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**FUEL CELL CONNECTION - March 2009 Issue**  
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### **News on U.S. Government Fuel Cell Programs**

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1. Obama Administration Announces \$3.2 Billion for Local Energy Efficiency Improvements

The Obama Administration announced a new \$3.2 billion Energy Efficiency and Conservation Block Grant program, funded by the American Recovery and Reinvestment Act, that will provide formula grants for projects that reduce total energy use and fossil fuel emissions, and improve energy efficiency nationwide. Cities and counties will receive nearly \$1.9 billion, and states and territories will receive nearly \$770 million. Up to \$456 million of the total funding is expected to be made available under a separate future competitive solicitation for local energy efficiency projects. A detailed breakdown of the distribution of the funding is available online at the DOE Recover Act web site.

http://apps1.eere.energy.gov/news/progress_alerts.cfm?pa_id=154

2. Researchers Discover "Enzyme Cocktail" for Hydrogen Fuel Generation

Researchers from Oak Ridge National Laboratory, Virginia Tech, and the University of Georgia have discovered an "enzyme cocktail" that converts cellulosic materials and water into hydrogen fuel. The "cocktail" mixes 14 enzymes, one co-enzyme and cellulosic materials isolated from wood chips and water. When heated to 90 degrees Fahrenheit, they produce hydrogen gas pure enough to be used in a fuel cell.

http://www.ornl.gov/info/press_releases/get_story_tip.cfm?ID=100

3. LBNL Scientists Discover Nano-Sized Crystals for Artificial Photosynthesis

Scientists at Lawrence Berkeley National Laboratory (LBNL) have discovered that nano-sized crystals of cobalt oxide can carry out the photosynthetic reaction of splitting water molecules into oxygen, electrons and hydrogen ions. A sensitizer allows the reaction to occur using visible light. The research was performed at the Helios Solar Energy Research Center at the lab.

<http://newscenter.lbl.gov/press-releases/2009/03/10/turning-sunlight-into-liquid-fuels-berkeley-lab-researchers-create-a-nano-sized-photocatalyst-for-artificial-photosynthesis/>

4. SOFC Stacks Surpass SECA Program Goals

Two 10-kW SOFC stacks, developed by FuelCell Energy in partnership with Versa Power Systems under the Solid State Energy Conversion Alliance (SECA) program, have achieved 5,000 hours of service, meeting and exceeding SECA's service goal. The stacks also surpassed the SECA goal for overall degradation, achieving 1.7 percent and 2.6 percent per 1,000 hours in comparison to the program goal of 4.0 percent per 1,000 hours.

http://www.fossil.energy.gov/news/techlines/2009/09018-Fuel_Cell_Exceeds_Goals.html

5. *NETL Announces Plans for Hydrogen Fuel Test Facility at West Virginia Airport*

The National Energy Technology Laboratory (NETL) plans to construct and operate a hydrogen fuel production plant and vehicle fueling station at the Yeager Airport in Charleston, West Virginia. Hydrogen fuel will be generated via electrolysis powered by the electric grid.

http://www.fossil.energy.gov/news/techlines/2009/09019-DOE_to_Build_Hydrogen_Test_Facilit.html

6. *SECA Test Successfully Demonstrates Fuel Cell-Powered Truck in Idling Conditions*

A test performed under the SECA program successfully demonstrated an SOFC operating the electrical system and air conditioning of a Peterbilt Model 386 truck while it simulated idling conditions for ten hours.

http://www.fossil.energy.gov/news/techlines/2009/09017-Fuel_Cell_Powers_Commercial_Trucks.html

7. *PNNL Chemists Advance Understanding of How Water Molecules Split*

A new discovery by chemists at Pacific Northwest National Laboratory (PNNL) may help scientists better understand how water splits into oxygen and hydrogen. Researchers used a technique called scanning tunneling microscopy to study water's reactions with titanium dioxide. The work improves the research community's "understanding of the chemistry needed to generate hydrogen fuel from water or to clean contaminated water."

<http://www.pnl.gov/news/release.asp?id=355>

8. *NETL Researchers Study Liquid Tin Anodes for Fuel Cells*

Researchers at the National Energy Technology Laboratory (NETL) studying liquid tin anodes for SOFCs have completed the first in a series of studies of electrode behavior. The anodes, which can directly consume solid fuel sources like carbon and coal dust, offer a higher degree of tolerance to coal contaminants that poison conventional nickel-based anodes.

http://www.ornl.gov/info/news/pulse/pulse_v281_09.html

9. *FTA Publishes Multi-Year Research Program Plan, Details Fuel Cell Bus Program*

The Federal Transit Administration (FTA) has published its Multi-Year Research Program Plan for FY2009 thru FY2013. The Program Plan summarizes existing FTA projects, including the National Fuel Cell Bus Program, and identifies transit industry research needs in order to assist in the Administration's strategic planning process. The Program Plan lists individual projects funded by the National Fuel Cell Bus Program and notes accomplishments.

http://www.fta.dot.gov/documents/FTA_TRI_Final_MYPP_FY09-13.pdf

10. *FTA Reports on Worldwide Hydrogen Bus Demonstrations 2002-2007*

The FTA has published "A Report on Worldwide Hydrogen Bus Demonstrations, 2002-2007," which includes a section on Key Issues and Lessons Learned in areas such as infrastructure, safety, public acceptance and maintenance. Demonstration sites include North American Transit Agencies such as AC Transit and SunLine Transit Agency, as well as international projects such as the China Fuel Cell Bus Project and the Clean Urban Transport for Europe (CUTE) program.

http://www.fta.dot.gov/documents/ReportOnWorldwideHydrogenBusDemonstrations_2002to2007.pdf

11. *GAO Says Restructuring Limited FutureGen Ability to Advance Emerging Technologies*

A new report from the Government Accountability Office (GAO) found that the restructured FutureGen effort is limited in its ability to advance emerging technologies aimed at the program's goal of near-zero emissions. The report is titled "Clean Coal: DOE's Decision to Restructure FutureGen Should Be Based on a Comprehensive Analysis of Costs, Benefits, and Risks." In it, GAO concludes that while the original and the new restructured FutureGen programs had the same goal -- attempt to use Carbon Capture and Storage (CCS) at coal-fired power plants to achieve near-zero CO2 emissions and to make CCS economically viable -- "DOE did not base its restructuring decision on a comprehensive analysis of factors, such as the associated costs, benefits, and risks." The report says the different approach of the new restructured program could affect the advancement of CCS technologies.
<http://www.gao.gov/new.items/d09248.pdf>

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**RFP/Solicitation News**  
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12. NSWC Solicitation Seeks White Papers for Energy Conservation Applications for the Navy
The Naval Surface Warfare Center (NSWC) has issued a Broad Agency Announcement (BAA) for Energy Conservation Applications for the U.S. Navy. NSWC is specifically interested in innovative concepts for Navy shipboard energy conservation and carbon footprint reduction. Areas of consideration include, but are not limited to: Primary Energy Source, Propulsion/Power Plants, Operational, and other areas. White papers should include budget estimates for completing Phase I concept refinement and Phase II detailed design/demonstration. Responses to the BAA are due April 6, 2009.

https://www.fbo.gov/index?s=opportunity&mode=form&id=48c7eec05fb87a0ba6ac15cef4d7800b&tab=core&_cview=1

13. Army Seeks Info from Potential Contractors for Lightweight Alternate Power Sources
The U.S. Army has issued a Sources Sought Notice for companies capable of designing, developing and producing lightweight alternate power sources (LAPS) for use in the field as auxiliary power sources on military armored and other vehicles. No funding is available under this solicitation. Information received from respondents will be used "to determine Source Selection, type of contract and competition strategy." Deadline for responses is April 20, 2009.

https://www.fbo.gov/index?s=opportunity&mode=form&id=1ce95f2426363a04a498197c72b0f130&tab=core&_cview=0

14. LLNL Offers Licensing Opportunity for Nanolipoprotein Particles for Hydrogen Production
Lawrence Livermore National Laboratory (LLNL) is offering the opportunity to license and further develop nanolipoprotein particles for hydrogen production. LLNL has developed a method of hydrogen generation using nanolipoprotein particles to solubilize and isolate membrane bound hydrogenases. LLNL seeks industry partners that can help move the technology into the market. Responses to this opportunity are due April 25, 2009.

https://www.fbo.gov/index?s=opportunity&mode=form&id=dd7bc47e53ad6841e4f49f9b8f76e2cf&tab=core&_cview=0

15. Air Force Issues Advanced Energy Storage Technology and Manufacturing RFI
The Department of the Air Force has issued a Request for Information (RFI) on Advanced Energy Storage Technology and Manufacturing (AEST&M) Roadmap Development, including storage for man-portable, mobile/vehicle, and installation-level technologies and manufacturing capabilities. The RFI specifies it is for energy storage only, not energy generation. Responses to the RFI may

help the Air Force identify potential future elements for its AEST&M Roadmap for 2011-2015. The deadline for responses to the RFI is April 27, 2009.

https://www.fbo.gov/index?s=opportunity&mode=form&id=d7a71fc4c949e7377f5bf6ee98f82fc5&ab=core&_cvview=0

16. DOE Issues Hydrogen Sensor Funding Opportunity Announcement

DOE released a Funding Opportunity Announcement (FOA) for Research and Development of Hydrogen Sensor Technologies. The goal of the FOA is to develop low-cost sensor technologies that are resistant to contaminants and that can be integrated with hydrogen systems for the following applications: stationary systems, portable devices, transportation, or infrastructure. Approximately \$2.5 million is available for 2-3 awards of up to \$1 million each. Applications are due April 30, 2009. <https://e-center.doe.gov/iips/faopor.nsf/UNID/422B208A9600A5F685257574007E9B62?OpenDocument>

17. EPA SBIR Solicitation Includes Fuel Cell-Related Topics

The U.S. Environmental Protection Agency (EPA) has issued its Small Business Innovation Research (SBIR) solicitation, which includes topics and sub-topics related to fuel cell technologies. Among EPA needs listed within the topics are power plant systems that use biomass mixed with coal, waste-to-energy systems, and energy technologies that can be incorporated into existing wastewater treatment plants to reduce greenhouse gas emissions. The Government expects to award approximately 25 contracts of up to \$70,000 each for Phase I projects under this solicitation. The deadline for proposals is May 20, 2009.

http://es.epa.gov/ncer/rfa/2009/2009_sbir_phase1.html

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**Contract / Funding Awards**  
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18. \$3.3 Million Contract Awarded by DOD for UAV Fuel Cell System

The U.S. Department of Defense (DOD) awarded a \$3.3 million contract to Protonex Technology Corporation for development of a fuel cell power system that can be used in small unmanned aerial vehicles (UAVs). The fuel cell is expected to enable new long-duration missions.

http://www.protonex.com/downloads/press-releases/3-18-09_SOCOM-AECV_FINAL.pdf

19. Army Awards \$1.48 Million Contract to Protonex for SOFC System

The U.S. Army has awarded a \$1.48 million contract to Protonex Technology Corporation to adapt its 500-Watt SOFC power system to operate on alternative fuels such as butanol and bio-diesel. The program will result in delivery of two fuel cell systems to the Army for testing and evaluation.

http://www.protonex.com/downloads/press-releases/3-5-09_FM-SOFC_FINAL.pdf

20. AC Transit Contracts UTC Power to Provide Fuel Cells for Buses

California's Alameda-Contra Costa Transit District (AC Transit) has contracted with UTC Power to provide an additional four PureMotion® Model 120 fuel cell systems for hybrid-electric fuel cell buses. AC Transit's first-generation fuel cell buses, which use UTC Power fuel cell systems, have demonstrated an average 70 percent better fuel economy than a control fleet of diesel buses.

http://www.utcpower.com/fs/com/bin/fs_com_Page/0,11491,0307,00.html

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## Legislative / Regulatory News

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21. FY 2009 Omnibus Appropriations Act Signed by President Obama

The FY 2009 omnibus appropriations act signed by President Barack Obama provides nearly \$169 million for hydrogen technologies under DOE's Energy Efficiency and Renewable Energy (EERE) program budget, including \$3 million for fuel processors and \$5 million for manufacturing activities. The act specifies \$25 million in EERE's industrial technologies program be directed to distributed energy generation, CHP activities and the advanced reciprocating engines system program. In the DOE Nuclear Energy program budget, \$7.5 million is appropriated for the Nuclear Hydrogen Initiative. In the DOE Fossil Energy program budget, \$58 million is directed to fuel cells within Fuels and Power Systems. Language in the act directs DOE to submit to the National Academy of Sciences an inventory of the energy development potential on all lands currently managed by DOE. The language specifies that the report should include a detailed analysis of all energy resources including oil, gas, coal, solar, wind, geothermal and other renewable resources. http://appropriations.house.gov/FY2009_consolidated.shtml

22. NFPA Releases Draft Hydrogen Technologies Code, Seeks Public Comment

The National Fire Protection Association (NFPA) has released a draft of "NFPA 2, *Hydrogen Technologies Code*," which is intended to be a single document for fire prevention issues related to hydrogen. The document would be available for use by designers, permitting authorities and regulators. NFPA is seeking public comments on the document, which is expected to be reviewed and acted on in August 2009. Comments are due by May 29, 2009. <http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=2&cookie%5Ftest=1>

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## State Activities

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23. Workshop Set to Receive Comments on California Transportation Fuel Infrastructure Issues

The California Energy Commission has scheduled a workshop to discuss and receive comments on transportation fuel infrastructure issues that could affect the adequacy of the state's petroleum and alternative fuel supplies. The combined Integrated Energy Policy Report and Transportation Committee workshop is scheduled for April 14-15, 2009, at the Energy Commission office in Sacramento, California.

http://www.energy.ca.gov/2009_energy_policy/notices/2009-04-14-15_workshop_notice.html

24. Draft Electric Resource Plan Claims Fuel Cells Too Costly to Fit in LIPA Portfolio

The Long Island Power Authority (LIPA) has released its Draft Electric Resource Plan 2009-2018, which says that while fuel cells "may hold promise as a useful and flexible future generation source", the results of LIPA's past RFPs "show the economics of the present fuel cell technology to be too costly at this time to fit in the LIPA generation resource portfolio." The RFPs referred to were a 2006 RFP for a 5-MW fuel cell and a 2005 RFP for a 10-MW fuel cell. LIPA will hold public hearings on the draft plan April 2, 6 and 7, 2009. Written comments on the draft plan will be accepted by email through April 30, 2009.

<http://www.lipower.org/company/powering/energyplan08.html>

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## Industry News

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grant, which runs through September of 2012, is one of six projects statewide funded by the Iowa Power Fund. Created as a tool for the Iowa Office of Energy Independence, the fund is used to promote a move away from dependence on foreign energy sources.

<http://www.umpr.uni.edu/news.asp?NewsID=4149>

Zhenhai Xia, a professor of mechanical engineering at the University of Akron, and a team of three other researchers from the University of Dayton and Wright-Patterson Air Force Base have discovered a new class of electrodes that can provide an economical alternative to the costly precious-metal catalysts currently used in fuel cells. Specifically, the team discovered that nitrogen-doped carbon nanotube arrays can act as metal-free electrochemical converters that produce electricity from fuel efficiently and economically.

http://www.uakron.edu/about_ua/news_media/news_details.dot?newsId=443675&pageTitle=UA%20News&crumbTitle=Fuel+cell+breakthrough

In the March issue of the *American Ceramic Society Bulletin*, Abdul-Majeed Azad, associate professor of chemical engineering at The University of Toledo in Ohio, discusses his team's development of an inexpensive, heterogeneous ceramic catalyst capable of converting greenhouse gases into syngas that could be used to fuel intermediate-temperature solid oxide fuel cells or proton exchange membrane fuel cells after water-gas shift reaction. The syngas produced in this manner also could be used as a precursor for Fischer-Tropsch synthesis of liquid fuels, including ethanol and diesel. (See page 15 of the following link.)

http://www.americanceramicsociety.org/bulletin/mar_09/

Researchers at West Virginia University and the Department of Energy's National Energy Technology Laboratory have developed a manganese-cobalt electroplate coating that makes connecting multiple solid oxide fuel cells more efficient. Operating at 800 degrees Celsius, the manganese-cobalt plated interconnects not only protect the SOFCs from corrosion, but are also cleaner and more cost-efficient than previous coatings that used hazardous chemicals. Xingbo Liu, assistant professor of mechanical and aerospace engineering in WVU's College of Engineering and Mineral Resources, leads the research team.

<http://wvutoday.wvu.edu/news/page/7535/>

Elizabeth D'Addio, a third-year Ph.D. candidate in chemical engineering at the University of Delaware, was selected to receive an \$18,000 Air Products fellowship for the 2008-09 academic year. D'Addio studies ammonia decomposition catalysts for hydrogen generation for fuel cells.

<http://www.udel.edu/udaily/2009/feb/fellowship022509.html>

Louis A. Madsen, assistant professor of chemistry in the College of Science and the Macromolecules and Interfaces Institute at Virginia Tech, received a \$475,000 National Science Foundation Faculty Early Career Development Award. Madsen's research focuses on improving advanced polymers for fuel cells and reverse-osmosis water purification.

<http://www.vtnews.vt.edu/story.php?relyear=2009&itemno=142>

Chris Keturakis, a senior chemical engineering undergraduate at Lehigh University, placed second in the American Institute of Chemical Engineers' undergraduate poster competition with his project, *High Temperature Water-Gas Shift over Supported CrO₃/Fe₂O₃- Catalysts*.

http://www3.lehigh.edu/News/V2news_story.asp?iNewsID=3146&strBack=%2Fnews%2FV2news%5Farchive%2Easp%3FiStoryType%3D27

The National Science Foundation has selected Richard Sykora, assistant professor of chemistry at the University of South Alabama, as the recipient of a five-year, \$625,000 NSF Faculty Early Career Development Award for his proposed research involving lanthanides, or rare earth, elements. If successful, his research will lead to more efficient catalysts for use in fuel cells. He will collaborate with colleagues at Oak Ridge National Laboratory and at North Carolina A&T State University.

<http://www.southalabama.edu/publicrelations/pressreleases/2009pr/030309b.html>

A University of South Carolina scientist has received a \$320,000 grant from BASF Fuel Cell GmbH/Inc. to support research on high-temperature fuel cells. Brian Benicewicz, the Center for Economic Excellence endowed chair in Polymer Nanocomposite Research, said the BASF award continues a decade of support for his research in the field of fuel cell membranes.

<http://uscnews.sc.edu/2009/03052009-RSRC064.html>

Augusta State University students Brandon Hammond, a biology major, and Jeremy Robinson, a chemistry major, conducted experiments using an aluminum-gallium-indium-tin alloy to extract hydrogen from water. In their research, *Synthesis of an Al-Ga-In-Sn alloy: An alternative method of generating Hydrogen gas for the operation of a fuel cell*, they show that after placing the alloy into water, the water is divided into hydrogen and oxygen.

<http://www.asupr.com/2009/03/06/asu-students-use-aluminum-to-produce-hydrogen-that-fuel-engines/>

Using a process known as "electrospinning" — a technique used to produce long, ultra-thin solid fibers — researchers at the University of Rochester have created platinum nanowires that are thousands of times longer than any previous such wires. The platinum nanowires produced by James C. M. Li, professor of mechanical engineering, and his graduate student Jianglan Shui are roughly 10 nanometers in diameter and also centimeters in length — long enough to create the first self-supporting "web" of pure platinum that can serve as an electrode in a fuel cell.

<http://www.rochester.edu/news/show.php?id=3335>

Space Daily reported in its March 14 edition that researchers at Britain's University of Leicester, led by Professor Jingzhe Pan of the Department of Engineering, are applying new computer modeling techniques to sintering, a critical step in the manufacture of ceramics. Professor Pan and his group continue to explore various properties of ceramic materials and are investigating properties of multi-layered ceramics, which are commonly used in fuel cells and industrial coating.

http://www.spacemart.com/reports/Engineers_Crack_Ceramics_Production_Obstacle_999.html

<http://www.le.ac.uk/engineering/staff/pan.html>

Two Brown University chemists — graduate student Vismadeb Mazumder and chemistry professor Shouheng Sun — have produced palladium nanoparticles with about 40 percent greater active surface area than commercially available palladium particles, and the nanoparticles remain intact four times longer. Results appear in the online edition of the *Journal of the American Chemical Society*.

<http://news.brown.edu/pressreleases/2009/03/palladium>

Researchers at the University of Arkansas at Little Rock (UALR) say they have developed a process involving nanostructures that shows great promise in boosting the efficiency of titania photoanodes used to convert solar energy into hydrogen in fuel cells. The UALR team, working with researchers at the University of Nevada, Reno, and supported by the U.S. Department of Energy and the Arkansas Science and Technology Authority, reported an 80 percent increase in efficiency with the new process.

<http://ualr.edu/www/2009/03/18/ualr-nano-team-increases-efficiency-of-sun-to-fuel-process/#more-2009>

Kerri Anderson, a senior at William Penn University, represented the institution at Iowa Independent College Day at the state capitol in Des Moines on March 17. Anderson presented her work on the effects of maternal cadmium intake on fetal mice to state legislators and passers-by in the rotunda. As part of her presentation, Anderson discussed the heavy metal cadmium, which acts as a catalyst in hydrogen fuel cells. She argued that the effects of heavy metals must be addressed before large-scale production of hydrogen fuel cells occur. Her research shows that cadmium produces severe developmental problems in fetal mice, indicating the potential to produce abnormalities in human development.

<http://www.wmpenn.edu/Home/tabid/36/ctl/Details/mid/542/ItemID/209/Default.aspx>

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Press releases and story ideas may be forwarded to Bernadette Geyer, editor, for consideration at [fuelcellconnection @ yahoo.com](mailto:fuelcellconnection@yahoo.com).

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**About *Fuel Cell Connection***  
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The Sponsors

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/>)

National Energy Technology Laboratory -- The National Energy Technology Laboratory is federally owned and operated. Its mission is "*We Solve National Energy and Environmental Problems.*" NETL performs, procures, and partners in technical research, development, and demonstration to advance technology into the commercial marketplace, thereby benefiting the environment, contributing to U.S. employment, and advancing the position of U.S. industries in the global market. (<http://www.netl.doe.gov>)