NO. 43 WINTER 2010
www.fuelcellpower.org.uk

FUEL CELL POWER

The magazine for the power source of the future

HEADLINE NEWS

The future of energy is here as UTC Power delivers one of their next generation fuel cells to a residential building in New York!

Fuel cells also provide clean, efficient electricity, heat and cooling for educational institutions, hospitals, manufacturing and wastewater treatment facilities, office buildings and supermarkets.

Fuel cells fit in with the new low carbon energy infrastructure which is being built. They are becoming increasingly competitive as fossil fuels cover their real costs and economies of scale are achieved with larger volume manufacturing.

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LAUNCHING THE UK'S FIRST HYDROGEN FUEL CELL FLEET

LIFE WITHOUT OIL!

Microcab has opened its new factory unit in Coventry, where they are building their new hydrogen fuel cell vehicles, branded the H2EV. Partners in the project include Lotus Lightweight Structures, who jointly developed the new chassis for the vehicle. The new range is available as a 4-seater car, light van or taxi and can have either a hydrogen fuel cell drive train or a pure battery EV drive, depending on the user's requirements and their access to refuelling infrastructure.

Eight of the new vehicles with hydrogen fuel cell drive are currently being built for the Coventry and Birmingham Low Emissions Demonstrator project (CABLED). This is part of a UK wide trial in which 300 low carbon vehicles will be made available to users and data are recorded to help understand how they are used in everyday life. The design of the 4-seater, 3-door urban vehicles is completely new, resulting from work with Delta Motorsport, RDM Automotive and Lotus, as part of a Niche Vehicle Network-funded project. The vehicles are due to go on the road in April 2011. Microcab employs lightweight construction techniques and fuel cell hybrid power trains with electric drive for light transport operations in urban and suburban areas. The hybrid power train architecture combines the power capability of a lithium-ion battery with the energy capability of a hydrogen fuel cell to achieve the necessary vehicle performance with ultra-low energy usage and zero emissions.

HIGHER TEMPERATURE PEM FUEL CELLS

Microcab is working with Serenergy A/S of Denmark, which is supplying a system module comprising their Serenus fuel cell, its control system, and power-conditioning circuitry for the hybrid battery and electric drive. Serenergy was the only European company to commercialise high temperature PEM technology which is used in its fuel cells, and which Microcab considers advantageous for its targeted automotive applications. Compared with the commonly used low temperature PEM technology, Serenus fuel cells have a higher internal temperature of 150°C or more, enabling them to operate over a wider range of environmental temperatures, and to use less pure hydrogen fuel. Furthermore, the high temperature exhaust greatly facilitates the use of otherwise wasted thermal energy for heating the vehicle interior, thus increasing overall system efficiency. Serenergy is supplying Serenus 3kW fuel cell systems for use in Microcab's demonstration fuel cell hybrid vehicles.

Microcab and its associates will initially manufacture 8 vehicles to the new design, which will be supplied to Coventry University for participation in a 12-month trial as part of the CABLED project. These will be the only hydrogen vehicles in the UK low carbon vehicle trials, which are funded by the Technology Strategy Board.

TRANSPORT MINISTER PREVIEWS HYDROGEN FLEET

During a visit to a state-of-the-art hydrogen fuelling station at the University of Birmingham, Transport Minister, Mike Penning, asserted that hydrogen vehicles will be part of the future transport mix and that the UK must not focus only on battery electric vehicles. "A one size fits all approach to low carbon vehicles simply isn't feasible. In order for the UK to decarbonise road transport, a mix of technologies, including hydrogen, has to be considered," he stated. Mike Penning saw the Air Products Series 100 fuelling station and witnessed the fuelling of one of the University's fleet of hydrogen powered vehicles. The Minister was also able to drive a hydrogen powered Microcab and see how the technology works in practice. After the drive, he added "I am delighted to see first-hand today Air Products and the University of Birmingham driving forward hydrogen fuel technology. It's state of the art technology like this that will help drive the British economy in years to come." The Minister was also shown around the University's research facility and was given a sneak preview of the new hydrogen powered Microcab design!

LAUNCH OF THIRD HYDROGEN STATION

Dave Wright of Coventry University cut the ribbon to launch the third hydrogen fuel cell station in the Midlands, while Christina Fell of ARUP, the global consulting engineers, refuelled a vehicle. Air Products latest Series 100 hydrogen fuelling station is based at Coventry University's TechnoCentre. The hydrogen station complements those in Birmingham and Loughborough, as part of the British Midlands 'Hydrogen Ring'. These fuelling facilities in the Midlands will form the heart of a planned UK hydrogen fuelling infrastructure. Air Products' Series 100 fuelling station won the Rushlight Hydrogen and Fuel Cell Industry award in 2010.

Jim Cunningham, MP for Coventry South, who also attended the launch, commented: "This is yet another example of the commitment to research and development at Coventry University. The West Midlands is known throughout the country for its innovation and high skill level and we need to ensure that we remain at the forefront of research and development by encouraging the development of low carbon infrastructure." Ian Williamson of Air Products, said, "The new facility at Coventry University strategically links three cities in the Midlands with hydrogen fuelling stations and will prove to be a vital step towards the creation of a low carbon hydrogen transport infrastructure for the UK. For members of the public to be able to trial hydrogen cars for the first time on the Midlands' roads is a hugely exciting development. It demonstrates that this low carbon technology is available today and with the right fuelling infrastructure, can be used across the country." John Latham of Coventry University, added that the University's new hydrogen fuelling station and their ongoing investment and research into low emissions related automotive technologies underlined their commitment to providing state-of-the-art expertise to help grow Britain's low carbon economy."
www.microcab.co.uk

www.air-products.com

FUEL CELL FOR LONDON'S REGENT STREET

FuelCell Energy, Inc. has announced the sale of a 300 kilowatt DFC300 (DFC) fuel cell to the Crown Estate for installation at the Quadrant 3 re-development project on London's Regent Street. The fuel cell will help the project meet clean air emission requirements and carbon reduction targets. The Quadrant 3 project is a 250,000 square foot mixed use retail/office/residential redevelopment project being developed by The Crown Estate with assistance from the Stanhope Estate. The redevelopment project will maintain the historical character of the area while incorporating modern technology and sustainable environmental practices. "Our long term outlook means that sustainability is a critically important part of our approach to business," said Alastair Smart, Head of Development, The Crown Estate. "Reliable on-site power generation delivered in an environmentally friendly manner is an important aspect of our development projects and the fuel cell fits our requirements at Quadrant 3." The plant is expected to be operational later this year.

EFFICIENT, NON-POLLUTING, QUIET OPERATION INSIDE BUILDING

The fuel cell will be physically located inside the building as the quiet operation and virtual lack of pollutants from fuel cells is well-suited for such urban applications. The power generation process of the fuel cell uses an electrochemical reaction rather than combustion, which very efficiently converts fuel into clean electricity. The DFC power plant generates clean electricity and high quality heat. Fuel cells can achieve up to 90% efficiency when the heat is utilized in a combined heat and power (CHP) configuration. The heat for this fuel cell installation will be used for facility heating and cooling, resulting in maximum fuel efficiency and cost savings for the client. The fuel cell project designer and installer, Logan Energy Limited, estimates the overall efficiency of this DFC installation at 82%.

Due to the lack of combustion, the fuel cell emits virtually no pollutants, such as NOx, SOx or particulate matter. This electrochemical power generation process is quiet, allowing for a normal conversational tone next to an operating fuel cell. "We were attracted by the various attributes of the fuel cell including the steady power output combined with ultra-clean, efficient and quiet power generation," said Paul Hargreaves, Development Director, Stanhope Plc, which is overseeing the development for The Crown Estate. "The high quality heat produced by the fuel cell will be used for heating and cooling the buildings, improving the economics of this power plant as both electricity and heat are produced."

"Fuel cells emit virtually no pollutants, an important attribute for an urban location," said Chip Bottone, President and Chief Executive Officer, FuelCell Energy, Inc. "This order by The Crown Estate demonstrates the value of ultra-clean and reliable fuel cell power to support sustainability goals. Recent clean energy proposals announced by the British and other European governments make the European markets attractive for fuel cells." The Crown Estate is a successful business organization guided by its core values – commercialism, integrity and stewardship. It manages a diverse property portfolio which includes office, retail and industrial premises; housing; farmland; forestry and minerals; parkland; and around half the foreshore and almost all the seabed around the UK. www.fce.com

HYDROGEN FUEL TRIAL AT STANSTED TAKE OFF!

ITM Power's Hydrogen on Site Trials (HOST) have commenced with a launch event at the Hilton Hotel at London Stansted Airport. During the trials, hydrogen produced by the on-site HFuel system will power two Ford Transit vans, which will form part of the airport's fleet and will be assessed by staff under every-day driving conditions. Britain's third busiest airport will be the first UK company to test the HFuel and two specially adapted vehicles, as part of ITM Power's nationwide Hydrogen On Site Trials programme (HOST). This pioneering new green fuel technology could drive down emissions and power the airport vehicles of the future.

Dr Andy Jefferson(left), Stansted Airport's head of health, safety and environment, said "Environmental management at London Stansted is critical to the sustainability of our business and is an issue that we take extremely seriously, so we're delighted to be working with ITM Power to launch their ground-breaking Hydrogen On Site Trial project" Dr Graham Cooley (right), CEO of ITM Power, added: "HOST will be the largest multi-sector trial of hydrogen refuelling for transport in the UK, involving 20 major partner organisations. Airports are perfect locations for trialling 'return to base' hydrogen refuelling and we are delighted that London Stansted airport was the location from which we launched the HOST program."

ISLE OF MAN JOINS HOST

The Department of Infrastructure of the Isle of Man Government has signed an agreement to participate in the HOST trials. The Department of Infrastructure is responsible for maintaining and developing much of the Isle of Man's key infrastructure, including the highways network, harbour and port facilities, planning and building control and the Island's key Government buildings including the Sea Terminal, Airport, Energy from Waste Plant and Animal Waste Processing Plant. Through its Operations Division, the Department provides a direct labour organisation which carries out essential works to the infrastructure and also maintains a 24 hour a day emergency response capability for the Island. Commenting for ITM Power, CEO Graham Cooley said: "We are thrilled that the Isle of Man Government's Department of Infrastructure will be joining our HOST trials. This is an exceptional opportunity to test our energy storage, clean fuel technology proposition for vehicle fleets operating in an island environment. Islands by their nature rely on imported fuel; our hydrogen trials will demonstrate how an island can produce its own clean fuel, offering a sustainable transport solution for the vital infrastructure logistics fleet." Keith Lowney, Fleet Transport Manager for the Department of Infrastructure on the Isle of Man, added: "We welcome the opportunity to trial ITM's hydrogen refueling station for 'return to base' operated vehicles. This is particularly appropriate given the geography of the island - 32 miles long by 10miles at its widest - as this will be relevant to most of our infrastructure fleet. Of particular interest will be how as an Island we can generate our own clean fuel from our ample sources of renewable energy." www.itm-power.com

FUEL CELLS FOR DEVELOPING COUNTRIES

Octopus Investments has announced an investment of £2 million into Diverse Energy Limited, a company that builds an emission-free, low-cost fuel cell power solution for mobile phone communication towers in rural areas of developing countries. Diverse Energy has developed the PowerCube™, a stand-alone replacement for the polluting diesel generators currently used as remote power supplies for mobile phone towers where electricity is not available. It delivers power in a highly efficient way with low fuel and maintenance costs, thus offering a 25% reduction in total cost of ownership with a two-year payback. The Company has designed an innovative, proprietary technology that allows the PowerCube to utilise ammonia as a fuel. When compared to traditional diesel generators, the PowerCube provides an 80% reduction in greenhouse gas emissions, a 74% reduction in energy use, and eliminates both local noise and air pollution. The investment provided by Octopus will enable the company to be able to complete the assembly plant and expand rapidly to fulfil orders and serve its large export market.

ENTERING THE GROWING LOW CARBON ENERGY MARKET

Luke Hakes, from Octopus, commented: "Diverse Energy is entering an exciting development phase and we recognise the Company's unique position in the growing green energy market. There has been a considerable amount of hype about fuel cells for off grid applications, but to date we have found no other company which has combined the necessary technology, fuel infrastructure and service agreements to take this proposition to market. As we partner with Diverse Energy to provide more than just funding, we look forward to watching this pioneering company build into a market leader."

"This is a monumental day for the Diverse Energy Team" said Dr Alastair Livesey, Managing Director of Diverse Energy. "Through hard work and with the help of numerous partners, including the Technology Strategy Board, Carbon Trust, Afrox, Centre for Process Innovation Teesside, Leading Light, Balton CP, Artemis Power, Nedstack and the University of Michigan MAP program, we are realizing the vision of our founders and early investors. This investment will enable Diverse Energy to complete the transition from development to a fully commercial manufacturing organization. In Octopus we have found a partner who is not only funding us but also helping us realize an ambitious roll-out programme."

The company was launched in 2007 by a team of energy and telecommunications professionals with over twelve years experience in the development of fuel cell technology and with collectively over 100 years of energy industry experience. Diverse Energy is headquartered in West Sussex, UK, but operates internationally. Its management team consists of a highly qualified, mix of sustainable energy scientists, engineers, management specialists, investors and automotive engineers from a former Le Mans F1 GT pit crew. Their mission is to develop clean, low cost, secure power plants to replace diesel generators in selected applications. During 2009, the company launched its flagship product, PowerCube™, which now uses 8th generation fuel cell technology. Highlights of Diverse Energy's performance include: the first fuel cell powered exhibition stand in 2001, powering the first fuel cell house in the UK in 2004 and powering the first

fuel cell house in India in 2007. Diverse Energy is part funded by the UK Carbon Trust and the Technology Strategy Board and has won numerous awards, including the UK Government iAward for innovation in 2009 and the Energy Institute Award for innovation in 2010.

FUEL CELL POWERCUBES FOR AFRICA

Diverse Energy has shipped to Africa the first fuel cell 'Powercube' a fully commercial power plant fuelled by anhydrous ammonia. The Powercube will provide electricity for off-grid cell phone towers.

This is the first of seventeen PowerCubes to be assembled and deployed under a UK Technology Strategy Board (TSB) 'Ammonia for Power' grant program. At the Diverse Energy facility in West Sussex, TSB Project officer, Christine Foster, named the PowerCube 'Ainra' meaning 'Lasting Power' in Swahili. One PowerCube is being used for local testing and the remaining fifteen will be shipped to Africa to prove the viability of the system in all regional climates and familiarize mobile network operators with the technology.

AMMONIA INFRASTRUCTURE STUDY

A "Multidisciplinary Action Project" (MAP) team from the Ross School of Business at the University of Michigan carried out a detailed ammonia infrastructure study for Diverse Energy and Afrox Oxygen Limited (Afrox), a member of the Linde Group and the largest industrial gases and welding company in sub-Saharan Africa.

The study verified and documented that the existing Afrox ammonia distribution chain has the excess capacity necessary to support initial sales of PowerCubes, and also identified PowerCube deployment "break points" on a country-by-country basis when additional ammonia infrastructure investment will be needed.

The study also provided external verification that the PowerCube represents a disruptive, fast growing, and highly profitable business opportunity for Afrox. According to the international ammonia market intelligence monitor, FMB Group, over 100 million metric tons of ammonia are consumed annually, primarily as fertilizer. 2.4 million metric tons of ammonia would be required if all existing off grid cellular phone towers were converted from diesel generators to PowerCubes.

www.diverse-energy.com

SCOTLAND'S HYDROGEN OFFICE OPENED BY FIRST MINISTER

A state-of-the-art demonstration and research facility powered by hydrogen fuel cell technology was officially opened by First Minister Alex Salmond when he visited the £4.7 million facility in Methil, Fife. The facility, known as the Hydrogen Office, houses a hydrogen production system that captures surplus energy from a wind turbine, stores it as hydrogen and then uses a high efficiency fuel cell to generate electricity from the stored energy when required. The system was developed by the Pure Energy Centre in Unst, Shetland Islands.

First Minister Alex Salmond opened the Hydrogen Office with Derek Mitchell, Project Manager, Adrian Gillespie of Scottish Enterprise and Dr Daniel Aklil of the Pure Energy Centre (left to right).

Alex Salmond said: "This is a hugely exciting development for Fife and for Scotland's low carbon industries as we work together to forge the new green economy. The Hydrogen Office is playing a leading role in the development of a range of carbon-cutting technologies – from the provision of clean energy for electricity, heat and transport to storing renewable power from other sources such as wind, as demonstrated at the site."

About a third of Scotland's electricity is already generated by renewables and last autumn the First Minister raised the national renewable energy target in 2020 to 80% of gross electricity consumed.

INTERNATIONAL CENTRE FOR RENEWABLE HYDROGEN

Derek Mitchell, Project Manager of the Hydrogen Office commented: "The opening of the Hydrogen Office project by the First Minister marks the completion of the first phase of this exciting project. Scotland has the potential to produce far more renewable energy than it currently generates for all its electrical needs; yet because we can't control when we generate energy from some renewable sources this huge potential is still limited. There is no need for such a limit and this breakthrough charts the future to realising Scotland's full potential. Storing wind energy as hydrogen; which we can do in large quantities and for long periods, means we can then use this energy for virtually anything, including in our cars, our cooking, our homes and offices. We can do this without generating any pollution or carbon dioxide and we can use this energy regardless of whether the wind is blowing."

Scottish Enterprise chief executive Lena Wilson added that this highly innovative, low carbon energy facility offers high spec, energy efficient space to encourage the development of renewable technologies. It will serve as an international demonstration centre for renewable and hydrogen energy technology, capturing a share of the £3 trillion global low carbon market.

UP TO 10 TIMES SCOTLAND'S ELECTRICITY REQUIREMENTS

Since commissioning last September, the 750 kW wind turbine has exported over 350,000 kilowatt hours (kWh) to the National Grid. It will generate more than enough electricity and hydrogen for the heating and lighting requirements of the Hydrogen Office. The Hydrogen Office is part of Fife's Energy Park, a 134-acre site strategically located close to the new offshore wind farm leasing sites in the North Sea, which is expected to become one of Europe's leading locations for innovation and the development of renewable technology. It will help reduce the impact of climate change and support the Government's ambitious renewable energy targets, which could see Scotland producing up to 10 times its own electricity requirements in a generation. The Hydrogen Office is a partnership project involving Scottish Enterprise, the European Regional Development Fund (ERDF), Alsherra Investments Ltd, Fife Council, the Scottish Government and the Energy Saving Trust. www.hydrogenoffice.com

http://www.scottish-enterprise.presscentre.com/Key-projects/Energy-Park-Fife-62.aspx

NEWS

FORMER FIAT DESIGN CHIEF JOINS RIVERSIMPLE

Christopher Reitz, the top European car designer who headed the design team at Fiat and then Alfa Romeo, has joined Riversimple, the UK based company which is developing a hydrogen fuel cell car. It is one of the most high-profile moves away from the traditional automotive industry to sustainable transport. Reitz said: "This is a step into something different, to design cars that really are the future. Increasingly I have felt that it does not make much sense to move tons of steel around, using a lot of fuel and resources. There has to be a better way and I think Riversimple has found it, not only with its hydrogen fuel cell car but with the whole concept of the company which has as its goal complete sustainability."

Reitz's first job will be to design the cars that will be seen on the streets of Leicester in 2012. In a ground-breaking deal with Leicester City Council, 30 cars will be driven around Leicester for a year, with drivers providing feedback on their experience. Reitz said: "It has to look good as well as be functional. We don't want to shock because if you shock you are very quickly old and out of fashion. We need to be robust, innovative and safe and getting the right mixture will help produce a successful product. It is very exciting.' Hugo Spowers, of Riversimple said: "I am delighted that someone of Chris' calibre and standing in the automotive world has decided to join Riversimple and help us to produce sustainable cars that will be the envy of others. Chris has been responsible for some of the most beautiful and practical designs in the auto industry in recent years. His experience and flair will be of great help to us as we move towards seeing Riversimple cars on the streets and roads of the UK." www.riversimple.com

CFCL SUPPLIES CHP FOR HOMES

Ceramic Fuel Cells Ltd (CFCL) has sold three BlueGen gas-to-electricity generators to one of the UK's leading energy companies, E.ON. One BlueGen will be installed in early 2011 at the E.ON training centre in Tipton, West Midlands, where E.ON's Property Services department trains its staff in the installation and maintenance of gas and electrical appliances. The other two BlueGen units will be installed at demonstration sites. CFCL is continuing to make progress towards having BlueGen certified under the Microgeneration Certification Scheme, in order to access the UK Government's feed in tariff. This pays 10 pence for every kilowatt hour (kWh) of electricity generated by small scale co-generation products, plus an additional 3 pence for every kWh of electricity sold back to the local power grid. In parallel with installing three BlueGen units, CFCL and E.ON are continuing to develop fully integrated power and heating products for the UK market. In this project, integrated units are being installed with appliance company Gledhill and in a test house with EA Technology.

200 FUEL CELL MCHP UNITS

CFCL has received a conditional order for up to 200 integrated power and heat generators from German energy service provider EWE. The order is conditional on EWE receiving partial funding under the German government's national hydrogen and fuel cell technology innovation program, which is providing 700 million Euros between 2008 and 2018. Subject to EWE obtaining the Government funding and to the units meeting agreed performance targets, EWE will order 70 units for delivery in 2011 and 130 units for delivery in 2012. "This is a significant follow-on order from EWE, and it will see us selling many more of the integrated products we have developed with EWE and our local partner Bruns," said Brendan Dow, managing director of CFCL. Ceramic Fuel Cells will supply the core Gennex fuel cell module and related components and, together with their local manufacturing partner, Gebrüder Bruns Heiztechnik GmbH, they will integrate the fuel cell module with a boiler into a power and heating product for supply to EWE.

MARKET DEVELOPMENT

CFCL has signed an agreement with Adelaide-based Hills Holdings Limited for Hills to sell and service BlueGen gas-to-electricity units, initially in South Australia. Hills will also provide installation and after-sales service for BlueGen products Australia-wide and will help CFCL to develop the market for BlueGen. Hills has a wide range of businesses in three major categories: home, hardware and eco products; electronic security and entertainment; and building and industrial products. "We are delighted to have signed this agreement with Hills, an iconic Australian company in the home hardware and eco products market," said Brendan Dow. "Hills designs, develops and makes its own appliances and solar products, so there are also longer term strategic opportunities for us to collaborate on the BlueGen manufacturing and supply-chain side. This agreement is in line with Ceramic Fuel Cells' strategy to sell BlueGen units in Australia through distributors and to outsource the installation and service of BlueGen units. The agreement with Hills follows similar distribution agreements with green products retailer Neco, based in Melbourne, and Harvey Norman's Commercial Division, in New South Wales and the Australian Capital Territory. The Australian market for BlueGen is estimated to be several hundred thousand units – the number of households connected to natural gas is more than three million. www.cfcl.com.au

NEWS

'WORLD FIRST' FOR CITY'S ELECTRIC CARS

Adelaide City Council has combined green energy with new technology for the city's environmentally aware shoppers. Together with the State Government, the Council has installed an electric vehicle charging station at the Central Market car park that is supplied by locally generated low-emission electricity. Adelaide Lord Mayor Stephen Yarwood said that, in what is believed to be a world first, the public charging station is powered by an innovative Australian-developed fuel cell. This enables city shoppers to recharge their electric vehicles from low emission sources rather than carbon intensive power from the electricity grid. The Central Market in Adelaide is owned and run by the Adelaide City Council and is South Australia's most visited tourist attraction.

The new station is free to users and can charge two vehicles at a time. The ChargePoint recharging station's 2kW BlueGen ceramic fuel cell will be able to generate at least 12,500 kilowatt hours of clean electricity each year. This is enough to power the average South Australian home and two electric cars travelling 15,000 kilometres each per year. Excess power not required for vehicle recharging will be fed into the grid.

"This initiative reinforces the City of Adelaide's role as a leader in environmental sustainability and new technology," Stephen Yarwood said. "This project is a sign of things to come as we move towards a cleaner and greener future for our beautiful city." Brendan Dow, Ceramic Fuel Cells Managing Director, added: "We are excited to have a BlueGen unit at Adelaide Central Market and we are thrilled that the Capital City Committee has recognised BlueGen's potential to power electric cars. BlueGen is an ideal companion technology to electric vehicles."

www.adelaidecitycouncil.com

INTELLIGENT ENERGY VISITED BY MINISTER OF STATE FOR BUSINESS

Mark Prisk MP, the UK Government Minister of State for Business and Enterprise, visited Intelligent Energy's Headquarters at Loughborough, UK. Mark Prisk (centre) is seen here with Intelligent Energy's Director of Communications, Dr Jon Moore (left) and Director of Corporate Finance, Dr Mark Lawson-Statham (right).

The Minister received a tour of the company's offices, test and production areas and was shown examples of Intelligent Energy's leading hydrogen fuel cell technologies. The fuel cell systems are presently being commercialized for multiple applications for transport, stationary, backup and portable power. Following the tour, the Minister had a ride in the company's fuel cell electric hybrid London Black Cab and discussed the rollout of hydrogen and fuel cell vehicles in the UK with Intelligent Energy's senior team. www.intelligent-energy.com

WORLD MARKETS FOR UTC POWER STATIONARY FUEL CELLS

ELECTRICITY, HEAT, COOLING AND REFRIGERATION FOR STOP & SHOP

The Stop & Shop Supermarket Company has announced a significant step in retail store innovation: a special dedication of a 400 kW fuel cell – a first for the supermarket chain – at its store in East Torrington, Connecticut.

The UTC Power PureCell® System Model 400, was supported with a grant from the Connecticut Clean Energy Fund's On-Site Renewable Distributed Generation Program and is the first fuel cell utilized by the Stop & Shop Supermarket Company. It is expected to generate over 90% of the store's electric energy.

"In our commitment to be a sustainable company, we continually look for new innovations and technologies that help us build more energy efficient stores," said Jihad Rizkallah, vice president of store planning for Stop & Shop. "The fuel cell technology is the latest step we've taken to ensure we're doing everything we can to lower our impact on the environment in each community we serve."

CUTTING ELECTRICITY AND GAS BILLS

Since the fuel cell was commissioned last summer it has produced over 1.7 million kilowatt hours (kWh) of electricity, accounting for 95% of the store's total electric energy requirements. This, coupled with the use of the thermal energy produced by the fuel cell, has reduced the total electric and natural gas utility bills for the store by roughly 50%. By generating most of its power on site, Stop & Shop is able to reduce the burden on the local power grid and its impact on the environment. The fuel cell operates without fossil fuel combustion which in turn makes electricity production virtually pollution-free.

Highlights of the fuel cell operation are:

- Stop & Shop anticipates it will prevent the release of more than 523 metric tons of carbon dioxide annually – the equivalent of planting more than 120 acres of trees.
- The annual nitrogen oxide emissions reduction will be equivalent to removing 88 cars from roadways.
- Designed to operate in water-balance, with no consumption or discharge of water under normal operations, the fuel cell at the Torrington Stop & Shop store will save 3.5 million gallons of water compared to central utility generated electricity.

"Stop & Shop did an outstanding job integrating this fuel cell into its new, energy-efficient supermarket in Torrington and maximizing the energy attributes of the fuel cell," said Dale Hedman, acting president of the Connecticut Clean Energy Fund. "The store will not only benefit from electricity produced by the fuel cell

but will also benefit from the fuel cell's waste heat, which will be used for heating, cooling and refrigeration."

GROWING DEMAND FOR FUEL CELLS

This fuel cell joins a growing fleet of UTC Power's PureCell® System Model 400 units. In 2010, UTC Power installed dozens of its stationary fuel cells at locations in California, Connecticut, New York, Wisconsin and South Korea. Since delivery to its first customer in late 2009, UTC Power's next-generation stationary fuel cell, the PureCell® Model 400 System fleet has completed 100,000 hours of field operation. In reaching this mark, the growing fleet has generated enough energy to power more than 3,000 homes for over a year. This game-changing product is one of the cleanest, quietest and most energy-efficient power-generating options available in the world today. The PureCell® Model 400 System has an industry-leading 10-year cell stack life - twice the durability of the previous generation. It builds upon technical development with over 9 million operating hours of the previous Model 200. Mike Brown, UTC Power vice president of government affairs said, "By providing clean, efficient and continuous base-load energy for buildings, fuel cells have become a proven and crucial component of the energy independence roadmap."

RESIDENTIAL BUILDINGS GENERATING OWN POWER

Becker + Becker, an architecture and development firm, has already purchased and installed two PureCell® Model 400 Systems. One system is in a 500-unit LEED (Leadership in Energy and Environmental Design) project in New Haven, Conn., making the facility the first large-scale mixed-use residential building to generate a majority of its own power onsite with a fuel cell. Another PureCell System is generating power and thermal energy at the Octagon, a 500-unit LEED upscale residential building on Roosevelt Island, N.Y. Bruce Redman Becker, president of Becker + Becker said, "We are proud to pioneer the fuel cell revolution in multi-family development, powering the first 1,000 homes with UTC Power's Model 400 System. The PureCell Model 400 can provide up to 400 kW of assured electrical power, plus 1.7 million Btu/hour of heat for combined heat and power applications. In a combined heat and power application, the fuel cell can achieve an industry-best 90% total system efficiency, resulting in lower energy costs and reduced emissions for customers.

POWER AND HEAT AROUND THE CLOCK

In late 2010 St Helena Hospital in California acquired a PureCell Model 400 to provide power and thermal energy around the clock. Since the early 1990s, UTC Power has designed, manufactured and installed more than 300 stationary fuel cell power plants in 19 countries on six continents. The fuel cells are located at diverse locations, including educational institutions, hospitals, manufacturing and wastewater treatment facilities, office buildings and supermarkets. To keep up with the growing demand for the PureCell System, UTC Power recently completed a major upgrade to its world-class production facility in South Windsor, Conn., which now features fuel cell fabrication robotics, rail and turntable assembly and state-of-the-art testing stations. www.utcpower.com

FUEL CELLS, AN EMERGING TECHNOLOGY

The International Energy Agency's latest *World Energy Outlook* says that the age of cheap oil is over. If we begin to change now to more efficient use of oil and the development of alternatives, then there could be a smooth transition to future clean energy technologies. On the other hand if governments do nothing, or little more than at present, then demand for oil will continue to increase, supply costs will rise, the economic burden of oil use will grow, vulnerability to supply disruptions will increase and the global environment will suffer serious damage.

The scenarios in the *World Energy Outlook* are the New Policies Scenario (NPS), which assumes that governments carry out the new policies and measures already announced by countries around the world and the 450 Scenario which proposes a much faster transformation of the global energy system. In the NPS Scenario, the average IEA crude oil price rises from just over $60 in 2009 to $113 per barrel in 2035, compared with $87 in the 450 Scenario or an increase to $140 if we continue with current policies. The 450 Scenario limits global warming gases in the atmosphere to a concentration of 450 parts per million C02 equivalent. It envisages that there would be major changes in transport fuel. By 2035 about 70% of global passenger car sales would be advanced vehicles (hybrids, plug-in hybrids and electric cars). Not only would the proposals under the 450 scenario help to stabilize oil costs, but they would give a reasonable chance of meeting the overall goal of keeping the global temperature increase below 2°C.

The *Outlook* recommends that present Government subsidies of over $300 billion for fossil fuels should be phased out. However, government support for renewables can, in principle, be justified by the long-term economic, energy-security and environmental benefits they can bring and the NPS scenario projects that overall government support for renewables will rise to $205 billion in 2035. Gas, including unconventional sources, will have an increasing role. The delays and uncertainties with the Copenhagen Accord have already increased the cost of keeping the global temperature increase below 2°C. At the launch of the *World Energy Outlook*, Nobuo Tanaka, Executive Director of the International Energy Agency said "We need to use energy more efficiently and we need to wean ourselves off fossil fuels by adopting technologies that have a much smaller carbon footprint". Mr Tanaka concluded that keeping the global temperature rise to a maximum of 2°C would require a phenomenal policy push by governments around the world.

Fuel cells can make a major contribution to meeting the global need for clean, efficient energy generation. They are becoming increasingly competitive as the true costs of fossil fuels are taken into account. They are of modular construction and costs are coming down as economies of scale are realized. Fuel cells make efficient use of natural gas and can be powered by a variety of renewable fuels. Hydrogen fuel cell systems can provide an efficient means of balancing the electrical load from intermittent renewable energy sources. Fuel cells can generate energy from waste in the area where it is produced, thereby minimizing infrastructure costs and transmission losses. They are so clean and quiet that they can be utilized in city centres and can be rapidly deployed.

CUSTOMERS HAVE FIXED COSTS AND SIGNIFICANT SAVINGS

BUY ONLY THE ELECTRICITY WITH BLOOM ELECTRONS SERVICE

Bloom Energy® has announced a new service, Bloom Electrons℠, which enables customers to purchase electricity provided by the Bloom Box without incurring any other costs. Customers can lock in their electricity rates for 10 years, delivering fixed predictable costs and significant savings versus the grid. Bloom manages and maintains the breakthrough solid oxide fuel cell systems on the customers' sites and the customers pay only for the electricity consumed. This allows immediate cost savings with no initial investment, making on-site clean, reliable, affordable energy more accessible. The Bloom Electrons Service has generated tremendous customer interest, with more than 20MWs of power (200 systems) already secured to provide electricity to new and repeat customers.

Under the Bloom Electrons service, customers can immediately save up to 20% on their energy bills. In today's economy, it is very appealing for companies to have freedom of choice, to either purchase the Bloom Box or utilize the Bloom Electrons service, while achieving savings under either program. Coupled with the opportunity to have cleaner, more reliable on-site electricity, this makes Bloom Electrons a compelling economic and environmental choice.

TRANSFORMING THE ENERGY LANDSCAPE

Amongst the first Bloom Boxes to be installed were those at EBay. The new Bloom Electrons service has generated tremendous interest with both existing and new customers. KR Sridhar, principal co-founder and CEO of Bloom Energy said "Bloom Electrons is about providing universal access to clean, reliable, affordable energy. Empowering our customers to buy energy on their own terms is another significant step on our journey to change the way energy is generated and consumed in the world. More and more companies are making a conscious decision to embrace energy innovation and the Bloom Electrons service gives them a unique opportunity to accelerate economic and environmental impacts on a larger scale. We take immense pride in our valued customers, whose repeat business demonstrates their confidence in our business and we are thrilled to welcome our new customers."

FINANCIAL FLEXIBILITY BACKED BY CREDIT SUISSE

Fuel choices such as natural gas or biogas allow customers to manage their carbon footprint and the modularity of the Bloom Box enables the technology to be scaled for

specific sites. Now Bloom Electrons gives customers financial flexibility as well. Customers can continue to buy Bloom Boxes as a capital purchase, or choose to sign up for the Bloom Electrons service. Bloom Energy created this program in collaboration with Credit Suisse and Silicon Valley Bank. Jerry L. Smith, managing director at Credit Suisse, said "We are very pleased to have the opportunity to partner with Bloom Energy to structure Bloom Electrons, a unique service to secure baseload electricity. Bloom Energy has developed a technology that can transform the energy landscape and we look forward to supporting Bloom throughout its growth."

MEETING CUSTOMERS' ENVIRONMENTAL AND ECONOMIC OBJECTIVES

The immediate financial and environmental benefits of the Bloom Electrons service have generated tremendous customer interest. The 20MWs of power (200 systems) already secured is equivalent to providing clean, reliable power for 20,000 American homes 24/7/365. Repeat customers, including the Coca-Cola Company, Staples Inc. and Walmart, are joined by several new customers, such as California Institute of Technology, Kaiser Permanente, and BD (Becton, Dickinson and Company).

Walmart already has 400 kW of Bloom Box systems in operation at two Southern California retail locations and is in the process of expanding deployments to additional stores through the Bloom Electrons service. "Walmart's first two Bloom Energy installations are helping reduce our carbon footprint and overall impact on the environment, while providing reliable, renewable energy at competitive prices. The Bloom Electrons service will allow us to grow our use of this technology and move closer to our company-wide goal of being supplied by 100% renewable energy," said Kim Saylors-Laster, vice president of energy, Walmart.

The Coca-Cola Company is operating 500kW of Bloom Boxes at its plant in Dinuba, CA, which has allowed the facility to generate 30% of its power needs using biogas. Through the Bloom Electrons service, Coca-Cola will be deploying Bloom Boxes at additional manufacturing facilities, as part of its ongoing commitment to operating a sustainable business. Staples Inc is continuing to focus on environmental leadership and operating costs and, following upon the success of their first deployment of Bloom Boxes, the company will be deploying more fuel cells at additional large facilities and distribution centers through the Bloom Electrons service. "The Bloom Box installation at our Ontario CA distribution center has demonstrated that we can reduce both our environmental footprint and operational costs," said Mark Buckley, vice president of Environmental Affairs for Staples. "Through the Bloom Electrons service we now have the flexibility to buy only the electrons and continue to achieve even greater environmental and economic success at more of our large facilities and distribution centers."

A HEALTHY ENVIRONMENT

Becton, Dickinson and Company (BD) was seeking a clean energy solution for its BD Biosciences facility in San Jose, CA, that provided reliable energy costs and decreased dependency on the electricity grid. This project supports BD's efforts to use onsite energy generation and reduce its greenhouse gas emissions.

"As a global healthcare company, BD believes that a healthy environment is essential to human health, and we must do our part to minimize our impact on climate change. Working with Bloom Energy to install these fuel cells through the Bloom Electrons service is an important example of BD's commitment to using innovative energy solutions in our global operations," said Glenn Barbi, vice president, BD Office of Global Sustainability.

Kaiser Permanente aspires to provide health care services in a manner that protects and enhances the environment now and for future generations. "Kaiser Permanente recognizes that the health of the environment directly affects individual and community health," said Kathy Gerwig, vice president and Environmental Stewardship Officer at Kaiser Permanente. "By expanding the use of clean energy through solutions like the Bloom Electrons service, Kaiser Permanente is demonstrating its commitment to greening its energy portfolio and reducing its carbon footprint."

SERVICE ALSO HELPS NON-PROFIT ORGANIZATIONS

Bloom Electrons is a service that opens the door to new types of customers such as non-profit organizations, educational institutions, and utilities. The California Institute of Technology (Caltech) is one of the first to benefit from the Bloom Electrons service with a 2MW installation. "Bloom Energy enables Caltech to more effectively carry out its core mission of research and education by providing cleaner, more economical and predictable power, which ultimately helps us achieve our strategic infrastructure and sustainability goals," said Dean Currie, vice president for Business & Finance at Caltech.

NOW A MARKET REALITY

Bloom's fuel cell production facility is meeting the demand of existing and new customers. To date, Bloom Energy's fuel cells have supplied customers with over 40 million kilowatt-hours and eliminated approximately 45 million pounds of CO2 emissions.

The Southern California Gas Company is a critical partner in completing customer projects. "We are thrilled to partner with Bloom Energy to bring this innovative technology from a vision to a market reality," said Michael W. Allman, President and CEO of Southern California Gas Company. "These fuel cells build on the important role natural gas plays today in delivering clean, reliable energy by enabling the production of power on a continuous low emissions basis using renewable natural gas - something we hope to make central to the renewables dialogue through projects like this." Bloom Electrons, and the 200 new systems that will initially be deployed, represent the next step on the path to deliver clean, reliable and affordable energy to everyone in the world. www.bloomenergy.com

NEWS

CERES POWER COMMENCES COMMERCIAL FIELD TRIALS

Ceres Power Holdings plc has commenced commercial field trials of its wall-mounted Combined Heat and Power (CHP) product in people's homes. Following upon receipt of the formal CE (European Conformity) certificate, an operating fuel cell CHP product generating heat and power has now been installed in the family home of a British Gas customer in South East England.

The field trials will continue throughout 2011 and into 2012 with CHP products being deployed in a wide range of homes across the country. The first wave of CHP products is being installed in customers' homes during the first quarter of 2011, with the second wave of products incorporating valuable in-field experience to follow six months later. The final wave of at least 150 field trial CHP products will take place in 2012 to test the Company's ability to scale-up for initial product sales and volume launch with British Gas.

Alongside the trials there is an extensive on-going testing programme of CHP products and components at the Company's test facilities. The CHP products for the field trials are being manufactured using processes which can be scaled up for volume production. The fuel cells at the heart of the product are being produced at the Ceres factory in Horsham and the CHP boiler assembly is taking place at the Daalderop factory in Holland. Peter Bance, Chief Executive Officer of Ceres Power, commented; "We have made enormous progress in the development of our product over the past few months and the start of commercial field trials is a major milestone in Ceres Power's development. I am delighted that our unique wall mounted fuel cell CHP product is now being installed in consumers' homes and look forward to selling the product in conjunction with British Gas." www.cerespower.com

AWARD FOR ALKALINE FUEL CELLS

AFC Energy plc won the Clean Energy Rushlight Award, which is designed to celebrate and publicise significant achievements in developing clean fuels. The Award aims to encourage further development and investment in clean technology, as well as the wider adoption of clean fuels by consumers and commerce. The winners were chosen by a panel of expert judges, which included representatives from the British Geological Survey, DECC, WWF, the Carbon Trust and DEFRA. As a consequence of their win, AFC Energy is now eligible to go forward and represent the UK in the European Business Awards for the Environment. AFC Energy is a developer of a low cost, fully scalable alkaline fuel cell. Focused on large-scale power generation, the technology produces electricity from hydrogen at up to 60% efficiency and has demonstrated its suitability for a large range of industrial applications and global markets. Current applications include combining fuel cells with coal gasification, a revolutionary approach to clean energy generation; waste to energy, which could see the end of landfills; and industries such as the chlor alkaline sector, where hydrogen is produced as a by-product. www.afcenergy.com

CUTTING UP-FRONT COSTS OPENS NEW MARKETS

UPS Systems has signed an innovative new distributor agreement with Air Liquide Hydrogen Energy to become the first UK company to offer its three brand new hydrogen fuel cell systems: the Energy Container, the Mobixane and the Commpac 500. This unique initiative will allow UPS Systems to lease Air Liquide's products to customers. This is a first for the UK market and part of UPS Systems' approach to broaden the use of fuel cells in the UK and

develop the market place. All three of Air Liquide Hydrogen Energy's hydrogen systems are powered by a PEM fuel cell. They offer an autonomous, clean power supply for remote locations where access to mains grid power is difficult. The units are silent when operational, easy to deploy and require little maintenance. The Energy Container is a containerized unit comprising a fuel cell, which delivers up to 2.5kW of power, power electronics and corresponding hydrogen supply. The unit offers an unlimited runtime as long as a constant supply of hydrogen is present, making it suitable for construction and remote sites, events and festivals. The Mobixane is a portable unit generating up to 2.5kW of power, with enough hydrogen storage to provide eight hours runtime. It's suited to the entertainment industry, on TV and film sets. The Commpac 500 is a light solution generating up to 0.5kW of power with an unlimited runtime for remote sites that don't have easy access to the National Grid.

UPS Systems Managing Director, Tom Sperrey, said, "Air Liquide Hydrogen Energy's rental model is a major breakthrough for the UK market. Whilst we are seeing more and more companies interested in fuel cells for their organizations, one of the barriers to adopting higher-output fuel cell systems has been the capital costs involved. To be able to lease Air Liquide Hydrogen Energy's hydrogen systems means that the technology is now much more financially accessible and we predict that this will open up entirely new markets for fuel cells and their adoption as a current and viable technology. This also provides an excellent opportunity for those interested in incorporating fuel cells into their business to lease a unit for a short fixed period of time and to assess their benefits with absolutely no risk. We find that once a customer has experienced the unique benefits of fuel cells they quickly become an advocate of them." www.upssystems.co.uk

HIGH POWER DENSITY DEMONSTRATED

ITM Power has announced an early result from the initial phase of their high power density fuel cell membrane testing, which is supported by a grant from the Carbon Trust. They have demonstrated exceptionally high power densities with their proprietary hydrocarbon membrane materials for hydrogen/oxygen fuel cells. A step change from the current state of the art has been achieved, with what is believed to be the highest power density ever recorded for a PEM fuel cell (5.5W/cm2 and 10A/cm2) using pure oxygen. While the Company's initial investigations focused on hydrogen and oxygen fed fuel cells, a commercial fuel cell system for deployment in a vehicle requires air to be used as the oxidant. ITM has now successfully demonstrated the performance of the membrane in a hydrogen/air fuel cell developing over 2.1W/cm2 and 4A/cm2, more than doubling the power density performance presently available on the market. This early result with air exceeds the ambitious target of 1.5W/cm2 as defined as part of the Carbon Trust project and is further evidence of the potential for ITM Power's materials to offer a step change in performance.

Commenting for ITM Power, CEO Graham Cooley said: "I am very pleased with the rate of technical progress. Exceeding our power density target for the fuel cell during the initial phase of the Carbon Trust project shows the huge potential of our materials and the enthusiasm with which we are attacking this development. I look forward to reporting further progress on completion of the project." Pierre Gaudillat, Technology Commercialization Manager at the Carbon Trust added: "We are delighted with how the fuel cell project with ITM is progressing. It is clear that ITM's technology has a great deal to offer and we continue to facilitate introductions to potential commercial

end users interested in these exciting developments." The summary of the power density performance achieved by ITM's patented membrane technology has been updated on the Company's website.

www.itm-power.com
www.carbontrust.co.uk

EVENTS

30th March 2011, 7th Annual International Conference and Exhibition, Generating the Hydrogen and Fuel Cell Society, NEC, Birmingham, UK. The conference will involve UK and international speakers from business and public sectors. There will be presentations, networking and partnering. www.climate-change-solutions.co.uk.

4th – 8th April, 2011. 17th Group Exhibit Hydrogen + Fuel Cells at Hannover Fair 2011, Germany. www.H2fc-fair.com

13th -15th April 2011. International Hydrogen Research Showcase 2011, University of Birmingham, UK. Presentations by the UK Sustainable Hydrogen Energy Consortium (UK SHEC) and other UK hydrogen research consortia www.Birmingham.ac.uk/index.aspx.

15th – 18th May, 2011. Hydrogen + Fuel Cells 2011 International Conference and Exhibition: Partnerships for Global Energy Solutions. Vancouver, BC, Canada. www.hfc2011.com

Fuel Cell Power will now bring you news about fuel cells and related technologies as it arises. Our new Blog covers all types of fuel cells and their applications for portable power, CHP and transport. Fuel cells utilize fossil fuels or energy from waste very efficiently. They can be powered by hydrogen which balances the electrical load obtained from intermittent renewable energy sources. Articles and features on the operation of fuel cells will enable potential operators to plan for long term energy efficiency, price stability and cuts in harmful emissions.

www.fuelcellpower.org.uk

Fuel Cell Power provides information on the practical application of fuel cells.
It is produced by the family and friends of the late Dr F T Bacon OBE, FRS,
who dedicated his life to the development of fuel cell technology.

Information can be obtained from: Jean Aldous, Editor, Fuel Cell Power, The Gallery, The Street, Woolpit, Suffolk, IP30 9QG.
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