



2013

Engineering Sustainability



*Innovation and the
Triple Bottom Line*

April 7–9, 2013

David L. Lawrence
Convention Center
Pittsburgh, PA

**FINAL
PROGRAM**

Sponsors:

University of Pittsburgh
**Mascaro Center for
Sustainable Innovation**

Carnegie Mellon University
**Steinbrenner Institute for
Environmental Education
and Research**

CONFERENCE CO-SPONSORS

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UNIVERSITY OF PITTSBURGH

Mascaro Center for Sustainable Innovation

The Mascaro Center for Sustainable Innovation (MCSI) 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 included projects on greening the built environment, the more sustainable use of water, and the design of distributed power systems.

www.engineering.pitt.edu/mcsi

Carnegie Mellon
STEINBRENNER INSTITUTE
for Environmental Education & Research



The Steinbrenner Institute for Environmental Education and

Research 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



CONFERENCE GUEST INFORMATION

Registration Hours & Locations

Monday, 7:30am-4:30pm

4th Floor, David L Lawrence Convention Center (DLLCC)

Tuesday, 7:30am- Noon

Speaker Ready Room (Room 415)

There will be a computer and printer available during the conference for speakers to check their presentation and make small changes if necessary.

Monday, 7:30am- 4:30pm

Tuesday, 7:30am- 3:00pm

Poster Room (Room 415)

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 7:30am- 3:00pm.

Message Board

As a service to conference registrants, a Message Board will be located in the registration area. Registration staff will

update the board from 8am to 4pm, April 8-9. 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 ES2013 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

Super Shuttle runs from the Pittsburgh International Airport to the many downtown hotels. Reservations are not required but are encouraged. Pickup is located on the baggage claim level, in the rental car area, behind the elevators by Door 4. 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 main terminal, Door 6. The cost is \$3.75 one-way to downtown Pittsburgh. For more information visit: www.portauthority.org/

Cell Phone Usage

As a courtesy to the speakers and fellow attendees, the ES2013 staff requests that all cell phones and pagers be turned off or switched to silent mode in all presentation rooms

Wi-Fi

Free wi-fi is available in the 4th floor registration area for all conference registrants for up to 30 minutes each day. Individual attendees can purchase extended basic wi-fi services for \$12.95/day



NEW THIS YEAR

To eliminate paper waste, this year's conference evaluation can be found at www.surveymonkey.com/s/ES13particpantevaluation

Please go on-line to provide us with feedback on all aspects of the event including plenary / technical sessions, location and amenities. The evaluation survey will be available through April 16th.

Continuing Education Credits

Individuals who require certificates documenting their participation in ES 2013 for Green Building Certification Institute (GBCI) or other continuing education purposes (e.g., professional engineer or geologist) should pick up a form at the registration desk to verify their session attendance. All conference sessions have been submitted to the U.S. Green Building Council for approval and are expected to total up to 2 full days of GBCI continuing education credit hours.

Sponsored by Green Building Alliance



Registration Lists

ES13 will not print paper copies of the registration list for each attendee; however, attendees may view a hard copy report at the registration desk. Additionally, attendees may download an electronic copy in pdf format in our speaker ready room (415) at no cost. Registrations received prior to April 1, 2013, will appear in the ES 2013 Registration List. The complete registration list, with an addendum, will be made available online and will include those attendees who registered after April 1, 2013, as well as on site during the conference. Please visit the ES 2013 Web site (<http://www.engineering.pitt.edu/MCSI/conference/>) following the conference to view the final, complete list.



LETTER FROM the CHAIRS



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*

First, let us take this opportunity to welcome you all to Pittsburgh and Engineering Sustainability (ES) 2013: 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. Each day will also include plenary speakers and interdisciplinary panels who will integrate, synthesize, and help us all look ahead.

This program contains comprehensive information about Engineering Sustainability (ES) 2013, but if you have questions or need help, please visit the registration area or ask any of the ES 2013 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

PLENARY SESSIONS



ALEX STEFFEN

Writer, Public Speaker, Planetary Futurist and Heinz Distinguished Lecture

How to Think Like a Worldchanger

Monday, April 8, 8:30 a.m.

Steffen shows us the worldchanging solutions and people who are meeting the planet's most pressing problems in innovative and creative ways – and how we can all learn from their examples to think about our own futures. By understanding the outlook these pioneers, inventors and change leaders bring to the problems they face, we can all learn to think like worldchangers, and find new solutions to the problems around us in our own lives and workplaces.

The Heinz Distinguished Lectureship is sponsored by a gift from the Heinz Endowments for the establishment of a Green Construction and Sustainable Development Program in the Department of Civil and Environmental Engineering at the University of Pittsburgh. The lectureship is an annual event that aims to bring to the University innovative, thought provoking, and forward-looking concepts appropriate for sustainable infrastructure development. This year's lecture is being presented in conjunction with Engineering Sustainability 2013.



KHANJAN MEHTA

Director, Humanitarian Engineering and Social Entrepreneurship Program, Penn State University

Developing Educational and Entrepreneurial Ecosystems to Actualize Social Ventures in Developing Countries

Monday, April 8, 12:30 p.m.

Khanjan Mehta's professional interests include innovative system integration, high-tech entrepreneurship and international social entrepreneurship. The HESE Program challenges students and faculty to break down the barriers between disciplines and collaborate to develop transformative social innovations and scalable business models. These technology solutions are then transformed into sustainable and scalable ventures that enable and accelerate positive social change. Mehta has led HESE ventures in Kenya, Tanzania, India, China and other countries. HESE received the 2011 Outstanding Specialty Entrepreneurship Program Award from the US Association for Small Business and Entrepreneurship (USASBE) and was named by *Popular Mechanics* as one of thirty "Awesome College Labs" across America.

This luncheon plenary is sponsored by:

**DIGIOIA GRAY
& ASSOCIATES**



MITCHELL JOACHIM

Associate Professor, New York University and the European Graduate School

The Organic City: Urbanism Redefined

Tuesday, April 9, 8:30 a.m.

Mitchell Joachim inspires us to rethink our approach to urban environments by pointing to mind-bending technologies that are already transforming the way we live. When the elevator was introduced, the nature of buildings changed. The same shift occurred for cities built in response to widespread car traffic. Today, Joachim is working on the next big shift. It could be an intelligent "soft" car that networks with a city grid. It might involve grafting living cells into green residences that can reverse the last 150 years of inefficient living. Joachim envisions a future in which biology and architecture are a single discipline – and shares the ground-breaking work and disruptive ideas that will make that future a reality.

This plenary is sponsored by:



INVITED SPEAKERS

Ram Gupta

National Science Foundation

"Energy for Sustainability"

Ram B. Gupta is the Director of Energy for Sustainability Program in the Division of Chemical, Bioengineering, Environmental and Transport Systems at the National Science Foundation. This program supports fundamental research and education that will enable innovative processes for the sustainable production of electricity and transportation fuels. Processes for sustainable energy production must be environmentally benign, reduce greenhouse gas production, and utilize renewable resources. Projects include those related to biofuels, photovoltaic solar energy, wind energy, and advanced batteries for transportation. Dr. Gupta serves National Science Foundation under an intergovernmental personnel assignment from Auburn University where he is Walt and Virginia Woltoz chair professor of chemical engineering. He received the B.E. degree (1987) from Indian Institute of Technology, Roorkee, the M.S. degree (1989) from the University of Calgary, and the Ph.D. degree (1993) from the University of Texas at Austin, all in chemical engineering. He joined Auburn University in 1995, after two-year postdoctoral work at the University of California, Berkeley. His recent books are: Nanoparticle Technology for Drug Delivery (2006, Taylor & Francis), Solubility in Supercritical Carbon Dioxide (2007, CRC Press), Hydrogen Fuel: Production, Transport, and Storage (2008, CRC Press), and Gasoline, Diesel and Ethanol Biofuels from Grasses and Plants (Cambridge University Press, 2010).

Arpad Horvath

University of California, Berkeley

"Environmental Impacts of Delivering Water"

Arpad Horvath is a professor in the Department of Civil and Environmental Engineering at the University of California, Berkeley (<http://www.ce.berkeley.edu/~horvath>), head of the Energy, Civil Infrastructure and Climate Graduate Program, Director of the Consortium on Green Design and Manufacturing, and Director of the Engineering and Business for Sustainability certificate program (<http://sustainable-engineering.berkeley.edu>). His research focuses on life-cycle environmental and economic assessment of products, processes, and services, particularly of civil infrastructure systems and the built environment. He is author of more than 60

peer-reviewed journal papers. He was Conference Chair of the 6th International Conference on Industrial Ecology in 2011. Professor Horvath is an Associate Editor of the J. of Infrastructure Systems and a member of the editorial advisory boards of Environmental Science & Technology, J. of Industrial Ecology, and Environmental Research Letters. He is a member of the Environmental Engineering Committee of the U.S. Environmental Protection Agency's Science Advisory Board.

Marija Ilic

Carnegie Mellon University

"Engineering IT-Enabled Sustainable Electricity Services: The Tale of Two Low-Cost Green Azores Islands"

Marija Ilic received her Doctor of Science Degree in Systems Science and Mathematics at Washington University in St. Louis, MO in 1980, and all other degrees in Electrical Engineering at the University of Belgrade, Serbia. She is currently a Professor at Carnegie Mellon University, Pittsburgh, PA, with a joint appointment in the Electrical and Computer Engineering and Engineering and Public Policy Departments. She is the Director of the Electric Energy Systems Group (EESG), <http://www.eesg.ece.cmu.edu/> and the Director of the SRC Smart Grid Research Center at Carnegie Mellon University <http://www.src.org/program/eri/>. She is also the Honorary Chaired Professor for Control of Future Electricity Network Operations at Delft University of Technology in Delft, The Netherlands. She was an Assistant Professor at Cornell University, Ithaca, NY, and tenured Associate Professor at the University of Illinois at Urbana-Champaign. She was then a Senior Research Scientist in Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, Cambridge, from 1987 to 2002. She has 30 years of experience in teaching and research in the area of electrical power system modeling and control. Her main interest is in the systems aspects of operations, planning, and economics of the electric power industry. She has co-authored several books in her field of interest. Prof. Ilic is an IEEE Fellow.





Leidy Klotz

Clemson University

"Flaming Camels and Road Diets: Why Do We Have Such a Hard Time Creating Elegant Sustainable Places?"

Leidy Klotz is an engineering faculty member at Clemson University, where he recently founded an Institute for Sustainability and developed and teaches courses in Sustainable Construction, Sustainable Restoration, and Sustainable Energy Innovation. He does research on related topics, some of which is supported by a CAREER award from the National Science Foundation. Leidy earned his Ph.D. in Architectural Engineering from Penn State and, prior to that, worked managing school construction projects in New Jersey. Before getting a real job, Leidy played for the Pittsburgh Riverhounds professional soccer team in 2000 and 2001. He lives with his beautiful wife, Monica, in South Carolina where they don't like to use air conditioning and the majority of their climate-changing emissions come from traveling to see family or the beach.

Vivian Loftness

Carnegie Mellon University

"Investing in Energy Efficiency for Economic, Environmental, and Human Benefits"

Vivian Loftness is a University Professor and former Head of the School of Architecture at Carnegie Mellon University. She is an internationally renowned researcher, author and educator with over thirty years of focus on environmental design and sustainability, advanced building systems integration, climate and regionalism in architecture, and design for performance in the workplace of the future. She has served on ten National Academy of Science (NAS) panels, the NAS Board on Infrastructure and the Constructed Environment and has given four Congressional testimonies on sustainability. Vivian is recipient of the National Educator Honor Award from the American Institute of Architecture Students and the Sacred Tree Award from the U.S. Green Building Council (USGBC). She received her BS and MS in Architecture from MIT and served on the National Boards of the USGBC, AIA Committee on the Environment, Green Building Alliance, Turner Sustainability, and the Global Assurance Group of the World Business Council for Sustainable Development. She is a registered architect and a Fellow of the American Institute of Architects.



Franco Montalto

Drexel University

"Emerging Phenomena in Green Infrastructure Research"

Franco Montalto, PE is a licensed civil/environmental engineer and hydrologist with 20 years of experience working in urban and urbanizing ecosystems as a practitioner, designer, and researcher. This experience includes planning, design, implementation, and analysis of ecological restoration and green infrastructure projects, many of which harness natural systems for both wastewater and stormwater treatment. As an Assistant Professor in Drexel University's Department of Civil, Architectural, and Environmental Engineering, he directs the Sustainable Water Resource Engineering Laboratory. Dr. Montalto is also the founder of eDesign Dynamics LLC, a consulting firm based in New York City that specializes in green infrastructure and ecological restoration. Previously, Dr. Montalto served as the Wetlands Engineer at the New Jersey Meadowlands Commission, where he was responsible for the engineering design of the 209-acre Mill Creek Marsh in Secaucus, NJ among other large urban wetland restoration projects. He has worked overseas in various capacities in Europe, Africa, the Caribbean, and Latin America and is the author of numerous publications in the water resources and environmental fields. He was also formerly a Fellow at the Earth Institute at Columbia University, a Fulbright Scholar, and an Adjunct Professor at the Cooper Union for the Advancement of Science and Art, where he received his first degree. His graduate degrees are from Cornell University.



INVITED SPEAKERS (CONT.)

Thomas Seager

Arizona State University

"Understanding Resilience Complex Engineered Systems"

Dr. Thomas P. Seager is an Associate Professor in the School of Sustainable Engineering & the Built Environment and Chair of the International Symposium on Sustainable Systems and Technologies (ISSST2013), where he teaches courses related to systems engineering, sustainability ethics, and engineering business practices. Dr. Seager founded the Sustainable Energy and Environmental Decision Sciences Studio (SEEDS). The studio advances understanding of the comparative life-cycle environmental consequences of alternative energy systems by working across socio-technical knowledge boundaries. Current projects within the studio include developing stochastic approaches to valuation in life-cycle impact assessment of emerging technologies, understanding the moral dimensions of global climate policies, anticipatory life-cycle assessment of nanomaterials in photovoltaic and other applications, the science of team science, and sustainable consumption. Dr. Seager was educated as a Civil Engineer at Clarkson University, where he earned his PhD in 2001, and has recently published several works related to resilience analysis and engineering disasters.

Charles Vorosmarty

The City College of New York

"Twenty-first Century Earth Systems and the Hippocratic Oath"

Charles J. Vorosmarty is a professor of civil engineering, a Distinguished Scientist with the NOAA-Cooperative Remote Sensing Science and Technology Center and Director of The City University of New York's Environmental Crossroads Initiative at CCNY. His research focuses on development of computer models and geospatial data sets used in synthesis studies of the interactions among humans and the hydrologic cycle. Dr. Vorosmarty is active in several national and international science activities and steering committees, including the Global Water System Project, U.N. World Water Assessment Programme, U.S. Arctic Research Commission, the National Research Council Committee on Hydrologic Science (as chair).

ATTENTION GRADUATE STUDENTS

Interested in Learning How to go About Getting Your Research Published?

Publishing research in well-known scientific journals is one way that researchers build reputation in their community and allow the wide dissemination of their work. This lunch time presentation will go through the history of journal publishing, introduce best practice tips and hints when writing a paper, highlight the editorial process, and detail the main ethical issues that face authors, reviewers, editors and publishers on a day-to-day basis.

PICK UP YOUR BOXED LUNCH AND JOIN US ON

Tuesday, April 9th at 12:30 p.m. in room 408

PANEL DISCUSSIONS



Monday, April 8

11:30 a.m.

PANEL DISCUSSIONS

Panel 1 ROOM 411-412

Panel Topic: "How are Buildings of Today Becoming the Places of Tomorrow?"

Host: *Green Building Alliance*

Organizations nationwide are trying to create more efficient, healthy, and high performing places, but often find it difficult to look towards tomorrow when so many things need attention today. Engage in discussion with thought and practice leaders who are in the trenches of making and proving out decisions for reaching inspirational goals and creating cultures of change for both organizations and buildings.



Moderator: **Mike Schiller**, CEO, Green Building Alliance

Panelists: **John Barker**, Facilities Manager, Google Pittsburgh
Erica Cochran, Center for Building Performance & Diagnostics, School of Architecture, Carnegie Mellon University
Marijke Hecht, Director of Education, Pittsburgh Parks Conservancy
Gary Sechler, Engineering Manager, U.S. Steel Tower, Winthrop Management

Panel 2 ROOM 413-414

Panel Topic: "Sustainable Water Management: Meeting the Challenge with Green Infrastructure"

Host: *Pennsylvania Environmental Council*

Integrated water resource management is a sustainable approach used globally to meet the vulnerability of our water resources. However management and regulations often compete and need to be integrated across the water chain. Solutions to manage stormwater and wastewater must protect public health and safety while being affordable to those that benefit from the water sector service.



Moderator: **Janie French**, State Director of Water Programs, PA Environmental Council

Panelists: **Donald H. Newman**, PE-Buchart Horn Engineering
Matt Graham, Principle, Landbase Systems
Erin Copeland, Senior Restoration Ecologist, Pittsburgh Parks Conservancy
John K Buck, CPSS- Adjunct Faculty Chatham University & Civil and Environmental Consultants, Inc.

Tuesday, April 9

3:15 p.m.

CLOSING PANEL

ROOM 407

Panel Topic: "Presenting the Case for Crafting a Regional Energy Strategy and Plan"

Hosts: *Sustainable Pittsburgh and Washington & Jefferson College Center for Energy Policy and Management*



WASHINGTON & JEFFERSON
COLLEGE

America's regions are the emerging locus for leadership in energy. With its energy prowess, our region stands primed to develop a comprehensive energy strategy and plan. Only through deliberate planning and policy can the region establish an enduring framework to unleash innovation for achieving goals that may include energy efficiency and reduced consumption, energy independence, reduced emissions and bridging to an abundant, affordable, lower carbon, and equitable energy future.

Moderator: **Court Gould**, Executive Director, Sustainable Pittsburgh

Presenter: **Jane Long**, retired Principal Associate Director at Large for Lawrence Livermore National Laboratory and Fellow in the LLNL Center for Global Strategic Research

Panelists: **Greg Babe**, CEO, Orbital Engineering, Inc. and former President and CEO, Bayer Corporation
Jeffrey Ball, Scholar-in-Residence at Stanford University's Steyer-Taylor Center for Energy Policy and Finance
Bobby Vagt, President, The Heinz Endowments



SPECIAL EVENTS



Welcome Reception

Sunday, 5:30-7:30pm

Tonic Bar and Grill
971 Liberty Ave Pittsburgh, PA 15222

Directly across from the Westin Hotel and Courtyard by Marriott

Sponsored by:



Poster Session and Social

Monday, 4:30-6:00pm

David L. Lawrence Convention Center
Garrison Overlook

Sponsored by:



CONFERENCE SCHEDULE

APRIL 7 SUNDAY

5:30 – 7:30 p.m.

WELCOME RECEPTION

Tonic Bar and Grill

971 Liberty Ave
Pittsburgh PA 15222

*Join us for a casual, relaxed evening
with good food and drinks!*

APRIL 8 MONDAY

7:30 a.m.

REGISTRATION

(David L. Lawrence Convention Center)

8:30 a.m.

OPENING PLENARY SESSION

ALEX STEFFEN

9:30 a.m.

TECHNICAL SESSIONS

Sustainable Water I

Sustainable Energy

Sustainable Places

11:15 a.m.

BREAK

11:30 a.m.

PANEL DISCUSSIONS

*How are Buildings of Today
Becoming the Places of Tomorrow?*

*Sustainable Water Management –
Meeting the Challenge with Green
Infrastructure*

12:30 p.m.

LUNCH PLENARY SESSION

KHANJAN MEHTA

1:30 p.m.

TECHNICAL SESSIONS

Sustainable Water II

Green Building and Energy

Green Building Case Studies

3:15 p.m.

INVITED SESSIONS

Sustainable Water

Sustainable Places

4:30 p.m.

POSTER SESSION AND SOCIAL

(DLLCC, Garrison Overlook)

APRIL 9 TUESDAY

7:30 a.m.

REGISTRATION

(David L. Lawrence Convention Center)

8:30 a.m.

PLENARY SESSION

MITCHELL JOACHIM

9:30 a.m.

INVITED SESSIONS

Sustainable Places

Sustainable Energy

10:30 a.m.

COFFEE BREAK

10:45 a.m.

TECHNICAL SESSIONS

*Green Building Design and
Construction I*

*Green Building Design and
Construction II*

12:30 p.m.

LUNCH

1:30 p.m.

TECHNICAL SESSIONS

Transportation Infrastructure

Green Building

3:15 p.m.

CLOSING PANEL

*Presenting the Case for Crafting a
Regional Energy Strategy and Plan*

AGENDA AT A GLANCE

Sunday, April 7

5:30 p.m. **Welcome Reception** Tonic Bar and Grill

Monday, April 8

7:30 a.m. **Registration Opens** David L. Lawrence Convention Center (DLCC), fourth floor

8:30 – 9:30 a.m. **Opening Plenary** Room 407

Conference Welcome

Eric J. Beckman, *Conference Chair*

David Dzombak, *Conference Chair*

Alex Steffen, *Writer, Public Speaker & Planetary Futurist*

"How to Think Like a Worldchanger"

9:30 – 11:10 a.m. **Technical Sessions**

Sustainable Water I	Room 408
Sustainable Energy	Room 409
Sustainable Places	Room 410

11:15- 11:30 a.m. **Break**

11:30- 12:30 p.m. **Panel Discussions**

How are Buildings of Today Becoming the Places of Tomorrow?	Room 411-412
Sustainable Water Management: Meeting the Challenge with Green Infrastructure	Room 413-414

12:30 p.m. **Lunch** Room 319-321

Khanjan Mehta, *Director, Humanitarian Engineering & Social Entrepreneurship Program, Penn State University*

"Developing Education & Entrepreneurial Ecosystems to Actualize Social Ventures in Developing Countries"

1:30 – 3:15 p.m. **Technical Sessions**

Sustainable Water II	Room 408
Green Building and Energy	Room 409
Green Building Case Studies	Room 410

3:15-4:15 p.m. **Invited Sessions**

Sustainable Water	Room 411-412
Sustainable Places	Room 413-414

4:30 p.m. **Poster Session and Social** Garrison Overlook

Tuesday, April 9

7:30 a.m. **Registration Opens** DLCC 4th floor

8:30 – 9:30 a.m. **Plenary Session** Room 407

Mitchell Joachim, *Associate Professor,*

New York University and the European Graduate School

"The Organic City: Urbanism Redefined"

9:30 – 10:30 a.m. **Invited Sessions**

Sustainable Places	Room 411-412
Sustainable Energy	Room 413-414

10:30-10:45 a.m. **Break**

10:45-12:30 p.m. **Technical Sessions**

Green Building Design and Construction I	Room 411-412
Green Building Design and Construction II	Room 413-414

12:30 p.m. **Lunch** Room 319-321

Networking opportunities

1:30 - 3:10 p.m. **Technical Sessions**

Transportation Infrastructure	Room 411-412
Green Building	Room 413-414

3:15 – 4:30 p.m. **Closing Panel** Room 407

Presenting the Case for Crafting a Regional Energy Strategy and Plan

CLIMATE FRIENDLY EVENT



We are supporting the NativeEnergy Manure Separation and Composting Project as implemented at the Mercer Vu Farms in Mercersburg, PA by keeping 32 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

Sponsored by:

RUTHRAUFF SAUER
ENGINEERS / MECHANICAL CONTRACTORS

ORAL PRESENTATIONS

Monday, April 8

9:30 - 11:10 a.m.

SUSTAINABLE WATER I ROOM 408

- 9:30 a.m. **Kevin Flynn**
AKRF, Inc.
"Green Infrastructure Asset Management and Maintenance"
- 9:55 a.m. **James Hunter**
Morgan State University
"Assessing the Possible Benefits Large Scale Implementation of Low Impact Development for Baltimore, Maryland"
- 10:20 a.m. **Uzair Shamsi**
Michael Baker Corporation
"Planning Green Stormwater Infrastructure Using EPA's SUSTAIN Program"
- 10:45 a.m. **Mark Santana**
University of South Florida
"Effect of Urbanization on the Embodied Energy of Water Treatment in the City of Tampa"

Monday, April 8

9:30 - 11:10 a.m.

SUSTAINABLE ENERGY ROOM 409

- 9:30 a.m. **Bassey Okon**
UCL, London
"Sustainable Infrastructure Challenges"
- 9:55 a.m. **Liang Tsai**
University of Michigan
"Life-cycle Assessment for Offshore Wind Farm Siting"
- 10:20 a.m. **John Vernacchia**
Eaton
"Challenges in Deploying Solar Photovoltaic Systems for Commercial Buildings"
- 10:45 a.m. **Lacour Mody Ayompe**
Dublin Institute of Technology
"Assessment of Energy Generation from Photovoltaic Systems in Cameroon Using Satellite-derived Solar Radiation Datasets"

Monday, April 8th

9:30 - 11:10 a.m.

SUSTAINABLE PLACES ROOM 410

- 9:30 a.m. **Liam Buckley**
IES Ltd
"Designing High Performance Buildings with 'Virtual Buildings' Analytics"
- 9:55 a.m. **Kristen Parrish**
Arizona State University
"The Contractor's Role in Achieving Deep Building Energy Savings"
- 10:20 a.m. **Laura Nettleton**
Thoughtful Balance
"Passive House at Two Scales"

Monday, April 8

1:30 - 3:15 p.m.

SUSTAINABLE WATER II ROOM 408

- 1:30 p.m. **Kristen Sanford Benhardt**
Lafayette College
"Multi-source Data Collection for Modeling Sustainability of Water Systems in Developing Countries"
- 1:55 p.m. **Kaitlin Vacca**
Villanova University
"Sustainable Soil Amendments Strategies for Soluble Reactive Phosphorus Retention within Surface-Flow Constructed Stormwater Wetlands"
- 2:20 p.m. **Don Kranbuehl**
PBC+L
"The Science of Water and How it Can Inform Design. The Design Process of the University of North Carolina Coastal Studies Institute"



Monday, April 8

1:30 - 3:15 p.m.

GREEN BUILDING AND ENERGY ROOM 409

- 1:30 p.m. **Tabitha Sprau Coulter**
 Pennsylvania State University
"A Case Study Comparison of the Energy Model Predictions to Actual Building Performance in Retrofitted Buildings"
- 1:55 p.m. **Paul Valenta**
 CALMAC
"Turning your Building into a Virtual Power Plant through Thermal Energy Storage & Demand Response"
- 2:20 p.m. **Jeff Hughes**
 United States Air Force
"Comparison of Large Scale Renewable Energy for the United States Air Force"
- 2:45 p.m. **Michael Blackhurst**
 The University of Texas at Austin
"The Decision Context for Planning Local Greenhouse Gas Reductions"

Monday, April 8

1:30 - 3:15 p.m.

GREEN BUILDING CASE STUDIES ROOM 410

- 1:30 p.m. **Cassandra Thiel**
 University of Pittsburgh
"Benefits of Green Hospital Design: A Comparative Longitudinal Assessment"
- 1:55 p.m. **Jeremy Snyder**
 Buro Happold
"PNC Tower: A Breath of Fresh Air for Commercial Office Towers"
- 2:20 p.m. **Joel Perkovich**
 Phipps Conservatory
"Blackwater Treatment Solutions at the Center for Sustainable Landscapes"
- 2:45 p.m. **Min Jae Suh**
 Virginia Tech
"The Impact of LEED and/or Energy Star Certification on Commercial Property Values in New York City"

invited

Monday, April 8

3:15 - 4:15 p.m.

Invited Session I

SUSTAINABLE WATER *invited* ROOM 411-412

- 3:15 p.m. **Arpad Horvath**
 University of California, Berkeley
"Environmental Impacts of Delivering Water"
- 3:45 p.m. **Franco Montalto**
 Drexel University
"Emerging Phenomena in Green Infrastructure Research"

Monday, April 8

3:15 - 4:15 p.m.

SUSTAINABLE PLACES *invited* ROOM 413-414

- 3:15 p.m. **Leidy Klotz**
 Clemson University
"Flaming Camels and Road Diets: Why Do We Have Such a Hard Time Creating Elegant Sustainable Places?"
- 3:45 p.m. **Thomas Seager**
 Arizona State University
"Integrating Risk and Resilience Approaches to Catastrophe Management in Engineering Systems"



ORAL PRESENTATIONS (CONT.)

invited

Tuesday, April 9

9:30 - 10:30 a.m.

Invited Session II

SUSTAINABLE ENERGY *invited*

ROOM 413-414

9:30 a.m. **Ram Gupta**
National Science Foundation
"Energy for Sustainability"

10:00 a.m. **Marija Ilic**
Carnegie Mellon University
"The Role of IT-Enabled Engineering in Achieving Low-Cost Green Energy Services"

SUSTAINABLE PLACES *invited*

ROOM 411-412

9:30 a.m. **Charles Vorosmarty**
The City College of New York
"Twenty-first Century Earth Systems and the Hippocratic Oath"

10:00 a.m. **Vivian Loftness**
Carnegie Mellon University
"Investing in Energy Efficiency for Economic, Environmental, and Human Benefits"



Tuesday, April 9

10:45 a.m. - 12:30 p.m.

GREEN BUILDING DESIGN AND CONSTRUCTION I ROOM 411-412

10:45 a.m. **Allison Smith**
Colorado State University
"Implications of Using Low-VOC Materials on Building Operations"

11:10 a.m. **Amy Nagengast**
Carnegie Mellon University
"Integrating Roofing Technologies for Enhanced Building Sustainability"

11:35 a.m. **Danielle Densley Tingley**
University of Sheffield
"Design for Deconstruction: Storing Valuable Resources in Buildings"

12:00 p.m. **Brent Stephens**
Illinois Institute of Technology
"How Do Building Design and Operational Choices Impact Indoor Exposures to Outdoor Air Pollution?"

Tuesday, April 9

10:45 a.m. - 12:30 p.m.

GREEN BUILDING DESIGN AND CONSTRUCTION II ROOM 413-414

10:45 a.m. **William DERENCE**
Mascaro Construction Company, LP
"BIM: Enhancing the Sustainability of the Operations and Maintenance of Buildings"

11:10 a.m. **Christine Mondor**
evolve
"Gravitational Assist: Leveraging Green Building into Organizational and Industry Sustainability Practices"

11:35 a.m. **Aurora Sharrard**
Green Building Alliance
"Pittsburgh 2030 District: Quantifying Building Performance Through Baselines and Annual Reporting"

12:00 p.m. **Benjamin Chambers**
Virginia Tech
"The Sharing of Stories about Unanticipated Consequences in the Green Building Industry"



Tuesday, April 9

1:30 - 3:10 p.m.

TRANSPORTATION INFRASTRUCTURE

ROOM 411-412

- 1:30 p.m. **Eric Vechan**
Mississippi State University
"Sustainability of Transportation Systems Using Social Network Analysis"

- 1:55 p.m. **Michelle Oswald**
Bucknell University
"Evaluation of the Sustainability of Roadway Redevelopment as a Result of Marcellus Shale Drilling"

- 2:20 p.m. **Elizabeth Traut**
Carnegie Mellon University
"U.S. Residential Charging Potential for Plug-In Vehicles"

- 2:45 p.m. **Jonathan Preisser**
Robert Morris University
"Development of a Model for Optimizing the Location of Natural Gas Fueling Stations in Pittsburgh"

Tuesday, April 9

1:30 - 3:10 p.m.

GREEN BUILDING ROOM 413-414

- 1:30 p.m. **Murat Kucukvar**
University of Central Florida
"A Policy Programming Model for Optimized Carbon Footprint Reduction Strategies of U.S. Residential and Non-Residential Buildings"

- 1:55 p.m. **Rodolfo Valdes Vasquez**
Colorado State University
"Social Sustainability Framework: A Series of Process for Evaluating Infrastructure Projects"

- 2:20 p.m. **Kristen Sanford Benhardt**
Lafayette College
"The Impacts of Stakeholder Behavior on Green Building Design"

- 2:45 p.m. **Matthew Eckelman**
Northeastern University
"Life Cycle Decisions for Maintaining Buildings and Infrastructure: What, Where, When, and How?"



POSTER PRESENTATIONS

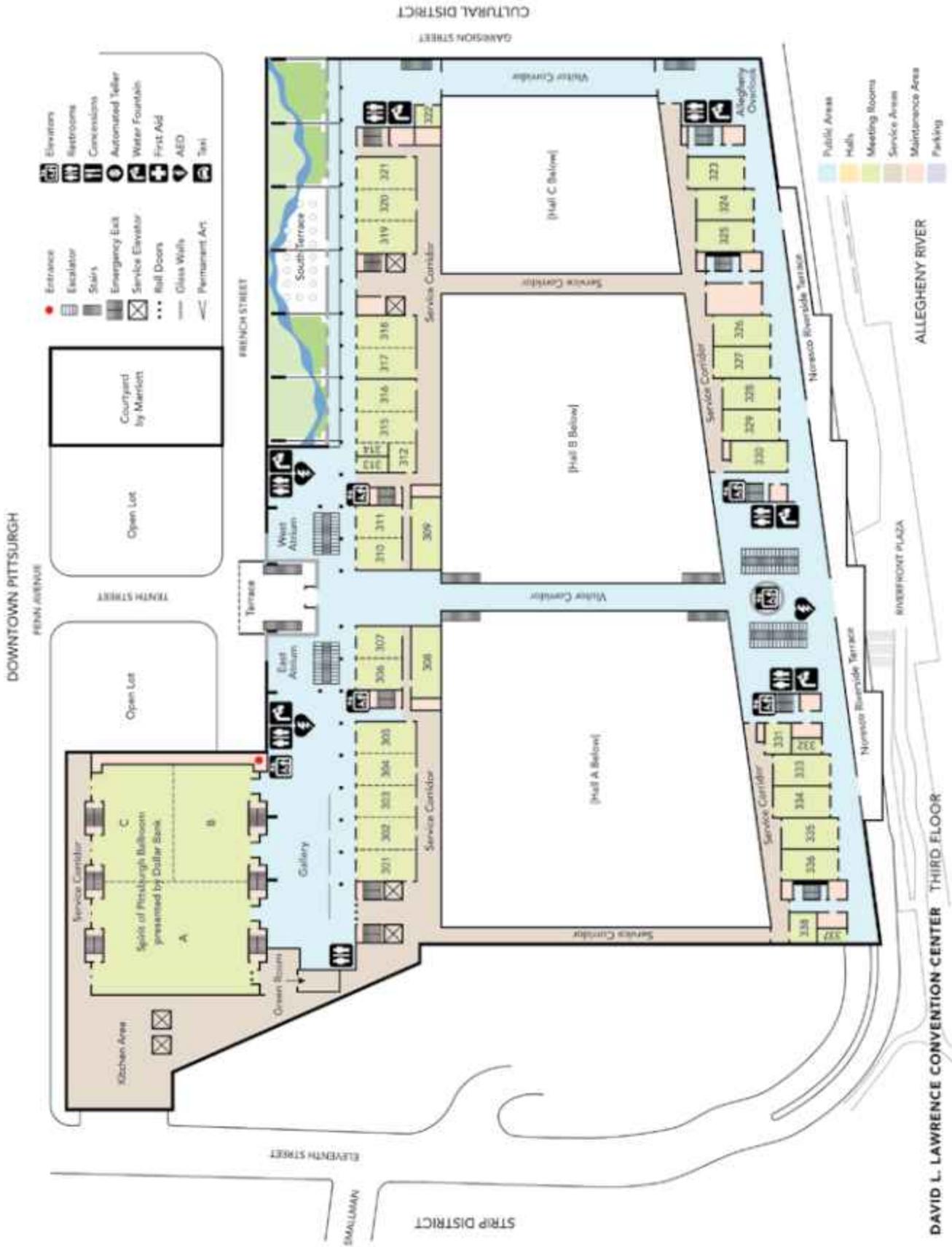
Monday, April 8

4:30 p.m. DLLCC, Garrison Overlook

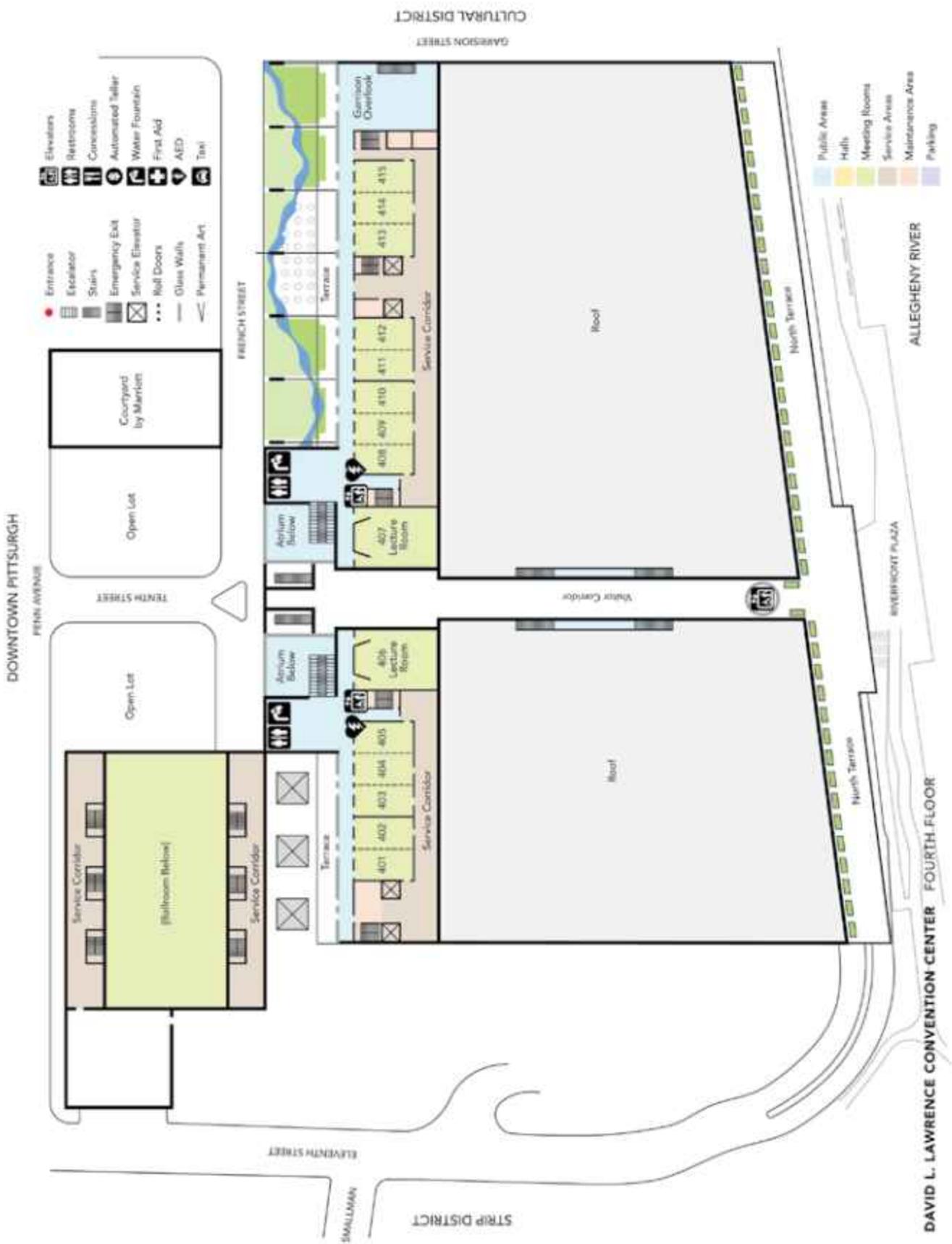
1	Design Thinking for A Sustainable Engineering Workforce	Jacquelyn Blizzard	<i>Clemson University</i>
2	Nutrient removal by microalgae from municipal wastewater treatment plants	Sarah Bauer	<i>Rowan University</i>
3	Pro-sustainability attitudes and behaviors in college students: The need for AEC programs to connect sustainability with helping others.	Rodolfo Valdes Vasquez	<i>Colorado State University</i>
4	Water House Model New Strategy for Self-sustainable Housing	Matyas Gutai	<i>Allwater Ltd.</i>
5	Coupling Life Cycle Assessment (LCA), Global Information Systems (GIS), and Thermodynamic Analysis to evaluate the sustainability of microalgae derived fuels	Gregory Zaimes	<i>University of Pittsburgh</i>
6	Short Term Environmental Impacts of Photovoltaic (PV) Deployments- Need to Look Beyond Traditional Life Cycle Analysis Assessments (LCA)	Dwarakanath T. R.	<i>Arizona State</i>
7	Preliminary design for low-cost prefabricated housing for developing countries	Justin Henriques	<i>James Madison University</i>
8	Understanding the Uncertainties Associated with Demand-side Efficiency Program Reporting in the US Electricity Sector	Russell Meyer	<i>Carnegie Mellon University</i>
9	Potential Climate Change Impact on Concrete Infrastructure of Metropolitan Boston	Mithun Saha	<i>Northeastern University</i>
10	The Economic Feasibility of Biogenically Produced Methane from Swine and Cattle Manure as a Sustainable, Renewable Source of Natural Gas	Daniel Gehrig	<i>Duquesne University</i>
11	Net-Zero Energy Building Material Perspective: A Life Cycle Assessment	Nicole Campion	<i>University of Pittsburgh</i>
12	Strategies for Designing Environmentally Responsive Campus Buildings	Jeremy Snyder	<i>Buro Happold</i>
13	Disciplinary Differences in Sustainability Career Interests	Allison Godwin	<i>Clemson University</i>
14	The Perception of Property Managers on Educating Low-income Housing Tenants about Energy Efficiency in Colorado	Anderson Lewis	<i>Colorado State University</i>
15	Study of rainfall partition by urban low-growing shrubs	Walter Yerk	<i>Drexel University</i>
16	Life-Cycle Cost Tracking of Charity-Funded Rural Water Systems in Western Uganda	Kelsey Lantz	<i>Lafayette University</i>
17	A Novel Decision Support Tool for optimal ranking of building energy retrofit options	Taofeeq Ibn-Mohammed	<i>Institute of Energy and Sustainable Development, Leicester</i>
18	A Systems Method Approach to the Sustainability Assessment of Civil Infrastructure Projects	Mehmet Boz	<i>Mississippi State University</i>
19	The Tower at PNC: A Blueprint for Comprehensive Urban Water Conservation	Mark Meredith	<i>PHOENIX Process Equipment Co.</i>
20	Microbes Involved in Concrete Sewer Pipe Crown Corrosion	Tao Yan	<i>University of Hawaii</i>
21	The Environmental Impact of Retrofitting Solid Wall Homes	Danielle Densley Tingley	<i>The University of Sheffield</i>
22	Wind Energy Analysis: The Distribution Network Case	Bassay Okon	<i>UCL, London</i>
23	Multi-Criteria Based Sustainability Decision Framework for Selecting Wind Energy Sources for Buildings	Mehdi Noori	<i>University of Central Florida</i>
24	The Paradoxes of Sustainability in Developing Countries	Rachel Dzombak	<i>Penn State University</i>

25	Applying Lean, Green and Six-Sigma Framework to Improve Exterior Construction Process in Saudi Arabia	Abdul-Aziz Banawi	<i>University of Pittsburgh</i>
26	Fostering innovation for Sustainability in future practitioners	Kenneth Sands	<i>Virginia Polytechnic Institute and State University</i>
27	Reducing Uncertainty in Life Cycle Methane Emissions from Natural Gas using Atmospheric Inversions	Stefan Schwietzke	<i>Carnegie Mellon University</i>
28	Environmental Impacts of Water Distribution Systems	Thomas Hendrickson	<i>University of California, Berkeley</i>
29	On the Development of a Research Methods Course for Sustainability at the University of Arkansas	Kim Needy	<i>University of Arkansas</i>
30	Bamboo Structures as Teaching Tool for Sustainable and Global Thinking	Michael Richard	<i>University of Pittsburgh</i>
31	Passive Refrigeration: Reusing Waste, Reducing Energy Consumption	Ben Chapman	<i>Wellesley College</i>
32	Assessing ETAC Learning Outcomes in a Green Building Design and Construction Undergraduate Course	Robert Korenic	<i>Youngstown State University</i>
33	Rapid Assessment of Environmental Impacts of Regional Energy & Water Supply Scenarios	Alex Dale	<i>University of Pittsburgh</i>
34	Potential Climate Changes Impacts in Water and Wastewater Utilities in NE Region*	Maria Raquel Catalano de Sousa	<i>Drexel University</i>
35	Factors Governing Change in Water Withdrawals for U.S. Industrial Sectors from 1997 to 2002	Hui Wang	<i>Carnegie Mellon University</i>
36	Measuring thermal mass in sustainable concrete construction	Omer Damdelen	<i>Kingston University</i>
37	Quantification of PM10 From Construction Activities Using a Life Cycle Approach	Kevin Ketchman	<i>University of Pittsburgh</i>
38	Evaluating a System Dynamic Approach to Planning and Maintaining Sustainable Water Services in Developing Communities	Jeff Walters	<i>University of Colorado Boulder</i>
39	A Sustainable Water Plan at Lynn University	Steven Baumgartner	<i>Buro Happold</i>
40	Infrastructure Performance Analysis and Sustainable Infrastructure Challenges	Bassey Okon	<i>Bartlett School of Construction and Project Management, UCL</i>
41	Do fewer design constraints encourage more sustainable infrastructure?	Tripp Shealy	<i>Clemson University</i>
42	CO2 gas transfer through hollow fiber membranes	Pavlo Kostetsky	<i>Rowan University</i>
43	Indoor Environmental Quality in a Dynamic Life Cycle Assessment Framework for Buildings: Case Study of the Mascaro Center for Sustainable Innovation	William Collinge	<i>University of Pittsburgh</i>
44	Comparison of Plug-in and Hybrid Electric Powertrains Under Simulated Driving Conditions for Environmental and Cost Benefits	Orkun Karabasoglu	<i>Carnegie Mellon University</i>
45	A Regional Earth System Model to Assess Energy and Environmental Tradeoffs	Ariel Miara	<i>City College of New York</i>
46	Contribution of Sustainable Built Environment towards a Green Economy	Vernica Prakash	<i>Leap Sustainable Design Construction</i>
47	Understanding Resilience in Economic Networks: Implications for Critical Infrastructure	Shauhrat Chopra	<i>University of Pittsburgh</i>

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