

Ten Phase II FY2011 Fossil Energy Projects Chosen by DOE's Small Business Innovative Research (SBIR/STTR) Program

Washington, D.C. — The Department of Energy has selected ten new projects under the Small Business Innovative Research/Small Business Technology Transfer (SBIR/STTR) Program.

Taken as a whole, the Department of Energy's (DOE) Fossil Energy (FE) Research and Development (R&D) activities help ensure that as the nation strives to reduce its reliance on imported energy sources, new technologies and methodologies will be in place to promote the efficient and environmentally sound use of America's abundant fossil fuels.

The selections will provide research grants in seven topic areas — advanced coal research, advanced fossil energy research, climate control technologies for fossil energy applications, coal gasification technologies, advanced turbine technologies for IGCC power plants, fuel cell technologies for central power generation with coal, and oil & gas technologies — and will be funded at a maximum of \$1,100,000 for 24 months. The projects are managed by the DOE's Office of Fossil Energy and its National Energy Technology Laboratory (NETL).

The selections mark the 31st round of the Department's SBIR program. Over the 26 years of its existence, the DOE SBIR Program has evolved significantly. DOE has issued 25 Phase I solicitations in SBIR, reviewed approximately 31,797 proposals, and selected for funding 4,413 Phase I projects and 1,816 Phase II projects valued in excess of \$2 billion.

A summary of the topic areas and the selected projects follow.

Advanced Coal Research

Carbon Dioxide (CO₂) Conversion to Fuels and Chemicals

Utilization of carbon dioxide (CO₂) has become an important global issue due to the significant and continuous rise in atmospheric CO₂ concentrations, accelerated growth in the consumption of carbon-based energy worldwide, depletion of carbon-based energy resources, and low efficiency in current energy systems. Projects under this topic will develop novel concepts, based on the use of advanced catalysts, for the conversion of CO₂ from energy production and utilization systems to value-added fuels and industrial chemicals.

- **Advanced Cooling Technologies, Inc.**, Lancaster, PA — The technology produces syngas from CO₂ and water using a solar driven thermochemical cycle reactor. The process will recycle CO₂ into fuels and chemicals such as methane, methanol and other hydrocarbon derivatives. (DOE Share: \$1,000,000)

Advanced Coal Research

Carbon Sequestration – Development of Air Capture of Carbon Dioxide

Projects in this research area will develop innovative and cost effective approaches to the removal of CO₂ from air. A successful scheme for capturing CO₂ from air would offer several unique advantages, including the ability to locate the device in close proximity to a remote

subterranean storage site, and the potential not only to stabilize CO₂ emissions but also to reduce atmospheric CO₂ concentrations. A primary challenge of such a scheme is the very low concentration of CO₂ in air (0.04%), which causes large scale capture to be energy intensive.

- **Eltron Research & Development, Inc.**, Boulder, CO — Eltron will fabricate an integrated system for the concomitant capture of CO₂ from air and electrochemical conversion to CO, ethylene or alcohols. The technology uses a CO₂ reduction electrocatalyst and CO₂ adsorbent materials integrated into the cathode. When used with wind or solar energy the process can store off-peak energy in the form of value-added products. (DOE Share: \$1,000,000)

Advanced Fossil Energy Research Advanced Concepts for Powering Wireless Sensors

An engineered, self-powered wireless package with an integrated protective housing for commercial installations of new sensor technology in high temperature environments is sought for development. Primary applications where the sensors would be applied are fossil fuel-based power plants including coal-fired boiler systems, coal gasification systems, and turbines.

- **Wireless Sensor Technologies, LLC.**, Encinitas, CA — This project will develop and demonstrate a high reliability waste heat-enabled power supply and wireless sensor system for power generation applications. The system consists of networked sensor nodes containing pressure and temperature sensors that may be used in gas turbine engines and other critical machines enabling condition-based maintenance for power generation plants. (DOE Share: \$998,795)

Climate Control Technologies for Fossil Energy Applications Alternative Use and Reuse of CO₂

Applications were sought to develop solvent-based technologies that can substantially lower the cost of CO₂ capture from flue gas produced by existing coal-fired power plants.

- **United Environment & Energy, LLC.**, Horseheads, NY — This project uses a catalyst to react greenhouse gas CO₂ with crude glycerol, a biodiesel plant waste, to produce a bio-based high value renewable industrial product – glycerol carbonate. (DOE Share: \$999,968)

Climate Control Technologies for Fossil Energy Applications Monitoring of CO₂ Geologic Storage

Applications are sought to provide reliable and cost-effective monitoring, verification, and accounting (MVA) of the CO₂ in geologic storage locations for the implementation of CCUS.

- **Intelligent Optical Systems, Inc.**, Torrance, CA — Proposes to build a distributed fiber optic sensor system for fully-distributed CO₂ monitoring. (DOE Share: \$1,000,000)

Climate Control Technologies for Fossil Energy Applications

Advanced Sorbents for CO₂ Capture from Existing Coal-Fired Power Plants

Projects in this area will develop sorbent-based systems for capturing CO₂ from existing coal-fired power plants.

- **Aspen Aerogels, Inc.**, Northborough, MA — This project will develop a novel aerogel based sorbent that will effectively remove the CO₂ from post combustion flue gas, be regenerated at low temperature, and will be suited for multiple-cycle use. (DOE Share: \$999,973)

Coal Gasification Technologies

High Temperature Heat Recovery IGCC

Applications were sought for novel ideas and approaches that significantly reduce or eliminate operational problems associated with high-temperature heat recovery units such as erosion, fouling, and pluggage.

- **Reaction Engineering International**, Salt Lake City, UT — This project will develop a boiler cleaning technology tailored for use in coal gasification plants to improve the reliability and efficiency of power generation, refinery, and chemical production applications. (DOE Share: \$1,000,000)

Technologies for Clean Fuels and Hydrogen from Coal

Concepts for Enhanced Catalysts for Water-Gas-Shift & Fischer-Tropsch Processes for Gases from Co-Mingled Coal & Biomass Gasification

Applications were sought for novel WGS and/or FT catalysts, or catalyst-related improvements, that result in improved CBTL plant efficiency and/or cost to optimize the coal-CO₂ slurry process from slurry preparation to readiness for gasifier injection (at least 750 psi), including necessary rheological testing not available in the literature, process tests and/or needed equipment design and construction.

- **TDA Research, Inc.**, Wheat Ridge, CO — This project will develop a new sulfur-tolerant water gas shift catalyst that permits efficient fuels production from coal and biomass while minimizing the number of steps. This catalyst performs significantly better than industry-standard commercial catalysts and gives greater yields of synthetic fuels and other valuable products with less energy and lower amounts of feedstock. (DOE Share: \$1,000,000)

Advanced Turbine Technology for IGCC Power Plants

Novel Coating Methods for Unique TBC/Bond Coat Architectures that can Operate at Higher Temperatures

Projects in this research area will explore new architectures for thermal-barrier coating/bond-coat (TBC/BC) materials, such as yttria stabilized zirconia (YSZ), having a coefficient of thermal expansion (CTE) close to that of nickel based super-alloys.

- **UES, Inc.**, Dayton, OH — UES proposes development of innovative coating architectures to provide lower thermal conductivity, higher corrosion resistance and strain tolerance for longer life. These architectures will be applicable to turbine engines used in electric power production, propelling aircraft, pumping fluids, etc. (DOE Share: \$749,992)

Oil and Gas Technologies

Development of Petroleum and Natural Gas Fields

Projects in this research area will develop innovative tools or methods to reduce cost and /or increase recovery efficiency associated with both conventional and unconventional oil and gas reservoir development.

- **ABSMaterials**, Wooster, OH — This project will develop water treatment technologies to remove organic contaminants from water created during fracturing operations so such water can be safely recycled or discharged. (DOE Share: \$978,821)