

International Conference

“FOOD-ENERGY-WATER BIOECONOMIES FOR NET ZERO TRANSITION”



March 18-20, 2024, Knoxville, USA

website: <https://fewsus.utk.edu>



CENTER FOR GLOBAL ENGAGEMENT

SPONSORS, ORGANIZING INSTITUTIONS, & UNITS

FEWSUS (International Research Coordination Network for Creating Transdisciplinary Nodes of Food-Energy-Water to Support Sustainable Urban Systems) is funded by U.S. National Science Foundation.

The project aims to create a robust international research network for charting a new path forward in developing urban and peri-urban sustainability and resiliency within the framework of food-energy-water nexus systems. Specific objectives are to (1) develop multinational, transdisciplinary research teams to address the interests of stakeholders; (2) create a focused food-energy-water network to inspire urban outreach and engagement programs; (3) educate and train a future food-energy-water workforce capable of implementing a sustainable urban systems agenda; and (4) build a comprehensive food-energy-water database/repository to support global urban sustainability.

OBJECTIVES

The symposium aims to explore the contributions of the food-energy-water nexus and resource circularity to net-zero economy systems that make both urban and connected rural communities healthy and resilient to the changes of climate and demography and the degradations of natural resources and ecosystems. Specific goals of the conference are to network research resources and synthesize publications that summarize current research and priority findings and needs to support convergence of future sustainability research, policy development, and stakeholder perceptions. The symposium will offer a transdisciplinary forum for researchers, stakeholders, and students to exchange knowledge, perspectives, and practices, prioritize research, and build collaborative teams in the following areas:

- Circular bioeconomy systems
- Net zero urban system
- Sustainability of renewable energy technologies
- Food-energy-water nexus for one-health ecosystems

Scientific Committee

Chairs

David Zilberman, University of California, Berkeley, USA
Brad Day, University of Tennessee, USA

Member (in alphabetical order)

Ron Chan, University of Manchester, UK
Carter Christopher, Oak Ridge National Laboratory, USA
Virginia Dale, University of Tennessee, USA
Alex Guerra, Institute of Climate Change, Guatemala
Ted Henry, Heriot-Watt University, UK and Malaysia
Susan Hubbard, Oak Ridge National Laboratory, USA
Gonzalo Irrazabal, Catholic University, Uruguay
Archileo Kaaya, Makerere University, Uganda
Keith Kline, Oak Ridge National Laboratory, USA
Jose Puppim de Oliveira, FVG- Getulio Vargas Foundation, Brazil
Alessio Russo, Queensland University of Technology, Australia
Gary Saylor, University of Tennessee, USA
Michael Seeger, Technical University Federico Santa Maria, Chile
Robert Spajic, Josip Juraj Strossmayer University of Osijek, Croatia
Jan Vymazal, Czech University of Life Sciences, Prague, Czech Republic
Justus Wesseler, Wageningen University & Research, The Netherlands

Organizing Committee

Chairs

Jie (Joe) Zhuang, University of Tennessee, USA
Gretchen Neisler, University of Tennessee, USA

Member (in alphabetical order)

David Ader, University of Tennessee, USA
Julie Carrier, University of Tennessee, USA
Tom Gill, University of Tennessee, USA
Mingzhou Jin, University of Tennessee, USA
Frank Löffler, University of Tennessee, USA
Deb Miller, University of Tennessee, USA
Sara Mulville, University of Tennessee, USA
Charles Sims, University of Tennessee, USA
Tim Rials, University of Tennessee, USA
Marcelo Torres, AAPRESID, Argentina

OVERALL AGENDA

Date	Time	Scheduled Activity	Venue
March 17 Sunday	6:30-7:00 pm 7:00-8:30 pm	Check-In & Registration Reception	Hilton Hotel (Ocoee room at Lobby level)
March 18 Monday	9:00-12:00 pm	Opening Ceremony & Keynote Presentations	UT Conference Center 4 th Floor
	12:00- 1:00 pm	Lunch & Keynote Presentation	
	1:00-4:25 pm	Transdisciplinary Presentation on Socio-Environment Interactions	
	4:25-5:10 pm	Lightning Session of Junior Researchers	
	5:30-7:00 pm	Banquet	The Foundry at the Fair Park
March 19 Tuesday	9:00-12:00 pm	Concurrent Workshops <ul style="list-style-type: none"> • Workshop 1: Circular bioeconomy systems • Workshop 2: Net-zero urban systems • Workshop 3: Sustainability of renewable energy technologies • Workshop 4: Food-energy-water nexus for one-health ecosystems 	UT Conference Center 4 th Floor
	12:00-1:00 pm	Lunch	
	1:00-1:30 pm	Overview, Discussion on Collaboration, and Breakout Group Formation	
	1:30-4:45 pm	Breakout Group Work	
	4:45-5:30 pm	Preparation of Workshop Report	
	5:30-7:00 pm	Dinner	
March 20 Wednesday	9:00-9:40 am	Reporting by Each Workshop to Identify Prioritized Convergence Research	UT Conference Center 4 th Floor
	9:40-10:10 am	Collaboration Opportunities and Transdisciplinary Team-Up	
	10:10-11:40 am	Transdisciplinary Breakout Discussion on How to Collaborate	
	11:40-12:00 pm	Closing Remarks	
	12:00-1:00 pm	Lunch	
	1:00-5:00 pm	Genera Facility and campus tour	Departs from Hilton
	5:30-7:00 pm	Dinner	Calhoun's on the River

Monday, March 18, 2024 (Morning)

WELCOME & OPENING REMARKS

Chair: Hongwei Xin (Dean of AgResearch, University of Tennessee)

9:00-9:30 am	<ul style="list-style-type: none">• Keith Carver (Senior Vice President & Senior Vice Chancellor, University of Tennessee Institute of Agriculture, USA)• Gary Saylor (FEWSUS Research Advisory Board Chair, University of Tennessee, USA)• Lloyd Day (Deputy Director General, Inter-American Institute for Cooperation on Agriculture, Costa Rica)• Paul Langan (Associate Laboratory Director, Oak Ridge National Laboratory, USA)• Randy Boyd (President, University of Tennessee, USA)
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OPENING KEYNOTES

Chairs: Gary Saylor (FEWSUS Research Advisory Board Chair) and Brad Day (Associate Vice Chancellor, University of Tennessee, USA)

9:30-9:40 am	Objectives of Symposium — Jie (Joe) Zhuang (FEWSUS Director, University of Tennessee)
9:40-10:10 am	Contribution of the bioeconomy towards sustainable development: opportunities and challenges. Justus Wesseler, Wageningen University & Research, The Netherlands
10:10-10:40 am	Building the bioeconomy for rural development and educational renewal. David Zilberman, University of California Berkeley, USA
10:40-11:00 am	Break and Group Picture
11:00-11:30 am	Food systems transformation: opportunities for reducing GHG emissions and climate change impact in Uganda. Archileo Kaaya, Makerere University, Uganda
11:30-12:00 pm	Net-zero and the broader sustainable development agenda: maximizing benefits, minimizing trade-offs. David McCollum, Oak Ridge National Laboratory, USA
12:00-1:00 pm	Lunch and Keynote Presentation Kelly Tiller, Genera, USA

Monday, March 18, 2024 (Afternoon)

TRANSDISCIPLINARY KEYNOTES ON SOCIO-ENVIRONMENT INTERACTIONS

Chairs: Tom Gill and Julie Carrier (University of Tennessee, USA)

1:00-1:20 pm	Food, energy and water implications of biofuel and climate policy. Bruce McCarl, Texas A&M University, USA
1:20-1:40 pm	Bioeconomy: A strategic commitment to sustainable development in Latin America and the Caribbean. Lloyd Day, Inter-American Institute for Cooperation on Agriculture (IICA), Costa Rica
1:40-2:00 pm	Stakeholder engagement improves decision making in food-energy-water systems that support the bioeconomy. Virginia Dale, University of Tennessee, USA
2:00-2:20 pm	Managing byproducts of agricultural production and agriculture industry. Robert Spajic, Josip Juraj Strossmayer University of Osijek, Croatia
2:20-2:40 pm	POLARIS: Pursuing opportunities for long-term arctic resilience for infrastructure and society. Guangqing Chi, Pennsylvania State University, USA
2:40-2:55 pm	Break
2:55-3:15 pm	Synergizing growth: some opportunities for sustainable development in Latin America. Enrique Garcia Baumgartner, WeTTo (USA) BYONYEK (Argentina)
3:15-3:35 pm	Future map: developing geographic futures for sustainability assessments using generative GeoAI, population synthesis, and agent-based modeling. Carter Christopher, Oak Ridge National Laboratory, USA
3:35-3:55 pm	Economic modelling of land use changes to disentangle economic, social, and environmental trade-offs. Daniel De La Torre Ugarte, Oak Ridge National Laboratory, USA
3:55-4:15 pm	Modeling benefits of planting climate-resilient perennial biomass crops in flood-prone agricultural landscapes. Esther Parish, Oak Ridge National Laboratory, USA
4:15-4:25 pm	Session Summary
4:25-5:10 pm	Lightning Session of Junior Researchers
5:30-7:00 pm	Banquet

Monday, March 18, 2024 (Afternoon)

LIGHTNING SESSION OF JUNIOR RESEARCHERS

Chairs: Frank Löffler and Ashley Morgan (University of Tennessee, USA)

4:25-4:30 pm	Place and contribution of resource-poor communities to net-zero economy systems. Abdelaziz Lawani, Tennessee State University, USA
4:30-4:35 pm	Tackling the effects of climate change on smallholder farmers in the Caribbean. Dimitris Herrera, University of Tennessee, USA
4:35-4:40 pm	Integrated multi-trophic aquaculture—low-waste, energy-efficient, nutrient-dense seafood production. Ashley Morgan, University of Tennessee, USA
4:40-4:45 pm	Toward sustainable architecture: navigating the framework of energy transition within energy, buildings, and human. We-An (Vivian) Chen, University of Tennessee, USA
4:45-4:50 pm	Restorative diets: towards the health of humans and non-humans. Erika Gavenus, University of British Columbia, Canada
4:50-4:55 pm	Investigating die-offs in freshwater mussels: safeguarding ecosystem services in a changing world. Jeronimo Silva, University of Tennessee, USA
4:55-5:00 pm	Circular economy project: composting of organic wastes for biofertilizer production using enzymes. Agustin Torres, National University of Mar del Plata, Argentina
5:00-5:10 pm	Session Summary
5:30-7:00 pm	Banquet

Tuesday, March 19, 2024

Workshop 1: Circular Bioeconomy Systems

Chairs: Tim Rials and Nicole Labbé (University of Tennessee, USA), Erin Webb and Keith Kline (Oak Ridge National Laboratory, USA)

9:00-9:10 am	Workshop Introduction
9:10-9:30 am	Keynote: Climate-smart technologies and food security in the context of a circular bioeconomy. Gal Hochman, Rutgers University, USA
9:30-9:50 am	Keynote: A sustainable dairy production model. Alejandro López Moriena, Adecoagro, Argentina
9:50-10:10 am	Keynote: An inclusive, climate-smart, circular economy: challenges and opportunities. Keith Kline, Oak Ridge National Laboratory, USA
10:10-10:30 am	Keynote: Accelerating the development of circular bioeconomy systems in Argentina. Claudio Dunan, President, National Seed Institute of Argentina
10:30-10:45 am	Break
10:45-11:00 am	Bio-based battery materials for circular energy storage systems. William Joe Sagues, North Carolina State University, USA
11:00-11:15 am	Diversifying agriculture, protecting the environment, stabilizing economies: the story of the black soldier fly. Jeffrey Tomberlin, Texas A&M University, USA
11:15-11:30 am	Shaping learning communities: the path of innovation in networks. Marcelo Torres, The Argentine Association of Direct Seeding Producers (AAPRESID), Argentina
11:30-11:45 am	Integrating edge AI and blockchain in precision dairy farming: towards sustainable and smart agricultural practices. Charles Cao, University of Tennessee, USA
11:45-12:00 pm	Design for a sustainable future: Advancing the sustainable production and use of renewable carbon. Nicole Labbé, University of Tennessee, USA
12:00-1:00 pm	Lunch
1:00-1:30 pm	Overview, Collaborative Task Prioritization, and Breakout Group Formation
1:30-3:00 pm	Group Work on the Prioritized Tasks
3:00-3:15 pm	Break
3:15-3:45 pm	Synthesis of Group Work Results
3:45-4:45 pm	Development of Outlines of Publications and/or Collaborative Research Projects
4:45-5:30 pm	Preparation of Workshop Report (workshop chairs and group leaders)
5:30-7:00 pm	Dinner

Tuesday, March 19, 2024

Workshop 2: Net-Zero Urban System

Chairs: Frank Löffler and Kellie Walters (University of Tennessee, USA), Wei Liao (Michigan State University, USA),
Jose Puppim de Oliveira (FGV - Getulio Vargas Foundation, Brazil), Adam Sochacki (Czech University of Technology, Czech Republic)

9:00-9:10 am	Workshop Introduction
9:10-9:30 am	Keynote: The dynamics of innovation in green and blue infrastructure in urban areas. Jose Puppim de Oliveira, FVG- Getulio Vargas Foundation, Brazil
9:30-9:50 am	Keynote: Designing multifunctional nature-based solutions for sustainable, healthy, and resilient cities. Alessio Russo, Queensland University of Technology, Australia
9:50-10:10 am	Keynote: Ecosystem services of urban wetland. Jan Vymazal, Czech University of Life Sciences, Prague, Czech Republic
10:10-10:30 am	Keynote: Offset or reduce: how should firms implement carbon footprint reduction initiatives? Gil Souza, University of Tennessee, USA
10:30-10:45 am	Break
10:45-11:00 am	Low emissions during the production of sugar, banana, avocados and bioenergy. Alex Guerra Noriega, Institute of Climate Change, Guatemala
11:00-11:15 am	Optimization opportunities in greenhouses and vertical farms. Kellie Walters, University of Tennessee, USA
11:15-11:30 am	The use of wetlands for (waste)water treatment in urban areas. Adam Sochacki, Czech University of Technology, Czech Republic
11:30-11:45 am	System integration and optimization toward sustainable solutions for small-scale waste treatment. Wei Liao, Michigan State University, USA
11:45-12:00 pm	Ecological benefits of green roofs and green walls. Martina Vítková, Czech University of Technology, Czech Republic
12:00-1:00 pm	Lunch
1:00-1:30 pm	Overview, Collaborative Task Prioritization, and Breakout Group Formation
1:30-3:00 pm	Group Work on the Prioritized Tasks
3:00-3:15 pm	Break
3:15-3:45 pm	Synthesis of Group Work Results
3:45-4:45 pm	Development of Outlines of Publications and/or Collaborative Research Projects
4:45-5:30 pm	Preparation of Workshop Report (workshop chairs and group leaders)
5:30-7:00 pm	Dinner

Tuesday, March 19, 2024

Workshop 3: Renewable Energy Sustainability

Chairs: Mingzhou Jin and Virginia Sykes (University of Tennessee, USA), Govindan Parayil (University of South Florida, USA),
Ron Chan (University of Manchester, UK)

9:00-9:10 am	Workshop Introduction
9:10-9:30 am	Keynote: Charged up? impacts of green energy transition on local labor markets. Ron Chan, University of Manchester, UK
9:30-9:50 am	Keynote: Circular farm economy for bioenergy and carbon neutrality. Manuel Ron, Bio4--Bioethanol Rio Cuarto S.A., Argentina
9:50-10:10 am	Keynote: Electricity wholesale market design in the zero-carbon future: a review of challenges and solutions. Zhi Zhou, Argonne National Laboratory, USA
10:10-10:30 am	Keynote: Developing sustainable aviation fuel system from winter oilseeds. Edward Yu, University of Tennessee, USA
10:30-10:45 am	Break
10:45-11:00 am	Can we use domestic vegetable oil to replace carnauba or petrowaxes? Toni Wang, University of Tennessee, USA
11:00-11:15 am	Winter oilseed crops exhibit potential as a source for sustainable aviation fuel in the Southern US. Virginia Sykes, University of Tennessee, USA
11:15-11:30 am	How green fertilizer will boost energy transition? Gonzalo Irrazabal, Catholic University, Uruguay
11:30-11:45 am	Renewable energy servicing for residential homes in developing countries. Gil Souza, University of Tennessee, USA
11:45-12:00 pm	Energetic sustainability in Antarctica through the implementation of renewable energies aiming at net-zero generation. Gabriel Guigou, Technological University of Uruguay, Uruguay
12:00-1:00 pm	Lunch
1:00-1:30 pm	Overview, Collaborative Task Prioritization, and Breakout Group Formation
1:30-3:00 pm	Group Work on the Prioritized Tasks
3:00-3:15 pm	Break
3:15-3:45 pm	Synthesis of Group Work Results
3:45-4:45 pm	Development of Outlines of Publications and/or Collaborative Research Projects
4:45-5:30 pm	Preparation of Workshop Report (workshop chairs and group leaders)
5:30-7:00 pm	Dinner

Tuesday, March 19, 2024

Workshop 4: One-Health Ecosystem

Chairs: Deb Miller and Charles Sims (University of Tennessee, USA), Ted Henry (Heriot-Watt University, UK, and Malaysia),
Michael Seeger (Technical University Federico Santa Maria, Chile)

9:00-9:10 am	Workshop Introduction
9:10-9:30 am	Keynote: Environmental systems biology: the whole is greater than the sum of its parts – team science. Terry Hazen, University of Tennessee and Oak Ridge National Laboratory, USA
9:30-9:50 am	Keynote: Developing sustainable cooling and cold chains in emerging economies–meeting the technical and educational needs. Ted Henry, Heriot-Watt University, UK and Malaysia
9:50-10:10 am	Keynote: Genomics and metagenomics are useful for the design of novel bioremediation processes for urban site clean-up. Michael Seeger, Technical University Federico Santa Maria, Chile
10:10-10:30 am	Keynote: Plastic pollution: challenges and strategies. Michael McKinney, University of Tennessee, USA
10:30-10:45 am	Break
10:45-11:00 am	Prioritizing public and conservations investments to support human health at the rural-urban fringe Charles Sims, University of Tennessee, USA
11:00-11:15 am	Develop antibody-based immunoassays for microplastic and nanoplastic analysis. Jun Lin, University of Tennessee, USA
11:15-11:30 am	Untreated wastewater, farming, and human health: The Bogotá River Johana Husserl, University of Ios Andes, Colombia
11:30-11:45 am	Applications of precision livestock farming (PLF) in poultry industry. Yang Zhao, University of Tennessee, USA
11:45-12:00 pm	Smart sensing for animal health and welfare. Hao Gan, University of Tennessee, USA
12:00-1:00 pm	Lunch
1:00-1:30 pm	Overview, Collaborative Task Prioritization, and Breakout Group Formation
1:30-3:00 pm	Group Work on the Prioritized Tasks
3:00-3:15 pm	Break
3:15-3:45 pm	Synthesis of Group Work Results
3:45-4:45 pm	Development of Outlines of Publications and/or Collaborative Research Projects
4:45-5:30 pm	Preparation of Workshop Report (workshop chairs and group leaders)
5:30-7:00 pm	Dinner

Wednesday, March 20, 2024

COLLABORATION & OUTREACH

Moderators: Brad Day (Associate Vice Chancellor, University of Tennessee), Jie (Joe) Zhuang (FEWSUS Director, University of Tennessee)

9:00-9:40 am	Reporting by Each Workshop to Identify Prioritized Convergence Research
9:40-10:10 am	Collaboration Opportunities and Transdisciplinary Team-up
10:10-11:40 am	Transdisciplinary Breakout Discussion on Research Collaboration Action
11:40-12:00 pm	Closing Remarks <ul style="list-style-type: none">• David Zilberman (Distinguished Professor, University of California Berkeley; National Academy of Sciences Member)• Gretchen Neisler (Vice Provost for International Affairs; Director of Center for Global Engagement, University of Tennessee)
12:00-1:00 pm	Lunch
1:00-5:00 pm	Facility and Campus Tour
5:30-7:00 pm	Dinner