

## News from the Savannah River National Laboratory

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### BIOFUELS PILOT PLANT SET FOR CLEMSON UNIVERSITY RESTORATION INSTITUTE IN CHARLESTON



FLORENCE, S.C. — A collaboration of research institutions and industry based in South Carolina today announced plans to build a biofuels research pilot plant at the Clemson University Restoration Institute in North Charleston, S.C. The goal is to use South Carolina's agricultural resources to help the state and nation reduce dependence on fossil fuels and enhance South Carolina's alternative-fuel industry.

The announcement was made Nov. 15 by Nick Rigas, Director of Renewable Energy at the Clemson University Restoration Institute and the S.C. Institute on Energy Studies, during the Switchgrass: Energy for the Future Conference at the university's Pee Dee Research and Education Center in Florence, S.C. The conference, geared toward researchers, state business leaders and legislators, focused on the fuel potential of switchgrass along with a tour of research studies conducted by the South Carolina Switchgrass Research and Education Team.

"This project will provide our state with unique facilities to scale-up new biofuel technology being developed by the research institutions," said Rigas. "Biofuels produced here will utilize locally available feedstocks that do not compete with food supplies. Without such a facility commercialization of this new technology is very difficult."

Savannah River National Laboratory (SRNL), Clemson University, South Carolina State University, and SC Bio have formed the South Carolina Bioenergy Research Collaborative to demonstrate the economic feasibility of using cellulosic biomass (stems, wood, leaves, etc.) from regional plants, such as switchgrass, trees and sorghum, to make ethanol. The research collaborative has expanded to include key industrial partners: Fagen Inc., one of the nation's leaders in designing and constructing ethanol plants; Dyadic International Inc., a leader in the development of novel enzymes for breaking down cellulose; and Spinx Corp., one of the leading distributors of biodiesel and ethanol gasoline blends in the South.

"SRNL is very pleased to bring our environmental and biological research and development capabilities to this program, which has such great potential for addressing the nation's energy needs," said Dr. G. Todd Wright, laboratory director of the U.S. Department of Energy's SRNL, which is operated for DOE by Washington Savannah River Company, a subsidiary of Washington Group International. "It is exciting to be able to apply our skills to the complex problem of converting biomass to ethanol."

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In addition to the environmental benefits – analyses have shown that carbon emissions from cellulosic ethanol can be 85 percent lower than gasoline – this endeavor could lead to significant economic development for the region. South Carolinians consume over 2.5 billion gallons of gasoline every year, all of which is imported from out of the state. Producing enough cellulosic ethanol to replace just 20 percent of the state's gasoline usage would create thousands of new jobs and add \$2 billion to the local economy, according to the report "Breaking the Biological Barriers to Cellulosic Ethanol" produced by the U.S. Department of Energy in June 2006.

"South Carolina State University and the James E. Clyburn University Transportation Center are excited about this partnership, working on bio-fuels research," said Dr. Reinhardt Brown, Interim Executive Director of the Clyburn University Transportation Center. "Switchgrass is indigenous to South Carolina. The research from switchgrass will open many doors of opportunity for South Carolina. Biofuels is the 'energy for the future,' and switchgrass will play a significant role assisting America to reduce its dependence on foreign fuel."

Public and private-sector funding is supporting the initiative.

- Clemson has established a \$500K matching fund for the pilot plant design.
- Clemson has provided a pilot plant building and a laboratory building on the Clemson University Restoration Institute property in North Charleston, S.C.
- Clemson has received grants for 10 new faculty positions to form a research team focused on biomass conversion.
- Spinx Company Inc. has committed to funding for the pilot plant.
- Fagen Inc. has committed to provide gratis engineering and project management services for the pilot plant, and has begun the early stages of design for the Ethanol Pilot Plant.
- Dyadic International Inc. has begun the evaluation process to determine the best enzyme mixture to break down the cellulose and hemicellulose found in switchgrass

Jim Frederick is leading the switchgrass research at Clemson. The Switchgrass Research and Education Team is examining all facets of production, including soil and crop management, new variety development and measuring environmental impact. For more information about the project, go the Internet site <http://agroecology.clemson.edu/switchgrass/sg.htm>.

Cellulosic ethanol has the potential to be a highly efficient energy source. It is estimated that this approach could produce 800 to 1,000 gallons of ethanol per acre, compared to 416 gallons per acre for ethanol produced from corn. Even more striking, the energy content, which is the ratio of energy delivered to customer compared to the fossil energy used, could be as high as 10 for switchgrass, compared with .81 for gasoline and 1.36 for corn-based ethanol. (Source: "Breaking the Biological Barriers to Cellulosic Ethanol", US DOE, June 2006)

Among the technical challenges being addressed by the collaborative are the development of energy crops with high fuel yield per acre, low water consumption and the ability to grow on less fertile lands. Other research will seek to identify cost-effective ways to break down the plants and produce an efficient fuel. Each of the various partners on this project brings existing technology that can be expanded into this field, including novel conversion enzyme targets and chemical technologies to convert residual and row crops into ethanol.

Karl Kelly of SC Bio, not-for-profit organization that works to develop new life science companies in South Carolina, is enthusiastic about the prospects of this collaboration. "We are excited about the capabilities of this public/private team to rapidly move new ethanol technology into commercial application in South Carolina," he said.

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