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SRNL Study to Advance Innovation for Natural Gas Fueled Vehicles

AIKEN, S.C. (February 21, 2013) – The Savannah River National Laboratory (SRNL) in partnership with Ford Motor Company, the University of California-Berkeley, and BASF has been awarded \$5.5 million by the Department of Energy to help develop vehicles fueled by natural gas. This research will explore an innovative low-pressure material-based natural gas fuel system for automobiles and other light vehicles.

The Advanced Research Projects Agency-Energy (ARPA-E) funded project will accelerate the use of natural gas in vehicles by reducing the pressure of on-board tanks with a proposed technology using adsorbed natural gas (ANG). The project will use high surface area materials within a heat exchange system to increase the natural gas density far beyond that which can be achieved at similar pressures.

The first focus of the project is to develop improved metal-organic frameworks to adsorb the natural gas at high densities. Building on SRNL's extensive knowledge of hydrogen storage materials and systems, researchers here are responsible for designing and testing high performance fuel systems to use these next-generation metal-organic frameworks. This innovative research has the potential to lower the cost of storage tanks and compressors at the fueling station, resulting in increased use of natural gas vehicles.

"This is a logical extension of the work we have performed in hydrogen research," said SRNL Director Dr. Terry Michalske. "ARPA-E is a very significant and highly competitive



Metal organic frameworks



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program and our ability to attract such well-regarded partners and win this award underscores the quality of science and research taking place at SRNL every day.”

Today’s natural gas vehicle technologies require tanks that can withstand high pressures, are often cumbersome, and are either too large or too expensive to be suitable for light duty passenger vehicles. SRNL’s research and ARPA-E’s new projects are focused on removing these barriers, which will help encourage the wider use of natural gas cars and trucks.

The SRNL research is one of thirteen cutting-edge research projects that will receive a total of \$30 million to find new ways of harnessing America’s abundant natural gas supplies for cars and trucks, and expand the use of natural gas as a vehicle fuel. Through ARPA-E, the Department’s new program, titled Methane Opportunities for Vehicular Energy - or “MOVE” – aims to engineer light-weight, affordable natural gas tanks for vehicles and develop natural gas compressors that can efficiently fuel a natural gas vehicle at home.

Compressed natural gas (CNG) is composed primarily of methane. It is typically stored and distributed in expensive pressure vessels at 3,000 to 3,600 psi. About 85 percent of the CNG used in the United States is produced domestically. CNG is used in traditional gasoline internal combustion engines that have been modified for its use. The benefits of CNG are numerous; it is a nontoxic, clean-burning fuel and significantly reduces carbon monoxide, carbon dioxide and nitrogen oxides compared to gasoline. According to the U.S. Environmental Protection Agency, use of CNG can result in 30-40% less greenhouse gas emissions.

President Obama launched ARPA-E in 2009 to seek transformational, breakthrough technologies that are too risky for private-sector investment, but have the potential to promote quantum leaps in energy technology, form the foundation for new industries, and have large commercial impacts. Demonstrating the success ARPA-E has already seen, the program announced last year that eleven of its projects secured more than \$200 million in outside private capital investment after initial funding from its programs. To date, ARPA-E has attracted over 5,000 applications from research teams, resulting in approximately 180 groundbreaking projects worth nearly \$500 million.

Sponsored by DOE’s Office of Environmental Management, SRNL is DOE’s applied research and development national laboratory at the Savannah River Site. SRNL puts science to work to support DOE and the nation in the areas of environmental stewardship, national security, and clean energy. The management and operating contractor for SRS and SRNL is Savannah River Nuclear Solutions, LLC.

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