



Sustainable Earth Sends Message to G-20 Summit

Economy and ecology: these words share the prefix “eco” derived from the Greek word for “home.” Economy refers to the wealth of our home, while ecology refers to the health of our home.

Mending the tremulous state of the global economy was the focus of the G-20 Summit held in Pittsburgh on September 24 and 25. The financial crisis has seized the attention of heads of state and citizens alike; however, on September 16, students from Sustainable Earth, Carnegie Mellon’s student-run environmental organization, held an event to call attention back to the environment and to their belief that ecology should also be included in economic considerations.

Students stressed the message that economic stability and ecological stability are not mutually exclusive. “To improve the wealth of our world, we must improve the health of our world,” remarked Dyanna Becker, an undergraduate student in the Department of Civil and Environmental Engineering.

In the Scaife Hall courtyard, students gathered to dedicate a black gum tree, a plant native to the Pittsburgh region, and hung small flags on the tree representing each of the G-20 countries, noting extraordinary actions each country has taken to protect the environment. Students, many wearing traditional dress of their culture, then released doves. The ceremony symbolized the type of peaceful collaboration in which countries must engage to achieve both economic and environmental sustainability.

“The planting of the G-20 tree is part of a message we want to convey to the world: that we are students from different nations and cultures, but we are unified in the belief that the economy and ecology can and should grow stronger together,” said Daisy Wang, president of Sustainable Earth and an undergraduate student in the Department of Civil and Environmental Engineering.

The ceremony also served as the kick-off event for “Take Your Best Shot,” a photo contest sponsored by the Steinbrenner Institute and the Carnegie Institute of Technology. Students will compete to receive prizes and publication on the Steinbrenner Institute website in the following three categories: people, places, and nature.

For more information on the contest, see page 12 of this newsletter.



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Steinbrenner Institute Hosts Journalists at Media Fellowship Program

The Steinbrenner Institute hosted five top journalists at its fifth annual environmental media fellowship program in July 2009. The journalists were Tim Wheeler, environmental reporter with the *Baltimore Sun*; David Ledford, executive editor of Gannett's *The News Journal* in New Castle, Del.; Margaret Kriz, environmental correspondent for the *National Journal*; Lindsay France, a producer and reporter for ABC Seattle/Tacoma; and Hanneke Brooymans, an environmental reporter for the *Edmonton Journal* in Alberta, Canada.

“The fellowship enables leading environmental science, technology and policy journalists to broaden and deepen their knowledge of environmental issues and provides a unique opportunity for Carnegie Mellon faculty to share their research findings with and learn from an outstanding group of professional communicators,” said David A. Dzombak, faculty director of the Steinbrenner Institute and the Walter J. Blenko Sr. Professor of Environmental Engineering.

University researchers met with the journalists to discuss green design, air and water quality, risk management and alternative energy issues. The media fellows were on campus for three days and met with faculty members and students from many of the research centers affiliated with the Steinbrenner Institute.

Dzombak and Steinbrenner Institute Executive Director Deb Lange accompanied the journalists as they visited former brown-field sites, participated in a boat cruise highlighting riverfront transformation, and saw the city's (Leadership in Energy and Environment Design) LEED gold rated convention center.



Media Fellows visit Kennywood Amusement Park.



Lindsay France, Margaret Kriz, Tim Wheeler, David Ledford, Hanneke Brooymans, Deborah Lange, and David Dzombak aboard the Explorer, a newly deployed 'green' vessel that is owned and operated by the Pittsburgh based "RiverQuest".

Carnegie Mellon Faculty Recognized for Environmentally-Friendly Research

Carnegie Mellon is receiving attention for its research on clean energy technologies through the individual achievements of its engineering faculty. Recently, faculty members Jeremy J. Michalek and Krzysztof Matyjaszewski received awards for their individual projects to create alternative approaches that have a lower impact on the environment.

Krzysztof Matyjaszewski, the J.C. Warner Professor of the Natural Sciences and University Professor at Carnegie Mellon University, received the 2009 Presidential Green Chemistry Challenge Award from the U.S. Environmental Protection Agency. Matyjaszewski, the second Carnegie Mellon professor to receive the award, was recognized in the academic category for the development of an environmentally low-impact form of Atom Transfer Radical Polymerization (ATRP), a widely used method for preparation of functional polymers.

“Approximately 400 billion pounds of synthetic polymers are produced each year. Often, hazardous chemicals are used to produce these important industrial products,” Matyjaszewski said. “We’ve been able to use environmentally friendly chemicals, such as vitamin C, to reduce the level of catalyst employed in ATRP by a factor of over 1,000. This both enhances the scope of the procedure and reduces the environmental impact of polymer fabrication.”

Polymers created using ATRP have been used for coatings, adhesives, lubricants, cosmetics and electronics and are currently under investigation for use in the medical and environmental fields. Both the scientific and industrial communities have largely accepted ATRP as an important way to produce polymers. As of 2008, Matyjaszewski’s group published more than 500 papers and these papers have been cited more than 30,000 times, making Matyjaszewski one of the most cited researchers in the field of chemistry. In 2006, ATRP formed the basis for a Carnegie Mellon spin-off company called ATRP Solutions that uses the technology to develop next generation materials for evaluation by their customers in their targeted markets.

Also recently recognized, Jeremy J. Michalek received the Design Automation Outstanding Young Investigator Award. This award is given to recognize an outstanding young investigator who is making noteworthy contributions in the area of design automation, evaluation and integration. Michalek is an assistant professor in the departments of Mechanical Engineering and Engineering and Public Policy, as well as the director of Carnegie Mellon’s Design Decisions Laboratory.

“Much of my research revolves around understanding the tradeoffs in the capabilities of new technologies, and predicting what consumers are likely to buy and how profit-seeking companies will respond in the regulated marketplace,” said Michalek.

Some of his latest research involves a new study suggesting that some plug-in hybrid vehicles could help drivers save money while addressing global warming and oil dependency. His work shows that when charged frequently, plug-in hybrid vehicles with small battery packs offer the largest reductions of greenhouse gas emissions, gasoline consumption and lifetime vehicle cost. Such vehicles will likely play an important role in achieving President Obama’s target of 1 million plug-in hybrid vehicles on the road by 2015 and as a pathway to adoption and improvement of plug-in vehicle technology.

No Link Found Between Solar Activity and Global Warming

As the US Congress considers regulations on greenhouse gases, researchers have disproved a persistent hypothesis about how the sun may impact global warming. Carnegie Mellon's Peter Adams and Jeff Pierce from Dalhousie University in Halifax, Canada have developed a model to test a controversial hypothesis that says changes in the sun are causing global warming.

The hypothesis they tested says that increased solar activity reduces cloudiness by changing cosmic rays. So, when clouds decrease, more sunlight is let in, causing the earth to warm. This argument has been used by some climate change skeptics to suggest that greenhouse gases may not be the global warming culprits that most scientists agree they are.

In research published in *Geophysical Research Letters*, and highlighted in the May 1 edition of *Science* magazine, Adams and Pierce report the first atmospheric simulations of changes in atmospheric ions and particle formation resulting from variations in the sun and cosmic rays. They find that changes in the concentration of particles that affect clouds are 100 times too small to affect the climate.

"Until now, proponents of this hypothesis could assert that the sun may be causing global warming because no one had a computer model to really test the claims," said Adams, a professor of civil and environmental engineering.

"The basic problem with the hypothesis is that solar variations probably change new particle formation rates by less than 30 percent in the atmosphere. Also, these particles are extremely small and need to grow before they can affect clouds. Most do not survive to do so," Adams said.

Despite remaining questions, Adams and Pierce feel confident that this hypothesis should be laid to rest. "No computer simulation of something as complex as the atmosphere will ever be perfect," Adams said. "Proponents of the cosmic ray hypothesis will probably try to question these results, but the effect is so weak in our model that it is hard for us to see this basic result changing."

OpEd Article Advocates Being Afraid of Climate Change

Media pundits attribute the current stage of the economic crisis to excessive fear and see this fear leading potentially to further financial paralysis. However, as George Loewenstein and Paul Brest express in a July 12th *Pittsburgh Post-Gazette* editorial, "we weren't sufficiently afraid when we should have been. We had ample warnings of economic disaster."

Loewenstein, Herbert A. Simon professor of economics and psychology at Carnegie Mellon, and Brest, president of the William and Flora Hewlett Foundation, apply this lesson of fear to the current state of climate change. Similar to the economic crisis, the deadly consequences of climate change are unfolding gradually and are, therefore, less noticeable to us. As a result, we are not as afraid as we should be.

Rather than seeing fear as a paralyzing force, Loewenstein and Brest recognize fear to be "an evolved response that mobilizes us and prepares us to react physiologically and psychically to the kinds of threatening situations encountered repeatedly in our prehistoric past." Even if our fear alarms are not currently ringing regarding climate change, they believe that now is the time for mobilization and courageous leadership.

Steinbrenner Institute Co-Sponsors

AEESP 2009

The Steinbrenner Institute helped co-sponsor this year's Conference of the Association of Environmental Engineering and Science Professors (AEESP) held at the University of Iowa in late July.

The AEESP conference is held every two years to provide an opportunity for focused discussion of research frontiers and education innovations in environmental engineering and science. AEESP is the leading professional society for environmental engineering and science educators in North America. This year, the AEESP Conference was focused on "Grand Challenges in Environmental Engineering and Science" and organized around eight sessions: water sustainability, international environmental education and research, managing the nitrogen cycle, carbon capture and storage (CCS), renewable energy, waterborne disease, economics in environmental education and research, and nanotechnology.

Carnegie Mellon has a long history of involvement in and leadership of AEESP. Professor Jeanne VanBriesen is a current member of the AEESP Board of Directors, and Professor Dave Dzombak was a member of the board in the late 1990s. Carnegie Mellon faculty and students were present in force at the conference and gave a number of talks and poster presentations. Greg Lowry and Dave Dzombak were keynote speakers in the sessions on Nanotechnology and CCS, respectively. Recent Ph.D. graduate Shahzeen Atari won a student award for her talk on "Preferences for Change: Do Individuals Prefer Voluntary Actions, Soft Regulations, or Hard Regulations to Decrease Fossil Fuel Consumption?" Her proud advisor Cliff Davidson was in attendance. Numerous Carnegie Mellon alumni who are now professors of environmental engineering and science at other institutions were also at the conference.

At the conference banquet and awards ceremony on July 28, two Carnegie Mellon professors received awards. Greg Lowry received the 2009 AEESP Malcolm Pirnie/AEESP Frontier in Research Award, given to recognize an environmental engineering or science professor who has advanced the environmental engineering and science field through recognized research leadership and pioneering efforts in a new and innovative research area. Jeanne VanBriesen received the 2009 McGraw-Hill/AEESP Award for Outstanding Teaching in Environmental Engineering & Science, given to honor a faculty member who has made substantive contributions directly through class-oriented teaching.



Carnegie Mellon faculty members, students, and former students were present in force at the AEESP 2009 meeting. From left to right: Catherine Peters (alum, now at Princeton University), Patrick Gurian (alum, now at Drexel University), Cliff Davidson (CEE/EPP), Dominic Boccelli (alum, now at University of Cincinnati), Greg Lowry (CEE, and AEESP award winner), Navid Saleh (alum, now at University of South Carolina), Julian Fairey (behind Navid Saleh - now at University of Arkansas), Jeanne VanBriesen (CEE, another AEESP award winner), Dan Giammar (alum, now at Washington University in St. Louis), Jim Mihelcic (alum, now at University of South Florida), and Dave Dzombak (CEE, and Steinbrenner Institute). Several other faculty members, students, and alums missed the picture!

LEDs are Groundbreaking Solutions for Energy-Efficient Lighting

In a study published in IEEE Spectrum Magazine, Carnegie Mellon researchers argue that new lighting technologies can be a key component of the portfolio of strategies needed to promote energy efficiency and to help reduce the emission of greenhouse gases.

“Lighting our houses, streets and commercial buildings constitutes more than 20 percent of total U.S. electricity consumption. Light emitting diodes (LEDs) can reduce consumption and the emission of greenhouse gases because of their high-efficiency conversion of electricity to visible light,” said Ines Lima



Azevedo, a recent Ph.D. graduate from Carnegie Mellon’s Department of Engineering and Public Policy (EPP), and a researcher at the university’s Climate Decision Making Center and its Electricity Industry Center. Azevedo, along with M. Granger Morgan, the Lord Chair Professor of Engineering at Carnegie Mellon and EPP department head, and Fritz Morgan, chief technology officer of Philips-Color Kinetics and a Carnegie Mellon alumnus, found that some LED technologies are already cheaper than most commonly used lighting technologies. The researchers concluded that it is imperative that society moves to solid-state lighting to save money and to help the environment.

“Technology and innovation in the area of lighting has quickly become a vital aspect of the broader movement toward increased energy efficiency and responsible use of global resources,” said Morgan, past chair and current member of the US Environmental Protection Agency’s Science Advisory Board and the Scientific and Technical Council of the International Risk Governance Council. He is also co-director of Carnegie Mellon’s Electricity Industry Center.

Morgan says that LEDs offer a cost-effective solution to reduce emissions during a time when the nation needs to find solutions to meet the growing needs of an energy dependant society. “In addition to providing an energy-efficient alternative, unlike the fluorescent tubes they replace, solid-state lighting is mercury free,” said Morgan. The more than 500 million fluorescent tubes discarded yearly in the United States introduce an estimated four tons of dangerous mercury into the environment.

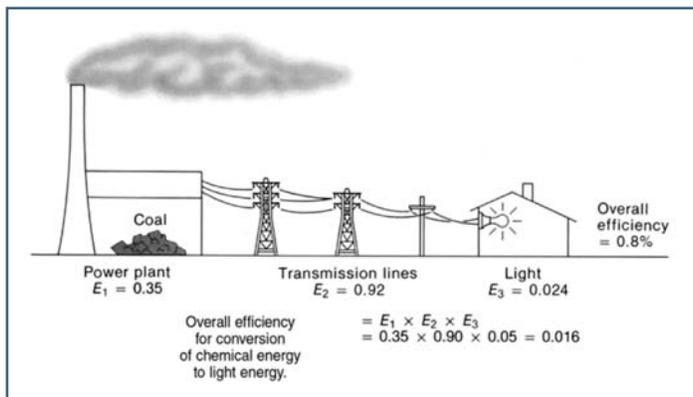
The study also reports that the change to more sustainable illumination systems won’t happen without policy interventions. “Even if the LED technology is cheaper on a lifecycle basis, consumers are likely to stick to what they know,” Azevedo said. “We need the design of smart policies to make this transition.”

In addition to championing a phased-in transition to solid-state lighting, the researchers recommend development of nationwide illumination standards for new residential and commercial construction projects.

Energy Efficiency Report Identifies Both Barriers and Success Stories

In a recent paper, Lester B. Lave relays the findings of the Energy Efficiency Panel of the National Research Council project called America's Energy Future (AEF). Lave served on the panel. The report suggests that finding a way to reduce energy intensity in the United States, even more than we currently have done, could keep energy use from growing, despite a growing economy.

Lave, university professor of Economics at the Tepper School of Business, co-director of the Electricity Industry Center at Carnegie Mellon, and chair of the AEF Energy Efficiency/Conservation Panel, published a summary of the panel's report in the summer 2009 issue of the National Academy of Engineering's publication *The Bridge*. The report discusses energy efficiency in buildings and in the industrial and transportation sectors; and it identifies barriers to implementing energy-efficient technologies and the drivers of energy efficiency.



Lighting Efficiency, Source: NRC (National Research Council). 2009. Realistic Prospects for Energy Efficiency in the United States. Washington, D.C.: National Academies Press.

In buildings, for example, although there are potential gains from individual projects (e.g., introducing more energy-efficient appliances), the gains would be much greater if an integrated whole-building approach were adopted. "Buildings can achieve much more substantial savings if they are designed to take advantage of natural light and if equipment is placed to reduce heating and cooling energy," says Lave.

Cross-cutting technologies such as combined heat and power, better separation processes, advanced materials that resist corrosion and can withstand high temperatures, better steam and process heating technologies, new fabrication processes, and better sensors could lower energy use in many industries. The report also covers ways in which the transportation industry – including air and rail transportation, and marine and freight shipping – can practice energy efficiency.

In *Real Prospects for Energy Efficiency in the United States*, the NRC panel's report describes how energy efficiency is being achieved with new energy-efficient technologies; intense competition; regulations, such as vehicle fuel-economy standards, appliance and building codes; and consumer education about how much energy a product uses.

In addition, the report highlights the barriers that are in the way of greater energy efficiency, including artificially low energy prices that do not account for environmental or energy-security external factors like air and water pollution, greenhouse gas emissions, and other environmental factors. Other factors include current tax policies which encourage expenditures on energy rather than on greater efficiency; state utilities profits benefiting when they sell more electricity or natural gas rather than encouraging efficiency; decisions about whether to invest in energy efficiency being made by those other than the person paying the energy bill; and the often higher initial price tag associated with energy-efficient alternatives.

If these barriers are overcome, however, the AEF panel concludes that "existing technology, or technologies that will be developed in the normal course of business, could save 30 percent of the energy that would have been used by 2030 under current policies and assumptions. About half of that efficiency increase could be achieved by 2020. The energy savings represent a savings in dollars as well as in energy."

Corporate Partnership Focuses 2nd Meeting on Carbon Management

On September 10, the Steinbrenner Institute Corporate Partnership (SICP) held its second annual meeting at Carnegie Mellon. The theme of the meeting was “Carbon Management” and 15 industry representatives participated in two themed sessions, including “carbon management in the steel industry” and “moving beyond the numbers in carbon management”. Faculty speakers included Sridhar Seetharaman, professor and co-director of the Center for Iron and Steel Making; Scott Matthews, associate professor with the Green Design Institute; Civil and Environmental Engineering Assistant Research Professor Christopher Weber; Chemical Engineering Assistant Professor John Kitchin; and Civil and Environmental Engineering doctoral student Michael Blackhurst. Industry participants included US Steel Corporation, Allegheny Ludlum, Vallourec, PPG, Bayer, Westinghouse, Nova Chemical, and AECOM.



The mission of the SICP is to conduct cooperative world-class research in environmental science, technology, management, and policy to provide innovative solutions to environmental challenges in the metals, chemicals, construction/buildings, energy, and other industrial sectors. Companies qualify for membership in the SICP by supporting research in one of the centers associated with the Steinbrenner Institute at an annual level of \$10,000 or more per year.

Sustainability and Computer Science Seminar

New monthly seminar to be held the second Friday of each month.

The goal of this series is to create a forum for discussion of ways in which computer science contributes to sustainability, energy, and the environment, and to foster greater interdisciplinary dialogue in this area.

Watch for upcoming speakers and topics at <http://seminar.living-environments.net/>

Seminars to date have included “*Customizing Commute Ecology: a community-empowered road for electric vehicles*” and “*Wind Power: Optimization at All Levels*”.



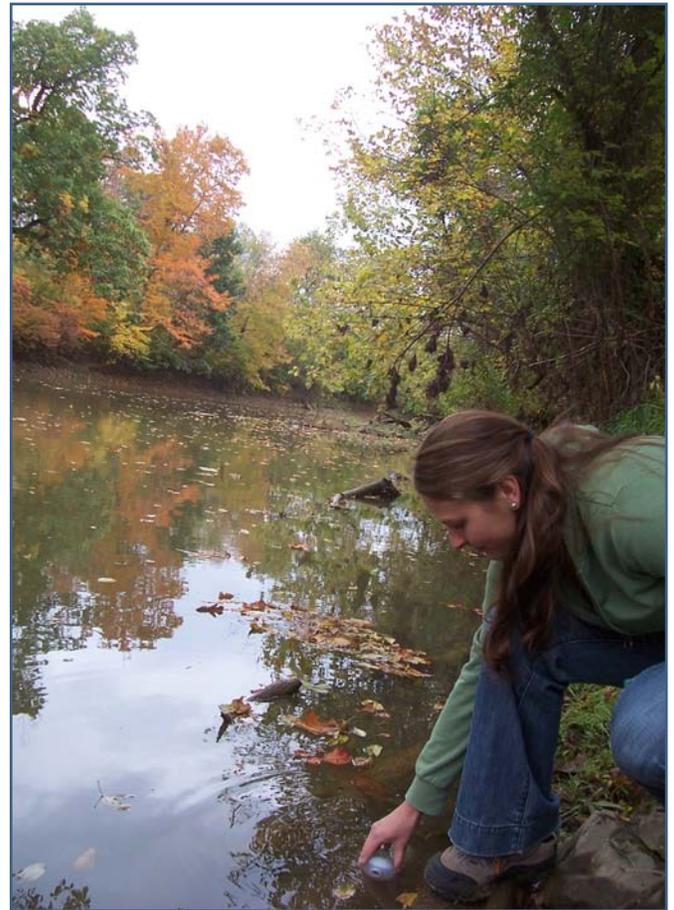
Marcellus Shale and Water Quality: Opportunity and Challenge

Civil and Environmental Engineering professors Jeanne M. VanBriesen and Kelvin Gregory recently received a \$100,000 grant from the Pittsburgh-based Colcom Foundation to study water quality in the Monongahela (Mon) River. The focus of their research is on the presence and effect of TDS (total dissolved solids) in the river, specifically looking at bromide associated with Marcellus Shale gas produced water and sulfate from acid mine drainage.

“As we consider the benefits of drilling the Marcellus Shale for natural gas, we must also consider our responsibility to address the effects of this resource extraction on our water resources,” says VanBriesen, faculty director of the Center for Water Quality in Urban Environmental Systems (WaterQUEST).



“The type of natural gas drilling required for the Marcellus Shale uses significant quantities of fresh water and produces significant quantities of salty wastewater. The combined effect of this can be higher levels of salt in surface waters in our region. Last fall 2008, higher salt levels were reported in the Monongahela River, triggering drinking water alerts. This fall, a major fish kill in Dunkard Creek (a tributary to the Mon River) has been linked to invasive algae that thrives in salty water,” said VanBriesen, explaining the timeliness of this project.



While the exact cause of higher salt levels regionally are still being investigated, the Pennsylvania Department of Environmental Protection (PaDEP) took steps earlier this year to create a monitoring network of drinking water suppliers to detect changes in the saltiness of the water in the Monongahela River by measuring TDS.

WaterQuest is coordinating efforts with PaDEP and the River Alert Information Network (RAIN), a regional association of drinking water suppliers that has been selected by the state to monitor the river quality. RAIN is charged with maintaining a real-time network of sensors that measures temperature, pH and TDS. WaterQuest is collecting and testing water at the same locations as the RAIN sensors for things the sensors cannot detect – like the concentration of bromide and sulfate. The goal is to determine if specific sources

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Carnegie Mellon Graduate is U.N. Youth Delegate

By Carnegie Mellon alum Andrew Stocchetti (Civil and Environmental Engineering BS 2008, MS 2009)

I found it hard to believe that I wasn't going to be on campus for the last two weeks before my college graduation. It was even more surprising that I was voluntarily leaving early, missing out on senior week and the long extended goodbyes. So what was compelling enough to convince me to give up my last few days of college? The opportunity to be a youth delegate at the United Nations Conference on Sustainable Development in New York City.

Following the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil (also known as the Earth Summit), the United Nations set up the Commission on Sustainable Development (CSD) in December of 1992 to ensure the effective follow-up of the conference at local, national, and international levels. Since its creation, the CSD has had 17 annual conferences to review progress and implementation as well as create policy for local, regional and world-wide sustainable development.



Youth delegates participate at the Commission on Sustainable Development.

May 4th marked the start of the 17th annual session of the Commission on Sustainable Development (CSD-17). The major themes at this year's conference were Africa, Agriculture, Drought and Desertification, Land, Rural, and Development, as well as Interlinkages and Cross-cutting Issues. By the end of the two-week conference, representatives from countries all over the world had worked out a 52-page platform addressing the topics. Representatives from governments, major groups and nongovernmental organizations swarmed the UN headquarters in Manhattan to voice their views on the future of sustainability. I was involved with the youth component, representing both the Youth Caucus (an international group) and SustainUS (a non-profit organization promoting youth involvement in sustainable development and youth empowerment).

My role at CSD-17 was to lobby. While I went to side events and plenary sessions, most of my time was spent reviewing the negotiating text, finding ideas and phrases that the youth supported, disagreed with, or inserting ideas that were missing. These points were then adopted into a platform which was lobbied to the government officials who had the power to make changes (or prevent changes) to the text.

Days were long at the conference. I arrived at the UN headquarters at 7:45 am. My mornings included attending a Youth Caucus meeting, where we discussed the strategy for the day - who we were going to lobby and what points to lobby - and divided into smaller groups to accomplish specific tasks. We broke for breakfast and then attended the SustainUS morning meeting, similar to the Youth Caucus meeting in format. As American youth, we all had a similar mindset and were able to make a unified stance on controversial issues. To round out the morning, plenary sessions were held on the major themes, during which government representatives argued, compromised and drafted the final document.

During the afternoons, side events were held, which were presentations put on by a specific industry or demographic groups to educate (and influence) the attendees on an issue. Although side events had smaller audiences, typically 20-40 attendees, they include interesting topics, including sustainable forestry, environmental ethics, bees and pollination, watersheds, genetically modified organisms and their role in agriculture, and more. A second plenary session was also held in the afternoon, after which I attended another Youth Caucus meeting to go over what happened that day. Often I would stay at the UN until 6:00 or 7:00 pm working on our lobbying strategy for the next day.

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The Center of Our Attention: Center for Sustainable Engineering Summer Workshops

By Cliff I. Davidson, Professor of Civil and Environmental Engineering, and Engineering and Public Policy

From July 12 – 17, the Center for Sustainable Engineering (CSE) held two workshops on the Carnegie Mellon campus for engineering professors from across the country, as part of a series that began in the summer of 2006. The goal of the workshops was to assist faculty members who wish to include educational material on sustainable engineering in their courses. Space at the workshops was limited to 30 participants each, and the participants were chosen through a competitive application process.

The first workshop was for individuals who have had little experience in this area, and desire to learn from the ground up about written materials, websites, topic areas, and tools available for sustainable engineering. The second workshop was for individuals who have some experience with coursework and/or research in the field, and would like to share their ideas and compare notes with others working in the area.



Author, Cliff Davidson, is in the first row, far right.

The workshops contained information-sharing sessions for engineering schools which have sustainability programs: what these schools are doing; how to teach sustainable engineering to freshmen; how to teach it to upperclassmen; developing learning objectives for sustainable engineering courses; developing the use of tools, such as Life Cycle Assessment software; developing metrics for sustainability; writing proposals for funding in sustainable engineering research and education; and many other related topics. These topics were discussed in plenary sessions as well as breakout groups. The latter divided by topic area into groups including energy, manufacturing and design, infrastructure, transportation, and water and air resources.

A total of over 180 attendees from 117 different colleges and universities have participated in these workshops since their inception in 2006. Roughly half of the attendees had already received tenure by the time of their workshop. About one third of the participants were women; just under 10% were minority, with several attendees from historically black colleges and universities. Altogether, participants were from schools in 38 states including Puerto Rico and Canada.

The CSE is funded by the National Science Foundation and the US Environmental Protection Agency, a partnership of Carnegie Mellon, the University of Texas at Austin, and Arizona State University, and the workshops rotate among these institutions. The CSE expects to continue the program, perhaps in a different form, in 2010.

Alumni Spotlight

RICHARD CREECH (BS CIVIL ENGINEERING, 1984)



As a young man growing up in southern Florida, Richard “Rick” Creech knew what destiny lay in store for him. Being the son of a professional land surveyor, he aspired to work with the land in a way that would be both sensitive to the environment and to man. He set his sights on becoming a civil engineer. Creech envisioned sustainable types of design within civil engineering before “sustainability” became vogue. From his youth as an avid fisherman and outdoorsman, he could see the impact that traditional types of design were having on the “hot bed” of growth in Florida. Upon his decision to attend Carnegie Mellon University, he was interviewed by the local newspaper and asked why he wanted to be a civil engineer. Creech calmly stated, “Because I want to come back to Florida and design projects that are in concert with the environment and nature.” After returning home and successfully starting a consulting engineering firm, CREECH Engineers, Inc., in operation for over 21 years ago in Florida, he feels he has accomplished this goal time and time again.

Creech’s choice to attend Carnegie Mellon University was not a difficult decision. As a high school football player, he wanted to play at a high level in college and achieve his goal of becoming a civil engineer. Being an undersized offensive guard, he knew his prospects were limited, but his high school football coach (a native of Pittsburgh) introduced him to coach Chuck Klausling, the football coach at Carnegie Mellon, and introduced the university to him. After learning more about the high academic reputation of Carnegie Mellon and wanting to experience another climate other than Florida’s, he filed his application and was accepted for admission. When asked, what attracted him to the university, Creech replied, “CMU had everything I was looking for: a great academic challenge, a fantastic civil engineering program, a nationally ranked football program, a semi urban environment with a deep American history...not to mention, phenomenally different weather than southern Florida. Needless to say, the weather was not quite what he expected, but everything else exceeded his expectations.

After graduation in December 1983, Creech returned to his hometown of Stuart during the recessionary period of the early 1980’s and went to work with his father on a survey crew. “Things were pretty rough at that time. Not only in Pittsburgh where the mills were shutting down but all over,” he stated when asked how his career evolved after college. As the economy started to get back on track, Creech went to work for his mentor, Ken

Ferrari, at a local well known engineering firm designing residential and commercial land development projects. During his tenure there, he was able to pass the professional engineers exam at 24 years of age, making him one of the youngest professional engineers in the country. Still believing in his youthful mantra, he felt the need to pursue the creation of sustainable designs in what was a traditional field of land development. He set upon achieving this by starting CREECH Engineers at the ripe old age of 27 in 1988.

After starting his firm, the Carnegie Mellon training kicked in. He found himself working hard to create an outstanding engineering firm with little business background. As typical for a CMU graduate, he soaked up the chance to learn at an accelerated pace. “The extreme learning pace and hard work at Carnegie Mellon really set me up for not allowing failure to enter into the mix during the start-up period of the firm. And the lessons learned at CMU still carry a lot of impact today as the firm reaches new heights in its development,” Creech stated when pressed on how his education and training prepared him for his career. His university training also led him into new design techniques in the 1990s and 2000s when he utilized innovative stormwater designs to treat stormwater in area retrofits. Creech Engineers received awards from the Florida Institute of Consulting Engineers for projects such as the East Fork Creek retrofit and the Salerno Creek stormwater retrofit in 1998 and 2004, respectively. In both cases, the utilization of wet and dry detention of stormwater runoff, along with the introduction of aquatic plants, were utilized to treat stormwater runoff prior to discharge into sensitive marine estuary environments. Prior to the retrofits, runoff was discharged into sensitive water bodies without any biological treatment or sedimentation removal. Creech credits his Carnegie Mellon background with teaching him to utilize and combine creative and known techniques in the design processes.

Today, Creech finds himself at the helm of a 10- person firm with offices throughout the state of Florida. The firm’s latest “cool” project is the Heathcoat Botanical Gardens project located in

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Business and Policy Students Making a “Net Impact”

By Justin Parisi, master's student in Civil and Environmental Engineering and Tepper School &
Mona Abdel-Halim, masters student in Tepper School and Heinz College

Net Impact (NI) is a global organization of students and professionals using business to improve the world. The Net Impact network includes over 200 chapters in cities throughout the world, including our Carnegie Mellon Chapter. The mission of the CMU Net Impact Chapter is to add value to Carnegie Mellon University and the greater Pittsburgh area by further implementing social and environmental initiatives in line with management principles. We strive to achieve this goal by promoting initiatives that highlight corporate social responsibility (CSR) as a central theme. Essentially, CSR is the deliberate inclusion of public interest into corporate decision making, and the honoring of a triple bottom line: people, planet, profit.

Our chapter is comprised of graduate students from the Tepper School of Business and the Heinz College. We operate across two integrated paths: 1) social programs and initiatives and 2) environmental programs and initiatives. Here are just a few of the many projects we worked on over the last year.



Justin Parisi at the Greenstar Recycling Center.



Net Impact members at the 2008 national meeting.

Pro-Bono Consulting Initiative

NI worked in partnership with the Tepper Consulting Club to provide an opportunity for management students to help local government and nonprofit organizations with specific business challenges. This past year, projects included the following clients: Pittsburgh Children's Museum, Pittsburgh Downtown Partnership, Silk Screen Film Festival and several others.

Developed Plans for Implementing SAGE Global Program at Local High Schools

NI members wrote an implementation plan for launching the Students for the Advancement of Global Entrepreneurship (SAGE) at local charter high school, City High. Net Impact members will work with teams of high school students to develop socially and environmentally responsible business plans for regional competition in spring.

Created Tepper Kiva Micro Lending Team

NI set up a Tepper Kiva Micro Lending Team. Kiva is a non-profit website that allows you to lend (not donate) as little as \$25 to a specific low-income entrepreneur in the developing world. As part of the team, the loans show up in our team's collective portfolio, so our team's overall impact will grow.

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Alumni Spotlight

RICHARD CREECH (BS CIVIL ENGINEERING, 1984)

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St. Lucie County, Florida. The project is unique because it incorporates a park, botanical garden, environmentally sensitive water bodies to the east and south, serves roughly 1000 acres of runoff from developed semi-urban development and includes roughly 15 different state, local and private stakeholders. The project is roughly 300 acres and will ultimately be a large park. It will include a creative wetland botanical feature that serves both as a stormwater treatment retrofit area and an interpretive garden to share the many fauna that will be included in the treatment/botanical area. "Heathcoat is probably one of the most challenging projects of my career, given the number of stakeholders involved, along with the sensitive nature of the pristine areas adjacent to the project. It is a really high profile

high profile project for the area. A lot of synergy can be attained through its development."

Creech has returned to campus frequently to recruit interns and serve the university in various ways. When approached by students at CMU, Creech provides the following guidance, "go 100% everyday and great things will happen." Creech also serves as the president of the Carnegie Mellon University's Alumni Association Board and is an ex-officio member of the Board of Trustees. He also adds that, "Truly, life is not a spectator sport, and as CMU alumni know, we are all in the game. Where else would we be?"

Take Your Best Shot

A Steinbrenner Institute photo competition was launched in conjunction with the G-20 (September 24 and 25) events on campus. The competition is divided into three categories: people, nature, and places. There is a limit of one photo per entry per category.

Deadline is November 1.

Winners will receive award certificates and publication on the Steinbrenner web site the first week of December 2009.

For more information and for photo submittals, contact Chriss Swaney at swaney@andrew.cmu.edu.



Marcellus Shale Gas Project

(Continued from page 9)

have “signatures” that show up in the TDS. The sensors act as an early warning system that the Monongohela River is experiencing unacceptable levels of TDS, and the work of Water QUEST will help to determine what is causing those high levels.

The team is also coordinating with RAIN to make all the data from the project available through a web-based public information system. These activities will help to spur additional education and discussion among environmental groups and individual citizens about the best way to manage salty water produced in Marcellus Shale gas extraction and ensure protection of the region’s surface water resources.

VanBriesen sees Colcom’s support of this project as being critical at this time. “Produced water volumes will increase over the coming years, and plans for treatment and disposal may not keep pace with generation. The potential for poor disposal practices and shortcuts like dilution in our waterways is high,” explains VanBriesen. “The recent changes in water quality in Dunkard Creek suggest additional attention needs to be paid to our waterways. Colcom’s support makes possible the critical step in ensuring that unbiased, comprehensive research is done to understand the impact on river ecosystems and to share this information with the full community.”

In addition to the Colcom Foundation, the Steinbrenner Institute provided seed funding for this research through a Steinbrenner Institute Graduate Fellowship award to PHD student Jessica Wilson, a research assistant on the project.

Carnegie Mellon Graduate is U.N. Youth Delegate

(Continued from page 10)

SustainUS is fortunate in that every year the U.S. State Department takes the time to meet with it at every conference. At CSD-17, John M. Matuszak met with me and the rest of the SustainUS delegation. Because it was only a select group of U.S. youths, we were able to speak with Representative Matuszak as individuals, not as a huge party handing over a policy paper. Also, because we were the constituents of the U.S. delegation, we hoped that our views would hold more weight.

Working with the Youth Caucus was an incredible experience. The caucus was composed of over fifty young adults (between the ages of sixteen to twenty-four) from all over the world. I worked alongside peers from Rwanda, Kenya, Australia, Switzerland, Singapore, Ireland, Canada and many other countries. It was amazing to see how a group of youths, most of us still in college, were able to come together to make a statement about what we want our future to hold. While most of the lobbying groups were focusing on their specific issue (such as genetically modified organisms –GMOs - or women’s rights) the youths at CSD lobbied on a variety of different topics. It felt wonderful to be in a room with so many people my age, all passionate about a sustainable global future.



From left to right: (back row) Allison Greenberg, Columbia University; Ryan Wood, New School; (at table) Lauren Nutter, College of the Atlantic; unknown; Nicole Wires, Stanford University; John Matuszak, US State Department; Maura Allaire, Resources for the Future. Photo by Andrew Stocchetti

Students' Learning Opportunity Benefits Community

By Gregory Tanski, Architecture undergraduate

In the fall of 2008, twelve students signed up for a year-long project that would be the first rendition of the *Urban Design Build Studio*, or UDBS. Along with Professor John Folan, these students began by using the Urban Lab as a means of studying the neighborhood of Wilkinsburg, with the long-term goal of designing and building a catalytic demonstration project for urban revitalization in Wilkinsburg, a resource restrained community. Building off of the successes with the Solar Decathlon – a previous design build program in the school of Architecture - the goal was to make an investment in the local community, and have the project ultimately result in something that could be a resource for the community.

Starting with a four-month participatory design process in the fall through Carnegie Mellon's Urban lab, students worked with the residents of Wilkinsburg, as well as the Pittsburgh non-profit Institute for Ecological Innovation (IEI). The resulting project and program was the Hamnett Homestead Sustainable Living Center (HHSLC), located in the Hamnett Place neighborhood of Wilkinsburg. The HHSLC will house the offices of the IEI and will also be a neighborhood resource center and homestead for community building. The goal of the design of the HHSLC was to implement affordable sustainable strategies, as well as planning strategies appropriate to the neighborhood and its long-term growth.



The design of the HHSLC was completed during the spring 2009 semester, and presented a fifteen year plan for the development of the site and the community center. The students then undertook the development of construction documents and prototypes to allow for the building of Phase One in summer 2009. Phase One included a Community Porch/Pavilion located on the northern perimeter of the HHSLC site that spans one hundred feet long. New, recycled and reconstituted materials harvested from local deconstruction projects were integrated into the project, as the project was designed to integrate with the existing structures on site, as well as provide a permeable barrier between the street and the fields of the Urban Farm. The structure of the Porch/Pavilion incorporated characteristics of harvested lumber, as well as architectural geometries present in the built environment of the existing urban fabric. All rainwater from the roof of the structure is diverted into cisterns, helping to reduce the impact on the watershed and support the regional water management policies of the Nine Mile Run Watershed Association.

Article continued on page 19...

History Repeats...

In an August *Pittsburgh Post-Gazette* story entitled “There Will Be Gas,” (<http://www.post-gazette.com/pg/09214/987834-109.stm>) Carnegie Mellon professor Joel A. Tarr summarizes the history of Western Pennsylvania’s natural gas drilling booms and busts. His motivation for doing this was to give Pittsburghers an historical perspective to the rapidly expanding regional enthusiasm for drilling the Marcellus Shale for natural gas.

the next page

There Will Be Gas

A LOOK AT WESTERN PENNSYLVANIA'S OTHER NATURAL GAS DRILLING BOOMS (AND BUSTS)

BY JOEL A. TARR

There is great excitement in Pennsylvania and other states in the Appalachian Basin about the promise of the Marcellus Shale to provide copious amounts of natural gas and to thereby reduce dependence on foreign oil, help conserve energy prices, create jobs and provide a financial windfall for the states where the deposits are located. These possibilities have created a natural gas boom in Pennsylvania. Before we run full steam into developing this area, however, it would be useful to examine the history of past natural gas booms in Pennsylvania. From the boom of 1865 to the boom of 1915, the boom of 1915 to the boom of 1925, and the boom of 1925 to the boom of 1935, each time the boom of a city or town, except that they produce no smoke.

Natural gas development began in Western Pennsylvania in the 1860s, highlighted by the discovery of the famous Hurricane Well and exploitation of the Murrysville field, with a smaller field developing at Thurston on the Allegheny River.

George Wittinghouse's Philadelphia Co., the Penn Fuel Co. and People's Natural Gas became the most prominent actors developing and distributing the gas, although many small companies were also formed. Companies fervently competed for leases on land to drill for wells, with "bloody diggers" and "cash" ensuing.

Spirited competition also developed between gas companies in Pittsburgh in the mid-1880s as they tried to capture gas markets in the city. Nearly 500 wells had been drilled in the region by 1882, a number in Homestead and other parts of the city. One gas well, dug in 1877, was on Boy's Hill overlooking the Monongahela River. It reached down 2,900 feet and had a 26-foot derrick that came in dry. Westinghouse, who patented many technical advances for natural gas development, had more luck, sinking a producing gas well on his estate "Seltzick," on Third Avenue in 1883.

Numerous industries and residences adopted the fuel and thousands of jobs were created, although many local coal miners lost their jobs. Pittsburgh's skies became notably cleaner. But a number of explosions, some fatal, also accompanied the introduction of gas in the city.

By 1890 or so, in spite of predictions by boosters that the gas supply was inexhaustible, many wells were coming up dry, as wasteful practices and horses added to depletion. Many industries that had converted to natural gas reverted to the use of coal as their primary fuel and by the 1900s Pittsburgh had regained its title as the "Smoky City."

Gas exploration in the region continued, however, and in 1910 two oil and gas operators produced a quarter the Sooke Hillow Gusher in North Versailles that at its peak produced 62 million cubic feet a day and made huge profits for investors. The well drew from the Speerley sand, a geological formation about 3,200 feet below the Pittsburgh coal seam. This discovery led to a wave of new drilling in an area of about nine square miles including Versailles, Port Vue, Lincoln and Elizabeth. It became known as the McKeesport gas boom.

In the expectation of large financial killings, oil companies were formed within six months to exploit the field. Owners leased their land for large sums. A host of slicks sprang up in the area.

A frenzy of gas well speculation swept over the towns. Ads in the Pittsburgh and McKeesport newspapers by gas exploration companies promised huge returns to investors.

One 1919 ad proclaimed that the "McKeesport Gas Fields are pronounced by experts the Great and the World's Best known," and claimed that "Sudden wealth has been thrust upon thousands of investors and the Real Estate is just beginning." "The time-making opportunities" were offered to investors at \$50 a share.

A local booster claimed that the area in which the gusher was drilled was "absolutely proven territory," while still another claimed, "60 per cent of wells drilled are producers." Some companies sold their shares at \$1 a share in order to attract the small investor.

Many residents signed leases for drilling on their land. They bought and sold gas company stock on street corners and in backyards, transferred into brokerage houses. Houses were torn down and front yards uprooted. Hand-dredged and even thousands of wells were supposedly drilled in the 9-square-mile area.

Many of the wells, however, came in dry. By the end of 1920, while 180 wells were producing gas, 441 wells were dry and gas volumes from the productive wells had declined. A People's Natural Gas Co. spokesman later readily confessed that while \$10 million had been invested in the field in less than a year, less than \$1 million had been returned. The McKeesport gas field had become the "Scum of the Pittsburgh district's biggest boom and loudest crack," and many of those who had invested money in gas stocks were very losers.

In the history gas booms in the region suggested several lessons for those concerned about the current Marcellus Shale boom. One is that over-optimism and gas supplies will continue into the future is often unwarranted, possibly leading to heavy losses on the part of investors. Even wells that initially produced copious amounts of gas can be exhausted quickly. A second is that expenses for leases and drilling equipment can readily eat into profits as gas prices fall, as they recently have.

And finally—and most consequential for many of those concerned about the current gas boom—are the environmental impacts of natural gas development.

We have limited information about the environmental effects of the late 19th century gas boom, but we can be assured that considerable environmental damage had been done in an era of little environmental regulation, with frequent fires and explosions. More tangible evidence exists for the McKeesport boom where methane was reportedly found to be leaking into homes from abandoned and unsealed gas wells from the earlier boom period. Some leases had to be condemned while in other families had to vacate while the problem was corrected.

The development of the Marcellus Shale has also caused environmental problems in relation to water usage and wastewater disposal and damage to roads and wilderness areas by construction and transportation equipment.

We need to learn from our past experience with natural gas booms to perform needed research on actual and potential environmental dangers and to strengthen the oversight capabilities of the state Department of Environmental Protection. Many have suggested that a sensible manner to pay for the costs of potential environmental damage and of enhanced inspection would be the levying of a severance tax on the extraction of natural gas. In reacting to such a tax, the state would be joining all other states that have greater natural gas production than Pennsylvania.

Without required environmental research and regulatory oversight Pennsylvania would be making the same choices made in the natural gas booms of the past—leave the environmental damages created by the current boom to the next generation to remedy.

Joel A. Tarr is the Richard S. Caliguiri University Professor of History & Policy at Carnegie Mellon University (joeltarr@cmu.edu).

The Next Page is different every week. Contact Joe Meyer at joemeyer@post-gazette.com at 412.263.4915.

VERSAILLES FROM ACROSS THE YOUGH

“Before we run full steam into developing this gas...it would be useful to examine the history of past natural gas booms in the region to see if we could learn anything from it,” says Tarr, Richard S. Caliguiri University Professor of History and Public Policy.

Tracing natural gas development in this region from the 1870s, Tarr highlights historical lessons for a contemporary audience. He cautions against overly optimistic visions for future natural gas abundance with the Marcellus Shale project. He notes that in our regional history, gas supplies have been exhausted quickly following initial development. The second lesson is to be aware of the expenses needed for leases and drilling equipment which will lower profits. Finally, Tarr cautions his audience to be mindful of the environmental impacts of natural gas development, of which were given limited attention in the past.

Environmental Policy: Global and Local Solutions

On March 31, the Steinbrenner Institute, in collaboration with Alumni Relations, hosted a panel discussion in the University Center featuring representatives from Carnegie Mellon and John Hopkins University. With alumni from both universities in attendance, the goal was to explore the future of federal environmental policy, given the new Administration, and the proposed impact on state and local level policies and initiatives.

Our panelists included:

- Vivian Loftness, professor, Carnegie Mellon School of Architecture
- Catherine Norman, professor, John Hopkins Department of Geography and Environmental Engineering
- Jerry Paytas, GSP Consulting Corporation, John Hopkins, alumnus, A&S 1989
- William Peduto, Pittsburgh City Council

The session was moderated by Richard Fitzgerald, president, Allegheny County Council, and Carnegie Mellon alumnus, College of Engineering 1981.



(Left) Allegheny County Council President Fitzgerald speaks with event attendees while (right) panelists Vivian Loftness and Jerry Paytas talk.

Dr. Norman began by noting that in the first 100 days of President Obama's Administration, it appears as though many scientific documents are being dusted off and considered as a new stage is set for science-based policy. The panelists agreed that it was too soon to notice any real change, but the direction was encouraging as noted by the Administration's commitment to climate change and the reduction in mercury emissions. Messrs. Peduto and Fitzgerald commented on the greening of Pittsburgh (*New York Times*, April 1, 2009) that is being defined by the number of LEED certified buildings and brownfield development. Other local initiatives include the conversion to LED street lights in the city and the consideration of commuter rail. Dr. Loftness spoke of state initiatives such as the Governor's Climate Action Committee, a group of academics, practitioners and policy makers focused on recommendations related to the building and land use sectors. With respect to energy (citing options for coal, nuclear and renewables), Jerry Paytas reminded the assembly that all policies will impact businesses, consumers, education systems and others. He noted, however, that the tension will drive the development of new products and new strategic incentives. All agreed that funding is important and that federal funding must be passed down to state and local government where needs can be targeted and results measured.

Net Impact (Continued from page 13)

Organized Compostable Lunch Program

NI designed a program for successful composting at Carnegie Mellon University. Food orders are designed to minimize packaging and then Net Impact volunteers handle waste collection and separation to maximize the amount of waste that is diverted from the landfill. Post-consumer food waste is deposited on campus at the UC.

Tour of the Greenstar Recycling Center

NI took a tour of Pittsburgh's active, automated recyclables sorting facility. The group saw firsthand how the recyclables are received at their destination, move through the sorting and packaging process, and are sent for reprocessing. Greenstar personnel led a discussion about how the re-sale price of recycled stock and the operational preferences of the automated equipment translates into waste collection techniques.

Net Impact Speaker Series

Last year NI created a Speaker Series with guest lecturers Jessica Jackley (Co-Founder of Kiva.org), William Strickland Jr. (Founder/CEO of Manchester Bidwell Corp. and MacArthur "Genius" award winner) and David Bornstein (Author of How to Change the World).

Over the last year, we've completed a number of projects, held many events, and hosted several speakers. We have had great success in furthering our mission, and have already begun the 2009-2010 academic year with a bang. To learn more about who we are and what we do, visit us at <http://sites.google.com/site/cmUNETimpact/> or send us an e-mail at cmu.netimpact@gmail.com. And be sure to send us an e-mail if you'd like to collaborate on a project at CMU or in Pittsburgh!

Design Build (Continued from page 16)

Throughout the project, there were plenty of ups and downs. Back in August of 2008, we had no reason to believe that funding would be as difficult as it was to secure, and many of the issues tied to insurance on the project forced us to alter our plans. It was a tremendous learning experience for all of the students to be a part of a project that dealt with the submission of contract documents to the Borough of Wilkesburg for approval, testing of prototypes to understand the implications of our initial design ideas, and the recalibration of the design to improve it structurally, aesthetically, and spatially. Working with the community was a tremendous opportunity as it helped us in understanding what was important and relevant in our design process. The project, which was pre-fabricated at Construction Junction, is being installed permanently at the HHSLC during the fall of 2009.



Author (first row, far right) with classmates and Professor John Folan (second row, far right).



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Steinbrenner Institute Environmental Dialogue

Pittsburgh Then and Now: An Environmental Transformation

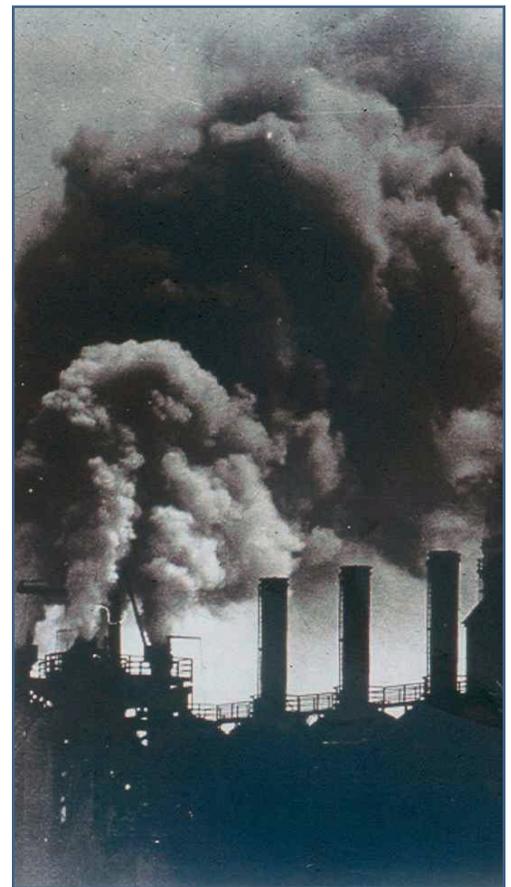
Homecoming 2009, October 31 – 11:30 a.m.-1:00 p.m.
Location: Tartans Pavilion

Guest Speakers:

- Jerome Dettore (CEE '69) – Michael Baker Corporation
(former Director of Pittsburgh's Urban Redevelopment Authority)
- Dr. Joel Tarr - Richard S. Caliguiri University Professor of History and Policy

Registration recommended due to limited seating:

<http://www.cmu.edu/alumni/involved/events/homecoming/registration.html>



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