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Mascaró Center for Sustainable Innovation
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Engineering Sustainability 2011

Innovation and the
Triple Bottom Line

April 10-12, 2011

David L. Lawrence Convention Center
Pittsburgh, Pa.

Final Program



Eric J. Beckman
Faculty Director, Mascaro Center
for Sustainable Innovation,
University of Pittsburgh



David A. Dzombak
Faculty Director, Steinbrenner Institute
for Environmental Education and Research,
Carnegie Mellon University

LETTER FROM THE CHAIRS

First, let us take this opportunity to welcome you all to Pittsburgh and Engineering Sustainability (ES) 2011: Innovation and the Triple Bottom Line.

We hope you not only have a rewarding conference experience, but also that you have the opportunity to take advantage of the many amenities that our city has to offer. Our conference has been designed to showcase cutting-edge science and engineering that focuses on greening the built environment, the sustainable use of water and energy, and sustainable transportation. Progress in these areas will require innovations from professionals in a variety of disciplines, and we are grateful to have scientific contributions from researchers in fields ranging from engineering to architecture to urban planning to the sciences. Designing more sustainable technologies and systems for the built environment is vital to the creation of sustainable global economies, hence our desire to showcase innovation in these areas.

We have arranged the program as a series of topical sessions, allowing you to focus your attention on a specific area or sample from a variety of topics.

This program includes comprehensive information about ES 2011, but if you have questions or need help, please visit the registration area or ask any of the ES 2011 volunteers. If we can do anything to make your time in Pittsburgh more enjoyable and productive, please let us know.

Sincerely,

Eric J. Beckman

David A. Dzombak

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CONFERENCE COSPONSORS

The Mascaro Center for Sustainable Innovation at the University of Pittsburgh is a center of excellence in sustainable engineering, focusing specifically on the design of sustainable neighborhoods. The Mascaro Center was created to encourage and nurture new collaborative projects based on strong and innovative research, helping to translate the fundamental science of sustainability into real products and processes. Research conducted under the auspices of the Mascaro Center includes projects on greening the built environment, the more sustainable use of water, and the design of distributed power systems. www.mascarocenter.pitt.edu

The Steinbrenner Institute for Environmental Education and Research (SEER) champions Carnegie Mellon University's commitment to making a difference in the way the world thinks and acts about the environment. The Steinbrenner Institute supports and facilitates interdisciplinary research and education activities at Carnegie Mellon, including bringing together faculty and students associated with 20 environmentally related research centers on campus to collaborate and pursue new initiatives. Environmental research at Carnegie Mellon focuses on two principal themes within the framework of transitioning to an environmentally sustainable society: (1) urban infrastructure and sustainable cities, and (2) energy transition strategies and the environment. www.cmu.edu/steinbrenner

Registration Lists

New this year, we will no longer print paper copies of the registration list for each attendee; however, attendees may view a sample report at the registration desk. Additionally, attendees may download an electronic copy in pdf format in our speaker ready room (room 411) at no cost. Registrations received prior to April 4, 2011, will appear in the ES 2011 Registration List. The complete registration list, with an addendum, will be made available online and will include those attendees who registered after April 4, 2011, as well as on site during the conference. Please visit the ES 2011 Web site (www.mascarocenter.pitt.edu/conference) following the conference to view the final, complete list.

GENERAL INFORMATION

Registration Hours and Locations

Sunday 5-7 p.m.
Westin Convention Center, Pittsburgh
Monday 7:30 a.m.-5:30 p.m.
David L. Lawrence Convention Center (DLLCC)
Tuesday 7:30 a.m.-noon
DLLCC

Speaker Ready Room (Room 411)

There will be a computer and printer available during the conference for speakers to check their presentations and make small changes if necessary.
Monday 7:30 a.m.-5:30 p.m.
Tuesday 7:30 a.m.-2:30 p.m.

Poster Room (Room 411)

All posters are to be delivered to the Poster Room by noon on Monday. Posters can be picked up in the same room on Tuesday from 7:30 a.m. to 2:30 p.m.

Message Board

As a service to conference registrants, a Message Board will be located in the registration area. Registration staff will man the board from 8 a.m. to 5 p.m., April 11-12. Messages will be retained until the end of each day, and any program changes also will appear on the Message Board.

Badge Information

Please wear your ES 2011 name badges at all times. Not only is the badge your passport to all conference activities, but it also lists several important local phone numbers on the back. You may be denied access to educational sessions and events if you are not wearing your badge.

Transportation Information

Checker Cab: 412-381-5600
Yellow Cab: 412-321-8100

SuperShuttle runs from Pittsburgh International Airport to the Westin Convention Center, Pittsburgh, and Courtyard by Marriott Pittsburgh Downtown every hour on the hour. Pickup is in the baggage claim area, and the cost is \$19 one way. More information and advance reservations are available at www.supershuttle.com.

The Airport Flyer bus (Port Authority of Allegheny County bus 28X) boards just outside the baggage claim area approximately every 30 minutes from 6 a.m. to midnight. The cost is \$2.75 one way.

Cell Phone Usage

As a courtesy to the speakers and fellow attendees, the ES 2011 staff requests that all cell phones and pagers be turned off or switched to silent mode in all presentation rooms.



PLENARY SESSIONS

**"Life Cycle Models for Engineering Sustainable Buildings, Transportation, and Infrastructure Systems"**

Gregory A. Keoleian
Codirector, Center for Sustainable Systems, and Professor
University of Michigan
Monday, April 11, 8:30 a.m.

Gregory Keoleian cofounded and serves as codirector of the Center for Sustainable Systems at the University of Michigan. His research focuses on the development and application of life cycle models and metrics to enhance the sustainability of products and technology. He has pioneered new methods in life cycle design, life cycle optimization of product replacement, life cycle cost analysis, and life cycle-based sustainability assessments ranging from energy analysis and carbon footprints to social indicators. He has studied such systems as alternative vehicle technology, renewable energy systems (photovoltaics and willow biomass electricity), buildings and infrastructure, information technology, food and agricultural systems, household appliances, and packaging alternatives.

**"The Utility as a Catalyst for Solar Development"**

Carl J. Frattini
Director, Business Development
Northeast Utilities
Monday, April 11, 9:30 a.m.

Carl J. Frattini is the director of business development for Northeast Utilities (NU). He is responsible for developing opportunities that create customer value, particularly in areas where a utility franchise can facilitate the policies and objectives of the power sector. Frattini's most recent focus is the design and implementation of a solar program for the Western Massachusetts Electric Company. The program focuses on using restricted-use properties (brownfields, capped landfills) to accommodate utility-owned photovoltaic facilities.

NU operates New England's largest utility system, serving more than 2.1 million electric and gas customers in Connecticut, New Hampshire, and Massachusetts. Frattini joined NU in October 2006 as business unit risk controller. His 18 years of experience in the utility sector cover a variety of financial, operational, and leadership positions. Frattini earned a Bachelor of Science degree in finance from Southern Connecticut State University in 1992. He has executive development certifications from Harvard Business School in the areas of change management and corporate performance. He also is among the original alumni of Michael Hammer's Process Mastery Curriculum. Frattini and his family live in Guilford, Conn.

**"Harnessing Domestic Solar Resources: U.S. Solar Market Development and Commercialization Pathways"**

Jesse Grossman
Chief Executive Officer
Soltage, Inc.
Monday, April 11, 12:30 p.m.

Jesse Grossman cofounded Soltage and has served as the company's chief executive officer since October 2005. Grossman has formal training in emerging markets, physical science, and business development. Prior to cofounding Soltage, he worked in venture development and management, project finance, marketing, and resource use in diverse locales including East Africa and Indonesia, as well as on the East Coast and West Coast of the United States. Grossman has worked with energy demand management, solar, and wind companies and has developed and managed projects for the U.S. Agency for International Development, U.S. Geological Survey, and Carnegie Mellon Foundation. He has an undergraduate degree in biology from Carleton College and a graduate degree in environmental science from the Yale University School of Forestry & Environmental Studies with business development certification from the Whitney and Betty MacMillan Center for International and Area Studies at Yale.

**"Sustaining Our Built Environment: Profound Energy Savings via Retrofits of Building Envelopes"**

Brandon Tinianov
Chief Technology Officer
Serious Materials Inc.
Tuesday, April 12, 8 a.m.

Brandon Tinianov, chief technology officer at Serious Materials Inc. in Sunnyvale, Calif., is a recognized expert in building science and the creation and patenting of novel construction materials to support global sustainability initiatives. A professional engineer, Tinianov is LEED accredited, board certified as an expert by the Institute of Noise Control Engineering of the USA (INCE/USA), and a Bay Area bike commuter. Through his influential participation in the Green Building Initiative and Sustainable Silicon Valley, Tinianov has been recognized as a leading voice in the green construction innovation realm and recently was elected founding chairman of the Silicon Valley branch of the U.S. Green Building Council. He is chairman of the Acoustical Society of America Technical Committee on Architectural Acoustics and a member of its College of Fellows, chairman of the INCE/USA standards committee, a past executive officer of the American Society of Testing and Materials (now ASTM International), and a designated expert on various ISO and American National Standards Institute working groups. Tinianov has 12 issued patents and holds more than 20 pending applications.





INVITED SPEAKERS

Allen P. Davis

Professor of Civil and Environmental Engineering,
University of Maryland

“Sustainable Urban Stormwater”

Allen P. Davis is in his 22nd year as a professor of civil and environmental engineering at the University of Maryland. From 2001 to 2010, he also was director of the Maryland Water Resources Research Center. For more than a decade, he has been investigating sources and treatment of pollutants in urban stormwater runoff with a focus on low-impact practices, particularly bioretention. Since 2003, Davis has served as chair of the Association of Environmental Engineering and Science Professors Government Affairs Committee, for which he was named the recipient of the 2004 Distinguished Service Award. From 2004 to 2010, he was associate editor of *Chemosphere: Science for Environmental Technology*. Davis is a fellow of the American Society of Civil Engineers and a Licensed Professional Engineer in Maryland. He has authored more than 80 refereed publications on environmental processes, technology, and education and is coauthor of *Stormwater Management for Smart Growth* (Springer, 2005). Davis received the 2010 University of Maryland A. James Clark School of Engineering Faculty Outstanding Research Award, recognizing his exceptional and influential research accomplishments related to urban stormwater quality, its management, and the concept of low-impact development.

Roland Geyer

Assistant Professor, Bren School of Environmental Science
and Management, University of California, Santa Barbara

“Engineering Sustainable Fuel Vehicle Systems”

Roland Geyer is assistant professor at the University of California, Santa Barbara, Bren School of Environmental Science and Management. Prior to this appointment, he served as a research fellow at the University of Surrey (United Kingdom) Centre for Environmental Strategy, research associate at the INSEAD (France) Centre for the Management of Environmental Resources, and consultant in financial risk management for what was then American Management Services (now part of CGI) in Germany. Since 2000, Geyer has worked with a wide range of governmental organizations, trade associations, and companies on environmental sustainability issues. In his research, he uses the approaches and methods of industrial ecology, such as life cycle assessment and material flow analysis, to assess pollution

prevention strategies based on recycling, reuse, and material and technology substitution. He combines these approaches with research methods from operations management and other fields to study the relationship between environmental performance, economic viability, and the technical and operational feasibility of pollution prevention strategies. His overarching goal is to help develop the science and knowledge necessary to reduce the environmental impact of industrial production and consumption. Geyer has a graduate degree in physics from the Technical University Berlin and a PhD in engineering from the University of Surrey.

Heather L. MacLean

Associate Professor, Department of Civil Engineering,
University of Toronto (Canada)

“Life Cycle Assessment of Energy Systems: Case Studies and Lessons Learned”

Heather L. MacLean is an associate professor in the Department of Civil Engineering at the University of Toronto with cross appointments in the Department of Chemical Engineering and Applied Chemistry and the School of Public Policy and Governance. She received a joint PhD in civil engineering and engineering and public policy from Carnegie Mellon University, an MBA from Saint Mary's University and a BEng from Dalhousie University. MacLean's expertise is in the field of energy systems analysis and, more specifically, assessment of alternative energy and infrastructure systems with a focus on the transportation and electricity generation sectors. In the past decade, her research has examined a large set of bioenergy systems as well as oil sands-derived fuels, examining the environmental and techno-economic implications. She has worked closely with the automotive, transportation fuels, and electricity industries as well as federal and provincial governments.

Gavin McIntyre

Cofounder and Chief Scientist, Ecovative Design LLC

“Nature's Materials: Using Fungi to Create Next-Generation Materials”

Gavin McIntyre is cofounder and chief scientist at Ecovative Design LLC and has led all mycological material and biological process development in the company's strides to replace synthetics. McIntyre coinvented the MycoBond platform, a patent-pending technology that uses a growing organism

to transform agricultural byproducts into strong composite materials. These materials are 100 percent compostable and made with a fraction of the energy of conventional plastics. He has served as the principal investigator on grants received from the U.S. Environmental Protection Agency and Department of Agriculture, National Science Foundation, and New York State Energy Research and Development Authority. McIntyre also has served on Technology Roundtables, hosted by former New York Governor David Paterson and Congressman Paul Tonko.

McIntyre received a dual BS in mechanical engineering and product design from Rensselaer Polytechnic Institute.

Frank Rijsberman

Director, Water, Sanitation, & Hygiene, Bill and Melinda
Gates Foundation

“Sustainable Sanitation Services: Can We Reinvent the Toilet?”

A prominent voice on global water issues, Frank Rijsberman also was responsible for public health grantmaking at google.org, the philanthropic arm of Google. As program director at google.org, Rijsberman developed and managed grants and investments in global public health focused on using innovative technologies to combat emerging infectious diseases in Southeast Asia and Sub-Saharan Africa. Prior to this, Rijsberman served as director general of IWMI, a leading research organization in the areas of water, food, and the environment. He transformed IWMI from a single, localized institute into an international research network with 12 offices across Africa and Asia. He also was a member of the Task Force on Water and Sanitation for the United Nations Millennium Development Goals Project and was a key organizer of the second World Water Forum. He served as part-time professor at the UNESCO-IHE Institute of Water Education, the world's largest facility dedicated to research and capacity building in the areas of water, environment, and infrastructure.

Originally from the Netherlands, Rijsberman received his bachelor's and master's degrees in civil engineering from Delft University of Technology and earned a multidisciplinary PhD in water resources planning and management and civil engineering from Colorado State University. He has worked in Africa, Asia, and Europe and speaks four languages including his native Dutch.





INVITED SPEAKERS, *continued*

David A. Sabatini

David Ross Boyd Professor and Sun Oil Company Endowed Chair of Civil Engineering and Environmental Science, University of Oklahoma

“Developing Sustainable Water Treatment Technologies for Fluoride and Arsenic Mitigation in Developing Countries”

David Sabatini is a David Ross Boyd Professor and Sun Oil Company Endowed Chair of Civil Engineering and Environmental Science at the University of Oklahoma. He also is director of the WaTER (Water Technologies for Emerging Regions) Center at the University of Oklahoma. His research focuses on sustainable drinking water technologies for developing countries, surfactant-based environmental and biofuel technologies, and contaminant fate and transport in the environment. He is editor in chief of the *Journal of Contaminant Hydrology*, editorial board member for the *Journal of Water, Sanitation and Hygiene for Development*, and a member of the science advisory boards for DuPont Chemical Co. and the University of Arizona Superfund Research Center. Sabatini has coauthored or coedited four books and more than 150 refereed journal publications and book chapters. His most recent awards include the DaVinci Fellow Award from the DaVinci Institute of Oklahoma (2010) and the Oklahoma Medal for Excellence at a Research University from the Oklahoma Foundation for Excellence (2010). He was a senior Fulbright Scholar in Angewandte Geologie at the Universitaet Tuebingen (Germany) in 1997–98. Sabatini received his BS in civil engineering from the University of Illinois, his MS in civil engineering from Memphis State University, and his PhD from Iowa State University.

Timothy Wagner

Principal Engineer, Energy Systems Program Office, United Technologies Research Center

“Sustainable Buildings through a Systems Approach”

Timothy Wagner is a principal engineer in the Energy Systems Program Office at United Technologies Research Center (UTRC). He currently is leading the development of technology for advanced energy systems.

During his 24 years at UTRC, Wagner has led or contributed to numerous projects in the fields of thermodynamics and heat transfer. He holds several issued or pending patents. In addition to his position at UTRC, Wagner is an adjunct associate professor of mechanical engineering at Rensselaer

Polytechnic Institute at Hartford, where he has been an advisor for more than 30 master’s seminar projects.

Wagner holds a BS, MS, and PhD in mechanical engineering from Virginia Polytechnic Institute and State University (Virginia Tech). During his doctoral program, he was a NASA Fellow at NASA Langley Research Center in Hampton, Va. Wagner is an associate fellow of the American Institute of Aeronautics and Astronautics and a member of the American Society of Heating, Refrigerating and Air-Conditioning Engineers and the American Society of Mechanical Engineers.

Eric Williams

Assistant Professor, School of Sustainability, Arizona State University

“Energy-Smart Homes: Opportunities and Challenges”

Eric Williams joined Arizona State University (ASU) in 2006 via a joint appointment between the School of Sustainable Engineering and the Built Environment and the School of Sustainability. Prior to ASU, Williams, whose educational background is in physics, spent eight years in the Environment and Sustainable Development group at United Nations University in Tokyo, Japan. His research interests include industrial ecology and life cycle assessment. His main methodological interests are in uncertainty analysis and enhanced models to better understand the sustainability implications of technological progress.

Subject areas he works on include urban systems, renewable energy, and information technology (IT). His IT-related work includes life cycle assessment of semiconductors and computers; sustainable management of global electronic waste; and macro-analysis of relationships between energy consumption, telecommuting, and e-commerce. In the energy domain, he is working on systems assessment of energy supply technologies, using thermodynamics-based measures to characterize historical trends and forecast technological progress, and the effects of development and urbanization on energy demand in industrializing nations.

SPECIAL EVENTS

Welcome Reception

Sunday, 5:30–7:30 p.m.
Westin Convention Center
Pennsylvania Ballroom

The City of Pittsburgh and Allegheny County governments have ramped up their sustainability efforts with the appointing of high-level officials to advocate for green concerns in local government. This event will highlight their recent accomplishments and preview their future plans.



Poster Session and Social

Monday, 5:30–7:30 p.m.
David L. Lawrence Convention Center
Garrison Overlook

Continuing Education Credits

Individuals who require certificates documenting their participation in ES 2011 for Green Building Certification Institute (GBCI) and/or professional engineer or geologist state registration board continuing education purposes should pick up a form at the registration desk that will verify their session attendance. All conference sessions have been approved by the U.S. Green Building Council for a total of 32 GBCI continuing education credit hours.



*sponsored by the Green Building Alliance





CONFERENCE SCHEDULE

Sunday, April 10	Monday, April 11	Tuesday, April 12
	7:30 a.m. Registration David L. Lawrence Convention Center (DLLCC)	7:30 a.m. Registration DLLCC
	8:30 a.m. Opening Plenary Sessions Gregory A. Keoleian Codirector, Center for Sustainable Systems, and Professor, University of Michigan Carl J. Frattini Director, Business Development Northeast Utilities	8 a.m. Plenary Session Brandon Tinianov Chief Technology Officer, <i>Serious Materials Inc.</i>
	10:30 a.m. Concurrent Sessions Sustainable Water I Green Building and Energy I Green Building Projects	9:30 a.m. Concurrent Sessions Sustainable Water III Green Building and Energy III Green Building Case Studies
	12:30 p.m. Lunch Plenary Session Jesse Grossman Chief Executive Officer <i>Soltage, Inc.</i>	12:30–2:15 p.m. Concurrent Sessions Sustainable Water IV Sustainable Transportation Green Building Design and Construction
	1:30–4 p.m. Concurrent Sessions Sustainable Water II Green Building and Energy II Design of a More Sustainable Construction Process	2:30–4:15 p.m. Concurrent Sessions Sustainable Water Case Studies Business Case for Green Building
5 p.m. Registration Opens Westin Convention Center Pennsylvania Ballroom		
5:30 p.m. Welcome Reception Westin Pennsylvania Ballroom	5:30 p.m. Poster Session and Social DLLCC, Garrison Overlook	

AGENDA AT A GLANCE

Sunday, April 10	Tuesday, April 12
5 p.m. Registration Opens Westin Pennsylvania Ballroom	7:30 a.m. Registration Opens DLLCC fourth floor
5:30 p.m. Welcome Reception Pennsylvania Ballroom	8–9:30 a.m. Plenary Session Room 407 “Sustaining Our Built Environment: Profound Energy Savings via Retrofits of Building Envelopes” Brandon Tinianov , Chief Technology Officer, <i>Serious Materials Inc.</i>
Monday, April 11	
7:30 a.m. Registration Opens DLLCC fourth floor	
8:30–10:30 a.m. Opening Plenary Sessions Conference Welcome Eric J. Beckman , Conference Chair David Dzombak , Conference Chair “Life Cycle Models for Engineering Sustainable Buildings, Transportation, and Infrastructure Systems” Gregory A. Keoleian , Codirector, Center for Sustainable Systems and Professor, University of Michigan “The Utility as a Catalyst for Solar Development” Carl J. Frattini , Director, Business Development Northeast Utilities	9:30–11:30 a.m. Concurrent Sessions Sustainable Water III Room 408 Green Building and Energy III Room 409 Green Building Case Studies Room 410
10:30 a.m.–12:30 p.m. Concurrent Sessions Sustainable Water I Room 408 Green Building and Energy I Room 409 Green Building Products Room 410	11:30 a.m. Lunch Rooms 413–415
12:30 p.m. Lunch Plenary Session “Harnessing Domestic Solar Resources: U.S. Solar Market Development and Commercialization Pathways” Jesse Grossman , Chief Executive Officer, <i>Soltage Inc.</i>	12:30–2:15 p.m. Concurrent Sessions Sustainable Water IV Room 408 Sustainable Transportation Room 409 Green Building Design and Construction Room 410
1:30–4 p.m. Concurrent Sessions Sustainable Water II Room 408 Green Building and Energy II Room 409 Design of a More Sustainable Construction Process Room 410	2:30–4:15 p.m. Concurrent Sessions Sustainable Water Case Studies Room 408 Business Case for Green Building Room 409
5:30 p.m. Poster Session and Social Garrison Overlook	



ORAL PRESENTATIONS

Monday, April 11 10:30 a.m.–12:30 p.m.

Sustainable Water I Room 408

- 10:30 a.m. **Sustainable Urban Stormwater**
*Allen Davis, University of Maryland
- 11 a.m. **Preventing Sewer Overflows Using Sustainable Infrastructure**
Uzair Shamsi, Michael Baker Jr., Inc.
- 11:25 a.m. **Sustainable Water Collection and Treatment Systems: Strategies for Water Use Reduction for the Built Environment**
Bruce Corning, Malcolm Pirnie—ARCADIS U.S.
- 11:50 a.m. **Sustainable Green Infrastructure: Stormwater for the Next Decade**
Robert Traver, Villanova University

Green Building and Energy I Room 409

- 10:30 a.m. **Life Cycle Assessment of Energy Systems: Case Studies and Lessons Learned**
*Heather MacLean, University of Toronto
- 11 a.m. **Identifying Barriers to Address During the Delivery of Sustainable Renovation Projects**
Corey Cattano, Clemson University
- 11:25 a.m. **Case Study: Actual versus Theoretical Energy Savings and ROI Calculations from Installation of Variable-Frequency Drive and Lighting Control Systems in Both New and Renovated Commercial Office Buildings**
David Loucks, Eaton Corporation
- 11:50 a.m. **Climate-Responsive Buildings for Indoor Thermal Comfort: Investigation on Passive Environment Control System of Traditional Residential Architecture of Kerala**
Naseer M.A., National Institute of Technology Calicut

Green Building Products Room 410

- 10:30 a.m. **Nature's Materials: Using Fungi to Create Next-Generation Materials**
*Gavin McIntyre, Ecovative Design, LLC
- 11 a.m. **Evaluating the Lifetime of Interior Finishes and Life Cycle Assessment Results**
Can Atkas, University of Pittsburgh
- 11:25 a.m. **An Integrated System Modeling Framework for Designing a Sustainable Industrial Park**
Najet Bichraoui, University of Maine
- 11:50 a.m. **Service Life Assessment of Concrete Materials**
Michael Silsbee, RJ Lee Group, Inc.

Monday, April 11 1:30–3:45 p.m.

Sustainable Water II Room 408

- 1:30 p.m. **Sustainable Water Management for Thermoelectric Energy Production**
Ming-Kai Hsieh, Carnegie Mellon University
- 1:55 p.m. **3RWW Web-Based Mapping: A Tool for Regional Sustainability**
Beth Dutton, 3 Rivers Wet Weather Inc.
- 2:20 p.m. **Quantitative Sustainable Design of Wastewater Treatment Plants**
Jeremy Guest, University of Michigan
- 2:45 p.m. **Variation in Nitrogen Loading and Retention in Two Urban Stormwater Detention Ponds**
Bernice Rosenzweig, Princeton University

Green Building and Energy II Room 409

- 1:30 p.m. **Sustainable Buildings through a Systems Approach**
*Timothy Wagner, United Technologies Research Center
- 2 p.m. **Net-Zero Energy Building Lighthouse Projects**
Mark Wiltman, Bayer MaterialScience, LLC
- 2:25 p.m. **Concentrated Photovoltaic (PV) Technology From the Outside: A Case Study**
Michael Vargas, Atlas Project Support
- 2:50 p.m. **Demand Response "Killer Ap" of Smart Grid, Funding Source for LEED-EBOM**
Doug Dillie, Eaton Corporation
- 3:15 p.m. **Modeling the Effects of Geography and Climate on a Net-Zero Energy Residence Powered by Solar PV in Six Climates**
Brent Stephens, University of Texas at Austin

Design of a More Sustainable Construction Process Room 410

- 1:30 p.m. **Categorizing Processes of Social Sustainability during the Design Phases of Construction Projects**
Rodolfo Valdes, Clemson University
- 1:55 p.m. **Building Simulation as a Decision Support Tool in Conceptual Design**
Janelle Hygh, North Carolina State University
- 2:20 p.m. **The Role of Green Building Practices in Multiplicity and Rareness of the Organizational Resource Bundle in Health Care Settings**
Hessam Sadatsafav, Texas A&M University
- 2:45 p.m. **A Framework for Governing Infrastructure Sustainability**
Jane Scanlon, Manidis Roberts and University of Western Sydney

Tuesday, April 12 9:30–11:30 a.m.

Sustainable Water III Room 408

- 9:30 a.m. **Sustainable Sanitation Services: Can We Reinvent the Toilet?**
*Frank Rijsberman, Bill and Melinda Gates Foundation
- 10 a.m. **Developing Sustainable Water Treatment Technologies for Fluoride and Arsenic Mitigation in Developing Countries**
*David Sabatini, University of Oklahoma
- 10:30 a.m. **Sustainable Wastewater Treatment at the Boston Mills Historic District, Cuyahoga Valley National Park, Brecksville, Ohio**
Janet Popielski, Cuyahoga Valley National Park
Nancy Sauer, URS Corporation
- 10:55 a.m. **Sustainability Assessment of Standard and Alternative Toilet Technologies**
Chirjiv Anand, University of Toledo

Green Building and Energy III Room 409

- 9:30 a.m. **Energy-Smart Homes: Opportunities and Challenges**
*Eric Williams, Arizona State University
- 10 a.m. **Policy, Permitting, and Prototyping: The Challenge of Implementing Change**
Lyn Bartram, Simon Fraser University
- 10:25 a.m. **Finite Element Analysis of Attic Radiant Barrier Insulation System Performance in Residential Buildings for Different Climate Conditions**
Somayeh Asadi, Louisiana State University
- 10:50 a.m. **Simulation-based Energy Analysis of a Linear Concentrating Photovoltaic System under Pittsburgh, Pa., Meteorological Conditions**
Tony Kerzmann, Robert Morris University

Green Building Case Studies Room 410

- 9:30 a.m. **Situating Place within Organizational Sustainability: Why Buildings Matter—or Don't**
Christine Mondor, evolve environment::architecture
- 9:55 a.m. **Green Roof Demonstration Project: Allegheny County Office Building 2010**
Jack Scalo, Burns & Scalo Companies
- 10:20 a.m. **Lessons Learned in Implementing Sustainable Practices on Public Sector University Projects**
Naveen Sadhu, Virginia Tech
- 10:45 a.m. **Case Study to Develop Sustainable Design Priorities for Prototypical Senior Living Facilities**
Catherine Sheane, Astorino
- 11:10 a.m. **Energy Reduction in Multi-Family Senior Housing Facilities Case Study: South Hills Retirement Residence**
Laura Nettleton, Thoughtful Balance, Inc
Jonathan Iams, Iams Consulting, LLC

Tuesday, April 12 12:30–2:15 p.m.

Sustainable Water IV Room 408

- 12:30 p.m. **Integrating Micro-Algal Biofuels into a Sustainable Water, Energy, and Product Recovery Paradigm**
Monica Rothermel, University of Pittsburgh
- 12:55 p.m. **Integrating Rainwater Catchment Systems into Residential Buildings**
Justin Henriques, University of Virginia
- 1:20 p.m. **Field Performance Evaluation of Domestic-Scale Solar Water Heating Systems with Flat Plate and Heat Pipe Evacuated Tube Collectors**
Lacour Mody Ayompe, Dublin Institute of Technology
- 1:45 p.m. **A Study of Denitrification "Hot Spots" in an Urban Stormwater Detention Pond**
Christina Nolfo, Princeton University

Sustainable Transportation Room 409

- 12:30 p.m. **Engineering Sustainable Fuel Vehicle Systems**
*Roland Geyer, University of California, Santa Barbara
- 1 p.m. **Commuting from U.S. Brownfield and Greenfield Residential Development Neighborhoods**
Amy Nagengast, Carnegie Mellon University
- 1:25 p.m. **First Mover Lessons Learned from Smart Station Plug-in Electric Vehicle Charging Project with Electric Power Research Institute and Tennessee Valley Authority**
Brandon Rogers, Eaton Corporation
- 1:50 p.m. **Optimal Design and Allocation of Electrified Vehicles and Dedicated Charging Infrastructure for Minimum Greenhouse Gas Emissions**
Elizabeth Traut, Carnegie Mellon University

Green Building Design and Construction Room 410

- 12:30 p.m. **Designing a Sustainable Built Environment: A Hazards Analysis and Critical Control Point (HACCP) Approach**
Annie Pearce, Virginia Tech
- 12:55 p.m. **Exploring Local Energy Technologies and Practices**
James Pierce, Carnegie Mellon University
- 1:20 p.m. **Comparing the Environmental Impacts of Modular Building versus On-Site Construction**
Matthew Eckelman, Yale University
- 1:45 p.m. **The Art and Science of Sustainable Design: Critical Practices**
Eric Nay, Ontario College of Art & Design

* Indicates invited speaker

Tuesday, April 12 2:30–4:15 p.m.

Sustainable Water Case Studies Room 408

- 2:30 p.m. **A System Dynamics Approach for Urban Water Reclamation/Reuse Planning: A Case Study from the Great Lakes Region**
Ranran Wang, Yale University
- 2:55 p.m. **Life Cycle Assessment of Rainwater Use at a University Dormitory**
Hannah West, University of Toledo
- 3:20 p.m. **Measuring Resilience of Green and Grey Stormwater Infrastructure**
Valerie Fuchs, Yale University
- 3:45 p.m. **Methodology for the Evaluation and Comparison Benefits and Impacts of Green Infrastructure Practices Using a Life Cycle Approach**
Kevin Flynn, Villanova University

Business Case for Green Building Room 409

- 2:30 p.m. **Building Up to Organizational Sustainability**
Christine Mondor, evolve environment::architecture
- 2:55 p.m. **Developing a Green Building Brand for a Construction Company and Its Impact on the Bottom Line**
John C. Mascaro, Mascaro Construction Company, LP
- 3:20 p.m. **An Analysis of LEED-certified Homes in the Greater Pittsburgh Area**
Sam Klein, MaGrann Associates
- 3:45 p.m. **The Cost-Effectiveness of Green Roofs in the Built Environment**
Mike Blackhurst, Carnegie Mellon University





POSTER PRESENTATIONS Poster Session and Social; **Garrison Overlook; Monday, April 11; 5:30 p.m.**

1	Sustainable Finishing Solutions: A Paradigm Shift	Gregory Yahn	Advanced Finishing USA / Archi-Texture Finishing LLC
2	An Innovative Alternative Technology of Acidic Coal Mine Refuse Reclamation Using Bauxite Residue	Judodine Patterson	Alcoa Inc.
3	A Whole-Systems Approach for Designing Sustainable Infrastructure	Jacquelyn Blizzard	Clemson University
4	Public Private Partnership (PPP): Sustainability in the Context of PPP Educational Projects in Ireland	Renuka Rajput	Dublin Institute of Technology
5	LCA of OSB Panels, Ethanol, and Acetic Acid Coproduced in an Integrated Forest Biorefinery	J. Mason Earles	University of Maine
6	Implementation of Green Features to a Greenhouse	Can Atkas	University of Pittsburgh
7	Quantification of SBOD ₅ and PBOD ₅ Removals via Coupled Biological Contact Reactor and Ballasted High Rate Clarification System for Wet Weather Wastewater Treatment Applications	Reid Staton	I. Kruger, Inc
8	Defining the Modern Building	Kathleen Kelly	NBBJ
9	Sustainability is More than Green Buildings	Lyn Bartram	Simon Fraser University
10	The Role of Education for Sustainable Engineering and Technology in Construction Infrastructure	Bassey Okon	UCL Bartlett Faculty of the Built Environment
11	Environmental Footprint of Algae Cultivation from Life Cycle Perspective	Kullapa Soratana	University of Pittsburgh
12	Complexity of Sustainable Building Design (SBD) Dynamism	Ali Vakili-Ardebili	University of Toronto
13	Evaluation of Green Product Labeling System With Life Cycle Assessment	Neethi Rajagopalan	University of Pittsburgh
14	Rapid Enrichment of Anaerobic Ammonium Oxidizing (Anammox) Bacteria Using Wastewater Treatment Sludge	Wenjie Sun	University of Arizona
15	Establishing Innovativeness and Consumer Preference for Zero-Energy Homes	Chayanika Mitra	Virginia Tech
16	Sustainability Topics as a Route to Female Recruitment in Engineering	Leidy Klotz	Clemson University
17	The Influences of Allocation Mechanisms on Life Cycle Environmental Impacts of Agricultural Products	Xiaobo Xue	University of Pittsburgh
18	Energy Efficiency in Data Centers	Ricardo Rivera-Lopez	University of Pittsburgh
19	Green to the Core: A Study of Environmentally Friendly Insulation	Brandon McGlothlin	The Duggan Rhodes Group
20	Life Cycle Assessment of Pressure-Treated Wood Decking Products	Xinfeng Xie	University of Maine
21	Preliminary Life Cycle Impacts of Treatment of Marcellus Shale Waters	Alexander Dale	University of Pittsburgh
22	Analysis of HVAC System Selection in a Sustainable Construction Case Using Multi-Attribute Utility Theory	Tina Nikou	Clemson University
23	Pittsburgh Green Innovators: Collaborations for a Green Economy	Thomas Bartnik	Pittsburgh Green Innovators
24	The School Building Design Process in the State of Sao Paulo, Brazil: Is Sustainability an Issue?	Doris Kowaltowski	State University of Campinas
25	Greening Healthcare: A Preliminary Materials Life Cycle Assessment of Cesarean Section and Vaginal Birth Delivery Kits	Cassandra Thiel	University of Pittsburgh
26	Sustainable, Highly Insulating R5 Window Development	Jim Eisenbeis	Graham Architectural
27	Resource Recovery from a Coupled Wastewater Treatment and Microalgal Growth System	Matt Weschler Kayla Reddington	University of Pittsburgh
28	Water and Energy End-Use Measurements in Apartments in a Residential High-Rise Building in the Northeast	Uta Krogmann	Rutgers University
29	Battery Recycling on the University of Pittsburgh Campus	Kristen Ostermann	University of Pittsburgh
30	Photocatalytic Coating Material for Resisting Mold/Mildew under Visible Light Irradiation	Yao Gao	University of Miami
31	Effect of PCM Type in Window's Shutter Decrease the Heat Gain	Esam Alawadhi	Kuwait University
32	On the Development of a University-wide Minor in Sustainability at the University of Arkansas	Kim Needy	University of Arkansas

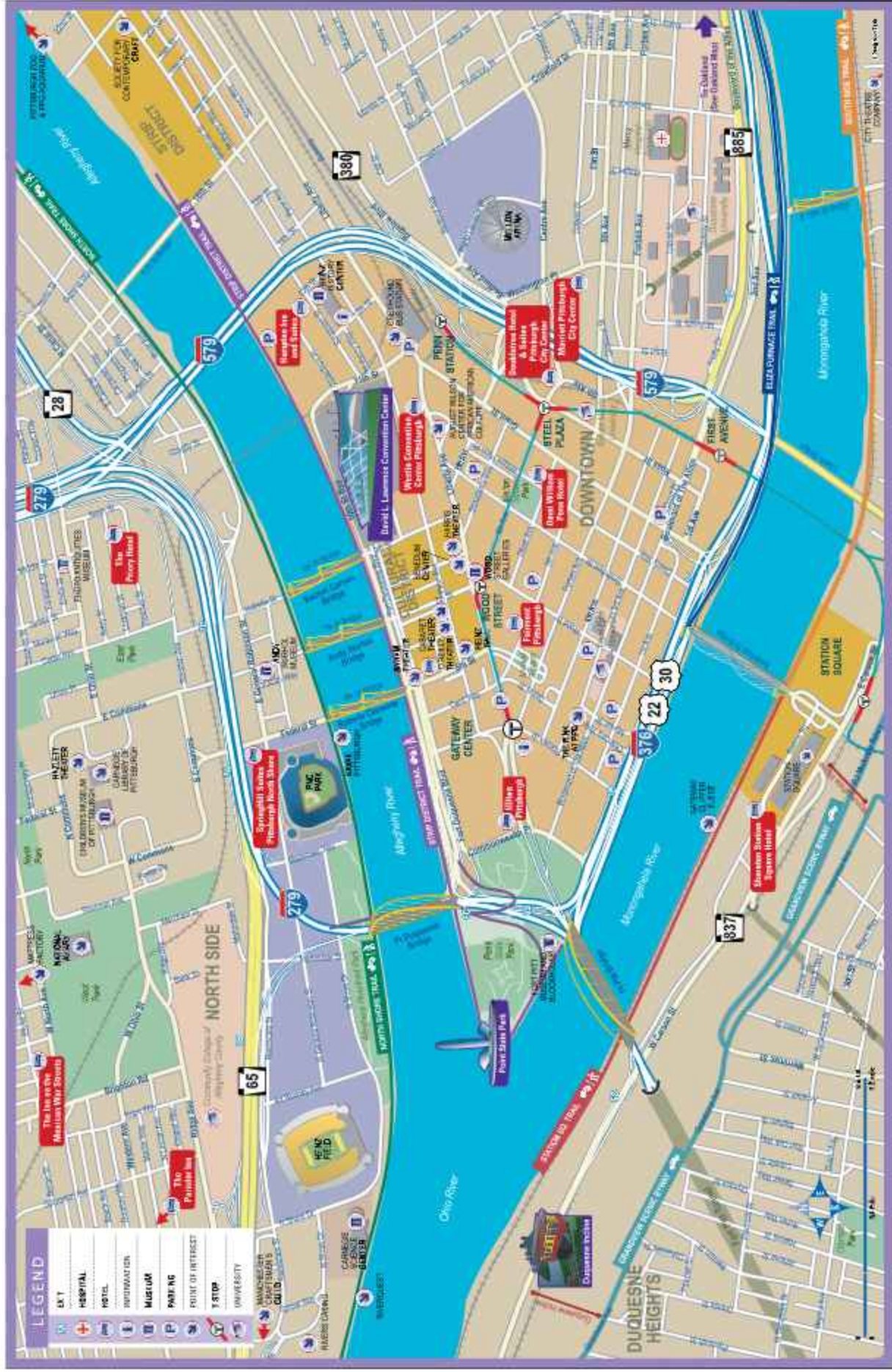
33	Life Cycle Comparison of Environmental Impacts from Alternative Pharmaceutical Disposal Methods	Sherri Cook	University of Michigan
34	Integrated Multidimensional Indicators for Envelope and Structural Frame Selection at the Conceptual Design Stage	Vanessa Gomes	State University of Campinas
35	A Benchmarking System for Sustainable Practice through Student Internship Experiences	Annie Pearce	Virginia Tech
36	Application of Life Cycle Cost and Life Cycle Inventory Assessment to Evaluate Tertiary Treatment Units for Municipal Wastewater	Ranjani Theregowda	Carnegie Mellon University
37	Optimization of Building Services Systems Performance	Anderson Barcellos	University of Reading
38	Collaboration Facilitates Design of Green Community Center in Historic Steel Town	Amy Scarbrough	University of Pittsburgh
39	Landforming: Sustainable Grading and Topographic Modification	Donald Gray	University of Michigan
40	The Effect of Agriculture in Urban Environments	Anthony Stewart	Peace Garden Pittsburgh
41	Framework and Data Acquisition for an Automated, Dynamic Building Life Cycle Assessment	Bill Collinge	University of Pittsburgh
42	Preliminary Life Cycle Assessment of a Rigidified Inflatable Composite Arch	Anthony Halog	University of Maine
43	Routinization of Innovation Toward Sustainability (ITS): A LEED Credit Analysis	Sandeep Langar	Virginia Tech
44	Structural Use of Bamboo: The Path to Standardization	Michael Richard	University of Pittsburgh
45	Adaptation to Climate Change: Engineering Sustainability into the Transportation Planning Process	Michelle Oswald	University of Delaware
46	Sustainability of Residential Hot Water Infrastructure: Public Health, Environmental Impacts, and Consumer Drivers	Randi Hope Lieberman	Virginia Tech
47	Opencell Technology: Versatile, Sustainable, and Affordable Structures	Antonio Valente Joseph R. Pickens	Ply Engenharia, Lda Concurrent Technologies Corporation
48	Brookline Boulevard Revitalization	Mike Babusci	PB Americas, Inc. Chatham University
49	A Practical Strategy for Data Center Energy Efficiency	Shaun Scheerbaum	Donwil Company Emerson Network Power

**Featured during the poster session:
2010-11 Energy-Efficient Building Technologies Challenge**

This challenge—open to all undergraduates in the region—was for student teams to work together to create innovative products for existing buildings that would reduce the demand for energy while exhibiting a payback time of one year or less. The four finalists' projects (listed at right) will be on display during the poster session. The winner of the \$5,000 award will be announced at the Tuesday morning plenary session.

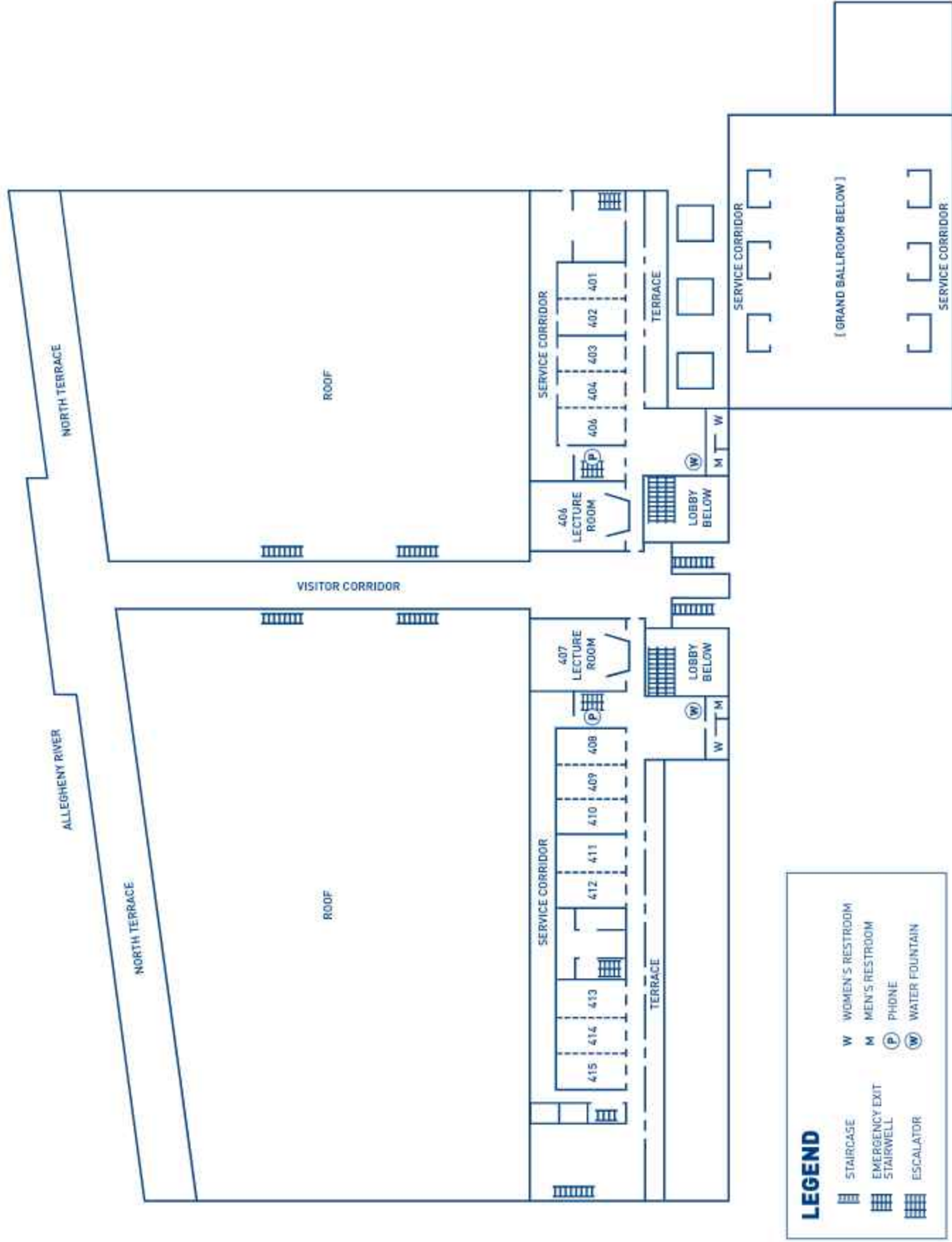
Finalists		The Green Space Heater	
Development of an Application for Crowd-Sourced Energy Management		Henrique Bergamo	University of Pittsburgh
Tim Pianka	Carnegie Mellon University	Lorena Carpes	University of Pittsburgh
Shane Rife	Carnegie Mellon University	Manuella Cantuaria	University of Pittsburgh
		Renato Mourão	University of Pittsburgh
		Bradley Harken	University of Pittsburgh
Energy-Efficient Water Heating System for Existing Buildings		Hydro-Pipe Turbine Generator	
Patrick Musgrave	University of Pittsburgh	EJ Werner	Robert Morris University
Jonathan Bumstead	University of Pittsburgh	Tom Teresi	Robert Morris University
Jeffrey Fein	University of Pittsburgh	Allen Page	Robert Morris University

Sponsored by the Mascaro Center for Sustainable Innovation



Map courtesy of VisitPittsburgh

DAVID L. LAWRENCE CONVENTION CENTER FOURTH FLOOR





EVALUATION FORM

PLEASE ANSWER THE FOLLOWING QUESTIONS BY CHECKING ALL APPLICABLE BOXES.

1. How did you hear about Engineering Sustainability 2011?

- Direct Mail (i.e. brochures) Web Site Word of Mouth E-Blast Another Conference

Other _____

2. Please check your company/organization affiliation(s):

- Consultant Government Contractor Manufacturer NGO Architect Academic

Other _____

3. What is the primary reason you attended the conference?

- Education/Credits Workshops Networking Speakers

Other _____

PLEASE EVALUATE THE FOLLOWING ITEMS BY CHECKING THE APPROPRIATE BOX:

	STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE	NOT APPLICABLE
4. Overall, the conference was well organized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. The conference provided valuable, timely information on important subject matter.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. The promotional materials (call for papers, preliminary program, Web site, etc.) accurately described the contents of the conference.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. The conference program served as a useful reference.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. The conference offered a balance of materials and information with broad appeal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. The conference provided a unique learning experience.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I am happy with the conference venue.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. I feel that the conference fees are in line with similar conferences I have attended.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. I would attend this conference in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. Were there specific topics at the conference that should have been

- a) omitted? _____
 b) added? _____
 c) emphasized more? _____
 d) emphasized less? _____

14. Please include any additional comments. _____

CONFERENCE NOTES

This is a Climate-Friendly Event
 We are helping to build three farm methane abatement projects in Pennsylvania, New York, and Maryland by keeping 36 tons of CO₂ out of the air through the purchase of carbon offsets. For more information about helping to build new renewable and carbon-reduction projects, visit www.nativeenergy.com.
 Provided by: NativeEnergy