

ISIE-SEM Conference 2022: Preliminary Detailed Programme (August 4, 2022)

Please note that the sequence of presentations within each session can still change!

Monday, 19.09.2022

09.15-09.45 **Welcome**

09.45-10.30 **Keynote: Paul Ekins (University College London, UK)**

10.30-11.00 **Coffee break**

11.00-12.30 **Parallel Sessions**

Special Session: Transforming urban metabolism (1)

The global and urban material stock of roads
 The consumption-based material-footprint of the building and transport sector of Vienna
 Learning from the past for the transformation towards sustainability: urban sprawl in Vienna and surrounding between 1984-2018
 A potential solution for overcoming regional, spatially explicit data unavailability of built environment stocks: deep learning based pilot estimation in Japanese metropolitans
 A review of spatial characteristics influencing circular economy in built environment
 Circular wien! The Viennese path towards a circular built urban habitat

Lola Rousseau
 Jakob Lederer
 Anna-Katharina Brenner
 Zhiwei Liu
 Ning Zhang
 Claudia Schrenk

Special Session: Global physical input-output analysis (1)

The footprint of food consumption and the role of the socioeconomic status
 Global physical input-output analysis of food
 Evolution and environmental consequences of Latin American wood trade patterns from 1997 to 2017
 Creating Hybrid Input-Output Models using US IELab and Process-Driven Physical Data from PIOT-Hub: An Application to Bioenergy Footprinting
 Consequential MRIO modelling
 Challenges and Added Value of the Getting The Data Right MRIO Project

Simon Grabow
 Sébastien M.R. Dente
 Zully Rosadio
 Miriam Stevens
 Bo Weidema
 Jannick Schmidt

Special Session: Nexus approaches in social metabolism research

Nexus approaches in socioecological metabolism research: where do we stand?
 Analysing the stock-flow-service nexus by linking building stock and industry modelling
 Operationalizing the stock-flow-service nexus for economy-wide material and energy flow analysis - empirical and prospective analysis for the USA
 Bridging service systems, circularity and decarbonisation: insights from UK mobility transitions
 Control data vs. reported data in the assessment of industrial plants' resource efficiency
 Modelling dynamic material stocks and flows for Spain with the MODESLOW Integrated Assessment Model

Helmut Haberl
 Meta Thurid Lotz
 Jan Streeck
 Gabriel Carmona
 Ana Morgado
 Emmanuel Aramendia

12.30-14.00 **Lunch (WU Mensa)**

14.00-15.30 **Parallel Sessions**

Special Session: Transforming urban metabolism (2)

Assessing Nutrient Circularity Readiness in South American Metropolitan Areas
 The urban biomass sprawl: An analysis of Vienna's biomass metabolism and its global environmental impacts
 Capital, energy, water and carbon in the Singapore economy
 Assessing Vienna's material and carbon footprint from a circular economy perspective
 Territorialising circularity

Alma Fleitas
 Lisa Kaufmann
 Lynette Cheah
 Nina Eisenmenger
 Cecilia Furlan

Open science in urban metabolism: building a science-policy-practice interface Aristide Athanassiadis

Special Session: Global physical input-output analysis (2)

A Multi-Regional Energy Physical Supply Use Table Framework For Energy Analysis Emmanuel Aramendia
Constructing a multi-regional energy flow model to assess energy use along international supply chains Jose Acosta
Modelling energy systems based on the physical supply and use framework: theoretical advances and applications Matteo Vincenzo Rocco
Exploring the French economy with physical supply-use tables Alexandre Borthomieu
The global trade flow network of zinc Leon Rostek
Commodity-level footprinting for policy makers Chris West

Regular Session: Energy transition

Costs of EV transition: projected waste generation and socio-environmental impacts of an ambitious EV policy in india Vivek Anand Asokan
The Energy and carbon inequality corridor for a 1.5°C compatible and just Europe Ingram S. Jaccard
Potential and challenges of critical materials under the IEA's Net-Zero Emission by 2050 scenario Yanan Liang
Indonesian Coal Bed Methane, The Environmental Consequences of New Energy Development in Indonesia Imam Eko Setiawan
Household Energy Transition and Demographic Transition in the Global South: Linkages and Opportunities for Sustainable Development Camille Belmin
Modeling the raw material requirements of the German energy transition Antonia Loibl

15.30-16.00

Coffee break

16.00-17.00

SEM Section General Assembly

16.45-17.30

SEM Student Board

19.00-21.30

Keynote (at BOKU): Ilona Otto (Karl-Franzens-Universität Graz, Austria)

Tuesday, 20.09.2022

09.00-10.30

Plenary discussion: **Thomas Madreiter (Planning Director, City of Vienna, Austria)**
Meadhbh Bolger (Resource Use Campaigner, Friends of the Earth Europe, Belgium)
Markus Ossberger (Infrastructure Manager, Vienna Public Transport, Austria)

10.30-11.00

Coffee break

11.00-12.30

Parallel Sessions

Regular Session: Circular economy (1)

MessageIX-materials: representation of material flows in an integrated assessment model Gamze Unlu
Circular Design for Steel Products Wiebke Hagedorn
Legacy residential natural-gas infrastructure: urban mine or hydrogen infrastructure? Teun Johannes Verhagen
Future simulation of urban metabolism considering in-use and obsolete stock: Case study on Kitakyushu City, Japan Masato Morita
Geography of the circular economy of tomorrow Tanya Tsui
Consumer-to-Business Selling: Advancing Second-Hand Markets to Extend Product Use Phases Christoph Ratay

Special Session: Built environment futures towards low energy and material demands (1)

Revealing university building stock materials using industry and private sources and material stock analysis in northeastern US city, Philadelphia
 Spatially explicit scenarios for the stock dynamics and environmental impact of building materials
 Plastic cycles in buildings and infrastructure: a stylized model on PVC use in Germany
 From resource extraction to manufacturing and construction: flows of stock-building materials in 177 countries from 1900 to 2016
 Material stock and flow analysis and resource efficiency assessment of non-metallic minerals in Japan
 Scenarios for low embodied building energy – global potential for the use of timber in long-lived construction materials

Kimberlee Zamora
 Janneke van Oorschot
 David Laner
 Barbara Plank
 Naho Yamashita
 Stefan Pauliuk

Regular Session: MFA methods and applications

A scalable approach to modelling detailed and complete material flow systems: the Physical Resources Observatory system
 The influence of socio-economic metabolism in resource decoupling: a comparative study of four European countries
 How we can perform a reliable data-driven material flow analysis: a combined uncertainty and sensitivity analysis
 Beyond production and consumption: using throughflows to untangle the global trade of externalities
 The socio-economic metabolism of European countries: drivers of resource productivity and decoupling
 A map of all the material flows in the UK: from raw material extraction to use

Peter Paul Pichler
 Kavya Madhu
 Apoorva Bademi
 Arthur Jakobs
 Ursula Cardenas-Mamani
 Stefano Merciai

12.30-14.00 Lunch (WU Mensa)**14.00-14.45 Keynote: Sina Leipold (UFZ / Centre for Environmental Research, Germany)****14.45-16.15 Parallel Sessions****Regular Session: Circular economy (2)**

How decarbonization with CE-strategies of increasing circularity alters Austrian social metabolism till 2040
 Applying the EU Circular Economy Monitoring Framework at the urban level - The case of Umeå, Sweden
 Scaling up Circular economy to catalyse decarbonization and reindustrialization: A prospective study for France
 Footprint Accounting of the Bioeconomy – Needs and Challenges to Incorporate Environmental Thresholds and Future Projections
 Island and Indigenous Systems of Circularity: How Hawai'i Can Inform the Development of Universal Circular Economy Policy Goals
 Circular economy finance: harnessing opportunities, managing risks

Willi Haas
 Asterios Papageorgiou
 Antoine Teixeira
 Hanna Helander
 Kamana Beamer
 Daria Kuznetcova

Special Session: Built environment futures towards low energy and material demands (2)

Projection of Urban Mine Availability with Big Demolition Waste Data and Probability Distribution of Building Lifetime and Material intensities
 What matters most to building material intensity? Random forest based evidence from China
 A building-level database and energy model for efficient retrofit of the European Union's building stock
 Building material intensity coefficients estimations for the entire world
 Global low energy and material scenarios for buildings
 Towards transferability and comparability of material intensity coefficients in bottom-up material stock studies: a data collection template

Pi-Cheng Chen
 Ruirui Zhang
 Nikola Milojevic-Dupont
 Tomer Fishman
 Alessio Mastrucci
 Maud Lanau

Special Session: Envisioning sustainable material and energy metabolism in a low-carbon future

Envisioning sustainable material cycles in a carbon-neutral future
 Material footprint implications of low carbon technologies
 The energy inequality corridor for a 1.5° C compatible and just Europe II
 Material and energy demand from buildings in response to Japan's decarbonization transition: considering non-linear substitution elasticities
 Material flow analysis and greenhouse gas emissions of petrochemicals sector in the UK
 Decarbonization pathways for the residential sector in the United States

Zhi Cao
 Stefan Pauliuk
 Peter Paul Pichler
 Yiyi JU
 Fanran Meng
 Peter Berrill

16.15-16.45 Coffee break

16.45-18.00 **Parallel Sessions**

Special Session: First ODYM MFA software User and Developers meeting

Modelling economy-wide material stocks of buildings, infrastructure and machinery for multiple material cycles and end-uses around the world
Monte Carlo simulation with ODYM in MaTrace-multi
Investigating trends in product lifetimes using dynamic MFA

Dominik Wiedenhofer
Christoph Helbig
Kamila Krych

Special Session: Supporting paradigm shifts in socio-economic metabolism by statistical entropy

The second law of thermodynamics for material flows: an introduction to material flow analysis and statistical entropy analysis
Statistical entropy analysis as an engineering tool for the circular economy of battery materials
Supporting paradigm shifts to accelerate disruptive material innovations by statistical entropy: towards universal plastics recyclability indicators
Statistical entropy analysis to assess material circularity of wood cascading use

Helmut Rechberger
Rodrigo Serna
Pieter Billen
Krantı Navare

Workshop: Socio-metabolic research for public policy

Main organiser: Stijn van Ewijk

Socio-metabolic research can play a greater role in policymaking by investigating how specific policy measures influence socio-economic metabolisms. Such policy-specific investigations require methodological advancements, new data types, and the bridging of disciplinary gaps between industrial ecology and the policy sciences. After a short introduction, participants will work on questions regarding the use of industrial ecology for policymaking. The intended outcome is a set of key insights and immediate next steps to enhance the role of socio-metabolic research in policymaking. Participants with any level of knowledge of SEM and public policy are welcome to join this session.

19.30-22.30 **Conference Dinner (at TU Wien)**

Wednesday, 21.09.2022

09.00-09.45 **Keynote: Ramzy Kahhat (Pontifical Catholic University of Peru)**

09.45-11.00 **Poster session and coffee break**

11.00-12.30 **Parallel Sessions**

Regular Session: Food and biomass

Adaption of a large-scale second-generation bioethanol production network towards resilience
The eating population: addressing food consumption in urban metabolism studies
Process integration of innovative technologies into the forest-based sector in Austria
Scenario analysis on Indian subcontinent's food phosphorus footprint by 2050
The hidden role of small-scale farming in our globalised food system
Mapping conservation risks of global agricultural production and consumption

Martin Bruckler
Barbara Redlingshöfer
Marilene Fuhrmann
Aurup Ratan Dhar
Oliver Taherzadeh
Nguyen Tien Hoang

Regular Session: Novel SEM methods

Computational reproducibility and openness in IE research practice
Comparative Life Cycle Assessment of Direct Air Capture Technologies Reveals Environmental Trade-Offs and Resource Demand
Comparison of Material Flows in Industrial Networks of Two US Regions Using PIOT Hub - A Novel Cloud Based Computational Tool
Where does my footprint come from? Using Monte-Carlo simulations to estimate the geographical variance of Hybrid-LCA footprints.
An Integrated Framework for understanding the contribution of Ecosystem Services to Urban Metabolism Assessments. Case studies in London and Lima
Updated version of EXIOBASE hybrid, more detail and more transparency.

Peter Paul Pichler
Kavya Madhu
Apoorva Bademi
Arthur Jakobs
Ursula Cardenas-Mamani
Stefano Merciai

Regular Session: Carbon emissions and climate change

Estimating the Uncertainty of Greenhouse Gas Emission Accounts in Multi-Regional Input-Output Modelling
Re-allocating carbon-emission responsibilities of capital investment along capital's full lifespan
What influences the carbon footprint of government consumption expenditures?
Structural decomposition analysis of carbon emissions in eEUu regions
Drivers of emissions embodied in global metal consumption
Spatial inequality and carbon taxes in Germany

Simon Schulte
Quanliang Ye
Hauke Ward
Jemyung Lee
Kajwan Rasul
Johannes Többen

12.30-14.00 Lunch (WU Mensa)**14.00-16.00 Parallel Sessions****Special Session: Spatially explicit supply chain assessments**

Mapping the land-use footprint of Brazilian soy embodied in international consumption: A spatially explicit input-output approach based on open data
'Do pasto ao prato': a citizen science initiative to (m)app the supply chain of cattle products within Brazil
Crop economic water scarcity driven by human consumption
Biodiversity for trade models: what difference does metric choice make?
Global metal supply chains induce significant tropical land use change through mining expansion
A global assessment of the consumer responsibility for environmentally risky metal ore extraction
The Global Trade Flows of Energy Transition Minerals and their Impacts on Forest Environments
Estimating re-export pathways for physical commodity flows

Stefan Trsek
Erasmus zu Ermgassen
Zhongxiao Sun
Jonathan Green
Stefan Giljum
Hanspeter Wieland
Sebastian Luckeneder
Simon Croft

Regular Session: Waste and recycling

Evaluating the performance of plastic packaging waste management systems
Environmental impact changes of global plastics waste trade during the Covid-19
What to do about plastics? Lessons from a study of UK plastics flows
Digital platforms: end-to-end data integration of industrial symbiosis stages
Past and future of steel scrap – a detailed analysis of the European scrap arisings and its quality
The potential reduction of primary material consumption of asphalt road surface layers
How does AI techniques aid for recycling system?: A case study on plastic waste in Japan
Role of advanced construction technologies in limiting waste in the built environment

Sarah Schmidt
Kai Li
Andre Cabrera Serrenho
Charalampos Manousiadis
Sabine Dworak
Daniel Grossegger
Richao Cong
Sabrina Spatari

Regular Session: Electronics and mobility

A product-component framework for modelling stock dynamics and its application for Li-ion batteries and electric vehicles
How IOT contributes to accelerating the transformation of the logistic industry – a Chinese case study
Introducing mat-dp: a material demand projections model and its application to African electricity system projections
Electronics without emissions
The transformation of the passenger car market - Effects on the demand for aluminium and its carbon footprint

Fernando Aguilar Lopez
Suiting Ding
Karla Cervantes Barron
Jack Lynch
Romain Billy

Regular Session: Mining

Exploring future pathways for the mining industry's global energy consumption
Development of IO-based model for supply chain risk analysis focusing on tailing dam failures at mining sites
Mapping global mining land-use and its induced deforestation using earth observation

Emmanuel Aramendia
Tomoya Sugiyama
Victor Maus

16.00-16.30 Closing