UNIVERSITY OF PITTSBURGH SCHOOL OF ENGINEERING

Engineering Sustainability 2005

Next-generation technology for green construction and sustainable water use

Sponsored by:
The Mascaro Sustainability Initiative
in the School of Engineering
at the University of Pittsburgh

David L. Lawrence Convention Center, Pittsburgh, Pa.
April 10-12, 2005

MASCARO SUSTAINABILITY INITIATIVE

EVENT PROGRAM

Letter from the Chair

First, let us take this opportunity to welcome you all to Pittsburgh. We hope that you not only have a rewarding conference experience, but also 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 and the sustainable use of water. Progress in these areas will require innovations from professionals in a variety of disciplines, and we are gratified to have scientific contributions from researchers in fields ranging from engineering to architecture to public policy to the sciences. Designing more sustainable buildings and water use technologies are vital to the creation of sustainable global economies; hence our desire to showcase innovation in these areas.

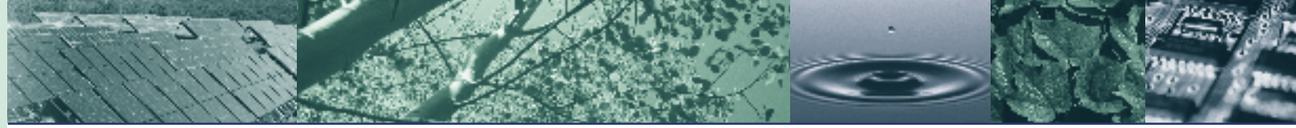
We have arranged the program as a series of topical sessions, allowing you to focus your attention on a specific area or sample from a variety of topics. Included in the program are two workshops, titled "Invention to Venture Workshop" and "Green Building Guidelines: Meeting the Demand for Low-Energy, Resource-Efficient Buildings" to allow interested conference-goers to delve deeper into relevant subjects if desired.

The program includes comprehensive information about ES 2005, but if you have questions or need help, please visit the registration area or ask any of the ES 2005 volunteers. If we can do anything to make your time in Pittsburgh more enjoyable and productive, please let us know.

Sincerely,

Eric J. Beckman

Gena M. Kovalcik



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General Information

Registration Hours

Sunday Noon–6 p.m.
Monday 7:30 a.m.–5:30 p.m.
Tuesday 7:30 a.m.–2 p.m.

Speaker Ready Room (Room 412)

During the conference there is a computer and printer available to check your presentation and make small changes to the presentations if needed. Monday and Tuesday: 7:30 a.m.–5:30 p.m.

Poster Room (Room 412)

All posters are to be delivered to the Poster Room by noon on Monday. The posters can be picked up in the same room on Tuesday between 7:30 a.m.–5:30 p.m.

Message Board

As a service to conference registrants, a message board will be located in the Registration area. The board will be manned by registration staff from 8 a.m. to 5 p.m. and April 11–12. Messages will be retained until the end of each day.

Visitor Information

Stop by the ES 2005 registration area for questions about Pittsburgh restaurants, entertainment, etc. You can also find information about Pittsburgh at the Visitors Information Center, 1-800-366-0093.

Travel Information

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

Express Shuttle USA runs from the Pittsburgh International Airport to the Westin Hotel every hour on the hour. Pickup is in the baggage claim area. $17/one way and $32/round trip.

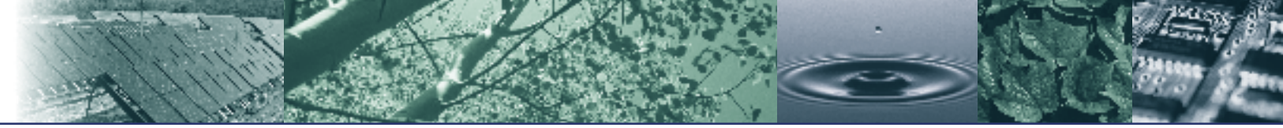
Badge Information

Please wear your ES 2005 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.

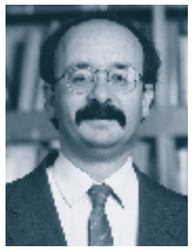
For emergency response at the Convention Center dial 412-325-6193.

Cell Phone Usage

As a courtesy to the speakers and fellow attendees, the ES 2005 staff requests that all cell phones and pagers be turned off or switched to silent mode in all presentation rooms.



Featured Plenary Presentations



THE HEINZ DISTINGUISHED LECTURER

Amory B. Lovins

Chief executive officer, Rocky Mountain Institute

Monday, April 11 at 8:30 a.m.

INTEGRATIVE DESIGN FOR ADVANCED RESOURCE EFFICIENCY

Amory Lovins, 56, is cofounder and CEO of Rocky Mountain Institute (www.rmi.org), a 22-year-old, 50-person, independent, entrepreneurial, nonprofit applied research center in Old Snowmass, Colorado. RMI fosters the efficient and restorative use of natural and human capital to create a secure, prosperous, and life-sustaining world. Lovins also founded and chairs RMI's fourth for-profit spinoff, Hypercar, Inc. (www.hypercar.com), and cofounded its third, E SOURCE (www.esource.com), which was sold to the Financial Times group in 1999.

A consultant physicist educated at Harvard and Oxford, he has received an Oxford MA (by virtue of being a don), nine honorary doctorates, a MacArthur Fellowship, the Heinz, Lindbergh, World Technology, and Hero for the Planet Awards, the Happold Medal, and the Nissan, Mitchell, "Alternative Nobel," Shingo, and Onassis Prizes; held visiting academic chairs; briefed 18 heads of state; published 29 books and several hundred papers; and consulted for scores of industries and governments worldwide.

The Wall Street Journal's Centennial Issue named him among 39 people in the world most likely to change the course of business in the 1990s, and Car magazine named him the 22nd most powerful person in the global automotive industry. His work focuses on transforming the car, real estate, electricity, water, semiconductor, and several other sectors of the economy toward advanced resource productivity. His latest books are *Natural Capitalism: Creating the Next Industrial Revolution* (with Paul Hawken and L. Hunter Lovins, 1999, www.natcap.org) and *Small Is Profitable: The Hidden Economic Benefits of Making Electrical Resources the Right Size* (RMI, August 2002).

The Heinz Distinguished Lectureship

The Heinz Distinguished Lectureship is supported 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 with the aim of bringing 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 2005.

Dr. Bernard Amadei

Founding president, Engineers Without Borders

Professor of civil engineering, University of Colorado at Boulder

Monday, April 11 at 12:30 p.m.

SUSTAINABLE ENGINEERING SOLUTIONS FOR THE DEVELOPING WORLD: CHALLENGES AND OPPORTUNITIES

Bernard Amadei is professor of civil engineering at the University of Colorado at Boulder. He obtained his MaSc. degree in civil engineering in 1979 from the University of Toronto and his PhD degree in civil engineering in 1982 from the University of California, Berkeley.

Amadei's interests cover the topics of sustainability, green construction, and international development. He is leading a new paradigm shift in engineering education and practice called Earth Systems Engineering (ESE: http://ese.colorado.edu). It emphasizes the interaction between the built environment and natural systems. As part of the ESE initiative, Amadei started a new program in Engineering for Developing Communities (www.edc-cu.org). Its overall mission is to educate globally responsible engineering students and professionals who can offer sustainable and appropriate solutions to the endemic problems faced by developing communities worldwide. Amadei is also the Founding President of Engineers Without Borders—USA (EWB-USA: www.ewb-usa.org) and the co-founder of the Engineers Without Borders—International network (www.ewb-international.org). The mission of EWB-USA is to partner with disadvantaged communities to improve their quality of life through implementation of environmentally and economically sustainable engineering projects, while involving and training internationally responsible engineering professionals and students.

Amadei has recently been appointed director of the Center for Appropriate and Sustainable Technologies (CAST), which reports to the International Centre for Science and High Technology (ICS), United Nations Industrial Development Organization in Trieste, Italy. ICS-CAST is chartered to serve several constituencies (industry, education, partners, communities in developed and developing countries) to further the understanding, development, transfer, and implementation of appropriate and sustainable technologies for capacity building in the developing world.

Dr. Takashi Asano

Professor, Department of Civil and Environmental Engineering, University of California at Davis

Tuesday, April 12 at 12:30 p.m.

SUSTAINABLE WASTEWATER RECLAMATION AND REUSE

Dr. Takashi Asano is a professor emeritus of the University of California at Davis. Asano has more than 35 years of academic and professional experience in environmental and water resources engineering. His field of specialization is water reclamation and reuse.

During 1978-1992, he served as the water reclamation specialist for the California State Water Resources Control Board (SWRCB) in Sacramento. He has conducted major water reclamation and reuse studies at the SWRCB and the University of California at Davis. His research for the last 10 years on quantitative microbial risk analysis and groundwater recharge with reclaimed water was awarded the 1999 Jack Edward McKee Medal by the Water Environment Federation (WEF), which was shared by his colleagues and a former graduate student at the University of California at Davis.

Asano was appointed as a scientific advisor to the Arab School on Science and Technology in Kuwait in 1996. In his native country of Japan, he served in 1996 as the Kubota Endowed Chair Visiting Professor of Environmental Engineering at the University of Tokyo. He also served in 1997 as the Nishihara Endowed Chair Visiting Professor of Environmental Engineering in the International Center for Water Environment Engineering at Hokkaido University in Sapporo, Japan.

Asano is currently serving as a member of the State of California and federal government's CALFED Water-Management Science Board. Asano was the recipient of the 2001 Stockholm Water Prize, and also the honorary doctorate from Hokkaido University in Sapporo, Japan in 2004. He is an elected member of the European Academy of Sciences and Arts as well as the International Water Academy.

Invited Speakers

***David Eakin**, P.E., Chief Engineer, Office of the Chief Architect, Public Buildings Service, General Services Administration*

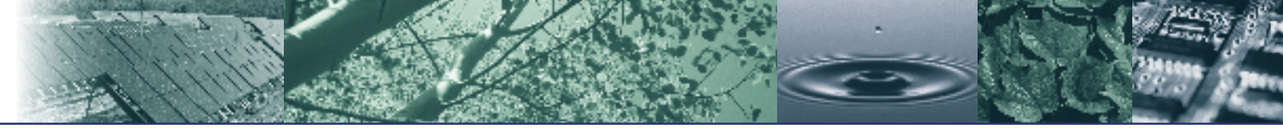
The Cost of Being Sustainable

David Eakin serves as chief engineer within GSA's Office of the Chief Architect, Public Buildings Service. His duties include developing design criteria/policies and optimizing construction program delivery practices—often involving information technology services. Standards and delivery practices emphasize integrated design, with special emphasis to sustainability, workplace performance, and safety. Additional areas of involvement include project development, cost management, delivery method definition, and the deployment of innovative building technologies. Ongoing activities include coordinating support for the Whole Building Design Guide, establishing Web-based Project Planning Tools, developing a Federal Envelope Design Guide, identifying sustainability cost impacts, and establishing the agency's project estimating/cost management practices.

***Dr. William Fisk**, Senior staff scientist and department head, Indoor Environment Department, Lawrence Berkeley National Laboratory*

Impact of Indoor Environmental Quality on Health and Productivity and Implications for Building Design and Operation

William J. Fisk is a senior staff scientist and the department head of the Indoor Environment Department at the Lawrence Berkeley National Laboratory. The Department staff of 60 conducts research on building ventilation, indoor environmental quality, energy use, exposure and risk assessment, and the relationship of indoor environmental quality with health and work performance. In addition to department leadership since 2000, Fisk has conducted research for 25 years at Lawrence Berkeley National Laboratory on indoor environmental quality. His current research focuses on technologies for ventilating and controlling indoor air quality, on the relationships of IAQ and related building characteristics with health, and on the economic consequences of indoor environmental quality. Fisk serves on the Editorial Board for the journal *Indoor Air*, was elected to the international Academy of Indoor Air Sciences in 1999, has served on National Academy of Sciences—Institute of Medicine committees on Asthma and IAQ and on Damp Buildings, Mold and Health. He also served for several years on the National Occupational Research Agenda—Indoor Environment Team and has been active in the American Society of Heating, Refrigerating, and Air Conditioning Engineers. Fisk received MS and BS degrees in mechanical engineering from the University of California, Berkeley and the University of New Mexico, respectively.



Invited Speakers, continued

***Dr. Bernard D. Goldstein**, dean, Graduate School of Public Health, University of Pittsburgh*

Clean Water and Human Health

Bernard D. Goldstein, MD, is dean of the University of Pittsburgh Graduate School of Public Health. He is past president for the Society for Risk Analysis, vice president of the Scientific Committee on Problems of the Environment (SCOPE), and a member of both the NIH National Advisory Environmental Health Sciences Council (NAEHS) and the Institute of Medicine Roundtable on Environmental Health Sciences, Research, and Medicine. He is a member of the Institute of Medicine of the National Academies of Science, and the former assistant administrator for research and development of the U.S. Environmental Protection Agency.

***Dr. Vivian Loftness**, University professor, School of Architecture, Carnegie Mellon University; senior researcher, Center for Building Performance and Diagnostics, Carnegie Mellon University*

Environmental Sustainability Contributes to Health, Productivity, and Quality of Life

Vivian Loftness is an internationally renowned researcher, author, and educator with more than 30 years of focus on environmental design and sustainability, advanced building systems and systems integration, climate, and regionalism in architecture, as well as design for performance in the workplace of the future. As a result of her research, teaching, and professional consulting, Loftness received the 2002 National Educator Honor Award from the American Institute of Architecture Students and a 2003 Sacred Tree Award from the U.S. Green Building Council. Loftness has a Bachelor of Science and a master's degree in architecture from MIT, is on the National Board of the USGBC, AIACOTE (2005 national chair), TSAC, ARTI, IDCE, and DOE's Federal Energy Management Advisory Council (FEMAC). She is a fellow of the American Institute of Architects and is a registered architect.

***Dr. Farhang Shadman**, director, NSF/SRC Engineering Research Center for Environmentally Benign Semiconductor Manufacturing, University of Arizona*

Sustainability: A Technology Driver in Semiconductor and Nano-Scale Manufacturing

Farhang Shadman received his PhD in chemical engineering from the University of California-Berkeley in 1972. He is currently a professor of chemical and environmental engineering (joint appointment in optical sciences) at the University of Arizona. He is also the director of the NSF/SRC Engineering Research Center for Environmentally Benign Semiconductor Manufacturing. Prior to joining the University of Arizona in 1979, he was a research engineer at the General Motors Research Laboratory in Michigan. Shadman is the author of more than 90 journal articles, three book chapters, and 15 patents/invention disclosures. Among his awards are the Akira-Inoue Award (2002), Landmark Innovation Award (2000), SRC/Sematech/SIA Excellence in Research Award (1998 and 1992), and two Invention Awards (SRC 1991 and 1992). He is a fellow of the American Institute of Chemical Engineers.

***Dr. H. Dennis Spriggs**, president, Matrix Process Integration*

Make Sustainable Development Work: Conserve Resources, Cut Emissions, and Generate Profits—Simultaneously

H. Dennis Spriggs is president and co-founder of Matrix Process Integration, an integrated design company serving the process industries since 1993. Previously Spriggs co-founded Linnhoff March, an international energy consulting firm, and served as director of central engineering for Union Carbide Corporation, where he was responsible for design and plant support worldwide. Spriggs is recognized internationally for the development and application of integrated process design methods and tools and is widely known for the application of technology to solve business problems. Spriggs has BS, MS and PhD degrees in chemical engineering, receiving his graduate degrees from the University of Virginia.

***Dr. Jorge A. Vanegas**, Fred and Teresa Estrada Professor, College of Engineering, Georgia Institute of Technology*

Built Environment Sustainability: A Roadmap for Implementation

Dr. Jorge Vanegas is currently the Fred and Teresa Estrada Professor in the College of Engineering, and an associate professor in the School of Civil and Environmental Engineering at the Georgia Institute of Technology. After obtaining MS ('85) and PhD ('88) degrees from Stanford University, he has been a researcher and educator, a facilitator and trainer, and a technical advisor and consultant in the architecture, engineering, and construction (A/E/C) industry. His current areas of research and teaching interests are: (1) advanced strategies, tools, and methods for integrated capital asset delivery and management, with a special emphasis on built environment sustainability; (2) design/construction integration in the development and rehabilitation of facilities and civil infrastructure systems; (3) constructability programs and advanced modularization technologies; and (4) advanced strategies, tools, and methods for affordable housing. He also has a strong interest in undergraduate and graduate curricula development, and in continuing education and technology transfer program development, having developed education and training programs in various topic areas for 28 organizations in the United States and Latin America. Vanegas has secured more than $3.6 million in public- and private-sector funding for more than 48 research, education, and continuing education projects, and has documented and disseminated the results and findings from his projects in more than 120 publications in technical journals, conference proceedings, and technical reports. Finally, he is an active member of the American Society of Civil Engineers (ASCE), the American Society for Engineering Education (ASEE), the Urban Land Institute (ULI), and the Society of Hispanic Professional Engineers (SHPE).

Special Events

Welcome Reception

Sunday, April 10
5:30–7:30 p.m.
PNC Firstside Center, LEED™ Silver
500 First Avenue

Shuttles will depart from the Convention Center East Lobby beginning at 5:15 p.m. Shuttles will run every 15 minutes until 8 p.m. Poster boards of Pittsburgh's green buildings will be highlighted.

Council of Chemical Research Conference

Collaboration, Globalization, and Growth: Your Path Forward
Hilton Pittsburgh
April 10–13, 2005

Registrants for Engineering Sustainability 2005 are invited to attend CCR's opening Plenary Session on Sunday, April 10 from 1–5 p.m. simply by displaying their name badge for ES 2005.

Topics will include: Globalization, Sustainability, Energy, Green Chemistry, Security, Nanotechnology and Diversity. In particular, James B. Porter, vice president for DuPont, will talk about "Solving the Sustainable Growth Equation." He will discuss DuPont's approach to achieve its vision of being a "sustainable growth company," while continuously reducing the environmental footprint along the value chains. He will detail actions as well as future direction for DuPont to "go where the growth is." He will also include specifics on how knowledge management techniques are being used to accelerate progress.

Tours

Pittsburgh's Green Building Tour

Monday, April 11
1:30–5:30 p.m.

Tour three of Pittsburgh's green gems—the McGowan Institute for Regenerative Medicine, Pittsburgh Glass Center, and Phipps Conservatory and Botanical Gardens.

The price for this tour is $25. Shuttle pickup and dropoff will be in the Convention Center's East Lobby. We ask attendees to be at the pickup location 15 minutes early (1:15 p.m.). The tour will depart promptly at 1:30 p.m.

David. L. Lawrence Convention Center

Monday, April 11 at 5 p.m.
Tuesday, April 12 at 7:30 a.m.

This LEED-NC Gold certified building is the world's first LEED Certified convention center and the largest LEED building to date. The tours will commence in the East Lobby.

Tours hosted by the Green Building Alliance.

Workshops

Invention to Venture: Technology Entrepreneurship and Sustainability

Monday, April 11, 2005
10:30 a.m.–12:30 p.m. (break for lunch)
2–5 p.m.
Room 411

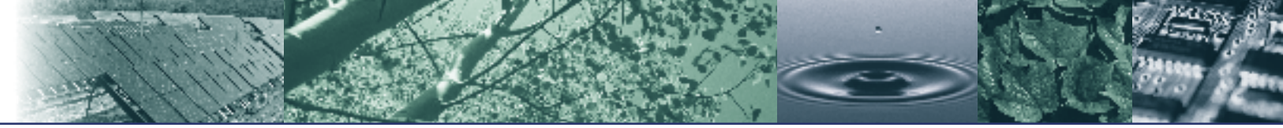
This track will focus on the technology entrepreneurship process in the context of next-generation technology for green construction and sustainable water use. Organized by the National Collegiate Inventors & Innovators Alliance (www.nccia.org) and Hunter Lovins, CEO of Natural Capitalism Inc. (www.natcapinc.com), the track is particularly relevant for technologists interested in the commercialization and new venture creation process. The track will include discussion of opportunity assessment and sales and marketing issues specific to green construction and sustainable water technologies, as well as provide practical advice on business plan development and financing strategies for early stage companies. The track is also relevant to faculty teaching entrepreneurship and faculty commercializing technology out of their labs.

Green Building Guidelines: Meeting the Demand for Low-Energy, Resource-Efficient Buildings

Tuesday, April 12, 2005
2–5 p.m.
Room 410

This workshop, presented by Green Builder and the Sustainable Buildings Industry Council (SBIC), will provide essential information about green building and sustainable growth, including environmentally sound building materials and technologies, increased water and energy efficiency, improved indoor environmental quality (air, sound attenuation, lighting, etc.), waste management practices, and operations and maintenance of green buildings. Ron Jones (official SBIC instructor) and Sara Gutterman, founding partners of Green Builder (www.thegreenbuilder.com), will discuss a whole-systems approach to development and methods to improve the comfort, health, safety, and environmental appropriateness of a structure. They will also offer innovative ideas and information about product opportunities within the marketplace, the current status of green building organizations and programs, and marketing techniques.

This workshop is relevant for engineers and other building industry professionals interested in garnering specific information about green building products and practices, and professors teaching green building or sustainability issues, as well as individuals interested in learning more about increasing the sustainability of buildings. CEUs will be provided to American Institute of Architects (AIA) members.



Conference Overview

Sunday, April 10	Monday, April 11	Tuesday, April 12
	8:30 a.m.	**8:30 a.m.**
	Opening Plenary Session **Presentation by:** Amory Lovins, Rocky Mountain Institute	**Concurrent Sessions** River Basin Management Green Construction and Health Biotechnology for Sustainable Water Use
	10:30 a.m.	**10:30 a.m.**
	Concurrent Sessions Sustainable Wastewater Treatment Sustainability Metrics Case Studies I Invention to Venture Workshop	**Concurrent Sessions** Sustainable Water Use in Industrial Processes Technology for Optimizing Water Use in Buildings Case Studies II
Registration Opens at Noon	**12:30 p.m.**	**12:30 p.m.**
	Lunch Plenary Session **Presentation by:** Bernard Amadei, founding president, Engineers Without Borders	**Lunch Plenary Session** **Presentation by:** Takashi Asano, University of California at Davis
	2 p.m.	**2 p.m.**
	Concurrent Sessions Sustainable Water Purification Green Construction Materials University-Based Initiatives Invention to Venture Workshop	**Concurrent Sessions** Economics, Design, and Procedures Case Studies III Green Building Guidelines Workshop
5:30 p.m.	**5:30 p.m.**	
Welcome Reception PNC Firstside Center	**Poster Session and Social** David L. Lawrence Convention Center	

Agenda at a Glance

Sunday, April 10

Noon–6 p.m. **Registration Open, DLL Convention Center**

5:30–7:30 p.m. **Opening Reception, PNC FirstSide Center**

Monday, April 11

7:30 a.m.–5:30 p.m. **Registration Open**

8:30–10 a.m. **Opening Plenary Session–Room 407**

Eric J. Beckman, conference chairman

Amory Lovins, CEO, Rocky Mountain Institute, ***Integrative Design for Advanced Resource Efficiency***

10–10:30 a.m. **Break**

10:30 a.m.–12:30 p.m. **Concurrent Educational Sessions**

Sustainable Wastewater Treatment *(Room 408)*

Sustainability Metrics *(Room 409)*

Case Studies I *(Room 410)*

Invention to Venture Workshop *(Room 411)*

12:30–2 p.m. **Lunch *(Room 413–415)***

PLENARY SPEAKER

Bernard Amadei, founding president, Engineers Without Borders, ***Sustainable Engineering Solutions for the Developing World: Challenges and Opportunities***

1:30–5:30 p.m. **Pittsburgh's Green Building Tour**
Meet at 1:15 p.m. in the East Lobby

2–4:30 p.m. **Concurrent Educational Sessions**

Sustainable Water Purification *(Room 408)*

Green Construction Materials *(Room 409)*

University-Based Initiatives *(Room 410)*

Invention to Venture Workshop *(Room 411)*

3–3:30 p.m. **Break**

5–6 p.m. **Convention Center Tour**
Meet in East Lobby

5:30–7:30 p.m. **Poster Session and Social**
Garrison Street Overlook, fourth floor

Tuesday, April 12

7:30 a.m.–2 p.m. **Registration Open**

7:30–8:30 a.m. **Convention Center Tour II**
Meet in East Lobby

8:30–10 a.m. **Concurrent Educational Sessions**

River Basin Management *(Room 408)*

Green Construction and Health *(Room 409)*

Biotechnology for Sustainable Water Use *(Room 410)*

10–10:30 a.m. **Break**

10:30 a.m.–12:30 p.m. **Concurrent Educational Sessions**

Sustainable Water Use in Industrial Processes *(Room 408)*

Technology for Optimizing Water Use in Buildings *(Room 409)*

Case Studies II *(Room 410)*

12:30–2 p.m. **Lunch *(Room 413–415)***

PLENARY SPEAKER

Takashi Asano, University of California at Davis, ***Sustainable Wastewater Reclamation and Reuse***

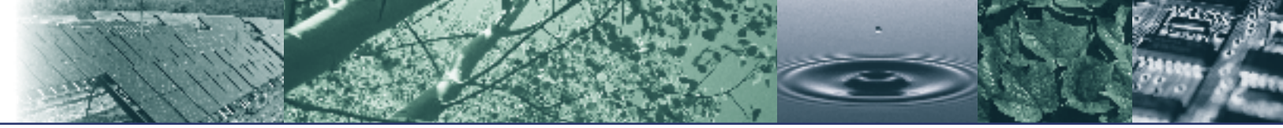
2–4:30 p.m. **Concurrent Educational Sessions**

Economics, Design, and Procedures *(Room 408)*

Case Studies III *(Room 409)*

Green Building Guidelines Workshop *(Room 410)*

3–3:30 p.m. **Break**



Educational Sessions

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

Sustainable Wastewater Treatment
Room 408

Urban Water Solutions (10:30 a.m.)
Mark Pitterle
University of Colorado at Denver Health Sciences Center

Law, Integrated Ecosystem Management, and the Effort to Build a Sustainable Wastewater Infrastructure (11 a.m.)
Colin Crawford
Center for the Comparative Study of Metropolitan Growth
Georgia State University

Sustainable Development: Beyond Water Supply and Demand (11:30 a.m.)
Slawomir W. Hermanowicz
University of California, Berkeley

An Evaluation of Methods for Comparing the Sustainability of Wastewater Treatment Options (noon)
Barton Kirk
University of Vermont

Sustainability Metrics
Room 409

Built Environment Sustainability: A Roadmap for Implementation (10:30 a.m.)
▶ **Jorge Vanegas**
Georgia Institute of Technology

Operational Life Cycle Assessment and Life Cycle Cost Analysis for Multi-Occupant Buildings (11 a.m.)
Angela Arpke
Vanderweil Engineers

The Potential for GHG Emissions Reduction of Building-Integrated Photovoltaics—A Life Cycle Assessment Approach (11:30 a.m.)
Maria Joao Rodrigues Pinto
Technical University of Lisbon, Portugal

A Hybrid Life Cycle Discussion of Environmental Impacts of the Construction Process (noon)
Melissa Bilec, University of Pittsburgh
Aurora Sharrard, Carnegie Mellon University

Case Studies I
Room 410

Density and Open Space: Ecology and Sustainable Site Design Provide Marketing Opportunity and Dollars for Development (10:30 a.m.)
Laura Nettleton
Perkins Eastman

Systems-Based Sustainability Assessment: A Method and Case Study (11 a.m.)
Annie Pearce
Georgia Tech Research Institute

A Hybrid Wind-Solar Power Model for Green Buildings Using Site-Specific Meteorological Data (11:30 a.m.)
Christopher Mutel
University of Iowa

Integrated Design and the Bottom Line (noon)
Lori Fitzgerald
Perkins Eastman

Monday, April 11
2–4:30 p.m.

Sustainable Water Purification
Room 408

Water and Sustainable Health (2 p.m.)
▶ **Bernard Goldstein**
University of Pittsburgh

Evaluating the Water Treatment Effectiveness of the Filtron (2:30 p.m.)
Angela R. Bielefeldt
University of Colorado, Boulder

Integrating Renewable Energy in Water Systems: Design Case Study for the Galapagos Island of Floreana (3 p.m.)
Xochitl Zamora-Thompson
University of Colorado, Boulder

Remote Site Chlorinator (3:30 p.m.)
A. Robert Marmo
Saxon Research Systems

Sustainable Energy Systems Design for Tribal Village Homes in India (4 p.m.)
Anu Ramaswami
University of Colorado at Denver Health Sciences Center

Green Construction Materials
Room 409

Fenestration's Contribution to a Greener Future (2 p.m.)
Michael B. Hill
TRACO

Modeling of Crack Formation and Failure of Surface Coatings (2:30 p.m.)
Benjamin A. Slavin
University of Pittsburgh

HARCwood—An Environmentally Sustainable Product and Process (3 p.m.)
Rohini Brahme
Houston Advanced Research Center

Compressive Testing and Analysis of a Typical Straw Wall Plaster (3:30 p.m.)
Stephen Vardy
Queen's University, Ontario, Canada

Acrylic Thermosets: A Green Chemistry Alternative to Formaldehyde Resins (4 p.m.)
Barry Weinstein
Rohm and Haas Company

University Based Initiatives
Room 410

The University of Florida: A Case Study in the Implementation of Sustainable Development at a Large Land Grant University (2 p.m.)
Charles J. Kibert
Powell Center for Construction and Environment
University of Florida

Designing a Campus of the 21st Century: Assessing the Feasibility of Rainwater Reuse in an Urban Setting (2:30 p.m.)
Dawn Henning
Columbia University

Sustainable Facilities and Infrastructure Training: Approaches, Findings, and Lessons Learned (3 p.m.)
Annie R. Pearce
Georgia Tech Research Institute

Research Experiences in Pollution Prevention and Sustainability for Undergraduates (3:30 p.m.)
Crystal Mattson
Rowan University

University Education Initiatives in Sustainability (4 p.m.)
David Hokanson
Sustainable Futures Institute
Michigan Technological University

Tuesday, April 12
8:30–10 a.m.

River Basin Management
Room 408

"Think Like an Ecosystem": Animating the Process of Ecological Design in Participatory Planning (8:30 a.m.)
Joanne Tippett
Centre for Urban and Regional Ecology
University of Manchester, England

Integrated Assessment of Water Quality Projects in a River Basin Context (9 a.m.)
Ying Luo
Newcastle University, United Kingdom

▶ Invited speakers

Creation of Monitoring System of the Dnipro River Basin to Protect Environment and Public Health (9:30 a.m.)
Ivan Sarwar
Foundation of Ecological Education and Development, Cherkassy, Ukraine

Green Construction and Health
Room 409

Environmental Sustainability Contributes to Health, Productivity, and Quality of Life (8:30 a.m.)
▶ **Vivian Loftness**
Carnegie Mellon University

A Framework for Accessing the Impact of Build Environment on Health (9 a.m.)
Jeen-Shang Lin
University of Pittsburgh

Impact of Indoor Environmental Quality on Health and Productivity and Implications for Building Design and Operation (9:30 a.m.)
▶ **William J. Fisk**
Lawrence Berkeley National Laboratory

Biotechnology for Sustainable Water Use
Room 410

Beneficial Reuse of Wastewater for Burlington County, New Jersey (8:30 a.m.)
Crystal Mattson
Rowan University

Sustainable, Environmentally Benign Thermoplastics Through Coupled Wastewater Treatment (9 a.m.)
Erik R. Coats
Washington State University

The Effect of Rhizostimulation in the Remediation of Polycyclic Aromatic Hydrocarbons (9:30 a.m.)
Cairn S. Ely
University of Connecticut

Tuesday, April 12
10:30 a.m.–12:30 p.m.

Sustainable Water Use in Industrial Processes
Room 408

Sustainability: A Technology Driver in Semiconductor and Nano-Scale Manufacturing (10:30 a.m.)
▶ **Farhang Shadman**
University of Arizona

Structural Characterizations of Bimetallic Pd/Cu Nanocatalysts for the Purification of Drinking Water (11 a.m.)
Judith C. Yang
University of Pittsburgh

Make Sustainable Development Work: Conserve Resources, Cut Emissions, and Generate Profits—Simultaneously (11:30 a.m.)
▶ **H. Dennis Spriggs**
Matrix Process Integration

Managing Freshwater Use by Thermoelectric Power Plants—A U.S. Department of Energy R&D Initiative (noon)
Barbara Carney
Department of Energy/National Energy Technology Laboratory

Technology for Optimizing Water Use in Buildings
Room 409

Implementation of Rainwater Collection Systems for Non-Potable Use Within Buildings (10:30 a.m.)
William R. Davis
Innovative Design, Inc.

Non-Potable Urban Reuse Using Membrane Bioreactor Technology (11 a.m.)
Ian C. Page
Enviroquip, Inc.

Development of a Micro-Distillation Appliance for Residential Wastewater Treatment (11:30 a.m.)
Frederick E. Becker
Oviation Products Corporation

Today's Fuel Cell and Cell Phone of Water and Wastewater Management (noon)
Clint Elston
Equaris Corporation

Case Studies II
Room 410

Quantifying Flows of Resources and Wastes During Construction of Milwaukee School of Engineering's Kern Center: Site and Concrete Construction (10:30 a.m.)
Robert G. Brillhart, Sigma Environmental Services, Inc.
Carol Diggelman, Milwaukee School of Engineering

Cost Implications of LEED Silver Certification for New House Residence Hall at Carnegie Mellon University (11 a.m.)
David A. Dzombak
Carnegie Mellon University

Alternative Residential Development: Keeping Cookie-Cutters in the Kitchen and Value Engineering with Residents in Mind (11:30 a.m.)
Thomas Bartnik
Perkins Eastman

Tuesday, April 12
2–4:30 p.m.

Economics, Design, and Procedures
Room 408

The Cost of Being Sustainable (2 p.m.)
▶ **David Eakin**
General Services Administration

Modifying the MEP Construction Delivery Process to Improve Life Cycle Value (2:30 p.m.)
Patrick Branch, Astorino
Arthur Bell Jr., Astorino
Ronald E. Mann, Astorino

Delivering Green Buildings: High Performance Processes for High Performance Projects (3 p.m.)
David Riley, Penn State University
Michael Horman, Penn State University

Case Studies III
Room 409

A Building Brings Daylight, Water Conservation, and Restoration to a Strip Mine Site (2:30 p.m.)
J. Gary Gardner
Davis Gardner Gannon Pope Architecture

Ecological Construction and On-Site Wastewater Treatment at Berea College, Kentucky (3 p.m.)
Buddy Williams
Van der Ryn Architects

Sustainable Solutions for Rwanda: A Case Study (3:30 p.m.)
Peter J. Bosscher
University of Wisconsin-Madison

Storm Water Engineering: From China to Hershey (4 p.m.)
Eric Tamulonis
Wallace Roberts & Todd, LLC

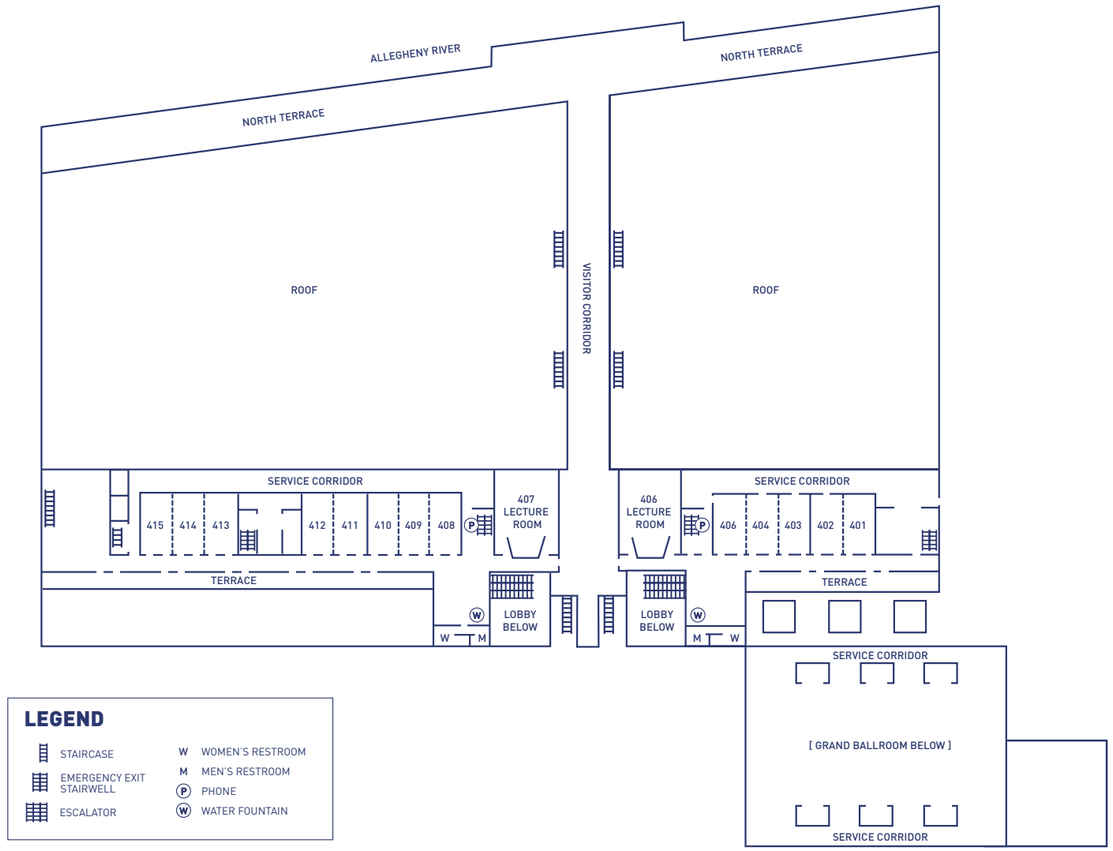
Poster Session and Social

Monday, April 11 from 5:30–7:30 p.m.
David L. Lawrence Convention Center, Garrison Street Overlook

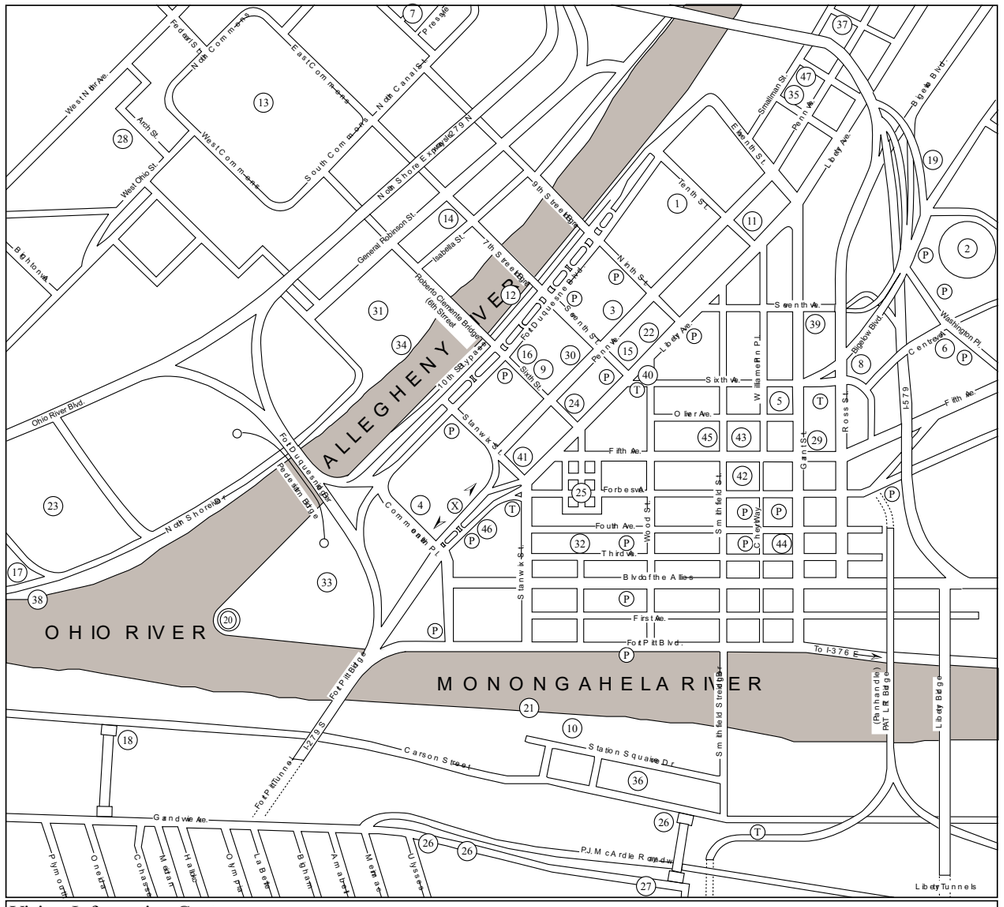
1	**The Sustainability Knowledge Base: The Right Information to the Right Person at the Right Time**	*Annie R. Pearce*	Georgia Tech Research Institute
2	**A Nervous System for Green Buildings**	*Jian Sun*	University of Pittsburgh
3	**Environmental and Economic Impacts of the Construction Site: On-Site Energy and Electricity Consumption**	*H. Scott Matthews*	Carnegie Mellon University
4	**Life Cycle Assessment of Residential Buildings**	*Luis Ochoa*	Carnegie Mellon University
5	**Review of Approaches for Characterizing, Propagating, and Communicating Uncertainty in Life Cycle Assessment**	*Shannon M. Lloyd*	University of Pittsburgh
6	**Life Cycle Assessment Optimization Model for Cogeneration Systems**	*Ayat Osman*	University of Pittsburgh
7	**Technology-Enabled Integration of Sustainability in the Life Cycle of Capital Projects**	*Jorge Vanegas*	Georgia Institute of Technology
8	**Polymeric Antifungal Surfaces**	*Richard Koepsel*	University of Pittsburgh
9	**Replacing Energy-Intensive Cements With Blast Furnace Waste That Has Been Enhanced Through the Addition of a Recycled Concrete Mineral Admixture**	*Nancy Whiting*	University of Pittsburgh
10	**Initial Commercial Application of Waste Coal Brixx**	*Michael E. Sawayda*	Pittsburgh Mineral & Environmental Technology
11	**Toward Environmentally Responsive Water Supply Systems: Live Cycle-Based Energy Use and GHG Emissions Inventories**	*Alina I. Racoviceanu*	University of Toronto
12	**Community Participation and Environmental Protection in the Construction of Mountain Roads: Promotion of the "Green Road" Approach in Nepal**	*K.C. Laxman*	Executive Council of Nepal, Green Chemistry Chapter Nepal
13	**A Research Protocol for Analyzing Green Building Construction**	*Kim LaScola Needy*	University of Pittsburgh
14	**Reuse of Materials in a Historic Building**	*Scott Fitzgerald*	Perkins Eastman
15	**Downtown Revitalization Through a Green Rehabilitation of a Historic Building for a Community Activity Center**	*Andrew Gast-Bray*	Sustainable West Virginia
16	**Design of a Green Roof With Integrated Monitoring Equipment**	*Megan Snyder*	Carnegie Mellon University
17	**Trade-Off Analysis for the 2020 Tower: A Case Study**	*Uta Krogmann*	Rutgers University
18	**Leapfrogging the First Cost Barrier in Sustainable Construction: A Taxonomy and Recommendations for the Next Generation of Costing Tools**	*Annie R. Pearce*	Georgia Tech Research Institute
19	**Using Moringa Oleifera for Water Treatment in Rural Communities in Southeastern Nigeria**	*Joachim Ibeziako Ezeji*	Rural Africa Water Development Project
20	**Understanding the Phytoremediative Characteristics of Sunflowers for Cadmium and Arsenic Uptake**	*Chantal Blake*	University of Pittsburgh
21	**Life Cycle Impact Assessment (LCIA) of a Food Product From Maize in South West Nigeria**	*Oludotun Dosunmu*	University of Lagos, Nigeria
22	**Estimating Life Cycle Energy Use and GHG Emissions for Water Treatment Systems**	*Alina I. Racoviceanu*	University of Toronto
23	**The Use of Ground Water, A Renewable Resource, for Cooling Applications at the David L. Lawrence Convention Center, Pittsburgh, Pennsylvania**	*William R. Gough*	P.G. Moody and Associates, Inc.
24	**Sustainable Construction in the Federal Sector: Federal Participation in LEED**	*Beverly Dyer*	U.S. Department of Energy
25	**Removal of Arsenic by Photochemical Oxidation**	*Chakrapani Sharma Acharya*	Department of Water Supply and Sewerage, Nepal
26	**Initial Construction Cost Premium of LEED Certification for the Children's Museum of Pittsburgh Project**	*Jonathan Machen*	Mascaro Construction Company LLP
27	**A Case Study of an Environmentally Sensitive Approach to Parking and Access Needs**	*Theresa Gay Rohall*	Powdermill Nature Reserve, Carnegie Museum of Natural History
28	**SEER—A Campus-Wide Institute at the Confluence of Environmental Research, Education, Outreach, and Practice**	*Deborah Lange*	Carnegie Mellon University
29	**Sandbag Dike Flood Protection Performance Evaluation Using Full-Scale Testing**	*Tim Krahn*	University of Manitoba
30	**An Ecological Engineering Approach to Pest Management: Slippery Rock University's Bat Conservancy**	*Steven Doherty*	Slippery Rock University
31	**Constructed Wetland Technology for Gray Water Remediation: A Pilot Study and Monitoring Project for Residential Use**	*Steven Doherty*	Slippery Rock University
32	**Rainwater Harvesting and Management in a University Campus**	*Daisy B. Badilla*	Ateno de Naga University, Philippines

Map of the David. L. Lawrence Convention Center

Fourth Floor



Map of Pittsburgh



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Sunday - closed

DOWNTOWN PITTSBURGH

HOTELS AND MEETING FACILITIES

1. David L. Lawrence Convention Center
2. Mellon Arena
3. Courtyard by Mariott
4. Hilton Pittsburgh
5. Omni William Penn
6. Pittsburgh Marriott City Center
7. The Priory - A City Inn
8. Ramada Plaza Suites and Conference Center
9. Renaissance Pittsburgh Hotel
10. Sheraton Hotel at Station Square
11. Westin Convention Center Hotel

ATTRACTION/POINTS OF INTEREST

12. Allegheny River Front Park
13. Allegheny Square
14. The Andy Warhol Museum
15. Benedum Center for the Performing Arts
16. Byham Theater
17. Carnegie Science Center
18. Duquesne Incline
19. Flag Plaza - Scout Center
20. Fountain at the Point
21. Gateway Clipper Fleet Dock
22. Harris Theater
23. Heinz Field
24. Heinz Hall for the Performing Arts
25. Market Square
26. Monongahela Incline
27. Mount Washington Overlook
28. National Aviary in Pittsburgh
29. One Mellon Bank Center
30. O'Reilly Theater
31. PNC Park
32. PPG Plaza
33. Point State Park
34. Roberto Clemente Park
35. The Senator John Heinz Pittsburgh Regional History Center
36. Station Square Complex and Shops
37. Strip District
38. USS Requin Submarine
39. USX Tower
40. Wood Street Galleries

SHOPPING

41. Fifth Avenue Place
42. Kaufmann's Department Store
43. Lord and Taylor
44. The Shops of One Oxford Centre
45. Saks Fifth Avenue

VISITOR INFORMATION CENTERS

46. Downtown
47. Heinz History Center

(X) Motorcoach Parking
(P) Public Parking
(T) Subway

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November 2004

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