

FUEL CELL POWER

The magazine for the power source of the future



HEADLINE NEWS

ITM Power has the solution for storing solar energy by converting it into clean hydrogen. They can do this now on a scale suitable for individual homes. This would allow householders to be self-sufficient for their power needs. At some time in the next few years, it will be scalable to wind farms. Renewable energy without storage offers no energy security and little in the way of CO2 reduction. Hydrogen can be burnt as a gas in cookers or domestic boilers and as a fuel for cars, trucks and vans. It can also be easily converted to electricity by using a generator or fuel cell. See page 6

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GROWING MARKETS FOR FUEL CELLS POWERED BY RENEWABLES

Karlskoga, Sweden

NEW TYPE OF ENERGY SYSTEM

During the past three years, Morphic Business Development AB has been working intensively on eco-friendly energy systems that make it possible to produce electricity and heating locally. A new type of energy system is being created by utilizing wind and hydro power, solar energy and biogas in energy systems designed around reformers and methanol and hydrogen fuel cells. The systems involve a completely new way of converting, storing and using renewable energy and enable a cost-effective build up in large-scale electricity production, as well as in production for private use.

Morphic acquired technology from Arcotronics Fuel Cells which offered innovative, competitively priced fuel cells, developed in-house and patented, in a number of variants and sizes, several of which were already in small-scale series production.



Morphic's patented technology makes it possible to manufacture key components for fuel cells considerably more cheaply and quickly and with higher quality than before.

Their subsidiary company, Cell Impact AB, produces flow plates which are a key component of fuel cells. Their design is crucial to the fuel cells' performance as well as the overall cost. The aim of Cell Impact is to be a leading supplier of fuel cell plates worldwide.

STORING INTERMITTENT WIND POWER

Morphic is developing complete energy systems based on fuel cells, in combination with various fuel processing and renewable energy technologies. They have developed their own small-scale wind turbine and the chemical processes required to convert the energy into hydrogen or methanol. The fuel can then be stored, to be used later for powering a fuel cell system.

REFORMING BIOGAS FOR FUEL CELLS

Many of the energy systems of the future will require the reforming of fuels, such as biogas, ethanol and methanol, to produce very pure hydrogen for fuel cells. Powerful, reliable fuel cells with long working lives will be required to make it possible to use the systems in continuous operation. As well as acquiring technology from Arcotronics Fuel Cells, Morphic has an interest in a Greek Company, Helbio A S, which has unique expertise in catalyzer technology, combined with innovative, patented technical solutions for reformers. The combined expertise of these companies enables Morphic to produce complete, free-standing energy systems for many different applications, and for different levels of output.

BUILDING A LOWER COST HYDROGEN INFRASTRUCTURE

Helbio's technology enables hydrogen gas to be produced cost-effectively. Their combined expertise with catalyzer and reformer technologies permits the development of systems for converting liquid and gaseous fuels such as alcohols and hydrocarbons. The strength of this technology lies in its high level of efficiency, low production costs and, perhaps especially, the opportunity it provides for producing hydrogen locally. Two of the factors that have long been obstacles to a wider distribution of hydrogen technology are thereby eliminated – high production costs and difficulties linked to distribution.

Jonas Eklind, President and CEO of Morphic Technologies, said "It is now possible to integrate reformers and fuel cells into one compact unit that will be both easy to use and cheaper to produce in large numbers. Units such as this can produce electricity and heating directly from renewable fuels, and will in future be able to replace diesel-powered generators, without generating any noise, toxic exhaust gases or carbon dioxide."

ENERGY FROM SEWAGE, HOUSEHOLD, AGRICULTURAL AND INDUSTRIAL WASTE

Helbio S.A. is providing a system for the Patras Municipal Corporation for Water Supply and Waste Water Management. Heat or electricity is extracted from biogas, which in turn is extracted directly from sewage. The system produces 20 kW of electrical energy and 20 kW of heat. Apart from Helbio's patented reformers, the system includes a purification filter for the biogas, a 20 kW fuel cell, and a voltage converter for adapting the fuel cell's output voltage to the electricity network.

The electrical energy is consumed locally within the water treatment plant, and the heating energy produced is used for making the purification process in the water treatment plant more efficient.

After the planned evaluation period this autumn, interest has been shown in additional systems for considerably greater outputs, since this pilot plant only uses a fraction of the biogas extracted. Jonas Eklind said "The system constitutes a typical example of the energy systems that we are now starting to offer the market. Sewage purification is only one area in which the combined reformer/fuel cell system can be used directly. Incineration plants, garbage stations, industries and agriculture are other prioritized areas."

STRONG MARKET GROWTH FOR FUEL CELLS

The market for fuel cells is undergoing a strong growth phase. With close to no negative environmental impact and superior energy efficiency, fuel cells have the potential to replace most of today's energy systems.



In the past year, Morphic's subsidiary, Cell Impact, has received several orders for test series of fuel cell flow plates for a number of different purposes, including mobile phones, road vehicles, back-up power and laptop computers. The purpose of the test series is to adapt the customer's flow plates in preparation for future mass production in Cell Impact's production facilities.

BREAKTHROUGH FOR THE ENTIRE FUEL CELL INDUSTRY

Cell Impact has received several orders from the USA and Asia, including a further order for flow plates for methanol fuel cells for incorporation in several of the products of one of the world's largest electronics manufacturers. Morphic's President, Jonas Eklind, said "The fact that one of the world's biggest players within consumer electronics is choosing our company as its supplier shows the strength of what we have to offer. However, this order is not just a breakthrough for us, it is also a breakthrough for the entire fuel cell industry." Martin Valfridsson, MD at Cell Impact, added: "In all certainty, consumer electronics, including computers, cameras and MP3 players, are going to be the first area in which we will see products powered by fuel cells, probably within the coming year."

ASIA MOVING TOWARDS VOLUME PRODUCTION

Earlier this year, the Swedish ambassador to Japan, Stefan Noreén, opened Morphic's new Technology and Customer Center in Yokohama. The center will enable customers in all Asian markets to produce test series of flow plates and optimise their design prior to ramping up for serial production. Several of the world's largest automobile and consumer electronic manufacturers are using the facility and serial production of flow plates will generally be carried out at Cell Impact's own production plants in Sweden. However, if the volumes are high enough to justify it, new production facilities can be built adjacent to the OEM's (original equipment manufacturer) plant. Martin Valfridsson said that this venture marks an important step in Morphic's marketing strategy for the Asian market.

The aim is to show on site how flow plates can be produced less expensively and to a higher standard than is possible with conventional methods. "There is strong interest in fuel cells in Asia" said Valfridsson "and several of our customers are on the verge of a broad market launch, so cutting the time-to-market is high on their agendas."

Cell Impact AB has signed several collaborative agreements with Chinese customers in the automotive industry. The agreements entail customizing the customers' fuel cell plates in order to reach optimal production efficiency and performance. There is great interest in fuel cells in China and it is expected to be the first commercial market for fuel cell driven vehicles.

INCREASING PRODUCTION CAPACITY



Cell Impact's patented technology creates a pattern on the flow plates with a single impact. This autumn, their new production facilities and laboratory at Karlskoga in Sweden will be running at full capacity. Their laboratory is already used for quality control and development, but the new, well equipped laboratory will shorten the time for development and production control of the flow plates.

www.morphic.se/en

UK – US BRIDGING TECHNOLOGY

Loughborough, UK

Intelligent Energy's CEO, Henri Winand, gave a presentation at a US Senate briefing in Washington entitled "Building Markets for Hydrogen and Fuel Cells: UK - US Bridging Technology"



Dr Winand discussed Intelligent Energy's advanced fuel cell power systems and fuel-flexible hydrogen generation technologies. He spoke of the new era that sees renewable energy sources being integrated with mains electricity and the opportunities this presented, as energy security becomes an ever greater issue for governments and businesses.

Dr Winand explained that hydrogen rich gas streams can be generated from a wide variety of feedstocks fitted with carbon capture and storage (CCS) and that this technology gives a potentially larger return on investment than conventional central generation power plants that use CCS. He also suggested that hydrogen and electricity work best together when significant amounts of renewable electricity are introduced on to the grid, as is now the case. Hydrogen then acts as a buffer between intermittent renewable power generation and consumer demand, and has the added advantage that it can also be used as a transport fuel.

Hydrogen and electricity have the potential to offer significant additional profit opportunities for national electricity and power generating companies, both in terms of reduced capital expenditure and increased energy efficiency.

FUEL DIVERSIFICATION AND EFFICIENCY

There is a clear need for diversification in the market. Intelligent Energy is working with a UK utility to deliver small scale CHP (combined heat and power) products, and the company's fuel cell systems are also used to power motorcycles, fuel cell hybrid cars and the world's first manned fuel cell flight. Together with electricity, hydrogen would be a key player in the delivery of a competitive and secure energy infrastructure, integrated with transport, and compatible with a more sustainable future.

FURTHER US FEDERAL FUNDING

Intelligent Energy has been awarded further US federal funding to advance its development of cleaner fuel technologies. The National Institute of Standards and Technology (NIST) has awarded \$696,658 in Advanced Technology Program funding for Intelligent Energy's program to develop robust fuel flexible desulfurization systems for clean power applications. As a result of this work they expect to reduce sulfur pollution from sources such as the power generation, marine and transportation sectors, as well as providing a cleaner route to the production of hydrogen from multiple fuels for use in fuel cells. www.intelligent-energy.com

HYDROGEN BREAKTHROUGH OFFERS NEW HOPE IN FUEL CRISIS

Saffron Walden, UK

HYDROGEN CAR COMPLETES SUCCESSFUL URBAN COMMUTING TRIALS

ITM Power Plc has unveiled a hydrogen powered car which could revolutionise commuting, while cutting fuel costs and CO2 emissions. Trials have been completed of a conventional petrol-engined Ford Focus, which has been converted to run on hydrogen without emitting CO2 and could ultimately reduce drivers' dependence on fossil fuels.



ITM Power has also revealed a home refuelling station, capable of producing hydrogen from water and electricity, which could offer an alternative to conventional fuels and provide a new power source for homes and businesses. The station overcomes one of the stumbling blocks to a hydrogen economy – the lack of hydrogen refuelling infrastructure.

It has taken scientists and chemists at the company's Sheffield research base, currently Europe's largest electrolyser and fuel cell development centre, eight years to create a low-cost means of manufacturing hydrogen.

ITM's patented electrolyser-based refuelling station uses a unique low-

cost polymer which dispenses with the need for expensive platinum and can be manufactured at 1% of the cost of traditional membrane materials. The result is a hydrogen production system, small enough to be used in a home or business, which can generate the gas from a supply of water and off-peak or renewable electricity – power created by wind, wave, solar or nuclear energy.

The stored hydrogen could then be used to fuel converted cars or provide power for domestic or commercial purposes. The Ford Focus converted by ITM Power is effectively a bi-fuel vehicle, capable of being switched back to petrol if the hydrogen supply is exhausted. The demonstration vehicle can travel 25 miles on a single recharge of hydrogen from the refuelling station, allowing it to complete most average commuter journeys without the need for the back-up petrol supply. If the hydrogen is compressed the range can be extended to 100 miles.

Vans and trucks will also be able to use the new fuel system to give commercial vehicle operators huge potential cost savings on delivery journeys, as well as further reducing CO2 emissions. ITM Power says further research and current engine and fuel-saving developments could well double the car's range and the shape of the standard pressurised hydrogen tank could be engineered to maximise space.

BRINGING TO COMMERCIAL REALITY

The home refuelling station, test production of which is already underway at ITM Power's Sheffield factory, underlines the potential for the generation of hydrogen both at home and in the workplace. The company

has already established a showcase 'hydrogen apartment' where hydrogen gas is used for heating, cooking and to operate a fridge, while a hydrogen internal combustion generator converts the gas back into electricity to provide power for general lighting and to operate a television, computer and DVD player.

Jim Heathcote, CEO of ITM Power, said: "This double announcement marks the end of a demanding research and feasibility programme and the beginning of an exciting new collaboration phase with manufacturers and developers to bring the potential of hydrogen to commercial reality."

Heathcote added "Renewable energy without storage offers no energy security solution and little in the way of

CO2 reduction, but if you can store the excess energy produced when conditions are good, then you have a real clean energy solution. This is what you have with hydrogen and it's the vital link. By converting electricity to hydrogen gas through an electrolyser, the gas can be stored to be used on demand. Hydrogen can be burnt as a gas in cookers or domestic boilers and as a fuel for cars, trucks and vans. It can also be easily converted to electricity by using a generator or fuel cell. Given the pressing need to reduce our dependence on fossil fuels, especially oil, and to cut CO2 emissions, the future for hydrogen as an alternative means of storing and utilising energy cost-effectively has never been brighter." www.itm-power.com

NEWS

HYDROGEN FILLING STATION FOR SHIPS

Munich, Germany

The Linde Group has opened the world's first hydrogen filling station for fuel cell passenger ships in Hamburg. The filling station provides regular fill-ups of hydrogen gas for a "Zemship" or zero emissions ship. The first passenger ship for 100 people to be operated via a hydrogen fuel cell will convey passengers on the Alster and the Elbe rivers. For fuelling, liquid hydrogen stored at a temperature of minus 253 °C is transformed into hydrogen gas in an evaporator and then compressed up to 450 bar.

The German Transport Minister, Wolfgang Tiefensee, was in attendance for the "Zemship-related" grand opening, an EU-sponsored project for the development of fuel cell ships.

Dr. Aldo Belloni, Member of the Executive Board of Linde AG, said: "As a pioneer in hydrogen technology, we want to make environmentally-friendly, hydrogen-based locomotion a reality in all areas. With this globally unique filling station, we are showing that hydrogen is well-suited as an emissions-free fuel for passenger ships."

Linde is one of the world's largest manufacturers of hydrogen and offers a complete range of technologies that are required for a functioning hydrogen value-added chain - from production to fuelling. This includes an average 300 fill-ups per week for cars, as well as lorries, buses and forklifts. www.linde.com

GERMANY CONTRIBUTES UP TO €550/KWE FOR MICRO CHP SYSTEMS

Berlin, Germany

The German Federal Environment Ministry has announced that this year €400 million will be available for investment in energy saving and renewable technologies from the sale of CO₂ allowances under their Climate Protection Initiative.

Up to €1550 per kilowatt of electrical power (kWe) will be allocated to mini combined heat and power (CHP) systems, including fuel cells. They are one of the most effective measures for reducing CO₂ emissions because they generate both electricity and heat and therefore use energy very efficiently. Germany has taken up the challenge of climate change, and is providing urgently needed impetus for innovations, employment and export.

A 40% reduction in greenhouse gas emissions from 1990 levels is being aimed for by 2020, subject to the E.U. agreeing to a 30% target.

The German Environment Minister Sigmar Gabriel said: "The Climate Protection Initiative makes an important contribution to reaching our goal. We are tapping the potential for CO₂ savings on a large scale, in schools, small and medium-sized enterprises and private households. We want to demonstrate that climate protection pays off for industry, municipalities and consumers. Those investing today will be rewarded with lower energy costs."

MAJOR NEW STUDY ON THE ECONOMICS OF ECOSYSTEMS

Berlin, Germany

Related to the Climate Change Initiative mentioned above, Sigmar Gabriel and the E U Commissioner for the Environment, Stavros Dimas, have commissioned a study to develop an

economic yardstick which will take into account the contributions of ecosystems to the economy which are normally ignored when assessing GDP. An interim statement has been prepared by Pavan Sukhdev of Deutsche Bank and the full report will be given in 2009. This will help policy makers to assess the real cost of the services provided by ecosystems and design appropriate financing mechanisms to cut pollution and promote conservation. www.bmu.de

DIRECT ETHANOL FUEL CELL READY FOR MASS MARKET

Wyoming, USA

Nanomaterial Discovery Corporation (NDCPower) of Cheyenne, USA, has announced that Eos, their Direct Ethanol Fuel Cell, can be used across a broad spectrum of product applications. Manufacturing costs are an order of magnitude lower than currently available systems. Their patented platinum-free catalyst, simple balance of plant, and innovative stack architecture ensure that the long awaited benefits of fuel cell technology can be delivered to the mass consumer market. The unique NDCPower design architecture ensures user-friendly size and weight. Operation is robust, with instant start up and operating temperatures ranging from -10°C to 80°C at altitudes up to 10500 ft. Lifetime is greater than 3700 hours.

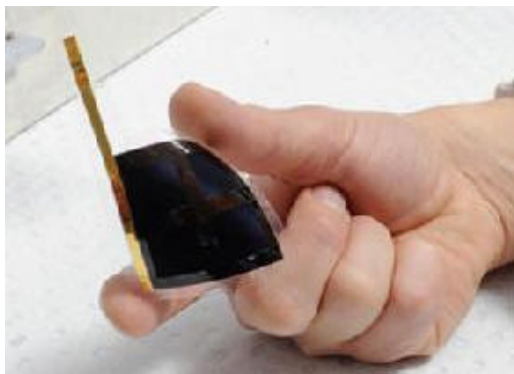
NDCPower can custom build from 1 watt up to 250 watt Eos direct ethanol fuel cells, which allows customers to evaluate integration into a wide variety of OEM (original equipment manufacturer) product lines at a realistic price. Under certain conditions NDCPower can pass on manufacturing rights to the OEMs through licensing and royalty arrangements.

www.fuelcellmarkets.com

CHEAPER POWER FOR GREEN CARS

Clayton, Australia

Scientists at Monash University, Australia, have revolutionised the design of fuel cells used in the latest generation of hybrid cars, which could make the vehicles more reliable and cheaper to build. The breakthrough revolves around the design of a fuel cell in which a specially-coated form of the popular high tech outdoor and sporting clothing material Goretex is the key component. The team has designed and tested an air-electrode, where a fine layer, about 100 times thinner than a human hair, of highly conductive plastic is deposited on the breathable fabric. The conductive plastic acts as both the fuel cell electrode and catalyst.



Dr Bjorn Winther-Jensen said that just as Goretex had revolutionised the outdoor clothing industry, it could hold similar promise for motorists. In the same way as waste vapour is drawn out of this material to make hikers more comfortable, so it is able to 'breathe' oxygen into their fuel cell and into contact with the conductive plastic. They are also working on a catalyst for hydrogen oxidation, based on the same principle, but with a different working potential.

Professor Doug MacFarlane from the Australian Centre for Electromaterials Science (ACES) at Monash said that the discovery was probably the most important development in fuel cell technology in the last 20 years.

"The benefits for the motoring industry and for motorists are that the new design removes the need for platinum, which acts as the catalyst and is currently central to the manufacturing process," he said. "The cost of the platinum component of current fuel cells for a small car with a 100kW electric engine is more than the total cost of a 100kW gasoline engine. Also current annual world production of platinum is only sufficient for about 3 million 100kW vehicles, less than one-twentieth of the current annual global production of vehicles."

The new design fuel cell has been tested for periods of up to 1500 hours using hydrogen as the fuel source.

Professor Maria Forsyth, Associate Director of ACES at Monash said testing has shown no sign of material degradation or deterioration in performance. The tests also confirmed that oxygen conversion rates are comparable with platinum-catalysed electrodes of the same geometry and found electrodes are not poisoned by carbon monoxide the way platinum is. "The small amounts of carbon monoxide that are always present in exhausts from petrol engines are a real problem for fuel cells because the platinum catalyst is slowly poisoned, eventually destroying the cell," Professor Forsyth added. "The alternative fuel cell design is more economical, more easily sourced, outlasts platinum cells and is just as effective." www.monash.edu.au

UK GOVERNMENT RENEWABLE ENERGY STRATEGY CONSULTATION

London, UK

The Government is consulting on its proposals for a Renewable Energy Strategy (RES) in order to meet the E. U. requirement for 15% of the UK's energy to come from renewable energy sources by 2020. This is lower than the EU's target of 20%, due to the UK's present low utilisation of renewable energy. The consultation covers renewable energy sources, storage and cost effective utilisation of energy for the electricity, heating and transport sectors. The Consultation Document points out that energy efficiency will be the subject of a later consultation, but the starting point for RES will be demand side reductions. This will minimise the investment needed in renewables.

CONTRIBUTION OF FUEL CELLS

By 2020 about 32% of the UK's electricity and 14% of heat will have to come from renewable sources. Fuel Cell Power proposes a more decentralized approach, so that we are not locked into an inefficient energy infrastructure in the 21st century. Micro and medium size combined heat and power systems, including fuel cells, will enable individuals, companies and communities to generate their own electricity and heat, increasingly from renewable sources. There will not be separate energy sectors as at present, with gas for heating, electricity for appliances and oil for transport, but renewable energy technologies will contribute to all these sectors. The heat produced when electricity is generated will be utilised on site and surplus electricity from intermittent renewable sources will be stored in the batteries of electric vehicles, or as hydrogen for fuel cells, or in other storage units under development. Fuel cells, with their high electricity to heat

ratio, will match the demands for electricity and heat in the well-insulated buildings of the future. Smart metering will ensure that every unit of energy is utilised most effectively. Alongside the new local energy generation, the grid will provide a valuable back up supply from wind and marine energy farms, tidal energy or other large scale power generating technologies such as concentrating solar power.

To date, Government policies have concentrated upon support for the global energy industries and university R & D, but assistance is needed for British innovative energy companies. Products must be developed so that individuals, businesses and communities will be able to choose from a range of high quality, reliable renewable technologies, with help where necessary from loans or grants. Large scale programmes initiated by central and local governments will be needed to build upon the existing skills base. It is important that the UK proceeds with the implementation of energy saving and renewable technologies, both for our own use and for deployment overseas. Otherwise developing countries will also get locked into inefficient fossil fuel powered energy infrastructures.

TRANSPORT

Under the EU's draft Renewable Energy Directive, 10% of transport fuels will have to come from renewable sources by 2020. The RES Consultation Document refers to vehicles powered by electricity from the grid, but there is also a role for small local generators to store surplus energy in batteries or as hydrogen for fuel cells. Most of the requirements for the second family car market could be met by battery electric vehicles and the market will

expand as new batteries become commercially available. The growing use of stationary fuel cells will expedite the build up of the hydrogen infrastructure for longer distance, heavy duty transport. At the last meeting of the Grove Fuel Cell Symposium in London, the European Committee recommended that there should be more support for alkaline fuel cells for transport applications. Hydrogen can be obtained from a variety of renewable sources, from wind, solar energy or waste, to power buses, trams or local delivery vehicles.

INNOVATION

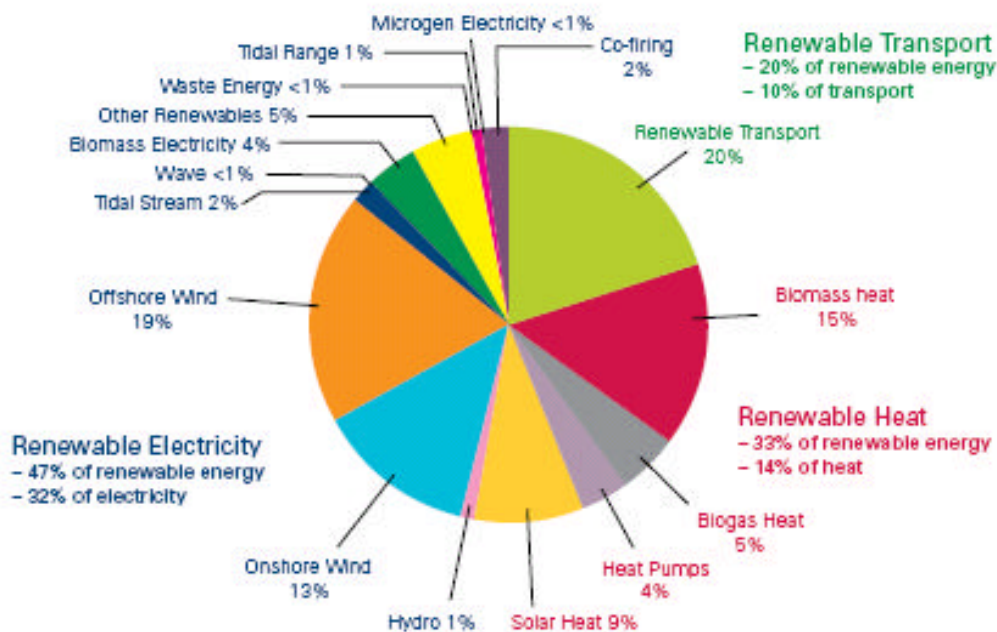
The RES Consultation Document gives an illustration of the possible final shares of different types of renewables in 2020, which shows less than 1% of renewable energy produced by electricity micro-generators.

There is, however, much interest from individuals, businesses and communities in generating their own electricity on site and making use of the by-product heat. British engineers led the world with the development of micro CHP systems, including fuel cells, as well as micro wind energy collectors, energy storage devices and battery and hybrid vehicles.

Regulatory barriers to micro generators are now coming down and, given a level playing field, British engineers could establish the UK as a world leader in the export of innovative technologies in the electricity, heating and transport sectors.

ENERGY PRICES

According to the RES Consultation Document, Government measures to reduce global warming gases have so far added about 7% to domestic energy bills and by 2020 are projected to add a further percentage. These higher costs should to some extent be offset by energy saving measures and the deployment of renewables should also reduce the upward pressure on the price of fossil fuels. Fuel Cell Power suggests that many energy saving and renewable technologies will be self-financing over a period and "energy mortgages" would help to expedite their implementation. The RES Document envisages future annual UK investment of £5bn to £6bn. Small and medium size micro-generators could ensure the most efficient application of these resources globally. www.berr.gov.uk



Illustrative renewable technology breakdown 2020

NEWS

COAST TO COAST ROAD TOUR

Massachusetts, USA

Americans had a glimpse of their hydrogen powered future during an historic two week road tour from Maine on the Atlantic coast to California on the Pacific. There were stops in 18 states where Air Products and Chemicals, Inc. and Linde provided mobile refuelling stations and hydrogen fuel. A visit was made en route to Nuvera Fuel Cells plant, where they launched their new refuelling station. Hydrogen vehicles from BMW, Daimler, Ford, GM, Honda, Hyundai-Kia, Nissan, Toyota, and Volkswagen took part and were joined by hydrogen transit buses. The U.S. Department of Energy, California Fuel Cell Partnership, National Hydrogen Association, and U.S. Department of Transportation (DOT) sponsored the Hydrogen Road Tour to show that hydrogen vehicle and fuelling technologies are approaching commercial availability, even as new technical breakthroughs continue.

Paul Brubaker of the DOT noted that six transit agencies across the country currently operate hydrogen-powered buses. Southern California auto dealers are leasing hydrogen vehicles, and hundreds of individuals are driving hydrogen-powered vehicles in demonstration programs across the United States. Hydrogen can be used as a fuel for either a fuel cell vehicle or in a modified internal combustion engine. "The technology necessary to put these cars on the road, and keep them moving, exists today" Brubaker said. "The question is not if hydrogen powered vehicles will be available commercially, but when." U.S. Department of Energy Under Secretary Clarence "Bud" Albright, Jr. added: "This tour provides Americans with an opportunity to see what the future

could hold for hydrogen powered vehicles, as we work to help make these vehicles cost competitive and available for all." www.dot.gov/affairs

ENTERPRISING BRITAIN AWARDS 2008

Southampton, UK

Bac2 is part of a team at Southampton University's Millbrook Technology Campus which has been selected as one of the twelve regional finalists for the Enterprising Britain Awards 2008. The awards are run by the Department for Business Enterprise and Regulatory Reform (BERR). Bac2 has developed high conductivity plates for fuel cells based upon their patented ElectroPhen material and now have customers around the world. They are producing bi-polar and end plates for Proton Exchange Membrane (PEM) fuel cells and they can also provide plates moulded to customers' specifications.



Well-known entrepreneur, Peter Jones (2nd left) met some of the Bac2 management team while judging the winner of the Enterprising Britain Awards 2008. Left to right: Dr Graham Murray (founder and technical director); Peter Jones; Jim Totczyk (head of production); and Mike Stannard (CEO). The national winner is being selected and will go forward as the UK's entry for the European Enterprise Awards. www.bac2.co.uk

RENAULT NISSAN ALLIANCE DEMONSTRATES FUEL CELL PROTOTYPES

Barcelona, Spain

The Renault Nissan Alliance is working towards mass production of electric vehicles, starting with battery and hybrid electric systems in 2010 and leading to the second phase, with fuel cell powered vehicles. Two fuel cell prototypes are currently in an advanced engineering phase.



Nissan's pioneering X-Trail fuel cell vehicle (FCV) has been undergoing 'real-world' testing for more than two years, with several leased to government authorities in Japan. During summer 2008, Nissan demonstrated the X-Trail FCV in six European countries.

The most recent development is a Renault prototype called Scenic ZEV H2. It is a joint Alliance project, featuring Nissan's in-house developed fuel cell stack, high-pressure hydrogen storage tank and compact lithium-ion batteries. Renault's Grand Scenic prototype was modified to accept the different FCV elements under the floor, thus managing to keep ample cabin space for five adults. Renault showcased the Scenic ZEV H2 at its Environmental Workshop in Barcelona this summer. Nissan has just announced that its new fuel cell stack has double the power density of the previous generation and they have also achieved 35% cost reduction. Test fleets incorporating the new fuel cells will be operational by the end of 2008.

This is another step towards the goal of the Renault Nissan Alliance for a zero-emission motoring future. www.nissan-global.com

SPANISH TEAM CAME ZEROTH!

Rotterdam, Netherlands



At the first race in the Formula Zero Championship for hydrogen fuel cell powered cars held in Rotterdam, Euplatech2 from Spain won 'zeroth' place. The Rotterdam Climate Initiative is the chief sponsor of the Formula Zero Championship. Vice-Mayor Harbers said: "By being the first city to host this race series we are demonstrating to the world that Rotterdam is going for sustainable mobility. Clean transportation is good for the economy, the climate and the air quality in our city. Above all, Formula Zero is a fantastic prelude to CO2-free motorsport."

The series is starting with racing karts and building up to full size racing cars, with circuits all over the world for hydrogen vehicles produced by car manufacturers by 2015. New university teams are being invited to join the 2009 Championship. In order to stimulate innovation, they will be able to choose their own fuel cell. Formula Zero Grand Prix events are already planned for next April in Columbia, South Carolina and at Tower Bridge in London. www.formulazero.nl

WORLDWIDE MARKET OPPORTUNITIES

Birmingham, UK

Valeswood ETD (Environment Technology Development) based in central England, provides practical solutions to resolve issues relating to renewable energy, waste reduction and recycling. Valeswood carried out successful trials with their hydrogen fuel cell powered boat this summer. A nickel hydride cylinder containing 1200 litres of hydrogen gas fuelled a PEM fuel cell.

Valeswood also supplies alkaline fuel cells and PEM fuel cell powered bikes.



John Turner, MD of Valeswood (right) is seen here with Dr Alex Bevan of Proto-Systems, one of the partners working with Valeswood to develop new worldwide environmental market opportunities.

Valeswood will shortly launch their new hydrogen fuel cell scooters, which are certified for use on UK roads. www.valeswood.com

EVENTS

8th-9th October 2008, Fuel Cells Science & Technology 2008, Copenhagen: The conference themes will reflect technical progress with fuel cells and their fuels. Organized by Elsevier. www.fuelcelladvances.com

13th - 15th October 2008, European Fuel Cell and Hydrogen (FCH) General Stakeholder Assembly, Brussels: On the 13th October there will be industry workshops and the Exhibition and Drive and Ride will be opened. The FCH Joint Technology Initiative (FCH JTI) will be launched on the 14th October at the start of the Conference. The objective is to position the Fuel Cell and Hydrogen in a European context as well as in a global emerging industry www.hfpeurope.org

31st May - 3rd June 2009, Hydrogen + Fuel Cells 2009 International Conference and Exhibition, Vancouver Convention and Exhibition Centre, Canada. HFC2009 will feature keynote addresses from prominent industry and government figures from around the world. Key issues will include environment, policy, investment, trading pollution credits, hydrogen production, distribution and storage, integrated systems, codes and standards, fuel cell materials, components, systems, as well as manufacturing for distributed power generation, transport and portable applications. The call for abstracts closes on 31st October. www.hfc2009.com

Fuel Cell Power provides information about all types of fuel cells. It has been set up by the family and friends of the late Dr. F. T. Bacon, OBE, FRS, the fuel cell pioneer who was concerned about the effects of discharging the by-products of combustion into the atmosphere.

Information can be obtained from:
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Telephone : 01359 245073

www.hydrogen.co.uk www.futureenergies.com www.fuelcellpower.co.uk