



SEER News

Steinbrenner Institute for Environmental Education and Research

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United States Congressman Tim Murphy (PA-18) hosted a coal energy workshop at Carnegie Mellon on September 1. United States Department of Energy Assistant Secretary for Fossil Energy Jeffrey Jarrett also participated in the event that was co-sponsored by the DOE's National Energy Technology Laboratory (NETL) and the Steinbrenner Institute at Carnegie Mellon. The workshop focused on how partnerships between NETL and local universities can be advanced to develop clean coal technology that will help move America toward energy independence, lower energy costs and be an important catalyst for job growth in the region.

"Coal's going to happen, even though a lot of people don't want to hear that," said Jarrett, who visited Carnegie Mellon University on September 1 to talk with university officials, students and business representatives in a discussion about coal and its future value to the economy.

Coal as fuel produces 52 percent of the nation's electricity, a figure projected by the government to rise to 57 percent within 25 years. "We are currently producing 1.1 billion tons of coal annually, and that number will grow to more than 1.7 billion tons per year of production for electricity production," Jarrett said. And, with oil prices rising, coal to liquid technologies will become more viable therefore production of coal will likely go beyond 1.7 billion tons.

Surrounded by an audience of more than 100 students and faculty members, the following individuals we led in discussion by Dr. Pradeep Khosla, Dean, College of Engineering:

- Carl O. Bauer, Director, National Energy Technology Laboratory
- Richard A. Bajura, Director, National Research Center for Coal and Energy, West Virginia University
- James T. Bartis, Senior Policy Researcher, RAND Corporation
- Lester B. Lave, Carnegie Mellon, Professor and Co-Director, Carnegie Mellon Electricity Industry Center



(from r to l): NETL Director Carl Bauer, U.S. Congressman Tim Murphy, DOE Assistant Secretary for Fossil Energy Jeff Jarrett and Dean Pradeep Khosla

- Paul King, Director, Environmental Health and Safety, Duquesne University
- John Hayward, Director, Graduate Studies, Robert Morris University
- Bob Enick, Chair of Chemical and Petroleum Engineering, University of Pittsburgh
- Lynn Barger, Director of Foundations and Government Relations, Washington and Jefferson
- Janine Hammer, General Manager for Environmental Regulations at Allegheny Energy
- Frank Burke, CONSOL
- John Hall, General Manager, Inter-Power/AhICON Partners
- Joseph Pierre, Manager Government Programs, Stationary Fuel Cells, Siemens Power Generation Inc
- Jon Wood, Vice President, Government and Community Affairs, Foundation Coal Corporation
- Jim Locher, Vice-President of Coal Plant Operations, Reliant Energy
- Chris Gabriel, Director, Innovation Economy Programs, The Heinz Endowments

One of the key panel issues was the discussion of pollution problems associated with coal-burning. Jarrett said that the problem is not that the industry is unable to produce cheap electricity using coal, or is unable to eliminate emissions. "The problem is that you can't take care of all the environmental concerns and produce electricity cheaply," Jarrett said. However, ongoing research is beginning to close this gap.

The federal government is spending millions of dollars on clean-coal research and much of that research is ongoing at the National Energy Technology (NETL) Laboratory, located just south of Pittsburgh. Carnegie Mellon researchers collaborating with the University of Pittsburgh and West Virginia University on a number of energy-related research projects with NETL.

Alumni Spotlight: Karina Tipton

Karina J. Tipton graduated with a Masters of Environmental Engineering with a concentration in Green Design from Carnegie Mellon University in 2004. Her thesis was titled "Environmental Indicators for Carnegie Mellon University: Baseline Assessment 2004" and was funded in part by a Steinbrenner Institute grant. The Environmental Indicators assessment evaluated various areas of operations at Carnegie Mellon and determined if the best environmental decisions were being made. Her scholastic focus on green design and on environmental indicators emphasized to Ms. Tipton that the City of Pittsburgh allowed her to live her life the way she wanted to. The nature of the city (and of the graduate student lifestyle) allowed her to pursue a low-impact and low-consumption lifestyle. In addition, the good company at Carnegie Mellon University and the City of Pittsburgh reinforced these lifestyle decisions.

After graduation, Ms. Tipton was hired by ARCADIS G&M as an Environmental Engineer. The position at ARCADIS necessitated a move to New Jersey, which she, as a former resident of NYC, viewed with some trepidation. However, she soon discovered that life in New Jersey could be lived as sustainably as she had been living in Pittsburgh. (An exercise in calculating her ecological footprint (<http://www.myfootprint.org/>) determined that in fact, she was consuming less planetary resources in NJ than she had in Pittsburgh!) She is committed to eating locally, belongs to a Community Supported Agriculture



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Research Spotlight: Solar House Sensors System

The Advanced Infrastructure Systems (AIS) program in the Civil & Engineering Department at Carnegie Mellon University is focused on the exploration and application of emerging Information and Communication Technologies to physical infrastructure systems and the processes to design, build, and operate those systems allowing them to become intelligent, able to continuously determine their conditions, perform self-assessment and support proactive decision making that improves their performance, increases their life spans and reduces life-cycle costs and impacts.

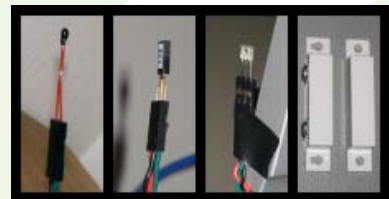


As part of the graduate studies coursework, during the 2006 fall semester the AIS Project class was developed by professors Chris Hendrickson, H. Scott Matthews, and Lucio Soibelman with the objectives of fostering an interdisciplinary academic environment and of exercising students in a system development of a project focused on infrastructure systems. This year the project was titled "Sensor Network for Solar Decathlon House" that aimed to demonstrate the sustainability concepts of a solar house by monitoring energy consumption, comfort levels and occupancy in the house. The solar house that was instrumented during the project was originally built for the Solar Decathlon; a



Department of Energy sponsored competition that has college participants from across the country competing for the Best Self – Sustaining Solar House. The winning house demonstrates most energy – conscious and innovative design, subject to an evaluation based on several criteria such as Architecture, Comfort Zone, Lighting, Energy Balance, and Documentation. The Solar Decathlon 2005 entrant, the Pittsburgh Synergy, was built collaboratively by Carnegie Mellon University, the University of Pittsburgh and the Art Institute of Pittsburgh. It was decided after the completion of the competition that the solar house would become a permanent building on CMU's campus. The primary motivation behind this decision was the desire to illustrate the possibility of evaluating the effectively of operating a fully functional, solar powered house.

The Steinbrenner Institute for Environmental Education and Research sponsored this year's AIS Project Course. The Institute posed the challenge of developing a sensor network that would constantly monitor data with regards to energy efficiency and ambient conditions. The goal of the project was to have data trends displayed to users and visitors of the solar house. It is envisioned that the solar house will attract many visitors, and it is thus critical to have a quantitative interface which illustrates the performance characteristics of the house. Furthermore, the presence of such data would initiate future research, primarily by allowing students and faculty members to analyze trends regarding energy efficiency and ambient conditions at different with respect to time. A total of nine students participated in this project, seven of were graduate students in the AIS program and two of whom were graduate students from the Department of Electrical and Computer Engineering at CMU. AIS Master's Students: Baber Farooq, Ben Ferguson, Tuan Nguyen, Mark Rau, Kedar Sawant, Jennifer Wong, and Jaime Wright. ECE Master's Students: Richard Allison and Jovan Williams. The project team was provided with a budget of \$8,000 to implement the project. It was decided that the following parameters in the house would be monitored: Electricity Generation, Electricity Consumption,



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Teresa Heinz Environmental Scholars

Three Carnegie Mellon students were awarded Teresa Heinz Environmental Scholarships because their research demonstrates their commitment to the environment. The Teresa Heinz Environmental Scholar Program provides support for doctoral dissertation (\$10,000) and master's thesis (\$5,000) research. Qualifying research must have public policy relevance that increases society's understanding of environmental concerns and proposed solutions. Awardees at Carnegie Mellon this year are:

Heather Wakeley (Ph.D. Candidate): The Future of Hydrogen as a Transportation Fuel

My research will address critical, yet little-studied aspects of using hydrogen as a transportation fuel: the environmental, economic, and safety impacts of potential production and distribution systems. I will build an optimization model of hydrogen production and distribution for the transportation sector, which will be used to generate trajectory scenarios for the transition to hydrogen. I will then be able to evaluate the pros and cons of each scenario, taking into account the effects on the different stakeholders (suppliers, refueling stations, vehicle owners) and the social feasibility. These results will provide key insights to guide public policymakers as we enter into the uncharted territory of building a new transportation fueling system.



Paulina Jaramillo (Ph.D. Candidate): Best Use of Natural Gas: A Life Cycle Comparison of NG/LNG Consumption for Different End Uses

For my PhD thesis, I am working on a life cycle comparison of natural gas (from different sources) and coal for different end uses. In this analysis, I compare greenhouse gas emissions from the entire life cycle as well as emissions of SO₂ and NO_x. I am in the process of completing the analysis for electricity generated using these fuels. The next step is to look at the life cycle of transportation fuels produced from coal and natural gas via the Fischer-Tropsch reaction. These type of comparisons can help us decide what are the best uses of these non-renewable resources. (Paulina was also a recipient of the Master's Scholar Award in 2005.)



Britney McCoy (M.S. Candidate): How Big is Big? Characterizing Oil Refining Upset Emissions

Upset emissions from petroleum refineries are excess emission events that occur during plant start-ups, shut-downs, maintenance, malfunctions, and flaring accidents. These emissions contain benzene, carbon monoxide, nitrogen oxides, hydrogen sulfate, sulfur dioxide, butadiene, and other volatile organic compounds. Several reports, including EPA's Office of Regulations and Enforcement (ORE) *Enforcement Alert*, indicate that refinery upset emissions are underreported to the Toxic Release Inventory (TRI) program. Although EPA maintains that all upset emissions are violations of the Clean Air Act, they generally do not penalize offenders. Rather, they leave it to states to promulgate regulations and take enforcement action. However, in many states regulation is poor at best with inadequate reporting standards and/or informal "automatic exemption" policies.



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(CSA) group, attempts to make as many of her own clothes as she has time for, and lives in an apartment building with a Can-o-Worms Vermicomposter in the kitchen. A hidden benefit of the 2006 Honda Insight Hybrid she purchased is that paying attention to the instantaneous mileage indicator prevents her from driving as fast as she can on the NJ Turnpike. Ms. Tipton is pleased to say that she shopped for towns in northern NJ until she found one where the intersection of apartment cost and “most like Pittsburgh” met, and that she has managed to move onto the same block as the town library.

Professionally, Ms. Tipton currently works on hazardous waste remediation products. She has presented her thesis at two conferences (the New York Water and Environment Association [NYWEA] and the Chemistry Council of New Jersey) and is a member of the NYWEA Sustainability Task Force. She is pursuing sustainability opportunities at ARCADIS and is active with the Hackensack Riverkeeper and other local community environmental groups.

Karina J. Tipton, P.E. is an Environmental Engineer with ARCADIS. She graduated from The Cooper Union for the Advancement of Science and Art in 1999 (BE Civil Engineering) and from Carnegie Mellon (MS Environmental Engineering/Green Design) in 2004. The results of her Master's thesis can be found at the Carnegie Mellon Green Practices webpage: (http://www.cmu.edu/greenpractices/campus_assessment/).

Steinbrenner Institute Media Fellowship

National journalists Zachary Coile, Catherine M. Cooney, and Chuck Quirnbach recently spent a week on the Carnegie Mellon campus meeting faculty and getting a personal look at some of the university's environmental research as media fellows of the Steinbrenner Institute for Environmental Education and Research.

Coile, a correspondent for The San Francisco Chronicle's Washington, D.C. bureau; Cooney, senior associate editor of Environmental Science and Technology in Washington, D.C. and Chuck Quirnbach, a reporter and producer for Wisconsin Public Radio, interviewed more than 20 Carnegie Mellon professors and researchers June 19-23, 2006.

“This fellowship is a wonderful way for media to get to meet and discuss key environmental issues with some of the nation's leading experts,” said Cooney, who covers a broad range of environmental and policy issues.

Quirnbach, who attended the 2004 Society of Environmental Journalists (SEJ) Conference at Carnegie Mellon, praised the Steinbrenner fellowship helping educate journalists about new environmental research. “It was a chance for me to get back to campus and meet some of the researchers and faculty I missed at the conference,” Quirnbach said.

The reporters met informally with researchers in laboratories and in the field. Their interviews spanned everything from green design and green buildings to air quality, water quality, green chemistry, risk management and alternative energy issues. The reporters also visited the National Energy Technology Laboratory (NETL) in Pittsburgh where Carnegie Mellon faculty are working on a handful of coal-related research projects with NETL researchers.

“The faculty have been great about participating and sharing their broad range of work with the media,” said Deborah Lange, executive director of the Steinbrenner Institute for Environmental Education and Research.

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Temperature, Humidity, Light, Carbon Dioxide, Door/Window states, and Sunlight.

The students designed and deployed the data acquisition system. They installed sensors and its wiring, assembled and installed the National Instruments FieldPoint data acquisition with its Ethernet, input/output, pulse, and power supply modules, and programmed the data acquisition software in LabView. They designed and developed the data management system with its MySQL database, linked it to the LabView interface, and installed the servers that record all the data being generated. Finally they developed the user interface for the Kiosk that allows solar house visitor's to interact with the database. The same interface developed for the Kiosk is available on line at the URL: <http://aisproject.cive.cmu.edu/overview/ais.html>.

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A third fellowship is planned for summer 2007. In addition to fellowships, the Steinbrenner Institute also supports a Media Boot Camp program designed to help faculty improve communication skills so essential in working with all media sectors.

Rosemary Lapka - 5th Year Scholar

Rosemary Lapka is a 2006 Carnegie Mellon graduate in Communication Design. She is also a 2006-2007 Fifth Year Scholar; a unique program here at Carnegie Mellon in which students are given a scholarship to stay an additional year at the university, take courses of interest to them, and give back to the campus through a community project. We are pleased to announce that for Rosemary's project, she will be working with the Steinbrenner Institute to develop a marketing and communication plan to raise awareness about Institute and green research opportunities here at Carnegie Mellon.



The motivation behind this project extends from both personal interest and previous project experience in marketing, business, and environmental issues. She has previously studied marketing techniques and promoting green interests through work with Ecosa Institute in Arizona, Carnegie Mellon's Green Practices & Solar Decathlon, Conservation Design Forum in Illinois, and in her own design work. Her degree in communication design extends itself beyond the development of interactive and printed marketing materials to examining and creating communication strategies and a sustainable framework so that these efforts extend well into the future.

Over the next calendar year, Rosemary will be working with SEER to develop a marketing plan for the Institute, along with designing and implementing a communications strategy. Some of our objectives and ideas for the upcoming year include focusing on the Institute's positioning and message, the website, and additional collateral and methods for communicating Steinbrenner Institute's objectives.

SEER Hosts EPA Administrator Johnson in Brownfield Event

On Monday, August 14, 2006, the Steinbrenner Institute hosted US Environmental Protection Agency Administrator Stephen Johnson and Congresswoman Melissa Hart (PA4) for the opening session of the “Stronger than Steel” brownfield workshop held at Value Ambridge Properties in Ambridge, Pennsylvania. Dr. Pradeep Khosla, Dean of the College of Engineering at Carnegie Mellon welcomed our special guests and workshop participants, then introduced Carnegie Mellon President, Jared Cohon. Dr. Cohon characterized this region as ‘where the old economy meets the new economy’ with examples such as robot manufacturing on area brownfields. He applauded the region for providing national and international leadership in demonstrating how environmental improvements can also result in economic benefits.



EPA Administrator Stephen Johnson

This leadership is exemplified in Congresswoman Hart. Recognizing the brownfield development opportunities in her region, Congresswoman Hart has introduced legislation that will have national impact.

H.R. 1237 would provide grants through the Department of Commerce targeted toward brownfield projects that restore employment and bring new income and private investment to distressed communities. These grants could fund business development projects, public facilities, and planning and technical assistance for projects. Criteria for the grants would include projects that directly address areas of high unemployment or low income households, the existence of blight, and population loss.

H.R. 3541, expands the use of qualified private activities bonds to include environmental remediation at brownfield sites. Permitting the use of such bonds to include environmental remediation at brownfield sites will provide access to additional financial resources to continue the redevelopment of brownfield sites and the positive economic impact that follows from redevelopment.

Stephen L. Johnson was sworn in as the 11th Administrator of the USEPA on May 2, 2006. He assumed the position with the stated goal of promoting and maintaining the utilization of sound science while using collaborative, innovative approaches to solving environmental problems. In implementing and enforcing the nation’s federal environmental laws and regulations, the Agency has over 18,000 employees nationwide and an annual budget of \$8.6 billion. To date, the USEPA has invested \$454 million (\$11.8 million in Pennsylvania) in the Federal brownfields program. The investment has leveraged \$8.2 billion in other public sector and private sector funds, created more than 37,000 jobs and allowed for the assessment of over 8,000 properties. Though the USEPA can help to catalyze projects, the ultimate development becomes a source of pride in local communities.

The “Stronger that Steel” brownfield workshop was a 2-day event during which outside experts assessed development progress 5 years after the first site-focused workshop was conducted. Both workshops (2006 and 2001) were facilitated by the Western Pennsylvania Brownfields Center at Carnegie Mellon. Experts included visitors Mayor Ron Littlefield (Chattanooga, TN), Jesse Silverstein (Colorado Brownfields Foundation), and William Muzychko (McRoberts, Roberts and Rainer – New York) as well as local experts Maureen Ford (Colliers Penn Real Estate) and DeWitt Peart (Allegheny Conference on Community Development). Despite a public-private partnership that includes an Australian developer and the Beaver County Commissioners, the Ambridge and Harmony Township communities are unaware of the local brownfield development progress at least partially due to the fact that most of the work to date has been done ‘underground’ (environmental assessment and remediation). Recommendations to improve communications and leverage the energy initiated by the developer were presented to Borough officials on the final day of the workshop. The Western Pennsylvania Brownfields Center will continue assistance in the development of an implementation plan.

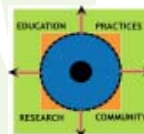
Galapagos Islands Alumni Voyage

Voyage of Discovery: Wonders of the Galápagos Islands

January 12 to 20, 2007

Join us for the journey of a lifetime to the Galápagos Islands aboard the state of the art exploration vessel, the M.V. Santa Cruz. Designed specifically to navigate the Galápagos Islands, it is fully equipped with everything necessary to make your Galápagos experience complete from a fleet of Zodiacs to complimentary snorkeling gear. Excursions are led by our highly qualified team of certified naturalists, whose knowledge and enthusiasm will enhance your understanding and enjoyment of this fascinating and often mysterious natural realm. For more information and to register, please visit: http://alumni.cmu.edu/for_you/alumni_benefits/travel.html.

Lonesome George



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