



# International Society for Industrial Ecology Conference

## ISIE Americas 2020

06 - 08 JULY 2020

LIMA - PERÚ

#### **ISIE AMERICAS 2020**

Pontificia Universidad Católica del Perú  
Departamento de Ingeniería

<http://conferencia.pucp.edu.pe/isieamericas2020/>

#### **Coordinación general**

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Violeta Antón

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Sección Ingeniería Industrial

Departamento de Ingeniería

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Red Peruana de Ciclo de Vida y Ecología Industrial







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International Society  
for Industrial Ecology

# PRESENTATION



ISIE Americas 2020: Industrial Ecology for Resilient and Sustainable Cities: Enhancing circularity and wellbeing

The mission of the International Society for Industrial Ecology (ISIE) is to promote the use of industrial ecology in research, education, industrial practice, policy and community development, in order to transform society and achieve a more sustainable economy.

The ISIE's biennial "Americas" conference is a recent arena for members of the industrial ecology community to come together to exchange ideas and continue the conversation about advancing the varied disciplines of industrial ecology among academics and practitioners. ISIE Americas 2020 is an interdisciplinary forum of natural and social scientists, engineers, policymakers and practitioners that advances systems-based analysis methods, tools and solutions in pursuit of sustainable technology, product and service systems, and economies.

Although the focus of the conference is to congregate academics and practitioners from the South, Central and North America, members from around the world are an important part to this conference. We have held conferences every two years since 2016. The two previous conferences were at Bogota Colombia (2016) and Cartago, Costa Rica (2018).

# COMMITTEE

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Pontificia Universidad Católica del Perú Department of Engineering Peru

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**Bernhardus Van Hoof**

Universidad de los Andes School of Management Colombia

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Yale University United States of America

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Universidad Nacional Agraria La Molina, and Pontificia Universidad Católica del Perú, Department of Engineering, Peru

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Utrecht University Netherlands

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Vienna University of Technology (TU Wien), Institute for Water Quality and Resource Management Austria

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Valle y Pampa Peru

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# KEYNOTE SPEAKERS



**Jeroen Guinee**

Netherlands  
Leiden University



**Chris Hendrickson**

United States of America  
Carnegie Mellon University



**Christopher Kennedy**

Canada  
University of Victoria



**Reid J. Lifset**

United States of America  
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**Adriana Zacarias Farah**

Regional Coordinator of Resource Efficiency  
UN-Environment



**Petra Schwager**

Austria  
United Nations Industrial Development  
Organization (UNIDO)



**Eric David Williams**

United States of America  
Rochester Institute of Technology





# P R O G R A M

## Monday 6th

Time (GMT-5)	Activity
8:30 - 8:55	Meet the participant
8:55 - 9:10	Welcome/Introduction
9:10 - 10:10	Plenary 1: <b>Energy and The Evolution of Cities</b> by Chris Kennedy
10:15 - 12:00	Parallel sessions
12:10 - 13:10	Plenary 2: <b>Possibilities of deep decarbonization for transportation modes</b> by Chris Hendrickson
13:10 - 14:00	Special event: Peruvian drinks

## Tuesday 7th

Time (GMT-5)	Activity
8:30 - 9:55	Plenary 3: <b>Circular Economy at the industrial park level: From theory to practice</b> by UNIDO
10:05 - 11:50	Parallel sessions
12:00 - 13:30	Plenary 4: <b>Circular economy in the ICT sector</b> by Reid Lifset and Eric Williams
13:40 - 14:40	Poster session

## Wednesday 8th

Time (GMT-5)	Activity
9:00 - 10:00	Plenary 5: <b>Assessing impacts of resource use in LCA: from ADPs to EDPs - from practice today to practice tomorrow</b> by Jeroen Guinee
10:05 - 11:50	Parallel sessions
12:00 - 13:00	Plenary 6: <b>Circular Economy Initiatives in Latin America</b> by Adriana Zacarias
13:00 - 13:40	ISIE announcements and Closing ceremony

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Monday 6<sup>th</sup>, 2020

## Parallel sessions 10:15 - 12:00

	Circular economy	Sustainable healthy diets in a circular economy	Energy in developing countries/ Energy systems	Industrial symbiosis, Eco-industrial park, Sustainable reporting
	Chair: Eduardo Parodi	Chair: Ian Vazquez-Rowe	Chair: Isabel Quispe	Chair: Marian Chertow
	Session A	Session B	Session C	Session D
10:15 a 10:30	<b>Steel scrap quantities and qualities - An MFA based assessment for the EU-28</b> Sabine Dworak and Johann Fellner	<b>Healthy Diets or Food Waste Reduction? Strategies to Reduce Resource Footprints of Food</b> Hanna Helander, Martin Bruckner, Sina Leipold, Anna Petit-Boix and Stefan Bringezu	<b>Power generation under uncertainty: the effects of changing hydrology, glacier melt, and reservoir operations through the 21st century in the Global South</b> Ana Lucia Caceres, Paulina Jaramillo, H. Scott Matthews, Constantine Saramas and Bart Nijssen	<b>Impact assessment of industrial symbiosis - the case of Synergie Québec</b> Julien Beaulieu and Jennifer Pinna
10:30 a 10:45	<b>A global assessment of material inflows to stocks and its implication for a circularity transition</b> Glenn Aguilar-Hernandez, Sebastiaan Deetman, João Dias Rodrigues and Arnold Tukker	<b>Linking GHG emissions from Spanish food consumption with the economic crisis</b> Xavier Esteve Llorens, Maria Teresa Moreira, Gumersindo Feijoo and Sara González-García	<b>Spatial life cycle analysis of soybean-based biodiesel production in Indiana using process modeling</b> Venkata Sai Gargeya Vunnava and Shweta Singh	<b>Industrial Symbiosis and Ecological Network Analysis: Robustness as a Network Structural Assessment Metric</b> Enora Barrau and Mathias Glaus
10:45 a 11:00	<b>The Role of the Product's Lifespan in a Circular Economy</b> Hanna Fux, Laura Talens Peiró and Xavier Gabarrell i Durany	<b>From farm to consumers: Which is the environmental impact of milk production?</b> Maria Margallo, Jara Laso, Cristina Campos and Rubén Aldaco	<b>Measuring the environmental performance of bio-hydrogen synthesis through life cycle assessment: opportunities and challenges in developing countries</b> Dorian Prato Garcia, Angélica Robayo-Avendaño and Rubén César Vásquez-Medrano	<b>Creating an industrial symbiosis network among experimental farms, a way for moving towards a circular economy</b> Gemma Cervantes
11:00 a 11:15	<b>Key aspects to advance towards circular economy of electronic products</b> Laura Talens Peiró and Xavier Gabarrell i Durany	<b>Effect of the socioeconomic level of households on the environmental impacts of the city of Santiago of Chile</b> Camila López, Larry Larrañaga, Ivan Franchi and Edmundo Muñoz	<b>Sugarcane press-mud to H2: A sustainable approach for rural areas in Colombia</b> Nestor Sanchez, Maria Fernanda Gomez Galindo, Anne Rödl, Ruth Ruiz and Martha Cobo	<b>Enabling early planning and development of Eco industrial parks for photovoltaic circular economy using multi objective optimization techniques</b> Nehika Mathur, J.W. Sutherland and Shweta Singh
11:15 a 11:30	<b>Circular Economy perspectives for tanneries</b> Paula Alejandra Barco Alzate	<b>Reducing GHG emissions of food loss and waste by improving the waste management sector in Peru</b> Kurt Ziegler, Ian Vázquez-Rowe, Rubén Aldaco, Ramzy Kahhat and María Margallo	<b>Life Cycle Analysis of a demonstrative Solar-Urban Agriculture Pilot for lettuce production in a mid-income area of Central Chile</b> María Martínez, Nicolás Zondek, Patricia Gese and Carolina Pizarro	<b>Material flow dynamics using mechanistic models and bottom-up physical supply use tables (PSUTs) for the state of Illinois, US</b> Venkata Sai Gargeya Vunnava and Shweta Singh
11:30 a 11:45	<b>Improving the recyclability of multi-layered coating systems</b> Zeynab Yousefzadeh and Shannon Lloyd	<b>Sustainable grape production for making wine: when pay attention to one resource implies the possible resignation of another one.</b> Bárbara Civit, Roxana Piastrellini, Germán Henderson, Silvia Curadelli and Pablo Arena	<b>Energy intensity in residential households on a district-level scale: Lima, Peru</b> Ursula Cardenas-Mamani, Ramzy Kahhat and Ian Vázquez-Rowe	<b>Dissemination of sustainability GRI reports in Colombia in the period from 2005 - 2019</b> Juan David Torijos and Bart van Hoof
11:45 a 12:00	<b>Challenges and strategies for the circular cities: a literature review</b> Maria Cristina Pegorin, Armando De Azevedo Caldeira-Pires and Jacob Silva Paulsen	<b>The carbon footprint of Brazilian households through Consumer Expenditure Survey (POF)</b> Celso Da Silveira Cachola and Sergio Almeida Pacca		



Tuesday 7<sup>th</sup>, 2020

## Parallel sessions 10:05 - 11:50

	Sustainable Mobility	Life cycle assessment, design, and management	Urban metabolism and stocks, and Resilience and natural disasters	Resource productivity and sustainability
	Chair: Reed Miller	Chair: Ian Vázquez-Rowe	Chair: Jorge Bentin	Chair: Karin Bartl
	Session E	Session F	Session G	Session H
10:05 - 10:20	<b>Environmental Impacts of Aircraft Manufacturing Around the World</b> Reed Miller, Marian Chertow and Edgar Hertwich	<b>Reconciling values and facts in comparative LCA</b> Valentina Prado	<b>Advancing urban metabolism studies through GIS data: resource flows and stocks, geography, and informality in Mexico City.</b> Daniel Otero Peña, Daniela Perrotti and Eugene Mohareb	<b>Joint use of Carbon Footprint and Network DEA for eco-efficiency assessment of Chilean beekeepers</b> Ricardo Rebolledo-Leiva, Lidia Angulo-Meza, Alfredo Iriarte, Leonardo Vasquez-Ibarra and Marcela González-Araya
10:20 - 10:35	<b>Accessibility for the disabled: requirements to walk around the city of Lima</b> Felix Cabrera	<b>Economic and energy impacts of wind energy expansion in the US using multi-regional input output (MRIO) tables.</b> Futu Faturay, Venkata Sai Gargeya Vunnava, Manfred Lenzen and Shweta Singh	<b>Geospatial characterization of material stock in the residential sector of a high-income district in Metropolitan Lima</b> Matías Gutiérrez and Ramzy Kahhat	<b>Industrial Mercury throughput in Austria - Is a balance possible?</b> Sabine Dworak and Helmut Rechberger
10:35 - 10:50	<b>GIS to support LCA of the public bus transport in the city center of a Brazilian metropol</b> Michelle Leichter, Isadora Hackenhaar and Ana Passuello	<b>The MarILCA project: A framework to assess marine plastic litter impacts in life cycle impact assessment</b> Ian Vázquez-Rowe, John Woods, Francesca Verones, Olivier Joliet and Anne-Marie Boulay	<b>Ecomimimetics as theoretical framework for the promotion of Urban Antifragility: Challenges and Opportunities.</b> Jorge Bentin	<b>A Method for Estimating, Optimizing, and Quantifying the Uncertainty of Energy Use in Earthworks.</b> Adrien Roy, Daniel Posen and Brenda McCabe
10:50 - 11:05	<b>Metric and Scale Effects in Consumer Preferences for Environmental Benefits</b> Vlada Pleshcheva	<b>Measuring Peru's share in marine litter</b> Diana Ita, Ian Vázquez-Rowe, Ramzy Kahhat	<b>Use of dry stone retaining walls for urban development works in peru</b> Sandra Santa-Cruz, Elliot Quispe and Nicola Tarque	<b>The GeoPolEndpoint indicator: Measuring the economic impact of the use of critical raw materials. Application to Li-ion batteries</b> Jair Santillán Saldivar, Christoph Helbig, Tobias Gaugler, Axel Tuma, Andreas Rathgeber, Andrea Thorenz and Guido Sonnemann
11:05 - 11:20	<b>The stock-flow-service nexus of Bogotá's bus rapid transit</b> Luis Gabriel Carmona, Kai Whiting and Edward Simpson	<b>Making easier market introduction of environmentally friendly gin products: Application of life cycle assessment</b> Maria Margallo Blanco, Sandra Ceballos, Jara Laso, Rubén Leivas and Rubén Aldaco	<b>Urban stocks quantification through remote sensing. Case Study: Flood zone in Piura during the El Niño phenomenon.</b> Eduardo Parodi, Ramzy Kahhat, Ian Vázquez-Rowe	<b>Assessing the Potential of the Recycling to Reduce Environmental Footprints in the Brazilian Steel Sector</b> Jhonathan F. T. de Souza and Sérgio A. Pacca
11:20 - 11:35	<b>A traffic microsimulation approach in Lima's urban environment: comparing exhaust emissions to those measured in conventional Life Cycle Assessment studies</b> Patrick Flores, Ian Vázquez-Rowe and Félix Israel Cabrera	<b>Comparative life cycle assessment of four final products generated in a tannery from bovine leather for the manufacturing of footwear</b> Sofia Cruz Cabello, Javier Montalvo and Ian Vázquez Rowe	<b>Quantifying urban material stocks for earthquake loss assessment</b> Carlos Mesta, Ramzy Kahhat and Sandra Santa Cruz	<b>Urban mining: Recovering lead from Cathode Ray Tubes via Self-reducing Pellets</b> Marco Gusukuma and Adolfo Pillihuaman
11:35 - 11:50	<b>Comparative evaluation of the massive introduction of electric vehicles in Peru</b> Berlan Rodríguez	<b>Launching the Revised UNEP Guidelines for Social Life Cycle Assessment: Opportunities in Latin America</b> Sonia Valdivia, Marzia Traverso, Catherine Benoit Norris, Elisabeth Ekener, Markus Berger, Thomas Schaubroeck, Sara Russo Garrido, Gabriella Arcese, Matthias		

Wednesday 8<sup>th</sup>, 2020

## Parallel sessions 10:05 - 11:50

	Sustainable waste management	Environmental footprints of water, wastewater and other systems	Urban sustainability and Sustainable production and consumption	Spanish special session
	Chair: Ruben Aldaco	Chair: Karin Bartl	Chair: Bart van Hoof	Chair: Alexis Dueñas
	<b>Session I</b>	<b>Session J</b>	<b>Session K</b>	<b>Session L</b>
10:05 - 10:20	<b>Transdisciplinary research in industrial ecology: a practical exercise with recycling cooperatives of Belo Horizonte, Brazil</b> Maryegli Fuss, Witold-Roger Poganietz and Raphael Tobias Vasconcelos Barros	<b>Chemical Leasing: a framework for opportunities in the chemical industry</b> Fernanda Cardoso, Thyago Jesus, Ana Oestreich and Victoria Santos	<b>Prioritizing circular economy strategies in cities: can we use the SDGs?</b> Anna Petit-Boix, Defne Apul, Thomas Wiedmann and Sina Leipold	<b>Interaction between Industrial Ecology and Eco Innovation in a course for industrial engineering students</b> Sayda Estela Mujica Bueno
10:20 - 10:35	<b>Using Social Indicators in Municipal Solid Waste Management: A Case Study in Peru</b> Luis Izquierdo-Horna, Miker Damazo, Deyvis Yanayaco and Rubén Varillas	<b>Coastal pollution by pharmaceuticals: a roadmap for reducing the chemical burden</b> Arnas Palaima and Tom Spencer	<b>Urban landscape and consumer characteristics affecting metabolic patterns at neighbourhood level</b> Ilse Voskamp, Nora Sutton, Sven Stremke and Huub Rijnaarts	<b>Carbon capture and water consumption in export fruits on Peruvian coast</b> Alexis Dueñas, Liliana Aragón, Sarita Moreno and Andrés Casas
10:35 - 10:50	<b>Environmental assessment of shifting to a waste-to-energy landfill in southern Chile</b> Lorena Alejandra Espinoza Pérez, Andrea Teresa Espinoza Pérez, Óscar C. Vásquez, Ian Vázquez-Rowe and Kurt Ziegler-Rodriguez	<b>Environmental and socioeconomic evaluation of textile products consumption in Brazil - relationships with the international trade.</b> Alessandra Giacomini and Sergio Pacca	<b>Finding an optimal subsidy for residential solar</b> Eric Williams, Tiruwok Tibebe, Eric Hittinger and Qing Miao	<b>Huella ambiental del café orgánico en Perú</b> Isabel Quispe, Shirley Muñoz and Alexis Dueñas
10:50 - 11:05	<b>Understanding material flow analysis and historical transformation for improvement of household solid waste management: the case of Belo Horizonte, Brazil</b> Maryegli Fuss, Witold-Roger Poganietz and Raphael Tobias Vasconcelos Barros	<b>Toward a sustainable system of wastewater treatment plants in Chile: A multi-objective optimization approach</b> Natalia Jorquera, Andrea Teresa Espinoza Pérez and Óscar C. Vásquez	<b>How can we use rooftops for “urban productivity” of food, energy and water?</b> Susana Toboso-Chavero, Xavier Gabarrell Durany, Gara Villalba and Cristina Madrid-Lopez	<b>Análisis de los factores que inciden en la adopción, implementación y certificación del modelo de gestión ambiental ISO 14001</b> Javier Augusto Vera Solano, Julio Eduardo Cañón Barriga and Silvia Teresa Morales Gualdrón
11:05 - 11:20	<b>Study of the feasibility of anaerobic digestion from municipal solid waste in Port-au-Prince, Haiti</b> Victor Tovar Zamudio	<b>Rethinking the wastewater system in Lima, Peru: Towards circularity and resilience</b> André Torre, Ian Vázquez-Rowe, Ramzy Kahhat and Eduardo Parodi	<b>Sustainable Consumption and Production in Latin America; two decades of advances in Cleaner Production</b> Bart van Hoof and Manuel Garzon	<b>Análisis de flujo de materiales, una herramienta utilizada para el diagnóstico del tejido industrial de la región de Valparaíso, bajo una perspectiva de ecología</b> Valentina Abello, Edmundo Muñoz, Camila López, Ximena Ovalle, Jose Tomás Videla and Patricia Martínez
11:20 - 11:35	<b>Bioconversion using black soldier fly larvae as alternative for cattle manure valorization: methane emissions and minerals content of products</b> Joan Sanchez Matos, Lara Pinto de Araújo, Ivon Pinheiro Lôbo and José Adolfo De Almeida Neto	<b>Life Cycle Assessment of La Atarjea water treatment plant, Lima, Peru</b> Mayra Montoya and Karin Bartl	<b>Introducing environmental decision-making criteria to foster green public procurement in Peru</b> Karen Biberos-Bendezú, Úrsula Cárdenas-Mamani, Ramzy Kahhat and Ian Vázquez-Rowe	<b>Circular economy in the management of municipal solid waste in Chile: recycling or composting?</b> Anibal Pérez, Camila López and Ivan Franchi
11:35 - 11:50	<b>Challenges for a sustainable Municipal Solid Waste management in Colombia: lessons learnt from developing countries.</b> Fabiana Franceschi, Lili T. Vega and Maria F. Gómez		<b>Assessing consumption-based carbon emissions for the city of Bogota, Colombia</b> Enrique Gilles	<b>Analysis of the environmental effects of urban copper mining in Chile under a circular economy approach</b> Jasna Villegas, Camila López and Edmundo Muñoz

Chair: Diana Ita



Say it in  
3 minutes!

# POSTER SESSION

1

**Social Corporate Responsibility in GMO-derived foods: impact on consumer attitudes**  
Angélica Robayo Avendaño and Dorian Prato Garcia

2

**Impactos Ambientales Asociados a la Disposición Ilegal de Residuos de Construcción y Demolición en Bogotá-Colombia**  
Lizeth D.C Molina Acosta and Luisa D Leiva Ramírez

3

**Life Cycle Assessment of Building Materials in the U.S. Virgin Islands**  
Claudia Bustamante, Ansh Nasta, Ariel Stolz and Vibhor Kumar

4

**Life Cycle Assessment of the reverse logistics in the State of São Paulo, Brazil: assessment of current and past practices for the management of pesticide empty**  
Karina Braga Marsola, Andréa Leda Ramos de Oliveira and Belmira Neto

5

**Conceptualizing and testing a geographically explicit urban metabolism - life cycle assessment (UM-LCA) approach**  
Angelica Mendoza Beltran, Xabier Gabarrell and Gara Villalba

6

**Water management strategies for a food production in circular cities**  
Felipe Parada, Xavier Gabarrell, Martí Rufí-Salís, Verónica Arcas-Pilz, Pere Pere Muñoz and Gara Villalba

7

**Recovery of urban solid waste in Puebla - México. Valorización de los residuos sólidos urbanos en Puebla - México.**  
Beatriz Espinosa Aquino, Xavier Gabarrell Durany and Roberto Quirós Vargas

8

**Geospatial Characterization of Material Stock in Buildings of High Andean Cities: Case Study of Abancay, Peru**  
Claudia Cucchi, Ramzy Kahhat

9

**Buying a new phone or repairing an old one? What is the environmental cost of each case? An environmental LCA approach of an average mobile phone**  
Kathia Cáceres, Ramzy Kahhat, Marco Gusukuma, Josh Lepawsky

10

**Evaluation of the potential formation of dioxins in wastewater treatment using LCA**  
María Fresnedo San Román, Sophie Schröder, Jara Laso, María Margallo, Ian Vazquez-Rowe and Rubén Aldaco

11

**Recovery nickel and copper from industrial wastewater under the circular economy approach**  
Laura Ulloa, Eugenio Bringas and María Fresnedo San Román







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