

# RESEARCH AND SPONSORED PROGRAMS FUNDING EXPRESS

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## Appalachian Faculty Receive \$120,000 to Study Landfill Gas in Brazil

A team of biofuels researchers led by Dr. Jeff Ramsdell, Associate Professor of Technology at Appalachian, was awarded \$120,000 from the Environmental Protection Agency's "Landfill Methane Outreach Program (LMOP)/ Methane to Markets Partnership" for a project to investigate the potential for landfill gas (LFG) utilization in Brazil, while educating officials and community members about the potential energy source available from landfill gas.

The team's approach to landfill gas utilization projects is different than the traditional approach of looking for existing users located close enough to the landfill to economically use the landfill gas. While not ignoring obvious users of the gas located adjacent to the landfill, the group's approach is a "community-based" one which first identifies energy and community needs which can be linked to the energy source represented by the landfill gas. The researchers believe that the energy needs identified by each community are unique and therefore cannot be met by a cookie cutter approach. Each participating landfill will be recognized as an energy source around which suitable development such as an "energy park" can be built.

The project will identify between seven and 10 landfills in Brazil that are strong candidates for LFG utilization. Selected communities will have LFG utilization studies completed; the researchers later will present the results in a series of meetings, presentations and workshops with the selected communities' local officials. At the project's conclusion, an overall feasibility report will be created which will include an analysis of technology options and economic feasibility for LFG utilization for the Brazilian landfills. These technology options will include gas separation and/or methane purification technology which will allow compressed natural gas (gCNG™) production as well as the sale of carbon dioxide. Electricity generation technology options will also be presented in the reports.

Compressed natural gas (gCNG™) can be used as a vehicle fuel, pipeline quality natural gas, or bottled CNG for use at sites remote from the landfill. Technologies like this, which promise improved portability of the LFG, offer improved chances for success in Brazil, with its emphasis on using bio-fuels for transportation.

This emphasis on transportation bio-fuels in Brazil also will figure predominantly in the development of this project. Methanol, a principal ingredient in bio-diesel production, is another potential product of the technology being utilized. In the U.S., there have been several incidents where bio-fuels production and testing facilities have been located at landfill sites, thus connecting their energy needs to LFG pipelines. One such plant is an Appalachian State University facility under development at the Catawba Eco-Complex, just 40 miles from Boone.

The project is expected to be just the first phase in an effort that will result in the development of one or more LFG utilization projects in Brazil during the next few years, based on the outcome of this feasibility study. As a result of this grant project, the team hopes to identify one or two of the studied landfills on which Appalachian could partner with for-profit companies to implement a community-based landfill gas utilization project.



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## Biodiesel Research Program Receives Grant from Biofuels Center of North Carolina

The Biodiesel Research Program at Appalachian State University recently received a \$129,133 grant from the Biofuels Center of North Carolina. This funding will allow the research team, led by Dr. Nicole Bennett, Dr. Jeff Ramsdell and Mr. Jeremy Ferrell, to continue their research on optimizing the processes for the refinement and extraction of oil from seeds and on educating growers about the benefit of planting biodiesel feedstocks in partnership with the Catawba County EcoComplex.

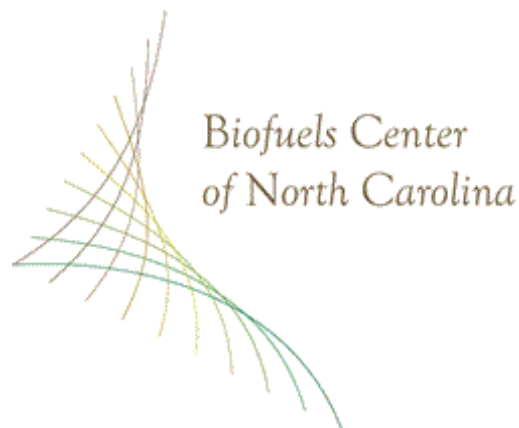
The team is dedicated to developing a multi-pronged approach to providing state growers and producers of biodiesel with efficient processes that will make it an economically viable alternative to petroleum.

Creating a viable mechanism for the production and distribution of biodiesel within North Carolina is of critical importance to the economy and security of the State. Successful long-term production of biodiesel in North Carolina pivots on the utilization of 1<sup>st</sup> generation high-yield oilseed feedstocks. However, challenges in the biodiesel production process lie in the extraction and refinement of oil from these feedstocks.

## Researchers at Appalachian to Monitor Air Quality and Climate Change

An interdisciplinary team of researchers from Appalachian State University will soon be monitoring air quality and atmospheric conditions and their impact on ecosystems and climate in the area. The project is called AppalAIR (Appalachian Atmospheric Interdisciplinary Research).

A monitoring station and a 30-meter tower have been installed behind the Broyhill Inn and Conference Center on campus. It is the only monitoring station east of Illinois that has been invited to collaborate with the National Oceanic and Atmospheric Administration's (NOAA) global network of aerosol monitoring stations. NOAA has loaned equipment to the university to assist with the collection of data related to air quality and climate change.



North Carolina currently consumes approximately 1.1 billion gallons of petroleum diesel fuel annually, resulting in approximately \$1.6 billion leaving the state economy each year.

The Biofuels Center of North Carolina is developing a statewide biofuels industry to reduce this dependence. Biodiesel is a renewable source of energy that can be easily produced from vegetable oils or animal fat. By 2017, 10% of liquid fuels sold in North Carolina - or about 600 million gallons - will come from biofuels locally grown and produced. Filling up with locally grown and manufactured biofuels blends will allow citizens to empower not just their vehicles, but also the North Carolina economy.

“This monitoring station will let us see how pollutants move across the country, how they age and affect the climate and vegetation,” said Patrick Sheridan with NOAA’s Earth System Research Laboratory in Boulder, Colo., and who recently installed some new instrumentation at the AppalAIR facility. He said partnerships, such as the one with Appalachian, are important in NOAA’s ability to monitor climate conditions across the United States.

The monitoring station may also become part of AERONET (AERosol RObotic NETwork), a network of ground-based remote sensing aerosol instruments established by NASA to collect data related to the optical, microphysical radiative properties of natural and manmade particles in the atmosphere. The idea for the interdisciplinary research project began nearly two years ago when Dr. Brett Taubman, an assistant professor of chemistry, and Dr. Ryan Emanuel, an assistant professor of geology, began discussing their common research interests related to atmospheric processes. Dr. James Sherman, a colleague of Taubman’s from Pennsylvania, joined Appalachian’s Department of Physics and Astronomy, adding his research expertise. They learned of others already at Appalachian who also shared their interests.

“I talked to my department chair about the critical mass of faculty on campus working on atmospheric research and suggested we establish some type of interdisciplinary effort. It snowballed from there and we all began working together,” Taubman said.

The group received \$50,000 in start up funds from the College of Arts and Sciences. They have spent the past 18 months developing and outfitting the Broyhill monitoring station, and fostering relationships with NOAA and other research partners. Taubman recently received \$15,000 from the N.C. Space Grant and \$15,000 in matching funds from the university to purchase equipment that will be used at AppalAIR to study the effects aerosols, or particles, in the atmosphere have on the amount of sunlight reaching the earth’s surface, which influences climate and weather. The grant also will provide stipends for student researchers.

“Plants emit volatile organic compounds that react with the atmosphere and ultimately form particles. The blue-grey haze of the Blue Ridge and Great Smoky mountains was historically from the natural aerosols that form as a result of these emissions,” Taubman said. “We are going to collect manmade and naturally occurring or biogenic aerosols and look at the size and number of particles and their chemical and optical properties. The effect of biogenic aerosols on the climate is a huge source of uncertainty especially here in the Southeast.” Taubman said the region’s higher temperatures plus the number of trees result in high biogenic emissions. At the same time, anthropogenic emissions, such as sulfur, have decreased. “We don’t know yet what the impacts to the climate will be as that ratio of inorganic to organic emissions changes,” he said.

Sherman also will study the effects of atmospheric pollutants and natural aerosols. “I plan to investigate the roles of aerosols, water vapor and clouds on regional solar radiation budget, and hence regional weather and climate,” he said. Radiation budget refers to the balance the Earth’s climate attempts to maintain between the amount of solar energy reaching earth and the amount of energy radiated back into space. Sherman will apply optical techniques and laser remote sensing to measure aerosol properties, water vapor and clouds up to the top of the troposphere. Included in this research is a plan to develop the next generation of an aerosol/water vapor LIDAR (laser radar) that Sherman helped develop at the Air Force Research Laboratory in Boston. LIDAR is able to make high-resolution measurements of clouds, water vapor and aerosols and determine their effects on electromagnetic radiation, such as light from the sun, high-energy laser beams and microwave sources and can potentially be used to predict clouds.

“Improved understanding of regional aerosol properties, distributions and variability will be incorporated into regional climate models, along with measurements made by fellow AppalAIR researchers, with the goal of better predictions of future regional climate,” Sherman said.



Dr. Ryan Emanuel, Assistant Professor of Geology

Emanuel will study interactions between land and the atmosphere. "I'm interested in how much carbon dioxide the region's landscapes are removing from the atmosphere," Emanuel said. "This monitoring station will provide data to help understand how factors such as climate change and air pollution affect the ability of southern Appalachian ecosystems to sequester carbon dioxide. Rising levels of atmospheric carbon dioxide load the dice toward more extreme weather events across the globe. This kind of research is needed to understand how rapidly carbon dioxide is added to or removed from the atmosphere by different types of ecosystems."

He also will study the amount of water vapor these ecosystems release back into the atmosphere through evaporation and transpiration. "These are important components of the water cycle. Much of our precipitation returns to the atmosphere through these processes," Emanuel said. "I'm also interested in the role of land use change in all of this. As we see our land across the southern Appalachians being converted for other purposes, how does that affect relationships between water, carbon and climate?"

Dr. Baker Perry, an assistant professor in the Department of Geography and Planning, is also part of the AppalAIR researchers. His research interests include synoptic climatology, orographic precipitation, snow, high winds, and tropical glacier responses to climate variability and change. His recent research activities have focused on improving snowfall forecasts in the southern Appalachian Mountains, particularly related to northwest flow snowfall. He will continue use of surface-based and balloon-borne meteorological measurements to study the impact of the region's diverse mountain topography on climate and precipitation.

Dr. Rahman Tashakkori from the Department of Computer Science will supervise data acquisition, management and visualization. "There is a real need for an atmospheric research facility in northwest North Carolina capable of collecting the atmospheric data that are currently lacking. Appalachian's location and mission make it the ideal place for doing this type of atmospheric research," said Biology Professor Howard Neufeld, a member of the research project. Dr. Neufeld's research focuses on the physiological effects of air pollution on native plant species. Data collected at the site will be posted to a Web site for the public to access. Future plans call for offering educational outreach programs to the public at the AppalAIR site.

## ***News of Note...*** *From the Grants Resource Center's GrantWeek for June 8, 2009*

### **All about Animal Research**

The Office of Laboratory Animal Welfare (OLAW) at the National Institutes of Health (NIH) has developed a comprehensive website designed to provide key information to investigators who use animals in their research. A range of topics are covered:

- Institutional Preparedness--Discusses what to do in the event of equipment failures, natural disasters, and laboratory break-ins, and provides a link to the Applied Research Ethics National Association/OLAW Institutional Animal Care and Use Committee Guidebook.
- Policy and Guidance--Provides extensive official policies and guidance on the use of animals in Public Health Service-funded research, training, and testing.
- Grants Resources--Gives information on the specific elements needed in proposals concerning research using animals.
- Understanding Humane Animal Care and Use--Provides links to additional information, including free tutorials and seminars.

The NIH Office of Extramural Research has also created a new series of stories on the work of NIH-supported scientists, "Advances in Animal Research". Investigators who would like to highlight their research can e-mail their stories to [Stories4advances@od.nih.gov](mailto:Stories4advances@od.nih.gov).

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## Foundation Center Expands Recovery Resources

The Foundation Center has debuted a new [website](http://foundationcenter.org/focus/economy/maps.html) (<http://foundationcenter.org/focus/economy/maps.html>) consolidating all of its interactive maps relating to the economic crisis. The site includes a map featuring the best resources by state for tapping into American Recovery and Reinvestment Act (ARRA) funding, a map detailing community foundations, and a map illustrating grantmakers with an interest in community and economic development.

### *News of Note...*

#### **Cratis D. Williams Graduate School and the Office of Research and Sponsored Programs to Close for State-mandated Furlough**

The Graduate School and the Office of Research and Sponsored Programs will be closed from 2 pm on Wednesday, July 1 through 5 pm on Friday, July 3, 2009. The office closings on July 1 and July 2 are in compliance with the State-mandated furlough of all employees. July 3 is an official University holiday. The two offices will reopen for regular business at 8 am on Monday, July 6. For graduate school applicants only: the online admission system and the email help feature will be monitored during this time.

During the furlough dates and the federal holiday, no staff will be available in the office or via email to handle other questions related to admission, enrolled student services, proposal development, research compliance or grant submission. Computers and lights will be turned off to save on energy costs.

Please plan ahead so that any business you anticipate transacting in the above areas during this time can be completed prior to 2 pm on Wednesday, July 1. Our staff will work with you ahead of that date to ensure that grants, contracts and letters of intent are submitted before 2 pm on 1 July.

#### **Middle Class Jobs Turning Green, Too**

The newly-created [Middle Class Task Force](#) has announced a joint effort between the Departments of Education, Energy, Housing and Urban Development, and Labor to create green job opportunities for the middle class. Each agency involved will have a specific role in developing this highly-anticipated White House initiative. Leading the way is the Department of Labor, which has agreed to use \$500 million in American Recovery and Reinvestment (ARRA) funds to train workers for green careers.

#### **RSVP: NSF Cyber Letter Invites Campus Action**

The National Science Foundation Office of Cyberinfrastructure (OCI) has issued a [Dear Colleague Letter](#) announcing expansion of support for research, education, and development in cyberinfrastructure (CI). GRC members are encouraged to work with faculty to assess interest and resources, as OCI anticipates the creation of new CI programs with input from the applicant community. For now, NSF-wide programs such as CAREER, Graduate Research Fellowships, and Course, Curriculum, and Laboratory Improvement (CCLI) will see an added CI focus, and OCI support for software, virtual organizations, and data-driven science is expected to increase.