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For immediate release

Argonne receives cost-shared DOE grants to improve light-vehicle fuel efficiency

ARGONNE, Ill. (August 24, 2007) – Two Argonne-based research-and-development projects have been selected to receive grants from the U.S. Department of Energy (DOE) as part of an effort to improve the fuel efficiency of light-duty vehicle engines while promoting collaboration between researchers in government labs, universities and industry.

"We expect this research to make significant strides toward maximizing an engine's performance in a cleaner, more economical manner," Secretary of Energy Samuel W. Bodman said, as he announced a series of awards totaling \$21.5 million nationwide for 11 cost-shared R&D projects last month. "Increasing the use of clean, renewable fuels will not only help reduce our reliance on imported oil, but will also help reduce greenhouse gas emissions for a more secure energy future."

These projects are part of President Bush's 20-in-10 initiative, which calls for replacing 20 percent of the gasoline usage by 2017 through increased use of clean, renewable fuels and improved vehicle efficiency. Combined with industry investment, the 11 projects will provide nearly \$43 million to support improvement of engine and combustion systems for the next generation of efficient vehicles. Improving the engine of a flexible-fuel vehicle can increase performance and fuel economy, and decrease emissions. A flexible-fuel vehicle is one that can use different fuels, either mixed in the same tank or with separate tanks and fuel systems for each fuel. Funding is expected to begin this year (Fiscal Year 2007, \$3.1 million) and continue through FY2010 (FY'08 - \$8.6 million; FY'09 - \$7.4 million; FY'10 - \$2.6 million), subject to appropriations from Congress.

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Argonne grants – add one

One project, based out of Argonne's Transportation Technology R&D Center, will attempt to make flexible-fuel engines more efficient by using advanced engine technology with in-cylinder sensors to rapidly extract large quantities of information every time the engine ignites fuel. This in-cylinder technology, called ionization sensing, provides real-time data to engineers that may enable them to significantly reduce the size and improve the fuel economy of an engine without sacrificing power. For this endeavor, Argonne will partner with German engine manufacturer Mahle Powertrain, Michigan-based Visteon Corporation and Michigan State University. For this project, Argonne has been selected to receive up to \$2.3 million from DOE, which will be matched in large part by investment from industry.

DOE also announced funding for research in lubrication technology that will be performed in Argonne's Energy Systems Division. The federal funds will support research into the use of very small particles of molybdenum disulfide (MoS_2) as a lubricant additive for motor oils. Scientists from the University of Arkansas, Caterpillar and nanoMech LLC will also help to develop and test this new additive. DOE will provide up to \$491,000 for this research, and Caterpillar will make a similar investment.

Argonne was the only DOE national laboratory selected to receive the cost-shared grants. To view a list of all projects selected by DOE, visit: <http://www.energy.gov/news/5298.htm>.

Ionization Sensing

Ionization sensing is not a new technology, but the DOE grant will enable researchers to acquire data more quickly and accurately than ever before, according to Argonne senior technical advisor Bob Larsen.

Advanced ionization sensing will enable scientists to determine optimal spark and fuel injection timing, detect knock and misfire and allow control of boost level and exhaust gas recirculation. Ionization sensing will also help to make flexible-fuel engines more efficient, as it continually detects the proportion of ethanol in the fuel mix and exploits its favorable attributes.

"The secret to the efficiency of these engines lies in their extraordinarily high compression ratio," said Larsen. "The increased efficiency of these engines – perhaps as much as 30 percent higher than conventional engines – is expected to compensate for the ethanol "penalty" of lower energy content that yields reduced range for cars that run on mostly ethanol."

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Argonne grants – add two

Molybdenum Disulfide Nano-lubrication

To the naked eye, molybdenum disulfide is a greasy black solid that looks and feels very much like graphite. The root of its slick texture, however, lies in its molecular structure, in which molybdenum atoms form sheets sandwiched by layers of sulfur atoms. The weak bonding between the planes of sulfur atoms allows them to slide over one another easily, resulting in extremely low coefficients of friction.

Ali Erdemir, senior scientist at Argonne, has spent nearly two decades looking for ways to reduce friction between sliding surfaces. The new lubricant that Erdemir and his colleagues have developed might prove especially valuable for the types of industrial and agricultural equipment that represent many of Caterpillar's products. "Dust can make its way into the crank case and cause abrasive wear, so this with this kind of additive the severity of that wear will be reduced," he said.

With employees from more than 60 nations, DOE's Argonne National Laboratory brings the world's brightest scientists and engineers together to find exciting and creative new solutions to pressing national problems in science and technology. The nation's first national laboratory, Argonne conducts leading-edge basic and applied scientific research in virtually every scientific discipline. Argonne researchers work closely with researchers from hundreds of companies, universities, and federal, state and municipal agencies to help them solve their specific problems, advance America's scientific leadership and prepare the nation for a better future. Argonne is managed by [UChicago Argonne, LLC](#) for the [U.S. Department of Energy's Office of Science](#).

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