State Technologies Advancement Collaborative (STAC)
DOE – ASERTTI – NASEO

FOR IMMEDIATE RELEASE – February 7, 2005
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STAC Selects Eight Science Proposals for Federal Funding

WASHINGTON, DC (February 7, 2005)—The State Technologies Advancement Collaborative (STAC) today announced the results of its Energy Efficiency and Fossil Energy Science Solicitation. The STAC Executive Committee approved funding for eight projects valued at $6,404,119 and covering each of the five technical areas in the solicitation. More than $2,116,814 of the selected projects' value represents costs to be shared by non-federal government entities, and $4,323,305 is funding from the STAC program—or an average cost share of 28%. The STAC Program Director, Bob Kripowicz, said he is, "pleased with the technical quality of the proposals, the large variety of technologies involved, and the potential impact of the selected proposals on the clean and efficient use of energy." The proposals selected for award are summarized below.

Organizations from 14 states are direct participants in the selected proposals. Final project awards will be contingent on achieving the mandatory requirements of the solicitation in the contract negotiation process, which STAC expects to complete during the next six weeks.

In total, thirty-five proposals collectively valued at approximately $29 million were submitted by State and Territory Energy Offices, State Research Institutions, public and private universities and other qualified organizations in response to the STAC solicitation. More than $7.5 million of the proposals' value represented costs proposed to be shared by non-federal government entities.

The solicitation, which closed in September 2004, supports joint energy research, development, demonstration and deployment of technologies where common Federal and State objectives exist. The program and the solicitation emphasize the wide dissemination of results from projects and the transfer of technologies for broad application and impact. The particular objective of the Science solicitation is to pursue "bridge" research and development (R&D) of interest to STAC and both the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) and Office of Fossil Energy (FE), with ultimate applications that will promote energy efficiency and clean use of fossil energy. This category of research and development occupies the spectrum between exploratory science and pre-commercial applied R&D. The projects selected for award, by program area, include:

Materials Sciences
1. *Preventing Solidification Defects in Large Superalloy Castings Used in Advanced Electric Power Systems.* This two-year project will develop improved methodologies for preventing macrosegregation in superalloy remelting processes. A combination of theoretical modeling and physical experimentation will address the weakness in existing models. The ultimate goal is development of a predictive technology that can be applied commercially to prevent solidification defects in large superalloy castings used in advanced energy systems. Improvement in these alloys has been identified by the Department of Energy (DOE) as a critical enabling technology for such systems.

Participants: West Virginia University (lead), Penn State University, Special Metals Corporation, GE Energy

Total Proposed Project Cost: $526,332; $150,859 in cost share; $375,473 in STAC funds

Fuels and Chemical Sciences

2. *Development of a Pilot Scale Module for Hydrogen Separation.* This two-year project will advance a selected hydrogen membrane technology to the pilot scale matching the requirements identified in the solicitation and then demonstrate that module. The membrane will consist of a thin film palladium alloy composite with either porous ceramic or porous metal substrate tubes. The proposed effort will optimize synthesis parameters for the membranes to reduce cost as well as meet performance characteristics and make them robust, durable in the long-term, and tolerant to impurities including sulfur species typically present in synthesis gases derived from a variety of feedstocks. The proposed development is applicable to both distributed and central station power generation.

Participants: New York State Research and Development Authority (lead), North Carolina State Energy Office, Research Triangle Corporation, Pall Corporation

Total Proposed Project Cost: $1,000,000; $200,000 in cost share; $800,000 in STAC funds

3. *Iron-based Mixed Metal Carbide Fischer-Tropsch Catalysis.* This three-year project will assess the performance of iron-based bimetallic catalysts formed in the carbide state at reaction temperatures and conditions rather than in their metallic state. It is expected that activity of the catalysts will be improved, and the rate of deactivation slowed, thus improving both the conversion rates in the process and the longevity of the catalyst. The resulting catalysts will be subjected to detailed testing and compared to a benchmark catalyst to evaluate commercial potential. These iron-based catalysts are crucial to Fischer-Tropsch synthesis of clean fuels, additives, and lubricants derived from gasification of both coal and biomass resources.

Participants: Clemson University (SC) (lead), Louisiana State University, South Carolina State Energy Office, Louisiana State Energy Office, RTI, Rentech, Sud-Chemie, Inc.

Total Proposed Project Cost: $1,334,594; $459,095 in cost share; $875,499 in STAC funds

Sensors and Controls Sciences

4. *Utilizing the National Corn-to-Ethanol Plant to Develop a Predictive Model for Distillers Dried Grain for the Fuel Ethanol and Animal Feed Industries.* This two-year project will develop and validate a neural network predictive plant model for the composition of Distillers Dried Grain with Solubles (DDGS), a coproduct from the dry grind fuel ethanol process. The research will identify, develop, install, and test appropriate plant sensors and controls critical to the determination of the quality and composition of DDGS. Constantly produced quality DDGS will add value to ethanol process plants and create opportunities for added sustainable “biorefinery” products. Validation of the model will take place through repeated testing at a pilot scale ethanol facility.

Participants: Southern Illinois University (lead), Washington State University, Illinois Department of Commerce and Economic Opportunity, Emerson Process Management

Total Proposed Project Cost: $1,519,875; $886,725 in cost share; $633,150 in STAC funds

5. *The Use of Real Time Measurement and Artificial Intelligence to Improve Efficiency and Reduce Emissions at Coal-fired Power Plants.* This two-year project will use laser technology to measure the properties of coal in real time and in situ in a coal-fired power plant, and along with other information feed this data to artificial intelligence software to provide operators with the information needed to adjust the operations of the plant to avoid slagging and fouling in the boilers. Operations will be at the laboratory level initially, and later at full scale in a commercial power plant. Projected savings from better plant operation in a 600MW system could be as much as $16 million per year.

Participants: New York State Research and Development Authority (lead), Lehigh University Energy Research Center (PA), Brayton Point Utility (MA)

Total Proposed Project Cost: $750,000; $150,000 in cost share; $600,000 in STAC funds

Energy Conversion Sciences

6. *Energy Conversion Sciences for Operations and Security of Large-scale Systems.* This two-year project will investigate methods to: expand research in solid state silicon carbide (SiC) to reduce the size, weight, and cost of power converters for motor drives and distributed power systems; investigate methods of motor control including the advantages of SiC devices; and incorporate results with existing fuel cell testing and modeling to include design and operation of these devices in DG systems and to investigate the control and performance of DG during islanding of an electric power grid. The proposed research is expected to provide significantly improved systems performance and reduced costs as well as improved security to the grid.

Participants: Purdue University (IN), Wright State University (OH)

Total Proposed Project Cost: $322,834; $72,835 in cost share; $249,999 in STAC funds

7. Motor Control and Power Conversion Technologies Using FLEXMOD. This eighteen-month project will develop a flexible, universal, modular inverter platform that can be applied to a range of power supplies from fractional horsepower up to 100kw. A family of inverter products will be developed that share common components and compatibility. High performance permanent magnet motors have high cost and many limitations. Current alternating current (AC) induction motors are widely used for more moderate performance objectives. This project will use advanced technology that can be applied to AC motors to meet the performance characteristics of permanent magnet motors as well as those for current AC motors. The large potential savings in electrical energy and hybrid electric vehicle markets are the targets of this project.

Participants: Advanced Energy (NC) (lead), Washington State University, Utah State Energy Office, Raser Technologies

Total Proposed Project Cost: $486,484; $97,300 in cost share; $389,184 in STAC funds

Emissions Reduction and Environmental Sciences

8. *Determination of CO2 Storage Capacity and Enhanced Coal Bed Methane (ECBM)Potential of Lignite Coals*. This two-year project will develop estimates of the gas content and CO2 storage capacity of a particular seam of lignite coal in North Dakota and Montana and determine the potential for application of CO2-based Enhanced Coal Bed Methane Recovery in those coals. The project will identify best practice gas content analysis methods specifically suited to low gas content, low-rank coals which can be used in other coal basins also, particularly in Texas and Alaska. The potential of the North Dakota and Montana seam being investigated is for millions of tons of CO2 sequestration annually.

Participants: University of North Dakota (EERC) (lead), North Dakota Industrial Commission, Oil and Gas Division, North Dakota Department of Commerce, Division of Community, Services, State Energy Program, Montana Board of Oil and Gas

Total Proposed Project Cost: $500,000; $100,000 in cost share; $400,000 in STAC funds

STAC is a five-year pilot program funded by the U.S. Department of Energy and directed by an Executive Committee that includes representatives of the Association of State Energy Research and Technology Transfer Institutions, the National Association of State Energy Officials, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy and Office of Fossil Energy, and an independent member. To learn more about STAC, please visit www.stacenergy.org.

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