INTERNATIONAL SOCIETY FOR INDUSTRIAL ECOLOGY

Industrial Ecology for a Sustainable Future

29 JUNE - 2 JULY 2003 -- UNIVERSITY OF MICHIGAN

Industrial Ecology for a Sustainable Future

The International Society for Industrial Ecology (ISIE) promotes industrial ecology as a way of finding innovative solutions to complicated environmental problems and facilitates communication among scientists, engineers, policymakers, managers and others who are interested in how environmental concerns and economic activities can be better integrated.

This conference highlights the contributions that industrial ecology can make towards attaining a sustainable future for the planet and its population. The ISIE conference provides a forum to introduce theoretical advances and to discuss practical experience, to learn about IE modeling and to explore the human dimension of applying IE in corporate, public policy, and consumer decision making. The ISIE Governing Council, Organizing Committee, and Technical Committee, thank you for joining us at the 2003 ISIE Conference.

2003 Conference Organizing Committee

Edgar Hertwich**, *Norwegian University of Science and Technology(NTNU)*
Gregory Keoleian**, *University of Michigan, Center for Sustainable Systems*
Jonathan Bulkley, *University of Michigan, Center for Sustainable Systems*
Helaine Hunscher, *University of Michigan, Center for Sustainable Systems*

*** Denotes Conference Co-Chair*

The Committee extends special thanks to Greg Kozak, Melissa Vernon, Ian Penn, Michael Sadowski, Laura Flanigan, Carole Shadley, Serge Medow, and Sanja Drinkovic for all of their help and support in planning this meeting.

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Sunday, 29 June 2003

9:00 AM - 3:00 PM Short Courses

Life Cycle Assessment: Process-based, Input/Output and Hybrid Methods
Instructors: Gregory Norris, Olivier Jolliet, Sangwon Suh
Room: Electronic Education & Resources - Room E1405

Life cycle inventory (LCI) modeling can be based on process models or economic input output models. Each of these above methods has its strengths and weaknesses. That is why the current application frontier represents syntheses of both methods, "hybrid" LCA. The purpose of this course is to enable attendees to develop a practical and solid basis of understanding and familiarity with process LCA, IO LCA, and hybrid methods. A computer lab will be provided for the course.

Designing and Operating Eco-Industrial Parks
Instructors: Ray Cote, Marian Chertow & Ernie Lowe
Room: Paton Hall - Room P1016

This course is designed for practitioners involved in the planning and implementation of eco-industrial parks, designers and planners interested in exploring new eco-industrial parks as well as researchers studying the industrial ecological features of eco-industrial developments. It will go through the characteristics of eco-industrial parks and other eco-industrial developments, discuss the financing, and present strategies to overcome the barriers to eco-industrial development. Four case studies will be presented.

System Dynamics in Industrial Ecology
Instructors: Klaus Vogstad
Room:Davidson Hall - Room E0402 (moved from D1279)

System Dynamics was developed during the 50ies by Jay W. Forrester at MIT. Originally developed to solve complex management problems within industry, it turned out to be a general method that could be applied in many areas, from industrial management problems to global environmental problems, urban planning, energy planning etc. The most famous studies are Limits to Growth, Urban Dynamics and Industrial Dynamics. The course will introduce system dynamics using a computer modeling environment developed especially for system dynamics. Examples will illustrate how the dynamic modeling of stocks and flows in system dynamics can address problems in industrial ecology.

Industrial Ecology and Optimization
Instructors: Urmila Diwekar
Room: Paton hall - Room P1018

This course provides an introduction to the optimization methods and tools to be used in the various areas of industrial ecology. It is a broad course designed to address the interdisciplinary nature of industrial ecology. The course covers wide variety of topics starting with linear programming, nonlinear programming, discrete optimization, multi-objective optimization, and optimization under uncertainty.

Buffet lunch for short course participants from 12:00 PM-1:00 PM, in D1275.

Sunday, 29 June 2003

12:00 - 3:00 PM **ISIE Administrative Meeting**
Assembly Hall - Board Room (moved from Wolverine Room)

3:30 - 5:30 PM **Technical Session (T1)**

Session: **16. Indicators, Metrics, and Corporate Sustainability Reporting**
Location: **Paton Center – Room P1016**
Chair: **Thomas Koellner**

Start Time	
3:30	*The E-Equity Index: The Use of Industrial Ecology Principles to Benchmark Sustainable Business Practices for Power Generation Facilities* (Makansi, Stallard, Earney)
3:50	*Sustainability Assessment of Eco-ethical Investment Funds: Principles and Method* (Koellner)
4:10	*A Set of Sustainability Indicators for Metallic Raw Material Flows -A Decision Support Approach* (Kuckshinrichs, Huettner, Poganietz)
4:30	*Evaluation of LEED Green Building Rating Program Using Life Cycle Assessment Methods* (Keoleian, Scheuer)
4:50	*Sustainability Assessment and Reporting for the University of Michigan's Ann Arbor Campus* (Rodríguez, Roman, Sturhahn, Terry, Bulkley, Keoleian)

Session: **15. The Spatial Dimension of IE**
Location: **Paton Center – Room P1018**
Chair: **Stefan Anderberg, Christian Bauer**

Start Time	
3:30	*Mapping Metal Habitats - Development of Site Specific Indicators on Global Scales* (Bauer)
3:50	*The Strategic Assessment of Value-chain and Environment (SAVE) Methodology: Demonstrated for the Case of Copper* (Giurco, Stewart, Petrie)
4:10	*Regional Material Flow Analysis for Environmentally Sustainable Basin Regional Management* (Fujita, Morioka, Tanji)
4:30	*Urban Consumption, Cash Crops and Human Night Soil: GIS Modeling on the Determinant of Hinterland Agriculture in Early Modern Japan* (Tajima)
4:50	*Multi-Scale Industrial Symbiosis* (Chertow)
5:10	*Constructing a Symbiosis with Inspiration from Kalundborg - The Avedøre Project (*Anderberg, Krüger Troelsen)

Sunday, 29 June 2003

Session:	**19. IE and Management/Operations Research**
Location:	**Assembly Hall - Michigan Room**
Chair:	**Urmila Diwekar**
Start Time	
3:30	*Options Theory and Sustainability* (Duggempudi, Diwekar)
3:50	*Optimizing End-of-Life Economics within the Environmental Constraints of Extended Producer Responsibility* (Johnson, Wang)
4:10	*A Life Cycle and Cost Analysis for Reverse Logistics: The Case of a Reusable Packaging System* (Cagno, Tardini, Trucco)
4:30	*Evaluating Recycling and Disposal Options for Batteries: The AHP Multicriteria Analysis Approach Compared to a Fuzzy-Sets Methodology* (Halog, Sagisaka, Inaba)
4:50	Oscillations in Material Supply Chains with Recycling (Vogstad, Melum, Bohne)
Session:	**01. Material/Substance Flow Analysis**
Location:	**Assembly Hall - Wolverine Room**
Chair:	**Ester van der Voet, Iddo Wernick**
Start Time	
3:30	*Resource Use and Economic Development: A Dematerialization Analysis for the EU-15 from 1980 to 2000* (Weisz, Hubacek)
3:50	*Decoupling Economic Growth from Dissipative Flows* (Holmberg, Karlsson)
4:10	*Dynamic Substance Flow Analysis: Integrating Substance Flow and Stock Models to Analyze the Long Term Consequences of Recycling* (Elshkaki, van der Voet)
4:30	*Data Cube Models for Physical Flow Data* (Löfving, Grimvall)
4:50	*Dynamic Modeling for Material Flow Analysis in the Resource Cycle of Passenger Vehicles* (Reuter, van Schaik)
5:10	*Industrial Ecology of Information Society - The Weight of Information* (Suh)

Sunday, 29 June 2003

Session: **18. Sustainable Consumption**
Location: **Davidson Hall - Room D1279**
Chair: **Annika Carlson-Kayama, Maurie Cohen**
Start Time

3:30 *Sustainable Consumption - The Case of Consumer's Choice in Tokyo* (Aoyagi-Usui, Shirai, Miwa)

3:50 *Household Energy Use: Generation Matters* (Carlsson-Kanyama, Linden, Eriksson)

4:10 *Sustainability Tools for Buyer Decision Making* (Brown, Smith, Wilmanns)

4:30 *A Cross-National Comparison of Sustainable Consumption Politics and Policy* (Cohen)

4:50 *Improving Environmental Systems Analysis: From Simple LCA to Sophisti cated Production and Consumption Modeling* (Huppes, Udo de Haes, Suh)

5:30 - 7:30 PM **Conference Kick-off Reception**
Alessi Courtyard

Brief address by Rosina Bierbaum, *Dean, School of Natural Resources and Environment, U of M*

7:00 - 10:00 PM **JIE Editorial Board Meeting**
Ford Conference Center Board Room

7:30 - 9:30 PM **EIEAsia Steering Committe Meeting**
Paton Center - Room P1004

Monday, 30 June 2003

7:30 - 8:30 AM **Continental Breakfast**
Ford Conference Center Lobby

7:30 - 8:30 AM **ISIE Newsletter Editorial Meeting**
Paton Center - Room P1004

8:30 - 9:30 AM Plenary I

Location: Hale Auditorium

Welcoming Remarks
John Ehrenfeld, *Executive Director, ISIE*

Ford Rouge Center Case Study in Sustainability
Timothy J. O'Brien, Ford Vice President, Corporate Relations

In May, 1999, Bill Ford announced that the Company would seek to transform the Rouge from the icon of 20th century industrial manufacturing into a model of 21st century sustainable manufacturing. The Rouge was famous as Henry Ford's model of vertical integration and mass production. This presentation will discuss the business case supporting Bill Ford's vision of a world-class manufacturing center, which is also environmentally superior. Among the environmental innovations which will be discussed are natural stormwater management, phytoremediation and the world's largest green roof, over 10 acres, on the new Dearborn Truck Plant.

9:30 - 10:00 AM **Morning Break**
Ford Conference Center

Monday, 30 June 2003

10:00 - 12:00 AM Technical Session (T2)

Session: **08. The Social Dimension/Side of Industrial Ecology**
Location: **Paton Center – Room P1016**
Chair: **Kristan Cockerill, Faye Duchin**

Start Time	
10:00	*Modeling the Economic Effects of a Material Efficiency Strategy in the Paper Cycle: Application of a Linked Model System* (Nathani)
10:20	*Characterization and Classification of By-product and Waste Exchange Relationships* (Zeman, Hennings)
10:40	*A Multi-Agent Model of a Polluting Firm* (Andrews, Axtell)
11:00	*Socio-metabolic Regimes, Time-use and the Environment* (Fischer-Kowalski)
11:20	*Shaping the Past and Future Paths of Industrial Ecology:* The Case of Mining Industry in the Murmansk Region of North-West Russia (Salmi)

Session: **17. Sustainable Transportation**
Location: **Paton Center – Room P1018**
Chair: **Yuichi Moriguchi**

Start Time	
10:00	*Sustainable Consumption of Transportation — Technological Development and Specific Fuel Consumption in the Swedish Car-fleet* (Holmberg, Karlsson)
10:20	*An Index of the Ecological Impacts of Water Toxics Emitted to Freshwater Ecosystems* (Papasavva, Beltramo, Cadle)
10:40	*Moving to Cleaner Vehicles: Policies and Programs Promoting China's Sustainable Development of the Automotive Industry* (Zhao)
11:00	*Product Inventory of the Swedish Railway Infrastructure- Implications for Influencing Upstream Environmental Impact* (Svensson, Eklund)
11:20	*A Performance Evaluation of Data and Models Used to Assess the Health Impacts of Transportation Systems in LCA* (McKone)
11:40	*Impacts of Transportation on the Urban Metabolism* (Kennedy, Sahely, Fung)

Monday, 30 June 2003

Session:	**11. Industrial Ecology Tools – Examples, Practical Experiences, and Critical Evaluation**
Location:	**Assembly Hall - Michigan Room**
Chair:	**Henrikke Baumann, Rene Klein, Diana Bauer**
Start Time	
10:00	*Ecolabel Certification for Travertine Slabs* (Cutaia, Massacci, Materazzo)
10:20	*Dynamic Frameworks for Industrial Ecology* (Suh, Huppes, Kleijn, Nikolic, Udo de Haes, Frenken, Vogstad, Wilting)
10:40	*Dynamic Modelling Of Complex Interconnected Metals Cycles* (Verhoef, Reuter, Dijkema)
11:00	*Environmental Performance of a Metals Industry Facility: Industrial Production Chain Analysis* (Neto, Kroeze, Pulles)
11:20	*Systems Analysis Tools for Promoting Effective Energy / Minerals — Partnerships in Regional Development* (Petrie, Basson, Stewart, Cohen)
11:40	*Using a Baseline Sustainability Footprint Analysis for a Commercial Operation* (Stough)
Session:	**01. Material/Substance Flow Analysis**
Location:	**Assembly Hall - Wolverine Room**
Chair:	**Ester van der Voet, Iddo Wernick**
Start Time	
10:00	*Elemental Cycles: A Status Report on Human or Natural Dominance* (Klee, Graedel)
10:20	*Recycling in Industrial and Ecological Systems: A Comparison* (Levine)
10:40	*Origin and Destination of Waste: Accounting and Analysis of Waste Flows by Means of Physical Input-output Tables* (Mäenpää, Muukkonen)
11:00	*Materials Flow Analysis of Organic Pollutants and Suspended Solids in the Tamsui River and Kaoping Stream Valleys in Taiwan* (Hsiao, Wernick, Yu, Lu, Kuo)
11:20	*Weighing the Materials: The Impact of the Kilograms* (van der Voet, van Oers, Nikolic)
11:40	*Flexibility of Industrial Material Flow Networks* (Moeller, Viere)

Monday, 30 June 2003

Session: 18. Sustainable Consumption
Location: Davidson Hall - Room D1279
Chair: Annika Carlson-Kayama, Maurie Cohen
Start Time

10:00 *Pollution Embodied in Import and Export and its Relevance for the Environmental Profile of Norwegian Households* (Hertwich, Erlandsen, Aasness, Sørensen, Hubacek)

10:20 *Sustainable Consumption Analysis using Dynamic IO LCA and Consumer Choice Theory* (Norris, Amlin)

10:40 *Lifetime-involved Substance Flow Analysis of Durable Goods: A Case Study of Brominated Flame Retardants in TV Sets in Japan* (Tasaki, Osako, Sakai)

11:00 *Dietary Habit Change Impact on Biomass Utilization and Energy Consumption: Energy Flow Analysis of Japan's Food System* (Zuo, Matsumoto)

11:20 *Sustainable Consumption at City Level: Evaluating and Changing The House hold Metabolism In Five European Cities* (Moll, Noorman)

12:00 - 1:30 PM **Lunch**
Alessi Courtyard
Student Chapter Meeting
Davidson Hall - Room D1275

1:30 - 3:30 PM Technical Session (T3)

Session: 07. Policy Cases
Location: Paton Center – Room P1016
Chair: Clint Andrews, Frans Berkhout
Start Time

1:30 *Telecommuting and Air Pollution* (Kitou, Horvath)

1:50 *Application of Industrial Ecology to Identifying Pollution Prevention Strate gies: Successes and Barriers to Success* (Panero, Boehme, Powers, Shaikh)

2:10 *Industrial Ecology- New Strategies for Developing Economies* (Ramaswamy)

2:30 *The Importance of Strategic Decisions in Sustainable Development* (Wennersten, Brandt)

2:50 *Environmental Systems Analysis of Sector Politics* (Engström, Carlsson Kanyama, Finnveden)

3:10 *Technological Change and the Environment: Rethinking the Porter Hypoth esis* (Managi, Opaluch, Jin, Grigalunas)

Monday, 30 June 2003

Session: **17. Sustainable Transportation**
Location: **Paton Center – Room P1018**
Chair: **Stella Papasavva**
Start Time

1:30 *Analysis of Materials Use in PEM Fuel Cell Vehicles* (Cooper)

1:50 *Life Cycle Inventory of a Future Fuel Cell Vehicle* (Melaina)

2:10 *Recycling Proton Exchange Membrane (pem) Fuel Cell Systems* (Papasavva, Privette, Coyle, Legati, Frisch, Paul)

2:30 *Towards a Sustainable Personal Transport Sector: Assessing the Potential of Cellulosic-Derived Ethanol* (MacLean, Griffin, Joshi, Lave)

2:50 *The Environmental Impacts of Cruise Ships: A Preliminary Use Phase Life-Cycle Inventory and Regulatory Analysis* (Polityka, Commoy, Chatfield, Bulkley)

3:10 *Mobility Contribution Metric* (Cors, Burns, Knight)

Session: **13. Sustainable Manufacturing**
Location: **Assembly Hall - Michigan Room**
Chair: **Tim Gotustui, Chihiro Watanabe**
Start Time

1:30 *Seeking Sustainability; Why Only for Some?* (Powell, Peters)

1:50 *Efficiency, Eco-efficiency and the Environment* (Gutowski, Dahmus)

2:10 *Toward a Sustainable Plastics Supply* (Rios, Stuart, Grant)

2:30 *Comparative Life Cycle Assessment of Portland Cement Manufacture from Contaminated Sediments vs. Conventional Materials* (Seager, Gardner, Dalton, Weimer)

2:50 *Rapid Enumeration of Bacteria in A Model Metalworking Fluid for Sustainable Metal Fabrication* (Chang, Rihana, Gruden, Adriaens)

3:10 *Life Cycle Assessment that Leads to Improved Environmentally Conscious Manufacturing of Automobiles* (Zhang, Mihelcic, Crittenden, Shonnard)

Monday, 30 June 2003

Session:	**01. Material/Substance Flow Analysis**
Location:	**Assembly Hall - Wolverine Room**
Chair:	**Ester van der Voet, Iddo Wernick**
Start Time	
1:30	*Material and Economic Flows in the Global Production Chain for High-purity Silicon* (Williams, Heller)
1:50	*Material Flow Analysis with Time-Dependent Stocks and Flows : A Case Study from the UK Iron and Steel Sector* (Davis, Ley, Geyer, Clift, Jackson, Sansom)
2:10	*Input Output model of Japanese Material Flow for Metals* (Murakami, Adachi, Mogi)
2:30	*Meso-scale MFA for Filling the Gap Between MFA in Nation-wide-economy and MFA in Micro-economy - Sectoral Decomposition and Spatial Decompo sition* (Moriguchi, Imura, Tanikawa)
2:50	*The Stocks and Flows of Nitrogen and Phosphorus in Finland* (Antikainen)
3:10	*Materials Flow Analysis (MFA) based Indicators of Sustainable Develop ment* (Wernick, Cassara, Rogich)
Session:	**14. Input-Output Analysis in LCA and MFA**
Location:	**Davidson Hall - Room D1279**
Chair:	**Sangwon Suh, Shinichiro Nakamura**
Start Time	
1:30	*Industrial Ecology of Portuguese Glass Products based on Hybrid Input-Output Analysis* (Ferrão, Nhambiu, Suh)
1:50	*Hybrid Life Cycle Assessment of Natural Gas Based Fuel Chains and End use in Transportation* (Strømman, Halvorsen, Hertwich)
2:10	*An Empirical Analysis of Hazardous and Other Wastes Embodied in the 1995 Japanese Economy* (Kagawa, Hashimoto, Inaba, Moriguchi)
2:30	*Environmental Impact and Economic Cost of Acceptance of Waste in Construction Industry: Analysis by Dynamic Extension of Waste Input-Output Analysis* (Yokoyama)
2:50	*Input-Output Analysis for Environmental Effect of Newly Developing Steel Recycling Technology* (Nakajima, Uchiyama, Halada)
3:10	*Decision Analytic Extension of Waste Input-Output Model Based on Linear Programming* (Kondo, Nakamura)

Monday, 30 June 2003

3:30 - 5:30 PM Poster Session (P1)

Location: Phelps Lounge

More than 70 posters will be presented at Poster Sessions P1 and P2. Like the technical sessions, these posters cover a diverse array of topics relevant to industrial ecology. Poster Session (P2) is scheduled for Tuesday from 3:30 -5:30 PM. Students will compete for "Best Student Poster Award" during this Poster Session P1.

From the Cow to the Kitchen Table - Opportunities for Reducing the Environmental Impact of Milk Transports in Denmark (Pedersen, Anderberg*)

Life Cycle Assessment of Thermal Treatment Technologies - An Environmental and Financial Systems Analysis of Gasification, Incineration and Landfilling of Waste (Assefa*, Eriksson, Frostell)

Historical Perspectives on Copper Usage in North America, a Residence Time Analysis (Bertram*, Spatari, Graedel, Gordon)

Construction of a Recycling System. Knowledge production and distribution of power The Case of Copenhagen (Bohne*, Mathiassen)

Measuring Corporate Sustainability (Burdick)

Decision Support Tools for Sustainable Product and Process Chain Management (Choi)

Multiobjective Decision-Making in Environmental Design: Facilitating Objective Valuation (Clayton*, Saunders)

Evaluating Sustainability at the Communal Level Using a Multi-regional Environmentally Extended Input-Output Model - with a Case Study of Vevey in Switzerland (Corbière-Nicollier*, Suh)

Indicators used to Plan an Environmental Strategy to Convert a Cluster into an Eco-Industrial Park (Gabarrell*, Sendra, Vicent)

The Industrial Ecology of an Italian "Tourist Farm": EMAS Application within the GESAMB Project (Galatola*, Canese, Russo)

Material Flow Analysis for Spain (1980-2000) (Cañellas, Gonzalez*, Puig, Russi, Sendra, Sojo)

Six Indicators of Material Cycles: Application to a Single Class of Product (Hashimoto*, Moriguchi)

The Role of Champions in Establishing Eco Industrial Parks. Focus: Komsomolske, Ukraine (Hewes)

Monday, 30 June 2003

Technical and Legitimation Uncertainty in Industrial Ecology Analyses of a Chemical Controversy (Howard)

Application of Information Management to Improve Material Accounting Techniques (Hung*, Low, Moore)

Computerization of Life Cycle Assessment (Wang, Xiao, Huppes*, Heijungs)

Input/Output Life Cycle Assessment of Air Transportation (Kaenzig*, Norris, Jolliet)

An Input-Output Approach for Tracking the Flow of Resources through an Industrial Ecology (Kraines)

Industrial Ecology and Regional Sustainable Development in Central and Eastern Europe. The Case of the Voivodship of Lodz, Poland (Kronenberg)

How can industrial ecology support regional planning? (Kronenburg)

Environmental Assessment of Different Waste Management Options of Recovered Waste Wood (Krook*, Mårtensson, Eklund)

Review of Life Cycle Assessment Activities in India (Kurani*, Sharma)

Reducing Dissipative Copper for Sustainable Consumption: A Revelation from Substance Flow Analysis of Copper in Hong Kong (Li*, Koenig)

A Nation-wide Case Study towards Environmentally Sustainable Transportation in Japan (Moriguchi*, Matsuhashi, Kudoh, Terazono, Hayashi, Yagishita, Kato, Doi, Suzuki, Tsuchiya, Masumoto, Komeiji, Sakurada)

Dynamic Allocative Efficiency of Environmental Burdens in the Japanese Economy (Nansai*, Kagawa, Moriguchi)

Information Flow Based Conceptual Framework and Model for Analysis of the Co-Evolution of Biosphere and Society, and Development of Novel Control Strategies and Management Options (Nikolic*, van der Voet, Huppes, Huele)

Combining Input-Output Analysis and Risk Analysis; a Case Study of Increasing Insulation in the US Homes (Nishioka*, Levy, Bennett, Norris, Spengler)

Incubating Sustainable Development: The interplay of Community Development Corporations and Eco-Industrial Parks as a means of generating Economic Development (Salcido)

Shaping the Past and Future Paths of Industrial Ecology: The Case of Mining Industry in the Murmansk Region of North-Western Russia (Salmi)

Life Cycle and Economic Investigation of Kenaf Reinforced HDPE Shipping Pallets (Seager*, Saliklis)

Designing a Chemical Cluster to Get a Sustainable Production (Sendra*, Gabarrel)

Composting Toilets Versus Conventional Toilets: A Comparison of Waste Treatment Technologies in an Institutional Setting (Taylor)

Thermodynamic Methods for Measuring Environmental Sustainability of Industrial Sectors (Ukidwe*, Bakshi)

Industrial Ecology of Norwegian Consumption of Paper (Vogstad*, Strømman, Suh)

Introduction of China Experience on Eco-industrial Park (Wang Z.*, Wang R., Liu, Wang M.)

Separation of Mixed Color Toner Waste For Reuse (A. Williamson*, B. Williamson, Theis, Powers, Campbell)

5:30 - 6:30 PM Technical Session (T4)

Session:	**18. Sustainable Consumption**
Location:	**Paton Center – Room P1016**
Chair:	**Annika Carlson-Kayama, Maurie Cohen**
Start Time	
5:30	*Ecological Impacts of Urban Household Consumption in China* (Liu, Yang, and Wang)
5:50	*The Dynamic Changes of Phosphorous Flow in a Swedish City, 1870-2000* (Schmid)
6:10	*Effects of the Information Technology Revolution on the Energy Embodied in Consumption* (Williams, Hatanaka)
Session:	**03. Industrial Ecology at NSF and EPA**
Location:	**Paton Center – Room P1018**
Chair:	**John Ehrenfeld**
Start Time	
5:30	*Research Opportunities in Green Engineering: Bridging Design, Manufacturing, and the Extended Enterprise* (Durham, Twomey)
5:50	*Industrial Ecology At Us Environmental Protection Agency* (Karn, Bauer, Allen, Giannini-Spohn , Leith, Purdy, Schoepf, Sparks, Weinstock, Young)

Monday, 30 June 2003

Session: **11. Industrial Ecology Tools – Examples, Practical Experiences, and Critical Evaluation**
Location: **Assembly Hall - Michigan Room**
Chair: **Henrikke Baumann, Rene Klein, Diana Bauer**
Start Time

5:30 *A Systems-Based, Economic and Environmental Process Planning Model for the Recycling of Plastics from End-of-Life Electronic Equipment* (Masanet, Horvath)

5:50 *Roadmap for a Sustainable Development of Information and Communica tions Technologies* (Dopmke, Lahser, Tobias, Weigmann)

6:10 *The Additional Value of the Industrial Ecology Perspective to Current Integrated Assessment Tools* with Cases of PVC and the Hydrogen Economy (Kleijn, van der Voet)

Session: **01. Material/Substance Flow Analysis**
Location: **Assembly Hall - Wolverine Room**
Chair: **Ester van der Voet, Iddo Wernick**
Start Time

5:30 *Scenarios for Future Copper Use* (Kapur)

5:50 *Cross-Scale Analysis of the Contemporary Copper and Zinc Cycles* (Graedel)

6:10 *Assessing the Policy Implications of a Copper Substance Flow Analysis* (Lifset, Gordon, Graedel, Kapur)

Session: **14. Input-Output Analysis in LCA and MFA**
Location: **Davidson Hall - Room D1279**
Chair: **Sangwon Suh, Shinichiro Nakamura**
Start Time

5:30 *Testing Dematerialisation and 'International' Pollution Coefficients* (Papathanasopoulou, Jackson)

5:50 *Can a Local Currency Harmonize Environment and Economy? Input-output Analysis of Environmental Effects by Means of a Local Currency in US* (Yoshida, Azis)

6:10 *Scenario Evaluation Using Integrated Product and Process Input-Output Material Flow Analysis* (Bailey, Bras, Allen)

6:30 - 7:00 PM **Transit to Burns Park**
Walk or Shuttle Van

7:00 - 9:30 PM **BBQ Dinner**
Burns Park

TUESDAY, 1 JULY 2003

7:30 - 8:30 AM **Continental Breakfast**
Ford Conference Center Lobby

7:30 - 8:30 AM **JIE Editor's Meeting**
Patton Center - RoomP1004

8:30 - 9:30 AM Plenary II

Location: Hale Auditorium

Industrial Ecology after Johannesburg: Contributions to the Plan of Implementation

Chair: **Edgar Hertwich,** ***Industrial Ecology Program, Norwegian University of Science and Technology, Trondheim, Norway***

Panelists: **Roland Clift,** ***Centre for Environmental Strategy, University of Surrey, UK***
Faye Duchin, ***Department of Economics, Rensselaer Polytechnic Institute, USA***
Dara O'Rourke, ***Department of Environmental Science, Policy, and Management at the University of California, Berkeley, USA***
Edgar Hertwich, ***Norwegian University of Science and Technology(NTNU)***

The media and environmental groups had pronounced the World Summit of Sustainable Development a failure already before the event started in August 2002 in Johannesburg. Indeed, the WSSD failed to produce the firm commitments on the actions needed to achieve sustainable development. Governments failed to take action on the scale needed to stop global warming, water-borne diseases, toxic pollution of oceans and developing countries, to preserve biodiversity, and to reduce resource exploitation to sustainable levels. The political climate for such drastic breakthroughs was just lacking. What got lost in the summary dismissal of the event, however, are a number of positive signs emerging from Johannesburg. There is a number of items that are of interest for Industrial Ecology. The Johannesburg Plan of Implementation calls for the establishment of a 10-year framework of programmes in sustainable consumption and production. At the same time, there were hopeful signs of cooperation among industry and civic society. Actions on renewable energy, clean water, and biodiversity are also of potential interest to the industrial ecology community. In this panel, we will explore how the field of industrial ecology can contribute to the implementation of sustainable develop-

9:30 - 10:00 AM **Morning Break**
Ford Conference Center

Tuesday, 1 July 2003

10:00 - 12:00 AM Technical Session (T5)

Session: **10. Industrial Ecology in a Global Context**
Location: **Paton Center – Room P1016**
Chair: **Dara O'Rourke, Marina Fischer-Kowalski**

Start Time	
10:00	*Real Problems for Applying Industrial Ecology Concepts* (Ruz, Urzúa, Serey)
10:20	*How Prepared are Nigerian Manufacturing Companies for Sustainable Practices*? (Adeleke)
10:40	*The Global Production and Use of Metals in Relation to Sustainable Development* (Rogich)
11:00	*An Integrated Assessment of Indicators for Socio-economic Development and Materials -and Energy Use for the region of Southeast Asia* (Schandl, Grunbuhel)
11:20	*World Systems Theory and Societal Metabolism: Two Complementing Concepts for Explaining Global Trade* (Eisenmenger, Giljum)
11:40	*Implementation Status of Environmental Management Systems* (Almgren)

Session: **09. Sustainable Cities and Regional Metabolism**
Location: **Paton Center – Room P1018**
Chair: **Susanne Kytzia, Matthias Ruth**

Start Time	
10:00	*Material Flow Analysis as a Tool for Sustainable Management of the Built Environment* (Kytzia)
10:20	*Urban Infrastructure and Sustainability in a Changing Environment* (Ruth, Kirshen)
10:40	*Estimation of Future Material Balance in Urban Civil Infrastructures and Buildings* (Tanikawa, Hashimoto, Moriguchi)
11:00	*Sustainable City Quarters: Material Flows, Local Consumption, and Regional Development – Results from two Case Studies of Brownfield Development in Germany* (Fritsche)
11:20	*Design of an Energy Conscious Waste Management Systems based on Unified City-Rural Area Metabolic Development* (Noda, Kawasima, Shirota, Ikefuji, Horio)
11:40	*A Collaboration Platform to Evaluate Energy, Mobility and Building Technologies for a Sustainable Urban Ecosystem* (Kraines, Wallace)

Tuesday, 1 July 2003

Session:	**13. Sustainable Manufacturing**
Location:	**Assembly Hall - Michigan Room**
Chair:	**Tim Gotustui, Chihiro Watanabe**
Start Time	
10:00	*Comparative Life Cycle Assessment of Direct Metal Deposition with Traditional Die and Mold Manufacturing* (Ross, Skerlos)
10:20	*Toxics in Vehicles: Lead* (Gearhart, Griffith, Menke)
10:40	*Product Process and Structure: Redesigning the Industrial Ecology of the Automobile* (Orsato, Wells)
11:00	*Management of Sustainable Development Innovation: Integration of TRIZ and QFD under the Framework of Soft Systems Methodology (SSM)* (Baki, Wang)
11:20	*Remanufacturing: Trendsetting Economic and Ecologic Benefits in a Global Review* (Steinhilper)
11:40	*Incorporating Degradation and Obsolescence Factors in Predicting Returns of End-of-Life Products* (Kasmara, Dong, Matsuoka, Muraki)
Session:	**02. Managing Energy and Greenhouse Gases**
Location:	**Assembly Hall - Wolverine Room**
Chair:	**John Holmberg, Klaus Vogstad**
Start Time	
10:00	*Formulation of Goals and Assessment of Goal Achievement for the Global Cycling of Carbon* (Grimvall, Löfving)
10:20	*Incorporating Dynamic Feedback Relationships between Material and Energy Flows, Vintage Effects and Regional Heterogeneity: Implications for Managing Greenhouse Gas Emissions* (Davidsdottir)
10:40	*Cost and Ecological Impact Analysis of an Integrated Energy system for Supplying Heating, Cooling, and Power Requirements to Buildings* (Weber, Kraines, Koyama)
11:00	*Sustainability of Advanced Silicon Solar Cell Technologies* (Alsema, de Wild-Scholten)
11:20	*Measuring the "Efficiency Gap" between Average and Best Practice Energy* Use (Boyd)
11:40	*Life-cycle Assessment (LCA) of Global Impacts from Electricity Generation Technologies* (Pacca, Horvath)

TUESDAY, 1 JULY 2003

Session: **04. Life Cycle Assessment and Management**
Location: **Davidson Hall - Room D1279**
Chair: **Masahiko Hirao, Rene van Berkel**

Start Time	
10:00	*Life Cycle Inventory for Semiconductor Manufacturing* (Murphy, Lauret, Allen, Schuppe)
10:20	*Printed Scholarly Books and E-book Reading Devices: A Comparative Life Cycle Assessment of Two Book Options* (Kozak, Keoleian)
10:40	*Comparative Life Cycle Analysis of a Petroleum- and Bio-Based Metalworking Fluid* (Zimmerman, Hayes, Skerlos)
11:00	*Life Cycle Assessment and National Energy Usage* (Allwood)
11:20	*Assessment of Thermal Treatment Technologies - An Environmental and Financial Systems Analysis of Gasification, Incineration and Landfilling of Waste* (Assefa*, Eriksson, Frostell)
11:40	*Integration of Design for Environment and Environmental Management Systems* (Ammenberg, Sundin)

12:00 - 1:30 PM **Lunch**
Alessi Courtyard

1:30 - 3:30 AM Technical Session (T6)

Session: **06. Eco-Industrial Parks and Networks**
Location: **Paton Center – Room P1016**
Chair: **Marian Chertow, Stephen Levine, Ernie Lowe**

Start Time	
1:30	*Industry And Infrastructure Co-Evolution: Transition Management In Rotterdam-Rijnmond* (Dijkema, Weijnen)
1:50	*Establishment of an Eco-industrial Park for Material Recovery of End-of-Life Electronics in Conjunction with a Methane Producing Landfill* (Murphy, Porter, Luedecke, Hanratty)
2:10	*The North Texas By-Product Synergy Program: A Case Study of an Effective Regional Eco-Industrial Network* (Stovall)
2:30	*Industrial Symbiosis in the Island Context: Case Studies in the Caribbean* (Deschenes)
2:50	*Why Participate in Eco-industrial Networks? Case Study of Puerto Rico's Pharmaceutical Manufacturing Cluster* (Weslynne)

TUESDAY, 1 JULY 2003

Session:	**09. Sustainable Cities and Regional Metabolism**
Location:	**Paton Center – Room P1018**
Chair:	**Susanne Kytzia, Matthias Ruth**
Start Time	
1:30	*Material Flux Analysis and Agent Analysis as a Basis for Transition Towards Improved Regional Wood Flows: The Case of Appenzell Ausserrhoden, Switzerland* (Binder, Lang, Wiek, Scholz)
1:50	*The Magnitude and Spatial Distribution of In-use Copper and Zinc Stocks in Sydney Metro* (van Beers, Graedel, Caldicott)
2:10	*Urban Cybernetics as a Platform for Industrial Ecology* (Commons)
2:30	*GIS Based Regional Material Flow Analysis and Environmental Impact Assessment caused by Long Term Urban Developments* (Khaled, Fujita, Morioka)
2:50	*Application of Industrial Ecology Principles for Reducing Regional Metabolism* (Kanduri, Daniels)
3:10	*Direct and Indirect Energy use of Households in Stockholm: Expenditures Versus Energy* (Carlson-Kanyama, Karlsson)
Session:	**12. Design for Environment**
Location:	**Assembly Hall - Michigan Room**
Chair:	**Armando Caldeira-Pires, Eric Masanet**
Start Time	
1:30	*Integrated Green & Quality Function Deployment (IGQFD)* (Cagno, Tardini, Trucco)
1:50	*123 Examples of Best Practice for Greening of Products* (Almgren)
2:10	*Sustainable Product Development: Design for the Environment at Herman Miller* (Wing)
2:30	*Network Analysis and Sustainability in Waste Management: Assessing Highest Resource Recovery Through Combinations of Open and Closed Loop Recycling* (Stewart, Cohen, Petrie)
2:50	*Analysis of Situational End-of-Life Factors to Promote Robust Design Strategies for Product Asset Recovery and Energy Conservation* (Hula, Hazma, Jalali, Saitou, Skerlos)
3:10	*Design for Environment: A Case Study of novel technology to Capture, Recover and Re-use Hazardous Air Pollutants* (Kaldate, Emamipour, Rood, Thurston)

Tuesday, 1 July 2003

Session:	**02. Managing Energy and Greenhouse Gases**
Location:	**Assembly Hall - Wolverine Room**
Chair:	**John Holmberg, Klaus Vogstad**
Start Time	
1:30	*Life-Cycle Based Greenhouse Gas Emissions Inventory of Canadian Waste water Treatment Facilities* (Sahely, MacLean, Monteith, Bagley)
1:50	*Ecological Cumulative Exergy Consumption Analysis, an Approach for Including Ecological Products and Services* (Hau, Bakshi)
2:10	*Energy Consumption of Wired and Wireless Communications Networks* (Matthews, Loh, Chong)
2:30	*A Source Generation Comparison of Electricity Consumption in US Production Sectors* (Matthews, Kostov, Mayes)
2:50	*Transport of Coal by Rail vs. Transmission for Electricity Generation: Application of Hybrid LCA Comparative Analysis* (Bergerson, Lave, Hendrickson, Mathews, Farrell)
3:10	*Resilience and Leveraging Consortia as a Survival Strategy for Japan's Electric Power Industry Amidst Megacompetition in an IT Driven Global Economy* (Watanabe)
Session:	**04. Life Cycle Assessment and Management**
Location:	**Davidson Hall - Room D1279**
Chair:	**Masahiko Hirao, Rene van Berkel**
Start Time	
1:30	*Simulation Framework for Life Cycle Assessment of the Built Environment* (Ries)
1:50	*Implementing Life Cycle Management for Production Chains using Life-Cycle-Images. A Method for Stepwise Modeling* (Gottschick)
2:10	*Environmental Assessment of Re-use Strategies - The Case of Concrete from the Swedish Building Sector* (Roth, Eklund)
2:30	*Material Selection for First Use and Downcycling: A Case Study* (Wright, Mellor, Clift, Stevens)
2:50	*Cascade Link of Fluoro-Nitric Acid between the Semiconductor and Steel Industries* (Hirao, Kuwauchi, Uesugi, Fumiwara, Suginaka)
3:10	*Integrated Economic and Environmental Assessment of Supply Loops for Mobile Phones* (Geyer, Jackson, Clift)

Tuesday, 1 July 2003

3:30 - 5:30 PM Poster Session (P2)

Location: Phelps Lounge

The second of two poster sessions scheduled for the conference. Like the technical sessions, these posters cover a diverse array of topics relevant to industrial ecology.

Quantitative Comparisons of Downcycling and Closed-Loop Recycling (Bailey*, Allen, Bras)

Comparing Material Cycling in Natural and Industrial Systems (Bailey)

Inclusion of Sustainable Development Principles in Product Development: Challenges and Opportunities (Baki*, Wang)

Assessment of the Pollution Prevention Potential of MSW Gasification for Integrated Solid Waste Management Using Life-Cycle Analysis (Barlaz*, Frey, Li)

International Comparison of Material Resource Use -The Development of Total Material Requirement, Direct Material Inputs and Hidden Flows and the Structure of TMR (Bringezu*, Moll, Schütz, Steger)

The Case of Hsinchu Science-based Eco-Industrial Park (Chung*, Kung)

Bioregional Development: An Analysis of the Environmental Implications of Local "Closed Loop" Graphics Paper Recycling (Hart, Clift*)

LCAccess: An On-Line Directory for Global Life Cycle Assessment Information and Data (Curran*, Skone)

Life Cycle Assessment of Food and Beverage Packaging as a Tool for Policy Definition: The Portuguese Case Study (Ferrão*, Ribeiro, Silva)

Infrastructure for the Industrial Ecology of the Automobile: the Portuguese Case Study (Ferrão*, Amaral)

Eco-Parks for Eco-Development: Part 2 (Gorden)

Environmental Impact Analysis of Engineering Materials by Analytic Hierarchy Process (Weng, Shi, Graedel*)

Rapid Enumeration of Bacteria for Microbial Stabilization in Metalworking Fluids (Chang, Rihana, Gruden*, Skerlos, Adriaens)

Life-Cycle Analysis in the Context of General Equilibrium Economic Growth: The Case of Advanced Vehicles, Fuels, and Infrastructure (Hanson*, Vyas, Melaina, Laitner)

Tuesday, 1 July 2003

A Plan for Japanese Forestry Reconstruction as Energy-Material Coproduction Industry (Horio*, Aoyagi, Noda)

Life Cycle Environmental Impacts of Telecommunication Networks and Telemonitoring System (Loerincik, Matas, Jolliet*)

Facilitating Policies for Sustainable Industrial Systems Stock Based Indicators for Redistribution of Cadmium to Swedish Arable Soils (Karlsson*, Fredrikson, Holmberg)

Developing an Inspection and Maintenance Policy for High-Emitting Automobiles Using Reliability Analysis of Emission Control Systems (Kim*, Keoleian, Bulkley)

Long-run Perspectives of Global Copper Material Flow: The Environmental Impact (Poganietz, Kuckshinrichs*, Zapp)

Material Flow Cost Accounting for Evaluation of Urban Organic Resource Circulation

(Matsumoto*, Zuo, Iwao)

Construction of a Visualization and Decision-Making Tool for Co-location of Facilities in Eco-Parks (Matthews*, Marriott)

Resource Recovery of Industrial Minerals - Synergies between the Alum and Portland Cement Industries (Merrell)

A Basic Analysis of Transport-related Environmental Features and Their Socio-economic Background in Asian Countries (Sakurada, Masumoto, Tsuchiya, Komeiji, Hayashi, Yagishita, Kato, Doi, Suzuki, Moriguchi*)

Applicability of Integrated Environment-Quality Design Approach to Services: the Case of Lodging Activities (Petti*, Raggi)

The Logic of the Consumer Economy (Princen)

A Framework for the Selection and Optimization of Energy Systems for Buildings (Osman, Ries*)

Scenario Construction for Sustainable Agricultural Production (Sonesson*, Berg, Gunnarsson, Nybrant, Stern, Öborn)

From Regional to Global: Zinc Stocks and Flows Analysis at Multiple Levels (Spatari*, van Beers, Bertram, Gordon, Graedel, Gritsinin, Harper, Kapur, Klee, Lifset, Memon)

Energy as an Indicator for Environmental Impact from Materials and Products (Svensson*, Mårtensson, Eklund, Roth)

Lifetime-Involved Substance Flow Analysis of Durable Goods: A Case Study of Brominated Flame Retardants in TV Sets in Japan (Tasaki*, Osako, Sakai)

TUESDAY, 1 JULY 2003

Benchmarking to Trigger and Sustain Eco-Efficiency in SMEs (Altham, van Berkel*)

Innovation in Response to the Sustainability Challenges in Minerals Processing (van Berkel)

Advanced Sustainability Analysis for Industrialised Countries (Vehmas*, Kaivo-oja, Luukkanen)

Resource Use of the EU 15 1980-2000: Lessons from the Revised Estimate (Weisz*, Amann, Eisenmenger, Krausmann)

*Partnership Between Universities and SMEs in Sustainable Development (*Wennersten*, Brandt)

3:30 - 5:30 PM Exhibition

Location: Phelps Lounge

The following organizations will be exhibiting hardware, software, products, services and literature relating to the theme of the conference:

Island Press
The Society for Environmental Toxicology and Chemistry
Prentice Hall Publishing
Greenleaf Publishing
MIT Press
National Center for Cleaner Production, Korea Institute of Industrial Technology
Center for Sustainable Systems
Corporate Environmental Management Program

5:30 - 6:30 PM **Transit to Dearborn**
Meet Outside of Business School

6:30 - 10:00 PM **Dinner**
Henry Ford Museum

10:00 - 11:00 PM **Transit to Ann Arbor**

Wednesday, 2 July 2003

7:30 - 8:30 AM **Continental Breakfast**
Ford Conference Center Lobby

8:30 - 10:30 AM Technical Session (T7)

Session: **06. Eco-Industrial Parks and Networks**
Location: **Paton Center – Room P1016**
Chair: **Marian Chertow, Stephen Levine, Ernie Lowe**
Start Time

8:30 *The Kwinana Industrial Area: An Evolving Example of an Eco-industrial Park* (Berkel)

8:50 *The Development of Industrial Symbiosis Networks - Experiences and Lessons from Regional UK Projects* (Mirata, Pritchard, Harris)

9:10 *By-Product Synergy: Lessons from Six Years of Regional Collaboratives* (Mangan, Forward)

9:30 *Eco-industrial Parks and the Zero-waste Philosophy: Potentials and Limits* (Rechberger)

9:50 *Managing Sustainable Revitalization of Urban Industrial Sites* (Korenromp)

Session: **23. Education**
Location: **Paton Center – Room P1018**
Chair: **Kristan Cockerill, Anahita Ahmadi Williamson**
Start Time

8:30 Panel discussion: Academia, ISIE and Industrial Ecology

Panelists: James Eflin, Kristan Cockerill, Helge Brattebo, Ann Dougherty, Rolf Bohne, Sergio Pacca

This panel will start with a short presentation on industrial ecology in academia and will then open to a moderated discussion. The panelists include educators, industry representatives, and students so that we might see various perspectives on the intersections among academia and industry.

Wednesday, 2 July 2003

Session:	**21. Environmental Management**
Location:	**Assembly Hall - Michigan Room**
Chair:	**Paulo Ferrao, Mary Stewart, Anthony SF Chiu**
Start Time	
8:30	*Thinking Outside the Box of Extended Producer Responsibility: A Looser View of Product Recovery* (Rosen, White)
8:50	*Approaches to the Study of Corporate Environmental Management* (Kamrasyid, Pan)
9:10	*Localisation, Production Technology and Sustainability* (Allwood)
9:30	*Combined Environmental and Economic Life Cycle Evaluation of a Company* (Margni, Della Croce, Jolliet)
9:50	*Integration of Design for Environment and Environmental Management Systems* (Ammenberg, Sundin)
10:10	*Lead In Electronics: An Industrial Ecology Case Study* (Schoenung, Ogunseitan, Saphores, Shapiro)
Session:	**05. Biomaterials and Biocomplexity**
Location:	**Assembly Hall - Wolverine Room**
Chair:	**Robert Anex**
Start Time	
8:30	*Biocommodity Engineering: Evaluating Environmental Impacts* (Landis, Theis, Cabezas, Glaser)
8:50	*Biobased Industrial Products: A Sustainable Industry Begins to Emerge?* (Dale, Kim)
9:10	*Raw Material, Energy and Greenhouse Gas Profiles of Polyhydroxyalkanoate (PHA) Derived from Corn Grain* (Kim, Dale)
9:30	*Methods of Defining the Sustainability of Biobased Materials* (Anex)
9:50	*Environmental Implications of Substituting Bio-Based Products for Traditional Lubricants in Industrial Applications* (Miller, Theis, Reich, Wang)
10:10	*Modeling the Biocomplexity of Alternative Materials to Achieve More Sustainable Infrastructure Systems* (Smith, Chandler, Dettling, Kendall, Keoleian)

Wednesday, 2 July 2003

Session: **22. Waste Management**
Location: **Davidson Hall - Room D1279**
Chair: **Roland Clift**
Start Time

8:30 *Life-Cycle-Based Solid Waste Management* (Kaplan, Solano, Dumas, Harrison, Ranjithan, Barlaz, Brill)

8:50 *Recycling C&D Waste in Copenhagen - An Impact Analysis* (Bohne, Opoku)

9:10 *Strategy Assessment for Municipal Solid Waste Management in China* (Zuo, Matsumoto)

9:30 *Utilization of Municipal Solid Waste and Wastewater for Reduction of Carbon Dioxide Emission in Tokyo* (Hanaki, Aramaki)

9:50 *Issues associated with Recovery of Resources from Waste Products using Energy from Waste Technologies: Stakeholder Perspectives* (Warnken, Cohen)

10:10 *Metal Mobilization: Phytomining as a Competitor for Anthropogenic Production* (Harper, Graedel)

10:30 - 11:00 AM **Morning Break**
Ford Conference Center

11:00 - 12:00 AM **Technical Session (T8)**

Session: **20. Quo Vadis IE**
Location: **Paton Center – Room P1016**
Chair: **Bhavik R. Bakshi**
Start Time

11:00 *Merging Emerging Ideas: "Science of Sustainability" (Industrial Ecology) and Science and Technology for Sustainability* (Karn, Correll, Bauer, Cash, Johnson)

11:20 *Towards a Research Agenda for Sustainable Resource Management* (Bringezu)

11:40 *Practical Challenges for Industrial Ecology* (Ehrenfeld)

Wednesday, 2 July 2003

Session: **23. Education**
Location: **Paton Center – Room P1018**
Chair: **Kristan Cockerill, Anahita Ahmadi Williamson**
Start Time

11:00 Industrial Ecology in the Classroom.

Panel: John Martin, Ann Dougherty, Stephen Levine

Session: **02. Managing Energy and Greenhouse Gases**
Location: **Assembly Hall - Michigan Room**
Chair: **John Holmberg, Klaus Vogstad**
Start Time

11:00 *The Transition from Fossil Fuelled to a Renewable Power Supply in a De-regulated Electricity Market* (Vogstad)

11:20 *Integrated CO2 Emission Computer Program—NICE III* (Yagita, Wei, Kobayashi, Inaba, Sagisaka)

11:40 *A Complete Decomposition Model of Korean Energy Flows* (Kim, Heo)

Session: **14. Input-Output Analysis in LCA and MFA**
Location: **Assembly Hall - Wolverine Room**
Chair: **Sangwon Suh, Shinichiro Nakamura**
Start Time

11:00 *Deriving a New Measure of Corporate Environmental Performance based on Human Health Impacts* (Koehler, Bennett, Norris, Spengler)

11:20 *Expansion of IO-based Embodied Emission Intensity from a Quantity Basis to an Impact Basis* (Nansai, Moriguchi)

11:40 *Climate Change Damage Assessment Using an Input-Output Approach* (Gloria)

Session: **04. Life Cycle Assessment and Management**
Location: **Davidson Hall - Room D1279**
Chair: **Masahiko Hirao, Rene van Berkel**
Start Time

11:00 *Life Cycle Assessment for Australian Grains* (Narayanaswamy, Altham, Van Berkel, McGregor)

11:20 *Application of the LCA Approach to the Environmental Management System Implementation of a Fruit-juice Production plant: The Italian GESAMB Project* (Galatola, Russo)

11:40 *Life Cycle Assessment of Cane Sugar Production on the Island Of Mauritius* (Ramjeawon)

WEDNESDAY, 2 JULY 2003

12:00 - 1:00 PM Plenary III/Closing

Location: Hale Auditorium

Presidential Address/Closing Remarks, Thomas Graedel, ISIE President

Box lunch for all conference participants at 1:00 PM in Ford Conference Center Lobby.

1:00 - 6:00 PM IE Workshop (no fee)
Paton Center - Room P1018

Two books about Input-Output Analysis in Industrial Ecology will be published by this working group. Colleagues who are willing to contribute to either or both of the two books are encouraged to attend this workshop.