PDF Versions of Fuel Cell Connection are posted at http://www.usfcc.com/resources/backissues.html

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FUEL CELL CONNECTION - December 2006 Issue

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News on U.S. Government Fuel Cell Programs
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1. DOE Lab Teams with Hydrogen Center on Fuel Cell Backup Power Systems
DOE's Savannah River National Laboratory (SRNL) has teamed with the Center for Hydrogen Research to demonstrate the use of hydrogen fuel cells as emergency backup power systems for hospitals and other critical facilities. The partners will use SRNL's hydrogen storage technology, combined with an electrolyzer and a fuel cell, in order to create a regenerative fuel cell system.
http://srnl.doe.gov/newsroom/2006news/hydrogen-backup.pdf

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2. NIST Researchers Investigate Ethylene for Hydrogen Storage
Researchers at the National Institute of Standards and Technology (NIST) and Turkey's Bilkent University are investigating ethylene as a potential material for storing hydrogen. The researchers' calculations show that attaching titanium atoms at opposite ends of an ethylene molecule can result in a total of 20 hydrogen atoms per one ethylene-titanium complex. The absorbed hydrogen molecules account for about 14 percent of the weight of the complex, about double DOE's minimum target for storage of hydrogen in a solid state material.
http://www.nist.gov/public_affairs/techbeat/tb2006_1207.htm#hydrogen

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3. Fuel Cell Exceeds Military Energy Density Targets
Millennium Cell and Protonex have developed and demonstrated a next generation hydrogen fuel cartridge technology. The fuel cartridge was demonstrated operating the Protonex P2 soldier power system at 33% higher power and >35% more energy per unit weight than previously achieved. The demonstration exceeded the 500 Wh/kg system energy density targets established by the military. The P2 unit was developed by the two companies under multiple contracts with the Air Force Research Lab and the U.S. Army Research Lab.
http://millenniumcell.com/fw/main/default.asp?DocID=92&reqid=944359

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4. PNNL Partners with Russian Institute on Miniature Hydrogen Sensor Research
Pacific Northwest National Laboratory is partnering with Apollo, Inc. of Kennewick, Washington, and the Karpov Institute of Physical Chemistry in Moscow, Russia, on commercialization of a miniature hydrogen gas sensor that features improved reliability and response time. The collaboration is taking place under the DOE National Nuclear Security Administration's Global Initiatives for Proliferation Prevention (GIPP).
http://www.pnl.gov/news/release.asp?id=205

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5. EIA Annual Energy Outlook Projects Energy Use, Generation to 2030
DOE's Energy Information Administration (EIA) has released its Annual Energy Outlook 2007 with projections to 2030 of energy use and generation. Of particular note, EIA projects a substantial increase in use of alternative fuels, with alternative vehicle technologies (including fuel cells) accounting for nearly 28 percent of projected new light-duty vehicle sales in 2030.
http://www.eia.doe.gov/oiaf/aeo/

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RFP/Solicitation News
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6. CEC Issues PIER-EISG Solicitation
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The California Energy Commission, through the Public Interest Energy Research (PIER) Program's Energy Innovations Small Grant (EISG) Program, is offering grant funding to projects that determine the feasibility of promising new energy R&D concepts. A maximum of $95,000 is available per project for hardware projects requiring physical testing and $50,000 for modeling projects. Approximately $2.1 million is available for the solicitation, which requires no matching funds or repayment requirements. The deadline for applications is February 6, 2007. http://www.energy.ca.gov/contracts/smallgrant/index.html

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7. LIPA Solicitation to Develop 5-MW Fuel Cell Cogen Project
The Long Island Power Authority (LIPA) has issued a Request for Proposals for the construction and operation of a 5-MW fuel cell cogeneration project. A Proposers' Conference will be held January 10, 2007, in Uniondale, New York. Potential proposers are strongly encouraged to provide a Notice of Intent to Submit Proposal by January 26, 2007. Full proposals are due February 16, 2007. http://www.lipower.org/company/papers/rfp/fuelcell06.html

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8. DARPA Releases BAA for Strategic Technologies
The Defense Advanced Research Projects Agency has released its Broad Agency Announcement, BAA07-01, for Strategic Technologies. Technical topic areas include next generation power generation systems and size-weight-power reduced soldier electronics and communication devices. The BAA is open through December 31, 2008.
http://www.fbo.gov/spg/ODA/DARPA/CMO/BAA07-01/SynopsisP.html

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Contract / Funding Awards
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9. DOE and Treasury Award Tax Incentives to Coal, Hydrogen Projects
DOE and the U.S. Treasury awarded $1 billion in federal tax incentives to nine companies for advanced coal-based power generation and gasification technologies. One of the incentive winners is Carson Hydrogen Power, LLC, of Carson, California.
http://www.fossil.energy.gov/news/techlines/2006/06068-Clean_Coal_Tax_Credits.html
http://www.doe.gov/media/TreasuryCleanCoalPressRelease.pdf

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10. Six Projects Receive Funding for Research on Hydrogen Production from Coal
Six projects were selected to receive $7.4 million in funding from the Department of Energy for research to promote the production of hydrogen from coal at large-scale facilities. The projects will focus on two areas of interest – Ultra-Pure Hydrogen, and Process Consolidation.
http://www.fossil.energy.gov/news/techlines/2006/06070-Hydrogen_from_Coal_Projects.html

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11. European Commission Awards Funding for High-Temperature PEMFCs
The European Commission has awarded €2.5 million to Plug Power and Vaillant Group for the international development and demonstration of three high-temperature CHP PEM fuel cell system prototypes. The U.S. Department of Energy has already awarded US$3.6 million to support the collaboration. http://www.plugpower.com

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12. Wright Fuel Cell Group Receives Grant for Fuel Cell Prototyping
Wright Fuel Cell Group's Fuel Cell Prototyping initative was one of six projects selected to receive $150,000 each in grant money from NorTech's Technology Leader's Group. The initiative will

support rapid commercialization of portable fuel cells created with Ohio-made products and using an Ohio workforce. http://www.wfcg.org/documents/wfcgGrantAward.pdf

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State Activities
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13. CEC Publishes 8th Edition of Emerging Renewables Program Guidebook
The California Energy Commission has published the eighth edition of its Emerging Renewables Program Guidebook, which was adopted December 13, 2006. Beginning January 1, 2007, the new guidebook is for wind and fuel cell systems only. Solar electricity systems will be handled by the California Public Utility Commission under the California Solar Initiative.
http://www.energy.ca.gov/renewables/documents/index.html#emerging

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Industry Headlines
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14. MTI MicroFuel Cells Now Selling Prototypes for Evaluation
MTI MicroFuel Cells has unveiled its Mobion® 30M prototype fuel cell system, which is available for sale for evaluation purposes. The system is being targeted toward military power needs as a replacement for BA5590 batteries. One fuel cell and three 100% methanol fuel cartridges deliver the energy of eleven primary BA5590 batteries, reducing the weight a soldier has to carry by one third. http://www.mtimicrofuelcells.com/news/article.asp?id=266

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15. Fuel Cell Industry Survey Shows Increases in Sales, R&D and Employment
The US Fuel Cell Council released its annual survey results, which show a 7% increase in sales between 2004 and 2005. Reported sales were $353 million in 2005. Reported spending on research and development increased 11% to $796 million, and reported fuel cell jobs increased 12% to 7,074 employees. The survey includes more than 180 voluntary and anonymous responses from members of the US Fuel Cell Council, Hydrogen & Fuel Cells Canada, Fuel Cell Europe, and the Fuel Cell Commercialization Conference of Japan.
http://www.usfcc.com/Nov27-EM-IndustrySurveyPressRelease-06-207.pdf

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16. CSA Certifies ReliOn Fuel Cells
ReliOn has received ANSI/CSA America certification for its T-1000™ and T-2000™ fuel cell systems. The certification assures potential customers and users that a product complies with applicable standards for mechanical, electrical, hydrogen and software performance and safety.
http://www.relion-inc.com/news.asp

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University Activities
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17. University Fuel Cell Roundup
(summaries contributed by Kathy Haq, Dir. of Outreach and Communications, National Fuel Cell Research Center, UC Irvine, khaq@nfcrc.uci.edu)

The Centre for Process Innovation has established the United Kingdom's first independent Fuel Cell System Development Centre in Wilton. The Centre is a public-access facility for regional companies involved in commercializing fuel cell technology. It will support the development of a regional industrial fuel cell cluster based around the Tees Valley. "The Centre for Process Innovation was established by One NorthEast as a UK-wide resource to stimulate and drive innovation within the process industry. Working with global industry partners and leading research universities, we are committed to delivering world-class, groundbreaking applied research and development," said Nigel Perry, the center's chief executive officer. [November 2006, http://www.uk-cpi.com]

Judy Wall, of the University of Missouri-Columbia, is one of the authors of "Microbial Energy Conversion," recently released by the American Academy of Microbiology. The report highlights the use of microbes to produce alternative fuels and describes in detail the various methods by which microorganisms can and are being used to produce numerous fuels including ethanol, hydrogen, methane and butanol. It also discusses the advantages, disadvantages and technical difficulties of each production methodology as well as outlining future research needs. The report also focuses on the relatively new field of microbial fuel cells, in which bacteria are used to convert food sources directly to electrical energy. "The study of microbial fuel cells is in its infancy, and yield and current density are low in today's systems, but the potential to make great leaps of progress … is great," says Wall. The report is result of a colloquium convened by the American Academy of Microbiology in March 2006. Experts in the field were brought together to discuss the status of research into various microbial energy technologies, future research needs, and education and training issues in these fields. A full copy of the report and recommendations can be found on the Academy Web site at http://www.asm.org/colloquia. To receive a printed copy of Microbial Energy Conversion, e-mail the Academy at colloquia@asmusa.org. [21-Nov-2006, *Space Daily*, distributed by United Press International]

Utah's State Advisory Council for Science and Technology has awarded seven individuals Governor's Science Medals for 2006. The awards are given to individuals who have distinguished themselves in the fields of science and technology. The honorees include Anil Virkar, professor and chairman of the Materials Science and Engineering Department at the University of Utah, for his research on solid oxide fuel cell technology and ceramic materials, along with co-founding the companies Ceramatec Inc. and Material and Systems Research Inc. Virkar and the other medal recipients will be recognized Jan. 4, 2007, at the Utah Museum of Natural History. [22-Nov-2006, *The Salt Lake Tribune*]

Air Products & Chemicals Inc. opened Pennsylvania's first hydrogen-filling station near Beaver Stadium on the Pennsylvania State University main campus in November. The experimental station — one of 53 nationwide, according to the National Hydrogen Association — cost $10.5 million and is part of a national effort to break what some politicians call the nation's addiction to foreign oil by developing hydrogen-powered fuel cell vehicles. The Air Products station in State College is partly financed by the Department of Energy. [23-Nov-2006, *Philadelphia Inquirer* (Pennsylvania)]

An all-British partnership that includes Oxford University plans to have the world's first fuel cell-powered sports car on the road within three years. Dubbed the LIFECar, the $4.4 million project involves Britain's Morgan Motor Company, QinetiQ, Cranfield, BOC and OSCar. The Morgan Aero Eight-based "green" car will be powered by a fuel cell that converts hydrogen into electricity, and will look nothing like any traditional Morgan the company has ever produced. Part of LIFECar's funding will come from the British Department for Trade and Industry, and the vehicle will be powered by a QinetiQ-made fuel cell. The car's fuel cell will power four separate electric motors — one for each wheel. Regenerative braking and surplus energy will be used to charge ultra-capacitors that will release their energy when the car is accelerating. This means the car's fuel cell will be much smaller than conventionally regarded as necessary. The fuel cell will provide about 24 kilowatts of power to bring the car to cruising speed, compared with about 85 kilowatts

proposed by most competitive systems. [24-Nov-2006, *The Federal Capital Press of Australia Pty Limited Source: Financial Times Information Limited*]

The Technical University of Denmark has placed an $11.5 million dollar order for seven FEI electron microscopes that will form the core of the university's new Center for Electron Nanoscopy. The order represents the largest-ever product sale for FEI. The range of equipment will be utilized for a wide spectrum of advanced research conducted by the university's researchers and companies that operate there. One of the Titan S/TEMs, the world's most powerful commercially-available microscope, will be equipped with an environmental chamber and will be used to advance environmental TEM applications for in-situ catalyst observations. Such studies will play an important role in catalyst research and development for alternative fuel cells, environmental catalysis (clean air and water), and petrochemical industries. Installation of the systems is targeted for the second half of 2007 and the Center for Electron Nanoscopy is scheduled to open at the end of 2007. [27-Nov-2006, *PR Newswire US*]

The new Energy Technologies Research Institute, based at the University of Nottingham's Jubilee Campus, will focus on conventional fossil fuels as well as alternative energy sources, looking at minimizing their impact on the environment. The institute, launched Nov. 29, involves more than 100 engineers, scientists and social scientists working with staff from major companies such as energy giant E.ON and air industry firm Rolls-Royce. More than £8 million in research projects have been lined up. "New clean fossil technologies linked to carbon (pollution) capture and storage, hydrogen fuel cells, and natural sources of power such as solar and wind energy will all play a vital role in changing the way in which we use energy," said Professor Colin Snape, director of the new institute. The institute's projects will be largely funded by industry, UK research bodies, the Department of Trade and Industry, and the European Union. [29-Nov-2006, *Nottingham Evening Post*]

Researchers in the Department of Chemistry at the University of Alberta's Gunning/Lemieux Chemistry Centre have published the first experimental images of the in-plane distribution of water within the PEM of a membrane electrode assembly in an operating fuel cell. "The effect of gas flow configuration on the distribution of water in the PEM and cathode flow field is investigated, revealing that the counter-flow configurations yield a more uniform distribution of water throughout the PEM. The maximum power output from the PEMFC, while operating under conditions of constant external load, occurs when H(2)O(l) is first visible in the (1)H NMR image of the cathode flow field, and subsequently declines as this H(2)O(l) continues to accumulate," wrote K.W. Feindel and colleagues. The study is published in the *Journal of the American Chemical Society* (Insights into the distribution of water in a self-humidifying H2/O2 proton-exchange membrane fuel cell using 1H NMR microscopy. *Journal of the American Chemical Society*, 2006;128(43):14192-9). [2-Dec-2006, *Medical Imaging Week* via NewsRx.com & NewsRx.net]

Pure Energy Visions Corporation, which describes itself as "the leading Canadian developer of energy storage technologies for the international alternative energy market," reports that it has signed a memorandum of understanding with the Indian Institute of Technology in Kanpur, India, for the development of the Pure Energy's direct methanol fuel cell technology. The memorandum is expected to lead to an eventual agreement between IIT Kanpur, Pure Energy and one or more corporate partners and will include a multidisciplinary development center located at IIT Kanpur. As part of the agreement, Pure Energy will contribute its existing equipment and prototypes, technical consultation, intellectual property and know-how. IIT shall be responsible for conducting research and development to upgrade existing prototypes and in doing so shall contribute its faculty, researchers and funding in collaboration with the Indian government and the corporate partners. IIT Kanpur will also provide necessary infrastructure, recruit researchers and ensure that the project timelines are met. [5-Dec-2006, *Comtex News Network, Inc.*]

A group of aspiring automotive technicians from Southern California got a sneak peak at new technologies such as hybrid and fuel cell power trains at the 2006 Los Angeles Auto Show on

Nov. 30. The high school students are part of the Automotive Youth Educational Systems' Future Techs program, a partnership involving 14 participating automotive manufacturers, the National Automobile Dealer's Association, state Automotive Trade Association Executives, Departments of Education, local dealers, and 410 selected local high schools/tech prep school programs. The organization's goal is to encourage quality students with a good mechanical aptitude to pursue careers in the ever-changing fields of automotive service technology or collision repair/refinish, and to prepare them for entry-level positions or challenging post-secondary academic options. For more information, visit http://www.ayes.org. [7-Dec-2006, *PR Newswire US*]

Ardica Technologies, a San Francisco company that manufactures "wearable" fuel cells, plans to open a new facility at Mississippi State University in Starkville to refine products that have both civilian and military applications. Tom Covington, Ardica's chief executive officer, said Ardica will grow to 10 employees in 2007 and expand its production staff over time. The company develops innovative micro fuel cell products and will be pursuing both manufacturing and research. "We have an agreement that two-thirds of their research will be done in Mississippi," said Colin Scanes, the university's research vice president. The company is expected to make its products available in late 2007 and hopes to achieve a steady production flow by 2015. The joint Ardica-MSU research effort also will address the design, development and demonstration of a highly novel hybrid fuel cell-battery portable power system for use by the U.S. military, university officials said. Two key technologies involved in the project are proton exchange membrane fuel cells and lithium-ion batteries. "It is envisioned that the proposed hybrid portable power system technology will significantly reduce the war fighter's operational burden and improve mission effectiveness through extended endurance of soldier-borne electronic systems," said Gary Butler, technology director for the MSU research office. [8-Dec-2006, *Associated Press*]

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Administration
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Press releases and story ideas may be forwarded to Bernadette Geyer, editor, for consideration at fuelcellconnection @ yahoo.com.

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US Fuel Cell Council -- The US Fuel Cell Council is the business association for anyone seeking to foster the commercialization of fuel cells in the United States. Our membership includes producers of all types of fuel cells, as well as major suppliers and customers. The Council is member driven, with eight active Working Groups focusing on: Codes & Standards; Transportation; Power Generation; Portable Power; Stack Materials and Components; Sustainability; Government Affairs; and Education & Marketing. The Council provides its members with an opportunity to develop policies and directions for the fuel cell industry, and also gives every member the chance to benefit from one-on-one interaction with colleagues and opinion leaders important to the industry. Members also have access to exclusive data, studies, reports and analyses prepared by the Council, and access to the "Members Only" section of its web site. (http://www.usfcc.com/)

National Fuel Cell Research Center -- The mission of the NFCRC is to promote and support the genesis of a fuel cell industry by providing technological leadership within a vigorous program of

research, development and demonstration. By serving as a locus for academic talent of the highest caliber and a non-profit site for the objective evaluation and improvement of industrial products, NFCRC's goal is to become a focal point for advancing fuel cell technology. By supporting industrial research and development, creating partnerships with State and Federal agencies, including the U.S. Department of Energy (DOE) and California Energy Commission (CEC), and overcoming key technical obstacles to fuel cell utilization, the NFCRC can become an invaluable technological incubator for the fuel cell industry. (http://www.nfcrc.uci.edu/)

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