FINAL PROGRAM

IEEE

International Symposium on

SUSTAINABLE SYSTEMS & TECHNOLOGY

SPONSORED BY
IEEE
COMPUTER SOCIETY
TECHNICAL COMMITTEE ON ELECTRONICS
& THE ENVIRONMENT

IEEE COMPUTER SOCIETY

May 17 – 19, 2010
Hilton Crystal City
Arlington, Virginia

2010 IEEE International Symposium on Sustainable Systems and Technology
May 17-19, 2010, Arlington, VA

Scope and Format

The IEEE Computer Society Technical Committee on Electronics and the Environment (TCEE) welcomes you to the 2010 IEEE International Symposium on Sustainable Systems and Technology (ISSST), known until 2008 as the International Symposium on Electronics and the Environment (ISEE).

ISSST provides an excellent opportunity for environmental and business professionals, design and manufacturing engineers, researchers, and government decision-makers interested in advancing practical sustainability solutions in the field to learn about leading edge research and initiatives.

Highlights of the 2010 ISSST program include:

- 18 sessions with topics spanning life-cycle stages from design to end-of-life and scales from nanotechnology to urban systems.
- A free tutorial session on EPEAT.
- Keynote address by Joel Garreau.

This year's event consists of 77 oral and 22 poster presentations on a diverse set of topics authored and presented by an international mix of speakers. A student technical paper contest and poster contest is organized to recognize student contributions to the advancement of knowledge on environmental impacts.

The organizers are interested in your views of the conference and the environmental aspects of the industry. Please share your views with the organizers and volunteer your time and effort to make future conferences successful.

We hope you find this event professionally and personally useful. It represents a unique opportunity to bring together all parties in the field to communicate progress and challenges to improve the sustainability of technology and society. We especially extend a warm welcome to our international participants, and wish them a pleasant stay in the Washington, DC area.

Braden Allenby
Scott Matthews
Conference Co-Chairs

Eric Masanet
Arpad Horvath
Program Co-Chairs

2010 IEEE International Symposium on Sustainable Systems and Technology

Organizing Committee

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Braden Allenby, *Arizona State University*

Scott Matthews, *Carnegie Mellon University*

Program Co-Chairpersons

Eric Masanet, *Lawrence Berkeley National Laboratory*

Arpad Horvath, *University of California, Berkeley*

Poster Session Chairpersons

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Eric Williams, *Arizona State University*

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Hong Chao Zhang, *Texas Tech University*

Thank You to Our Corporate Sponsors!

Poster Session and
Student Poster and Paper Competitions

MONDAY KEYNOTE PRESENTATION

"Radical Evolution"

Joel Garreau
Lincoln Professor of Law, Culture and Values
Arizona State University

Joel Garreau is the author of "Radical Evolution: The Promise and Peril of Enhancing Our Minds, Our Bodies – and What It Means to Be Human," published in 2005 by Doubleday. A long-time reporter and editor for The Washington Post, he is now a fellow of The New America Foundation, and is the Lincoln Professor of Law, Culture and Values at Arizona State University, where he heads The Prevail Project: Wise Governance for Challenging Futures. He has served as a fellow at the University of Cambridge, the University of California at Berkeley and George Mason University, and is an affiliate of the University of Oxford's James Martin 21st Century School. He is a member of Global Business Network, the pioneering scenario-planning organization, and is the troll of a small forest in the foothills of Virginia's Blue Ridge.

MONDAY TUTORIAL

An Overview and Update of EPEAT and the IEEE 1680 Standards

The dynamic growth of EPEAT will be described, including the status of new standards for Imaging Equipment and TVs, and adoption internationally and in the consumer sector. The tutorial will:

- Inform manufacturers who wish to participate in EPEAT.
- Help electronics recyclers understand how to be qualified for use by manufacturers to meet EPEAT.
- Explore how EPEAT fits within the several efforts by academia and others move electronic products toward sustainability.

Tutorial speakers:

Wayne Rifer, EPEAT Manager of Standards and Conformity Assessment

Holly Elwood, United States Environmental Protection Agency, Environmentally Preferable Purchasing Programming

Erin Gately, EPEAT Registry Services Manager

PROGRAM AT-A-GLANCE

	Time	ISSST Track 1: Products, Systems, and Services (Roanoke)	ISSST Track 2: Tools and Methods (Rappahanock)	ISSST Track 3: Special Topics and Critical Perspectives (James)
		Monday, May 17, 2010		
Registration (Foyer)	9:00-11:00am	**Free ISSST Tutorial Session** EPEAT Wayne Rifer, Holly Elwood, Erin Gately		
	11:00am-1:00pm	Lunch on your own		
	1:00pm-2:00pm	**Keynote Speaker (Dewey)**		
	2:00pm-2:15pm	Refreshment Break (Foyer)		
		Green Manufacturing	**LCA Methods and Applications I**	**Nanotechnology**
	2:15pm-2:45pm	*Modeling and Design of Multi-Step Separation Systems* Malima Wolf, Marcello Colledani, Stanley Gershwin and Timothy Gutowski	*Methodology for life cycle based assessments of the CO2 reduction potential of ICT services* Jens Malmodin, Nina Lövehagen and Dag Lundén	*Comparative Life Cycle Assessment: Reinforcing Wind Turbine Blades with Carbon Nanofibers* Laura Merugula, Vikas Khanna and Bhavik Bakshi
	2:45pm-3:15pm	*Environmental Analysis of Milling Machine Tool Use in Various Manufacturing Environments* Nancy Diaz, Moneer Helu, Stephen Jayanathan, Yifen Chen, Arpad Horvath and David Dornfeld	*Review of LCA Methods for ICT Products and the Impact of High Purity and High Cost Materials* Tim Higgs, Marissa Yao, Scott Stewart, Michael Cullen and Todd Brady	*Understanding Carbon Nanotube Electronic Products Through Their Life Cycle: A Regulatory Perspective* Lindsay Dahlben and Jacqueline Isaacs
	3:15pm-3:45pm	*The Role of Industrial Energy Efficiency in Meeting California's Greenhouse Gas Emission Reduction Targets* Eric Masanet	*Estimating Direct and Indirect Withdrawals of Water for Manufacturing Consumer Goods* Michael Blackhurst, Chris Hendrickson and H. Scott Matthews	*Minimum Exergy Requirements for the Manufacturing of Carbon Nanotubes* Timothy Gutowski, John Liow, and Dusan Sekulic
	3:45pm-4:15pm	*Sustainable Scale-up Studies of Atomic Layer Deposition for Microelectronics Manufacturing* Chris Yuan and Yangping Sheng	*Developing LCA Techniques for Emerging Systems: Game Theory, Agent-Based Modeling as Prediction Tools* Jose Alfaro, Benjamin Sharp, and Shelie Miller	*Desirability Functions for Optimizing Nanomanufacturing Production Scale-Up* Zeynep Ok, Jacqueline Isaacs, James Benneyan, Peter Antoinette, and Mark Banash
	4:15-4:45pm	*An Investigation of Indicators for Measuring Sustainable Manufacturing* Chengcheng Fan, John Carrell and Hong-Chao Zhang	*Industrial Ecology Network Optimization with Life Cycle Metrics* Joseph Fiksel and Bhavik Bakshi	
	5:00-7:00pm	**Poster Session and Reception (Decatur/Farragut)**		

		ISSST Track 1: Products, Systems, and Services (Roanoke)	ISSST Track 2: Tools and Methods (Rappahanock)	ISSST Track 3: Special Topics and Critical Perspectives (James)
	Time	**Tuesday May 18, 2010**		
Registration (Foyer)	7:00am-8:00am	ISSST/TCEE Committee Meeting (Charleston)		
		Breakfast (Farragut)		
		Renewable Energy Systems	**Sustainability Tools and Analyses I**	**Data Centers, Data Services, and Communications**
	8:00am-8:30am	*Promotion of Wind Generated Electricity Using Price Responsive Demand Side Management: Price Prediction Analysis for Imperfect Energy* Paddy Finn, Colin Fitzpatrick, Martin Leahy, and Liam Relihan	*A Tool to estimate Materials and Manufacturing Energy for a Product* Natalia Duque Ciceri, Timothy Gutowski and Marco Garetti	*Profiling Sustainability of Data Centers* Daniel Gmach, Yuan Chen, Amip Shah, Jerry Rolia, Cullen Bash, Tom Christian and Ratnesh Sharma
	8:30am-9:00am	*Experiences with Stakeholder Engagement in Transitioning to an Increased Use of Renewable Energy Systems* Efrain O'Neill, Cecilio Ortiz, Marla Perez and Scott Minos	*An Exergy Footprint Metric with Normalization Based on US Exergy Consumption per Capita* Reggie Caudill, Sun Olapiriyakul, and Brian Seale	*Reducing Lifecycle Energy Use of Network Switches* Priya Mahadevan, Amip Shah and Cullen Bash
	9:00am-9:30am	*The Environmental and Social Impacts of Biofuels Production in Japan* Lise Laurin and Kiyotada Hayashi	*Collaborative Filtering and Carbon Footprint Calculation* Joel Ross, Nitin Shantharam and Bill Tomlinson	*Techno-economic optimization of sustainable power for telecommunication facilities using a systems approach* David Picklesimer, Paul Rowley, David Parish, Harsha Bojja, Stephen Carroll and John Whitley
	9:30am-10:00am	*A Cradle to Grave Framework for Environmental Assessment of Photovoltaic Systems* Teresa W. Zhang and David A. Dornfeld	*An Integrated Architecture, Methods and Some Tools for Creating More Sustainable and Greener Enterprises* Paul Ranky	*Estimating the Changing Environmental Impacts of ICT-Based Tasks: A Top-Down Approach* Paul Teehan, Milind Kandlikar and Hadi Dowlatabadi
	10:00am-10:30am	Refreshment Break (Foyer)		

		ISSST Track 1: Products, Systems, and Services (Roanoke)	ISSST Track 2: Tools and Methods (Rappahanock)	ISSST Track 3: Special Topics and Critical Perspectives (James)
	Time	**Tuesday May 18, 2010**		
Registration (Foyer)		**Carbon Footprint of ICT**	**Sustainability Tools and Analyses II**	**Transportation**
	10:30am-11:00am	*Product Carbon Footprint (PCF) Assessment of Dell Laptop – Results and Recommendations* Scott O'Connell and Markus Stutz	*Sustainable Green Product Design and Manufacturing / Assembly Systems Engineering Principles and Rules with* Paul Ranky	*The Energy Impact of U.S. Passenger Vehicle Fuel Economy Standards* Lynette Cheah, John Heywood and Randolph Kirchain
	11:00am-11:30am	*Improving Methods to Estimate Energy and Carbon Footprints of Global Telecommunications* Marla Sanchez, H Scott Matthews and Christopher Weber	*Design-for-Environment (DFE) Guidelines for Nanomaterials-Containing Products* Sun Olapiriyakul and Reggie Caudill	*Assessment of Mobility, Energy, and Environment Impacts on IntelliDrive-based Cooperative Adaptive Cruise Control and Intelligent Traffic Signal Control* Kristin Malakorn and Byungkyu "Brian" Park
	11:30am-12:00pm	*Developing a Tool for Routine Carbon Footprint Assessment of Printing Systems* Jason Ord, Scott Canonico and Timothy Strecker	*Reducing Supply Chain Costs and Carbon Footprint during Product Design* Gül E. Okudan Kremer and Karl R. Haapala	*Impacts of Urban Traffic Signal Optimization on Fuel Consumption and Emission* Jaeyoung Kwak, Byungkyu "Brian" Park and Jsesup Lee
	12:00pm-12:30pm	*Data and Methodological Needs to Assess Uncertainty in the Carbon Footprint of ICT Products* Christopher Weber, Elsa Olivetti and Eric Williams	*ReLCD: Recycling and Re-Use of LCD Panels* Bernd Kopacek	*Modal Freight Transport Required for US Goods and Services Production* Rachael Nealer, Christopher Weber, Chris Hendrickson, and H. Scott Matthews
	12:30pm-2:00pm	**Luncheon and Awards Presentation - (Lunch Provided) (Decatur/Farragut)**		

		ISSST Track 1: Products, Systems, and Services (Roanoke)	ISSST Track 2: Tools and Methods (Rappahanock)	ISSST Track 3: Special Topics and Critical Perspectives (James)
	Time	Tuesday May 18, 2010		
Registration		**Urban Systems**	**LCA Methods and Applications II**	**Education**
	2:15pm-2:45pm	*Urban Systems, Cyberinfrastructure, and Security* Braden Allenby	*Application of the GeTLS EXIN Neuron for the Life Cycle Inventory of a Product* Antonino Marvuglia, Gordon Rios and Richard Wallace	*Curriculum Development for the Sustainability PhD Program at RIT* Paul Stiebitz, Gabrielle Gaustad, Callie Babbitt, Thomas Seager, and Nabil Nasr
	2:45pm-3:15pm	*The True Cost of Construction: An Analysis of the Carbon Dioxide Emissions from the Materials Used in a Pedestrian Bridge* Lauren Clark and Sigrid Adriaenssens	*Approaches and case studies for incorporating technological progress into LCA* Eric Williams	*Solar Panel Renewable Energy Inductive Learning* Cindy Orndoff
	3:15pm-3:45pm	*Environmental Analysis of Telework – What We Know, and What We Do Not Know and Why* Arpad Horvath	*Energy and Environmental Impacts of Consumer Purchases: A Case Study on Grocery Purchases* Rachael Nealer, Christopher Weber, H. Scott Matthews and Chris Hendrickson	*Problem-based Teaching / Learning Methods and Cases for Millennial Generation Engineering Students* Paul Ranky
	3:45pm-4:15pm	*Consensus Indicators of Sustainability for Urban Infrastructure* Karla Cedano and Manuel Martinez	*Performing a Water Footprint Assessment for a Semiconductor Industry* Tom Cooper and Joyann Pafumi	*Energy education in corporations* Rodrigo Cutri
	4:15pm-4:45pm	*Integrated water/energy infrastructure planning for sustainability* Ke Li, Eric Williams	*Enhancing the reliability of C and N accounting in economic activities: Integration ofBiogeochemical cycles with Ecologically Based Life Cycle* Shweta Singh and Bhavik Bakshi	*Developing a Social Capital Metric for Use in an Educational Computer Game* Zachary Gennett, Jacqueline Isaacs, and Thomas Seager

		ISSST Track 1: Products, Systems, and Services (Roanoke)	ISSST Track 2: Tools and Methods (Rappahanock)	ISSST Track 3: Special Topics and Critical Perspectives (James)
	Time	**Wednesday, May 19, 2010**		
Registration (Foyer)	7:00am-8:00am	Breakfast (Farragut)		
		Regulations and Standards	**Energy Analysis**	**Ethics and Policy Issues**
	8:00am-8:30am	*Trends in Energy Efficiency Regulation and Initiatives for Consumer External Power Supplies* John Hawley and Manthos Economou	*A MARKAL Model of State Electricity Generation* Todd Levin, Valerie Thomas and Audrey Lee	*Determining an Equitable Allocation Of Global Carbon Dioxide Emissions* Susan Spierre, Thomas Seager, and Evan Selinger
	8:30am-9:00am	*Predictive Market Demand Life Cycle Assessment: A Methodological Development and Case Study* Carol E. Girata, Hilary Grimes-Casey, Katie Whitefoot, W. Ross Morrow, James J. Winebrake, Gregory A. Keoleian, and Steven	*Energy Planning Using MESSAGE: The effect of large energy blocks in the Chilean system* David Watts and Victor Martinez	*Science or Politics? Problems with Advancing Environmental Policies in Managing Electronics Production.* Wenling Tu and Yujung Lee
	9:00am-9:30am	*Directions toward Environmentally Sustainable ICT As Defined through the Broad-based Stakeholder Consensus Process To develop the IEEE Family of Environmental Assessment Standards* Wayne Rifer	*A System for Disaggregating Residential Electricity Consumption by Appliance* Mario Berges, H Scott Matthews and Lucio Soibelman	*Debunking the Fallacy of the Individual Decision-maker: An Experiential Pedagogy for Sustainability Ethics* Thomas P. Seager, Evan Selinger, Daniel Whiddon and David Schwartz
	9:30am-10:00am	*Strength Analysis of International Feed-in Tariff Promotion of Clean Energy Applications for Greenhouse Gas Emission* Qiang Zhai, Samuel Alberts, Huajun Cao, Xiang Zhao and Chris Yuan	*Energy Payback for Systems Ensembles During Growth* Timothy Gutowski, Stanley Gershwin and Tonio Buonassisi	*Cost Benefit Optimization of Cistern Volume and Greenroof Area in the Florida Showcase Green Envirohome (FSGE)* Ni-Bin Chang, Marty Wanielista and Brain Rivera
	10:00am-10:15am	Refreshment Break (Foyer)		

		ISSST Track 1: Products, Systems, and Services (Roanoke)	ISSST Track 2: Tools and Methods (Rappahanock)	ISSST Track 3: Special Topics and Critical Perspectives (James)
	Time	Wednesday, May 19, 2010		
Registration (Foyer)		**End-of-Life Technologies and Systems**	**Analysis of Reuse and Remanufacturing**	**Materials and Sustainability**
	10:15am-10:45am	*Lifecycle Assessment of the Environmental Benefits of Remanufactured Telecommunications Product* Charles Goldey, Ernst-Ulrich Kuester, Renee Mummert, Thomas Okrasinski, Donald Olson and William Schaeffer	*Preliminary Feasibility Study on the Use of Mono-disposal Landfills for E-waste as Temporary Storage for Future* Ramzy Kahhat and Edward Kavazanjian	*Integrated Multiscale Modeling of Economic-Environmental Systems for Assessing Biocomplexity of Material Use* Vikas Khanna and Bhavik Bakshi
	10:45am-11:15am	*Modeling the Performance of E-waste Recovery Systems under Uncertainty* Boma Brown-West, Jeremy Gregory and Randolph Kirchain	*Appliance Remanufacturing and Life Cycle Energy and Economic Savings* Avid Boustani, Sahil Sahni, Stephen Graves and Timothy Gutowski	*Sustainable Developments For Flame Retardants* Susan Landry
	11:15am-11:45am	*Environmental and Economic Impacts of End-of-Life Decisions for Printer Cartridges in the US* Mark Krystofik	*A Method for Extracting Historical Thermal Data from Used PCs to Foster Reuse* Eanna Cronin, Stewart Hickey and Colin Fitzpatrick	*Significant Global Variability in a Facility-Level Greenhouse Gas Assessment of Primary Nickel* Matthew Eckelman
	11:45-12:15pm	*Bridging the Gap in Forward and Reverse Supply Chains for Evolving Electronic Products* Callie Babbitt and Erinn Ryen	*Investigating Reuse of B2C WEEE in Ireland* Maurice O'connell, Colin Fitzpatrick, and Stewart Hickey	*Characterization of Yield and Uncertainty During Aluminum Recycling* Tracey Brommer, Elsa Olivetti, Gabrielle Gaustad and Randolph Kirchain
	12:15-12:45pm	*Robust Analysis of Active Disassembly Process* John Carrell, Derrick Tate and Hong-Chao Zhang	*Reusing Personal Computer Devices – Good or Bad for the Environment?* Sahil Sahni, Avid Boustani, Timothy Gutowski and Steven Graves	*Balancing Material and Exergy Flows for a PCB Soldering Process: Method and Case Study* Subramaniam Sainganesh and Dusan P. Sekulic

MONDAY, MAY 17, 2010

FREE TUTORIAL

9:00-11 :00am
An Overview and Update of EPEAT and the IEEE 1680 Standards
Location: Roanoke

- Wayne Rifer, *EPEAT Manager of Standards and Conformity Assessment*
- Holly Elwood, *United States Environmental Protection Agency, Environmentally Preferable Purchasing Programming*
- Erin Gately, *EPEAT Registry Services Manager*

KEYNOTE ADDRESS

1:00-2:00pm
Radical Evolution
Joel Garreau, ASU
Location: Dewey

2:00-2:15pm
Refreshment Break
Location: Admiralty Foyer

TECHNICAL SESSIONS

2:15pm-4:45pm
TRACK 1: PRODUCTS, SYSTEMS, AND SERVICES
Green Manufacturing
Location: Roanoke

Modeling and Design of Multi-Step Separation Systems
Malima Wolf, Marcello Colledani, Stanley Gershwin, and Timothy Gutowski

Environmental Analysis of Milling Machine Tool Use in Various Manufacturing Environments
Nancy Diaz, Moneer Helu, Stephen Jayanathan, Yifen Chen, Arpad Horvath, and David Dornfeld

The Role of Industrial Energy Efficiency in Meeting California's Greenhouse Gas Emission Reduction Targets
Eric Masanet

Sustainable Scale-up Studies of Atomic Layer Deposition for Microelectronics Manufacturing
Chris Yuan and Yangping Sheng

An Investigation of Indicators for Measuring Sustainable Manufacturing
Authors: Chengcheng Fan, John Carrell, and Hong-Chao Zhang

2:15pm-4:45pm
TRACK 2: TOOLS AND METHODS
Life-Cycle Assessment (LCA) Methods and Applications I
Location: Rappahanock

Methodology for life cycle based assessments of the CO2 reduction potential of ICT services
Jens Malmodin, Nina Lövehagen, and Dag Lundén

Review of LCA Methods for ICT Products and the Impact of High Purity and High Cost Materials
Tim Higgs, Marissa Yao, Scott Stewart, Michael Cullen, and Todd Brady

Estimating Direct and Indirect Withdrawals of Water for Manufacturing Consumer Goods
Michael Blackhurst, Chris Hendrickson, and H. Scott Matthews

Developing LCA Techniques for Emerging Systems: Game Theory, Agent-Based Modeling as Prediction Tools
Jose Alfaro, Benjamin Sharp, and Shelie Miller

Industrial Ecology Network Optimization with Life Cycle Metrics
Joseph Fiksel and Bhavik Bakshi

2:15pm-4:45pm
TRACK 3: SPECIAL TOPICS AND CRITICAL PERSPECTIVES
Nanotechnology
Location: James

Comparative Life Cycle Assessment: Reinforcing Wind Turbine Blades with Carbon Nanofibers
Laura Merugula, Vikas Khanna, and Bhavik Bakshi

Understanding Carbon Nanotube Electronic Products Through Their Life Cycle: A Regulatory Perspective
Lindsay Dahlben and Jacqueline Isaacs

Minimum Exergy Requirements for the Manufacturing of Carbon Nanotubes
Timothy Gutowski, John Liow, and Dusan Sekulic

Desirability Functions for Optimizing Nanomanufacturing Production Scale-Up
Zeynep Ok, Jacqueline Isaacs, James Benneyan, Peter Antoinette, and Mark Banash

5:00pm-7:00pm
POSTER SESSION AND RECEPTION
Location: Decatur/Farragut

A Database and Characterization of Existing Lifespan Information of Electrical and Electronic Equipment
Masahiro Oguchi, Shinsuke Murakami, Tomohiro Tasaki, Ichiro Daigo, and Seiji Hashimoto

An Investigation of Indicators for Measuring Sustainable Manufacturing
Authors: Chengcheng Fan, John Carrell, and Hong-Chao Zhang

Bike Machine Energy Education
Sanford Jay Rotter, James Lee Ravenscroft, and Raul Gonzalez

Cloud Sustainability Dashboard - Dynamically Assessing the Sustainability of Cloud Computing Services
Martin Arlitt, Sujata Banerjee, Cullen Bash, Yuan Chen, Priya Mahadevan, Dejan Milojicic, Eric Pelletier, Amip Shah, Puneet Sharma, Christopher Hoover, Daniel Gmach, and Vishwanath RN

Developing a Business Model for Product Environmental Stewardship within IBM
Debra Horn and Greg Bone

Energy Concerns in Information and Communication Technology and the Potential for Photonics
Ece Gulsen, Elsa Olivetti, Lionel C. Kimerling, and Randolph Kirchain

Energy Model for Manufacturing Process A Case Study of Wind Turbine
Bingbing Li, Hong-Chao Zhang, and Qingdi Ke

Engineering Sustainable Engineers
Melanie Sattler, Kambiz Alavi, Victoria Chen, Steve Mattingly, Jamie Rogers, Yvette Weatherton, Benjamin Afotey, and Madhu Rani

Enhancing the Reliability of C and N Accounting in Economic Activities: Integration of Biogeochemical Cycles with Ecologically Based Life Cycle Assessment
Shweta Singh and Bhavik Bakshi

Greenhouse Gas Emission Mitigation of Global Automotive Manufacturing through Clean Energy Supply
Huajun Cao, Qiang Zhai, Samuel Alberts, Sean Zhao, and Chris Yuan

Identifying Barriers to Efficient Recovery and Sustainable End of Life Management of Electronic Waste
Erinn Ryen

Improving Aluminum Recycling Through Investigations of Thermodynamic Effects in Remelting
Tracey Brommer, Elsa Olivetti, and Randolph Kirchain

Incorporating Resilience into Life Cycle Assessments
Jeffery Plumblee, II and Leidy Klotz

Life Cycle Analysis of Plastics for Packaging: PVC and PET
Melissa Zgola, Elsa Olivetti, Jeremy Gregory, and Randolph Kirchain

Life Cycle Energy Consumption of Pultruded Flax Fiber Composites
Can B. Aktas, Melissa M. Bilec, Joe Marriott, Amy E. Landis, and Bhyrav Mutnuri

Modeling E-waste Recovery Systems under Uncertainty
Boma Brown-West, Jeremy Gregory, and Randolph Kirchain

Modeling Uncertainty in Greenhouse Gas Emissions of Biomass Feedstocks
Aimee Curtright, David Johnson, Henry Willis, and Constantine Samaras

The Contributions of Logistics to Enhance Energy-Efficiency in Freight Traffic
Doris Humpl

The Economic Cost of a Carbon Tax on the Personal Computer Market
Kiara Corrigan, Amip Shah, and Chandrakant Patel

TUESDAY, MAY 18, 2010

7:00am-8:00am
Continental Breakfast
Location: Farragut

TECHNICAL SESSIONS

8:00am-10:00am
TRACK 1: PRODUCTS, SYSTEMS, AND SERVICES
Renewable Energy Systems
Location: Roanoke

Promotion of Wind Generated Electricity Using Price Responsive Demand Side Management: Price Prediction Analysis for Imperfect Energy Storage
Paddy Finn, Colin Fitzpatrick, Martin Leahy, and Liam Relihan

Experiences with Stakeholder Engagement in Transitioning to an Increased Use of Renewable Energy Systems
Efrain O'Neill, Cecilio Ortiz, Marla Perez, Ivan Baiges, and Scott Minos

The Environmental and Social Impacts of Biofuels Production in Japan
Lise Laurin and Kiyotada Hayashi

A Cradle to Grave Framework for Environmental Assessment of Photovoltaic Systems
Teresa W. Zhang and David A. Dornfeld

8:00am-10:00am
TRACK 2: TOOLS AND METHODS
Sustainability Tools and Analyses I
Location: Rappahanock

A Tool to estimate Materials and Manufacturing Energy for a Product
Natalia Duque Ciceri, Timothy Gutowski, and Marco Garetti

An Exergy Footprint Metric with Normalization Based on US Exergy Consumption per Capita
Reggie Caudill, Sun Olapiriyakul, and Brian Seale

Collaborative Filtering and Carbon Footprint Calculation
Joel Ross, Nitin Shantharam, and Bill Tomlinson

An Integrated Architecture, Methods and Some Tools for Creating More Sustainable and Greener Enterprises
Paul Ranky

8:00am-10:00am
TRACK 3: SPECIAL TOPICS AND CRITICAL PERSPECTIVES
Data Centers, Data Services, and Communications
Location: James

Profiling Sustainability of Data Centers
Daniel Gmach, Yuan Chen, Amip Shah, Jerry Rolia, Cullen Bash, Tom Christian, and Ratnesh Sharma

Reducing Lifecycle Energy Use of Network Switches
Priya Mahadevan, Amip Shah, and Cullen Bash

Techno-Economic Optimization of Sustainable Power for Telecommunication Facilities Using a Systems Approach
David Picklesimer, Paul Rowley, David Parish, Harsha Bojja, Stephen Carroll, and John Whitley

Estimating the Changing Environmental Impacts of ICT-Based Tasks: A Top-Down Approach
Paul Teehan, Milind Kandlikar, and Hadi Dowlatabadi

10:00-10:30am
Refreshment Break
Location: Admiralty Foyer

TECHNICAL SESSIONS

10:30am-12:30pm
TRACK 1: PRODUCTS, SYSTEMS, AND SERVICES
Carbon Footprint of Information and Communication Technologies (ICT)
Location: Roanoke

Product Carbon Footprint (PCF) Assessment of Dell Laptop – Results and Recommendations
Scott O'Connell and Markus Stutz

Improving Methods to Estimate Energy and Carbon Footprints of Global Telecommunications
Marla Sanchez, H Scott Matthews, and Christopher Weber

Developing a Tool for Routine Carbon Footprint Assessment of Printing Systems
Jason Ord, Scott Canonico, and Timothy Strecker

Data and Methodological Needs to Assess Uncertainty in the Carbon Footprint of ICT Products
Christopher Weber, Elsa Olivetti, and Eric Williams

10:30am-12:30pm
TRACK 2: TOOLS AND METHODS
Sustainability Tools and Analyses II
Location: Rappahanock

Sustainable Green Product Design and Manufacturing / Assembly Systems Engineering Principles and Rules with Examples
Paul Ranky

Design-for-Environment (DFE) Guidelines for Nanomaterials-Containing Products
Sun Olapiriyakul and Reggie Caudill

Reducing Supply Chain Costs and Carbon Footprint during Product Design
Ming-Chuan Chiu, Ahmed J. Alsaffar, Gül E. Okudan, and Karl R. Haapala

ReLCD - Recycling and ReUse of LCDs
Bernd Kopacek

10:30am-12:30pm
TRACK 3: SPECIAL TOPICS AND CRITICAL PERSPECTIVES
Transportation
Location: James

The Energy Impact of U.S. Passenger Vehicle Fuel Economy Standards
Lynette Cheah, John Heywood, and Randolph Kirchain

Assessment of Mobility, Energy, and Environment Impacts on IntelliDrive-based Cooperative Adaptive Cruise Control and Intelligent Traffic Signal Control
Kristin Malakorn and Byungkyu "Brian" Park

Impacts of Urban Traffic Signal Optimization on Fuel Consumption and Emissions
Jaeyoung Kwak, Byungkyu "Brian" Park, and Jsesup Lee

Modal Freight Transport Required for US Goods and Services Production
Rachael Nealer, Christopher Weber, Chris Hendrickson, and H Scott Matthews

LUNCHEON AND AWARDS PRESENTATION

12:30-2:00pm
Location: Decatur/Farragut

TECHNICAL SESSIONS

2:15pm-4:45pm
TRACK 1: PRODUCTS, SYSTEMS, AND SERVICES
Urban Systems
Location: Roanoke

Urban Systems, Cyberinfrastructure, and Security
Braden Allenby

The True Cost of Construction: An Analysis of the Carbon Dioxide Emissions from the Materials Used in a Pedestrian Bridge
Lauren Clark and Sigrid Adriaenssens

Environmental Analysis of Telework – What We Know, and What We Do Not Know and Why
Arpad Horvath

Consensus Indicators of Sustainability for Urban Infrastructure
Karla Cedano and Manuel Martinez

Integrated Water/Energy Infrastructure Planning for Sustainability
Ke Li and Eric Williams

2:15pm-4:45pm
TRACK 2: TOOLS AND METHODS
Life-Cycle Assessment (LCA) Methods and Applications II
Location: Rappahanock

Using GeTLS EXIN Learning for the Life Cycle Inventory Problem
Antonino Marvuglia, Gordon Rios, and Richard Wallace

Approaches and Case Studies for Incorporating Technological Progress into LCA
Eric Williams

Energy and Environmental Impacts of Consumer Purchases: A Case Study on Grocery Purchases
Rachael Nealer, Christopher Weber, H. Scott Matthews, and Chris Hendrickson

Performing a Water Footprint Assessment for a Semiconductor Industry
Tom Cooper and Joyann Pafumi

Enhancing the Reliability of C and N Accounting in Economic Activities: Integration of Biogeochemical Cycles with Ecologically Based Life Cycle Assessment
Shweta Singh and Bhavik Bakshi

2:15pm-4:45pm
TRACK 3: SPECIAL TOPICS AND CRITICAL PERSPECTIVES
Education
Location: James

Curriculum Development for the Sustainability PhD Program at RIT
Paul Stiebitz, Gabrielle Gaustad, Callie Babbitt, Thomas Seager, and Nabil Nasr

Solar Panel Renewable Energy Inductive Learning
Cindy Orndoff

Problem-Based Teaching / Learning Methods and Cases for Millennial Generation Engineering Students Interested in Sustainable Green Engineering
Paul Ranky

Energy Education in Corporations
Rodrigo Cutri

Developing a Social Capital Metric for Use in an Educational Computer Game
Zachary Gennett, Jacqueline Isaacs, and Thomas Seager

WEDNESDAY, MAY 19, 2010

7:00am-8:00am
Continental Breakfast
Location: Farragut

TECHNICAL SESSIONS

8:00am-10:00am
TRACK 1: PRODUCTS, SYSTEMS, AND SERVICES
Regulations and Standards
Location: Roanoke

Trends in Energy Efficiency Regulation and Initiatives for Consumer External Power Supplies
John Hawley and Manthos Economou

Predictive Market Demand Life Cycle Assessment: A Methodological Development and Case Study
Carol E. Girata, Hilary Grimes-Casey, Katie Whitefoot, W. Ross Morrow, James J. Winebrake, Gregory A. Keoleian, and Steven J. Skerlos

Directions Toward Environmentally Sustainable ICT as Defined Through the Broad-Based Stakeholder Consensus Process to Develop the IEEE Family of Environmental Assessment Standards
Wayne Rifer

Strength Analysis of International Feed-in Tariff Promotion of Clean Energy Applications for Greenhouse Gas Emission Mitigation
Qiang Zhai, Samuel Alberts, Huajun Cao, Sean Zhao, and Chris Yuan

8:00am-10:00am
TRACK 2: TOOLS AND METHODS
Energy Analysis
Location: Rappahanock

A MARKAL Model of State Electricity Generation
Todd Levin, Valerie Thomas, and Audrey Lee

Energy Planning Using MESSAGE: The Effect of Large Energy Blocks in the Chilean System
David Watts and Victor Martinez

A System for Disaggregating Residential Electricity Consumption by Appliance
Mario Berges, H Scott Matthews, and Lucio Soibelman

Energy Payback for Systems Ensembles During Growth
Timothy Gutowski, Stanley Gershwin, and Tonio Buonassisi

8:00am-10:00am
TRACK 3: SPECIAL TOPICS AND CRITICAL PERSPECTIVES
Ethics and Policy Issues
Location: James

Determining an Equitable Allocation Of Global Carbon Dioxide Emissions
Susan Spierre, Thomas Seager, and Evan Selinger

Science or Politics? Problems with Advancing Environmental Policies in Managing Electronics Production
Wenling Tu and Yujung Lee

Debunking the Fallacy of the Individual Decision-maker: An Experiential Pedagogy for Sustainability Ethics
Thomas P. Seager, Evan Selinger, Daniel Whiddon, David Schwartz, Susan Spierre, and Andrew Berardy

Cost Benefit Optimization of Cistern Volume and Greenroof Area in the Florida Showcase Green Envirohome (FSGE)
Ni-Bin Chang, Marty Wanielista, and Brain Rivera

10:00-10:15am
Refreshment Break
Location: Admiralty Foyer

TECHNICAL SESSIONS

10:15am-12:45pm
TRACK 1: PRODUCTS, SYSTEMS, AND SERVICES
End-of-Life Technologies and Systems
Location: Roanoke

Lifecycle Assessment of the Environmental Benefits of Remanufactured Telecommunications Product within a 'Green' Supply Chain
Charles Goldey, Ernst-Ulrich Kuester, Renee Mummert, Thomas Okrasinski, Donald Olson and William Schaeffer

Modeling the Performance of E-waste Recovery Systems under Uncertainty
Boma Brown-West, Jeremy Gregory, and Randolph Kirchain

Environmental and Economic Impacts of End-of-Life Decisions for Printer Cartridges in the US
Mark Krystofik

Bridging the Gap in Forward and Reverse Supply Chains for Evolving Electronic Products
Callie Babbitt and Erinn Ryen

Robust Analysis of Active Disassembly Process
John Carrell, Derrick Tate and Hong-Chao Zhang

10:15am-12:45pm
TRACK 2: TOOLS AND METHODS
Analysis of Reuse and Remanufacturing
Location: Rappahanock

Preliminary Feasibility Study on the Use of Mono-disposal Landfills for E-waste as Temporary Storage for Future Mining
Ramzy Kahhat and Edward Kavazanjian, Jr.

Appliance Remanufacturing and Life Cycle Energy and Economic Savings
Avid Boustani, Sahil Sahni, Stephen Graves, and Timothy Gutowski

A Method for Extracting Historical Thermal Data from Used PCs to Foster Reuse
Eanna Cronin, Stewart Hickey, and Colin Fitzpatrick

Investigating Reuse of B2C WEEE in Ireland
Maurice O'Connell, Colin Fitzpatrick, and Stewart Hickey

Reusing Personal Computer Devices – Good or Bad for the Environment?
Sahil Sahni, Avid Boustani, Timothy Gutowski, and Steven Graves

10:15am-12:45pm
TRACK 3: SPECIAL TOPICS AND CRITICAL PERSPECTIVES
Materials and Sustainability
Location: James

Integrated Multiscale Modeling of Economic-Environmental Systems for Assessing Biocomplexity of Material Use
Vikas Khanna and Bhavik Bakshi

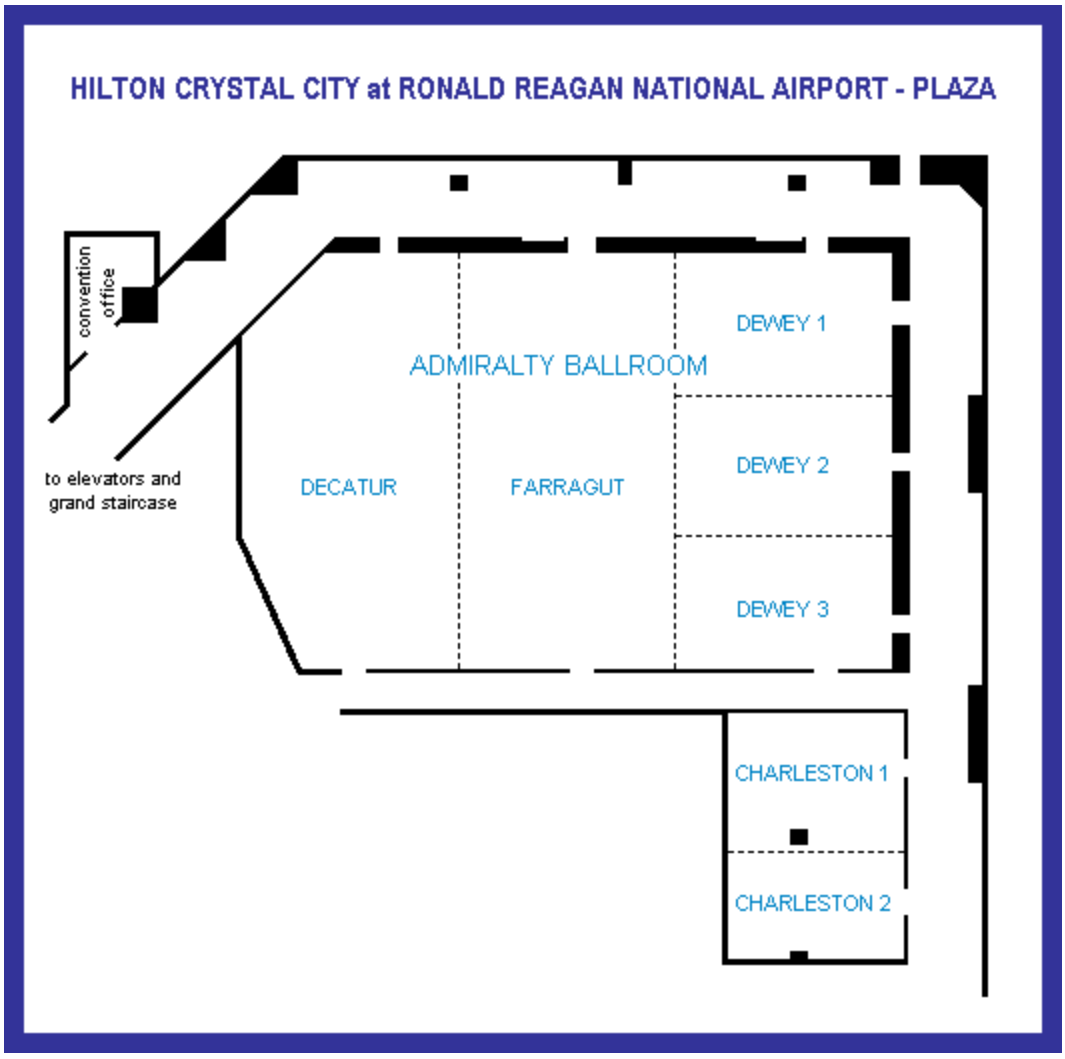
Sustainable Developments For Flame Retardants
Susan Landry

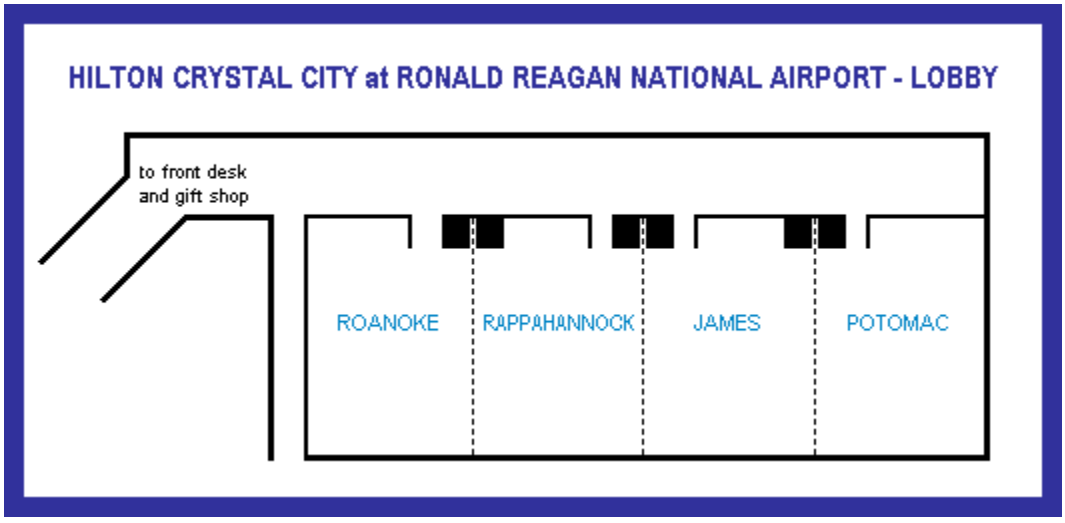
Significant Global Variability in a Facility-Level Greenhouse Gas Assessment of Primary Nickel
Matthew Eckelman

Characterization of Yield and Uncertainty During Aluminum Recycling
Tracey Brommer, Elsa Olivetti, and Randolph Kirchain

Balancing Material and Exergy Flows for a PCB Soldering Process: Method and Case Study
Subramaniam Sainganesh and Dusan P. Sekulic

HILTON CRYSTAL CITY FLOORPLANS





TCEE Executive Committee Structure

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Chair:	**H. Scott Matthews**
Vice Chair:	**Braden Allenby**
Treasurer:	**Arpad Horvath**
Secretary:	**Eric Masanet**

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Conferences:	**Braden Allenby**
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