BioEnergy Science Center (BESC) Education and Outreach

S. Kral1, J. Griffin1, L. Mulligan1 and H. Schulson1, P. Doney2,4, S. Fowler3,4, B. Davison3,4 and J. Westpheling2,4

1The Creative Discovery Museum, Chattanooga, TN, 2University of Georgia, 3ORNL, 4BESC

In addition to our efforts to prepare a new generation of scientists for the emerging fields of bioenergy through the interdisciplinary training of graduate students and post-docs, our center has taken a novel approach to education and outreach in that our education efforts begin with fifth graders. We have developed lesson plans aimed at 4th, 5th and 6th grades to educate and inform students about the basics of energy production and utilization. They include basic concepts such as the carbon cycle, lignocellulosic biomass as substrate for the production of biofuels as well as technical and economic obstacles to a biobased fuel economy. These lessons have been piloted in schools in Georgia and Tennessee and will be made available to schools nationwide in the Spring of 2010. We have piloted a series of “science night” programs offered to students and the general public through local schools, museums and community centers.

Grade and Middle School Outreach Lessons

In collaboration with the the educational outreach program of the Creative Discovery Museum we have created portable hands-on experimental work stations that allow students to understand the fundamentals of the carbon cycle, the complex nature of plant cell walls, the issues affecting the use of food versus non-food crops to produce biofuels such as ethanol, the mechanical differences between cars run by hydrogen, solar and wind power in a school classroom setting. During the 2008-2009 school year more than 120 lessons were piloted, reaching more than 3000 students, from Title one to Magnet schools. These lessons will be taught throughout the Southeast in the next school year with a view to making the lesson plans available nationally within 12 months. Mechanisms are in place to provide technical and planning support for teachers as well as students in this effort.

Science Nights

Also in collaboration with the Creative Discovery Museum we have assembled a number of larger and more detailed portable experimental work stations to be presented as “science night” activities as part of PTO meetings, school open-house nights, community centers, town libraries and local venues that will inform the general public about biofuels and bioenergy. The science night activities premiered at a reception held at the Creative Discovery Museum during the BESC science retreat in December, 2009, taking advantage of the opportunity to use BESC scientist as students, teachers and consultants for the experiments. 10 Science nights were held during the 2008-2009 school year drawing an average of 250 people each with student, parent and teacher participation. As with the classroom lessons, these activities will be presented throughout the Southeast in the next year with the view to making them available nationally within 12 months.

Pre-service Teacher Training

Developed as a collaboration between BESC and the University of Georgia Department of Science Education, this component involves teachers and BESC scientists teaching teachers. Pre-service teachers are educated about the science of bioenergy and biofuels and are trained in the teaching of the outreach lessons and science night activities. A course for 30 pre-service teachers is currently being taught at UGA with the view that these students will teach these lessons as student teachers in the fall of 2009.

Workshop for Museum Staff to Extend Outreach Activities

On June 9-11, 2009, museum educators from six museums participated in a teacher development workshop. These museums are currently providing lessons and outreach in their communities to areas throughout Georgia and Tennessee. The participating museums include the Hands On Regional Museum, Johnson City, TN, the National Science Center, Augusta, GA, the Lichterman Nature Center, Memphis, TN, the Adventure Science Center, Nashville, TN, and the Tellus Northwest Georgia Science Museum, Cartersville, GA.