

2008 IEEE International Symposium on Electronics and the Environment

**San Francisco, CA
19-22 May 2008**



IEEE Catalog Number:
ISBN 13:

CFP08SEE-PRT
978-1-4244-2272-2

Table of Contents

Environmental Sustainability in the Semiconductor Industry	1
<i>John Harland, Ted Reichelt, Marissa Yao</i>	
Comparison of Life Cycle Impact Assessment Tools in the Case of Biofuels	7
<i>Amy E. Landis, Thomas L. Theis</i>	
EPEAT Uncloaked Challenges for the Future of IEEE 1680 and EPEAT	14
<i>Wayne Rifer, Vicky Salazar, Jeff Omelchuck</i>	
Sustainability: Educating Informally.....	15
<i>C. Orndoff</i>	
Seeking Opportunities to Reduce Life Cycle Impacts of Consumer Goods- An Economy-Wide Assessment.....	19
<i>Y. Anny Huang, H. Scott Matthews</i>	
Trade of Secondhand EEE from Japan to Developing Asia - the Need for Policy Development Based on Actor Analysis	25
<i>Chika Aoki-Suzuki, Yasuhiko Hotta, Magnus Bengtsson, Akira Ogihara</i>	
What goes around comes around? High levels of cadmium in low cost jewelry	26
<i>Dr. Martin Streicher-Porte, Alexandra Buckenmayer, Dr. Susanne Pfenninger</i>	
Sustainability review of the international reverse chain for reuse and recycling of computers	31
<i>Eric Williams, Ramzy Kahhat, Braden Allenby, Edward Kavazanjian, Ming Xu, Junbeum Kim</i>	
Educating Engineers in the Anthropocene	37
<i>Brad Allenby</i>	
Recycling Advanced Batteries	40
<i>Steven E. Sloop</i>	
Key GHG Emission Reduction Strategies of Climate Leader Companies.....	41
<i>Ronald E. Meissen, Patrick D. Eagan</i>	
Assessing User Behaviour for Changes in the Design of Energy Using Domestic Products.....	47
<i>E. W. A. Elias, E. A. Dekoninck, S. J. Culley</i>	
Quantifying the Environmental Impacts of Labor	53
<i>Teresa W. Zhang, David A. Dornfeld</i>	
Trends in the Environmental Impacts of CMOS Manufacturing	54
<i>Sarah B. Boyd, Nikhil Krishnan, David Dornfeld</i>	
RFID Signalling to Stimulate Reuse of Personal Computers.....	55
<i>Eanna Cronin, Stewart Hickey, Colin Fitzpatrick</i>	
Life Cycle Inventories for Nanomanufactured Carbon Nanotube Products.....	56
<i>Lindsay J. Dahlben, Jacqueline A. Isaacs</i>	
End-of-life Management of Cell Phones in the United States	57
<i>V. Doctori Blass, M. Fuji, J. Neira, L. Favret, S. Mahdavi, R. Miller, R. Geyer</i>	
Increased Efficiency of Wind Generated Electricity using Demand Side Management	58
<i>Paddy Finn, Colin Fitzpatrick, Martin Leahy, Edin Omerdic</i>	
Characterizing Architectural Options for Electronic Waste Recycling Systems.....	59
<i>Susan A. Fredholm, Jeremy R. Gregory, Randolph E. Kirchain</i>	
E-Market for E-Waste.....	60
<i>Ramzy Kahhat, Junbeum Kim, Ming Xu</i>	
Halogen-Free FR Systems for Advanced Printed Circuit Boards.....	61
<i>Nikolas Kaprinidis, Sabine Fuchs, Ciba Corporation</i>	

Table of Contents

Energy and Environmental Flow Model for a Sustainable Networked Book Delivery System in the United States.....	62
<i>Junbeum Kim, Ming Xu, Ramzy Kahhat, Braden Allenby, Eric Williams</i>	
Assessing the Sustainability of the Material Recovery System for CRT Glass	63
<i>Marie-Claude Nadeau, Jeremy Gregory, Randolph Kirchain</i>	
Can Renewable Energy Meet Africa's Development Needs?.....	64
<i>Adaora Okwo</i>	
Complexity in Urban Systems: ICT and Transportation1.....	65
<i>Braden Allenby</i>	
Power generation - Sustainable or not?	68
<i>Preethi Rao, Srikanth Pingali</i>	
Understanding Population Dynamics of WEEE Recycling System in the Developing Countries: A SIR Model	69
<i>Tienhua Wu, Yenming J. Chen</i>	
Forecasting Computer Sales and Generation of End-of-Life Computers in the U.S.....	70
<i>Yan Yang, Eric Williams</i>	
Manufacturability and Sustainability Analysis of Nano-Scale Manufacturing	71
<i>Chris Y. Yuan, David Dornfeld</i>	
The Dynamics of the Availability of Platinum Group Metals for Electronics Manufacturers	72
<i>Elisa Alonso, Frank R. Field, Randolph E. Kirchain</i>	
Market Dynamics and Environmental Impacts of E-commerce: A Case Study on Book Retailing.....	73
<i>Ming Xu, Junbeum Kim, Ramzy Kahhat, Braden Allenby</i>	
Estimation of Secondhand Personal Computer Import and Export in Asian Region	79
<i>Aya Yoshida, Tomohiro Tasaki, Atsushi Terazono</i>	
Comparison of Simplified LCA Variations for Three LCA Cases of Electronic Products from the Ecodesign Point of View	83
<i>Jani Valkama, Marika Keskinen</i>	
Proposal and feasibility assessment of "tele-inverse manufacturing"	89
<i>Mitsutaka Matsumoto, Nozomu Mishima, Keijiro Masui, Shinsuke Kondoh</i>	
A Problem Based Learning (PBL) Module on Electronics & the Environment	95
<i>Colin Fitzpatrick</i>	
Thermodynamics and Recycling, A Review	101
<i>Timothy G. Gutowski</i>	
Thermodynamics The guidepost of effective use of energy	106
<i>Elias P. Gyftopoulos</i>	
Design and Assessment of a Sustainable Networked System in the U.S.; Case study of Book Delivery System	109
<i>Junbeum Kim, Ming Xu, Ramzy Kahhat, Braden Allenby, Eric Williams</i>	
Remanufacturing process planning for IT equipment	114
<i>Stylianios Chiotellis, Sebastian Kernbaum, Günther Seliger</i>	
Preparation The Sustainable Use of Flame Retardants in the Electronics Industry	120
<i>Raymond B. Dawson, Susan D. Landry</i>	
Modeling the Economic and Environmental Performance of Recycling Systems.....	121
<i>Jeffrey B. Dahmus, Susan A. Fredholm, Elsa A. Olivetti, Jeremy R. Gregory, Randolph E. Kirchain</i>	

Table of Contents

Environmental Implications of RFID	127
<i>Valerie M. Thomas</i>	
The Energy and Greenhouse Gas Emission Impacts of Telecommuting in the U.S.	132
<i>Kurt W. Roth, Todd Rhodes, Ratcharit Ponoum</i>	
Proposal For An E-waste Management System For The United States.....	138
<i>Ramzy Kahhat, Junbeum Kim, Ming Xu, Braden Allenby, Eric Williams</i>	
Original Equipment Manufacturer End-of- Life Equipment Collection Metrics.....	144
<i>Elsa A. Olivetti, Jeremy Gregory, Randolph E. Kirchain</i>	
Environmental and Health Assessment for California Printed Circuit Board Manufacturing: Providing Guidance for Pollution Prevention Opportunities	150
<i>Carl W. Lam, Xiaoying Zhou, Pauline Batarseh, Thomas Green, Kim Wilhelm, Julie M. Schoenung</i>	
Measures and Trends in Energy Use of Semiconductor Manufacturing.....	155
<i>Liqiu Deng, Eric Williams</i>	
Probabilistic and Monte Carlo Risk Models for Carbon Nanomaterial Production Processes.....	161
<i>Zeynep D. Ok, Jacqueline A. Isaacs, James C. Benneyan</i>	
How Much Electricity Do You Use? An Activity To Teach High School Students About Energy Issues.....	167
<i>Paulina Jaramillo, Joe Marriott, Deanna H. Matthews</i>	
Analysis of different biodegradable materials and its technique to produce dishware	172
<i>Xiujie Jia, Jianfeng Li, Fangyi Li, Baokun Wei</i>	
Does Standardized High-Tech Park Development Fit Diverse Environmental Conditions: Environmental Challenges in Building Central Taiwan Science Park.....	177
<i>Wenling Tu, Yujung Lee</i>	
Environmental Life Style Analysis (ELSA).....	183
<i>Timothy Gutowski, Amanda Taplett, Anna Allen, Amy Banzaert, Rob Cirinciore, Christopher Cleaver, Stacy Figueredo, Susan Fredholm, Betar Gallant, Alissa Jones, Jonathan Krones, Barry Kudrowitz, Cynthia Lin, Alfredo Morales, David Quinn, Megan Roberts, Robe</i>	
Forecasting Sales and Generation of Obsolete Computers in the U.S.	188
<i>Yan Yang, Eric Williams</i>	
An Integrated Impact Assessment and Weighting Methodology: Evaluation of the Environmental Consequences of Lead-Free Solder Alternatives.....	194
<i>Xiaoying Zhou, Julie M. Schoenung</i>	
Environmental Performance Characterization of Atomic Layer Deposition.....	200
<i>Chris Y. Yuan, David Dornfeld</i>	
Rethinking of Recycling and Reuse Options of Obsolete Personal Computers in China	206
<i>Jianxin Yang, Bin Lu</i>	
Simultaneous Disassembly of PCBs Based on Components Reusability Assessment	211
<i>Yang Jiping, Xiang Dong, Gao Peng, Cheng Yang, Duan Guanghong</i>	
Using Feedback to Enhance Use Phase Efficiency of Personal Computers.....	212
<i>S. Hickey, C. Fitzpatrick</i>	
The New Process in Integrated E-waste Management in China.....	218
<i>Xuefeng Wen, Xiaohua Zhou, Hualong Hu</i>	
The Application of the International Resource Recycling System (IRRS) to encouragement of Electronic Waste Recycling- the Case of Fuji Xerox.....	224
<i>Masachika Suzuki, Logakanthi Subramanian, Tomio Watanabe, Hiroyuki Hasegawa</i>	
SUSTAINABLE ENERGY GENERATION	229
<i>Preethi Rao, Srikanth Pingali</i>	

Table of Contents

Case Studies in Energy Use to Realize Ultra- High Purities in Semiconductor Manufacturing.....	233
<i>Nikhil Krishnan, Eric D. Williams, Sarah B. Boyd</i>	
Creating and Applying a Shared Vision of Sustainable ICT	239
<i>Jeff Omelchuck</i>	
Improving Environmental Information Handling and Data Exchange within the Electronics Industry	240
<i>Eric Simmon, John Messina</i>	
Model of Cost and Mass for Compact Sized Lightweight Automobiles using Aluminum & High Strength Steel.....	245
<i>Hyung-Ju Kim, Colin Mcmillan, Greg Keoleian, Steven J. Skerlos</i>	
Engineering Students Game to Green the Automobile Supply Chain	251
<i>Jacqueline A. Isaacs, Jay T. Laird, Thomas P. Seager</i>	
Development of the Supply Chain Optimization and Planning for the Environment (SCOPE) Tool - Applied to Solar Energy	257
<i>Corinne Reich-Weiser, Tristan Fletcher, David A Dornfeld, Steve Horne</i>	
Rethinking Product Design for Remanufacturing to Facilitate Integrated Product Service Offerings.....	263
<i>Erik Sundin, Mattias Lindahl</i>	
Improvement in Electricity Distribution Efficiency to Mitigate Pollution IEEE ISEE (May 2008).....	269
<i>Aditya Pyasi, Vishal Verma</i>	
Moisture Absorption Phenomena in Green Composite Printed Circuit Board Prototypes.....	270
<i>John D. Lincoln, Andrew A. Shapiro, Jean-Daniel M. Saphores, Oladele A. Ogunseitan</i>	
Improvement of home appliances design based on energy-saving concept: case studies on hair dryer and coffee maker	276
<i>Hua Li, Hong-Chao Zhang, Derrick Tate, John Carrell</i>	
A LCIA Weighting System Based on China Environmental Policy and Local Manufacturing Industry Situation.....	279
<i>Fangyi Li , Jianzhi Li, Jianfeng Li</i>	
The Role and Value of Information for Supply Loop Management: Framework and Application for the End-Of-Life Cell Phone Industry	280
<i>Vered Doctori-Blass, Roland Geyer</i>	
Application of WEEE / E-waste inventorization methodology using tracer tracking along material flow in EEE lifecycle in developing country.....	286
<i>Amit Jain</i>	
Lifetime Exergy Consumption of an Enterprise Server	290
<i>Christopher R. Hannemann, Van P. Carey, Amip J. Shah, Chandrakant Patel</i>	
Characterizing Architectural Options for Electronic Waste Recycling Systems.....	295
<i>Susan A. Fredholm, Jeremy R. Gregory, Randolph E. Kirchain</i>	
Opportunity for Landfill Gas-to-Energy Projects in the U.S.....	301
<i>Dexin Luo, Valerie Thomas</i>	
Understanding Population Dynamics of WEEE Recycling System in the Developing Countries: A SIR Model	302
<i>Tienhua Wu, Yenming J. Chen</i>	
Energetic and Environmental Evaluation of Titanium Dioxide Nanoparticles.....	308
<i>Geoffrey F. Grubb, Bhavik R. Bakshi</i>	
Design of the full biodegradable and single-use dishware mold based on automatic ejection technology.....	314
<i>Anfu Guo, Jianfeng Li, Fangyi Li, Yong Yang</i>	

Table of Contents

TurbSim: Reliability-based Wind Turbine Simulator	315
<i>Joseph T. Foley, Timothy G. Gutowski</i>	
Estimating Regional Material Flows for LCDs	320
<i>Seung-Jin Lee, Joyce Cooper</i>	
A Case Study of Life Cycle Assessment (LCA) on Ballast for Fluorescent lamp in Malaysia	326
<i>Sitty Nur Syafa Bakri, Salmijah Surif, Rajeswari K. Ramasamy</i>	
Using FMEA and FAHP to Risk Evaluation of Green Components.....	330
<i>Chia-Wei Hsu, Allen H. Hu, Wei-Cheng Wu</i>	
A Case Study of the Availability of Platinum Group Metals for Electronics Manufacturers.....	336
<i>Elisa Alonso, Frank R. Field, Randolph E. Kirchain</i>	
A Framework for Risk Management and End- Of-Life (EOL) Analysis for Nanotechnology Products: A Case Study in Lithium-Ion Batteries.....	342
<i>Sun Olapiriyakul, Reggie J. Caudill</i>	
Recycling Plastics from Electronic Scrap: A Case Study.....	348
<i>Puneet Shrivastava, Alex Abadi, Hassan Mohrekeh, Hong C Zhang</i>	
A Thermodynamic Framework for Analyzing and Improving Manufacturing Processes	349
<i>Matthew Branham, Timothy G. Gutowski, Alissa Jones, Dusan P. Sekulic</i>	
Sustainability of Plastics Used in the Electrical, Electronics Equipment Market.....	355
<i>Patrick Meyer, Kelly Polich, Rob Krebs, D'lane Wisner</i>	
Sources of Variability and Uncertainty in LCA of Single Wall Carbon Nanotubes for Li-ion Batteries in Electric Vehicles.....	356
<i>Thomas P. Seager, Ryne P. Raffaelle, Brian J. Landi</i>	
Estimating exergy renewability for sustainability assessment of corn ethanol	361
<i>Christopher D. Cummings, Thomas P. Seager</i>	
Can Renewable Energy Meet Africa's Development Needs?	367
<i>Adaora Okwo</i>	
Assessing Life Cycle Environmental Implications of Polymer Nanocomposites.....	368
<i>Vikas Khanna, Bhavik R. Bakshi, L. James Lee</i>	
Microchip Reuse: Environmental Rationale and Design Implications	374
<i>R. Geyer, J. Oliver, R. Amirtarajah, V. Akella, F. T. Chong</i>	
A Thermodynamic Metric for Process Quality Assessment in Manufacturing: Pb vs. Pb-free Solders Spreading Case Study.....	376
<i>Dusan P. Sekulic, Hui Zhao, Wen Liu</i>	
A Efficiency Improvement Methodology for Active Mode Efficiency Regulation.....	382
<i>Young-Bae Park, Hang-Seok Choi</i>	
Brominated Flame Retardants Voluntary Emissions Control Action Program (VECAPTM).....	387
<i>Glade E. Squires</i>	
Social Impact of ICT services -Different Impact in Different Countries-.....	390
<i>Kazue Ichino Takahashi, Masayuki Tsuda, Jiro Nakamura, Yasunari Matsuno, Yoshihiro Adachi</i>	
EPEAT Expansion - Moving Beyond Computers.....	393
<i>John Katz, Holly Elwood</i>	
Energy Efficiency Meets Ecodesign - Technology Impacts of the European EuP Directive.....	394
<i>Karsten Schischke, Nils F. Nissen, Lutz Stobbe, Herbert Reichl</i>	

Table of Contents

Use of Industrial By-Products in Urban Transportation Infrastructure: argument for increased industrial symbiosis.....	400
<i>Alberta C. Carpenter, Kevin H. Gardner</i>	
The Technical and Broader Societal Impact of Organic Photovoltaics	407
<i>Roderick K. Jackson, Diogenes Placendia, Cecile Domercq, Neil Armstrong, Samuel Graham</i>	
DfE for products distributed across borders.....	408
<i>Keijiro Masui</i>	