies and this will decrease as volume increases and the technology disseminates. Regardless of this platinum reduction is a strong driver across the FCEV industry and JMFC expects to see loadings decrease from ~30-40 g in first generation 2015 FCEV to ~10-20 g by 2020.

Conclusion – SHIFT

Despite its drawbacks, the ICE remains in a dominant position and will unavoidably be supported by the majority of stakeholders for the foreseeable future as automakers continue to find ways to extend its life and reduce its environmental impact. Regardless of this zero-carbon drivetrains are developing at an increasingly rapid pace and are beginning to commercialise globally.

Jonathan Wing Market Analyst
jonathanwing@fuelcelltoday.com
www.fuelcelltoday.com