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# WELCOME ADDRESS

## Greetings!

We want to welcome you to the first virtual Bioenergy Sustainability Conference brought to you by the Institute for Sustainability (IfS), an AIChE Technological Community.

The Bioenergy Sustainability Conference will bring diverse researchers together to address information gaps and solutions to bioenergy sustainability challenges including land, water, climate, and socio-economic aspects. Large-scale utilization of bioenergy is attractive as a potential alternative to fossil fuels only if the production and processing of bioenergy feedstocks is sustainable from economic, environmental, and social standpoints. Research into bioenergy sustainability will benefit from improved understanding of goals, progress to date, and cooperation among researchers active in multiple disciplinary domains. Technical sessions include: “Bioenergy Feedstock Sustainability”, “Biofuel Supply Chain, Development of Agile Biorefineries”, “Moving Beyond Ethanol - Replacing the Whole Barrel of Oil”, “Defining Sustainability Metrics”, “Current Status, Emerging Opportunities, and Challenges for Bioenergy Scale-Up and Policy Challenges and Opportunities”.

This great conference is headlined by a keynote address which will be delivered by Alicia Lindaur (U.S. Department of Energy) and Madhu Khanna (University of Illinois at Urbana-Champaign). Sessions throughout the week are also filled with many other top researchers and leaders in the field. This conference will also feature a poster session with short resenterers you may interact with.

Much work has gone into making this conference a success. If it were not for the contributions of our Organizing Committee, who was instrumental in selecting our speakers and shaping the program, as well as the invaluable assistance from our corporate sponsors, academic supporters, and media partners, this conference could not have happened. Moreover, the tremendous support of the IfS and AIChE staff has played an invaluable role.

Finally, we would like to thank you for attending the conference. We hope these next three days will be pleasant, educational and inspiring.

**Best,**

**Conference Organizers for the Bioenergy Sustainability Conference**

# TECHNICAL PROGRAM

## Conference Organizers

### Conference Co-Chairs

#### **Jeremy Guest**

*University of Illinois Urbana-Champaign*

Dr. Jeremy Guest is an Assistant Professor in the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign (UIUC). His research focuses on the development of technologies for sustainable water, sanitation, and biofuels, with applications in both technologically advanced and developing communities. Dr. Guest serves as the Sustainable Design Lead for the Center for Advanced Bioenergy and Bioproducts Innovation funded by the U.S. Department of Energy (DOE) and the Environmental Sustainability Lead for the Soybean Innovation Lab funded by the U.S. Agency for International Development (USAID). He is the recipient of a National Science Foundation (NSF) CAREER Award, the 2016 recipient of the Paul L. Busch Award for innovation in applied water quality research from the Water Research Foundation, and a Beckman Fellow of the Center for Advanced Study at UIUC. His research has been sponsored by a number of agencies including the NSF, the U.S. Environmental Protection Agency, the U.S. Department of Agriculture, the U.S. DOE, the USAID, and the Bill and Melinda Gates Foundation. Dr. Guest's formal training includes a B.S. and M.S. in civil engineering from Bucknell University and Virginia Tech, respectively, and a Ph.D. in environmental engineering from the University of Michigan.

#### **May Wu**

*Michigan Technological University*

Laboratory and the Principal Investigator of a multi-year water analysis project supported by the U.S. Department of Energy. Her research interests are water use, water quality, water resource availability, and wastewater management as related to the development of conventional and renewable energy. Wu is the principal author of a spatially explicit online model, WATER (Water Analysis Tool for Energy Resources), which develops water footprint of biofuels including conventional, cellulosic, and algal feedstock and various biochemical and thermochemical conversion technologies and assesses water availability under historical and projected biomass production in the United States with geospatial resolution, to help support decision making. Dr. Wu also heads a project developing watershed models for the Mississippi River basin and its tributaries. The work examines the impact of land use, integrated landscape design, biomass production, climate, and conservation practices on water quality at varying scales, and estimate value proposition. May's another area of expertise is in life cycle assessment for biofuels.

### Organizing Committee

**Corinne Scown**, *Lawrence Berkeley National Laboratory, Joint Bioenergy Institute*

**Glauca Mendes Souza**, *Instituto de Química - USP, Brazil*

**Kurt Thelen**, *Michigan State University, Great Lakes Bioenergy Research Center*

**Erin Webb**, *Oak Ridge National Laboratory*

**Mary Blanchard**, *University of Wisconsin-Madison*

**Douglas Karlen**, *DLKarlen Consulting LLC*

**Jennifer Dunn**, *Northwestern University*

# WELCOME ADDRESS

## Technical Program

### October 13<sup>th</sup>, 2020: Establishing Sustainable Feedstocks and Supply Chains

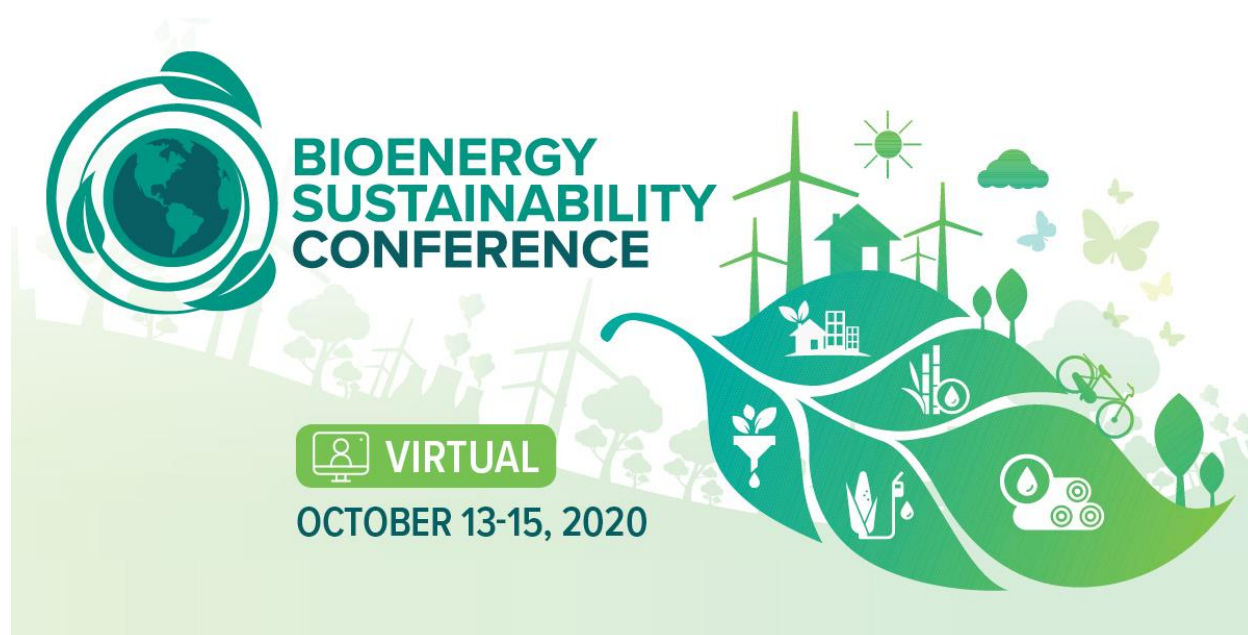
Start	End	Title	Speaker
10:00 AM	10:10 AM	Day 1: Establishing Sustainable Feedstocks and Supply Chains	
10:10 AM	10:40 AM	<b>Keynote Presentation</b>	<b>Alicia Lindauer</b>
10:40 AM	10:50 AM	Question and Answer Session with the Keynote Speaker	Moderator
10:50 AM	10:55 AM	<i>Break</i>	
10:55 AM	12:00 PM	<b>Bioenergy Feedstock Sustainability and Conversion Innovations</b>	
10:55 AM	11:15 AM	<b><i>Bioenergy Feedstock Sustainability in CABBI, the Center for Advanced Bioenergy and Bioproducts Innovation</i></b>	<b>Emily Heaton</b>
11:15 AM	11:30 AM	<i>Supercritical Hydrothermal Liquefaction of Construction Wood Waste for the Production of Biocrude</i>	Tahir Hussain Seehar
11:30 AM	11:45 AM	<i>Hydrothermal Liquefaction of Sewage Sludge with Recirculation of Pretreated Aqueous Phase from Activated Carbon</i>	Ayaz Shah
11:45 AM	12:00 PM	<i>Using SMB Technolgy to Extract Oxygenates from a Biofermentation System</i>	Deepak Sharma
12:00 PM	12:20 PM	Discussion and Breakout <b>Bioenergy Feedstock Sustainability Conversion Innovations</b>	Live Moderator
12:20 PM	12:30 PM	<i>Break</i>	
12:30 PM	1:25 PM	<b>Establishing the Biofuel Supply Chain</b>	
12:30 PM	12:50 PM	<b><i>Past and Future of Cellulosic Biofuels</i></b>	<b>Steve Hartig</b>
12:50 PM	1:10 PM	<b><i>Reimagining the Biofuel Supply Chain As If Carbon Matters</i></b>	<b>Tom Richard</b>
1:10 PM	1:25 PM	<i>Integrated Simulation Modeling of Supply Chain Impacts from Genetic Improvements in Switchgrass</i>	Haley Stauffer
1:25 PM	1:55 PM	Discussion and Breakout <b>Establishing the Biofuel Supply Chain</b>	Moderator
1:55 PM	2:15 PM	<b><i>Landscape Design – Connecting Feedstock Supplies, Land Use, and Sustainability</i></b>	<b>Doug Karlen</b>
2:15 PM	2:30 PM	Question and Answer Session with Doug Karlen	Moderator
2:30 PM	3:00 PM	Happy Hour Reception	



# WELCOME ADDRESS

October 14<sup>th</sup>, 2020: Developing a Portfolio of Products to Advance System Sustainability

Start Time	End Time	Title	Speaker
10:00 AM	10:10 AM	Day 2: Developing a Portfolio of Products to Advance System Sustainability	
<b>10:10 AM</b>	<b>11:00 AM</b>	<b>Development of Agile Biorefineries</b>	
10:10 AM	10:30 AM	<i><b>Integrated Methods for Spatially Explicit Landscape Design and Biofuel Supply Chain Network Design Optimization</b></i>	<b>Eric O'Neill</b>
10:30 AM	10:45 AM	<i>Reversibly Soluble Bases for Alkaline Oxidation of Lignin</i>	Jacob Kruger
10:45 AM	11:00 AM	<i>Catalytic Graphitization of Biomass for Green Battery Anodes</i>	Joe Sagues
11:00 AM	11:30 AM	Discussion and Breakout Development of Agile Biorefineries	Moderator
11:30 AM	11:40 AM	Break	
11:40 AM	12:10 PM	Poster Session	
<b>12:10 PM</b>	<b>1:20 PM</b>	<b>Moving Beyond Ethanol - Replacing the Whole Barrel of Oil</b>	
12:10 PM	12:30 PM	<i><b>Bioenergy, Bioproducts and Ecosystem Services</b></i>	<b>Christina Negri</b>
12:30 PM	12:50 PM	<i><b>Emerging Technologies and Opportunities to Replace the Barrel</b></i>	<b>Joel Stone</b>
12:50 PM	1:05 PM	<i>Sustainable Methyl Ethyl Ketone Production from Lignocellulosic Biomass</i>	Sarang Bhagwat
1:05 PM	1:20 PM	<i>Sustainable Lactic Acid Production from Lignocellulosic Biomass</i>	Yalin Li
1:20 PM	1:50 PM	Discussion and Breakout Moving Beyond Ethanol - Replacing the Whole Barrel of Oil	Moderator
1:50 PM	2:00 PM	Closing Statements from the Conference Chairs	



# WELCOME ADDRESS

October 15<sup>th</sup>, 2020: Charting Pathways to a Sustainable Bioeconomy

Start Time	End Time	Title	Speaker
11:00 AM	11:10 AM	Day 3: Charting Pathways to a Sustainable Bioeconomy	
<b>11:10 AM</b>	<b>12:15 PM</b>	<b>Defining Sustainability Metrics</b>	
11:10 AM	11:30 AM	<b>Invited Talk</b>	<b>Karen O'Brien</b>
11:30 AM	11:45 AM	<i>Economic and Environmental Assessment of Biological Conversions of Agile Biofoundry (ABF) Bio-Derived Chemicals</i>	Pahola Thathiana Benavides & Bruno Klein
11:45 AM	12:00 PM	<i>Prioritize Research and Development Needs for Sustainable Bioenergy Production Using the Integrated Modeling Framework for Agile Life Cycle Assessment of Biorefineries</i>	Rui Shi
12:00 PM	12:15 PM	<i>Enabling the Design, Simulation, and Techno-Economic Analysis of Agile Biorefineries in Biosteam</i>	Yoel Cortes-Pena
12:15 PM	12:45 PM	Discussion and Breakout Defining Sustainability Metrics	Moderator
<b>12:45 PM</b>	<b>1:15 PM</b>	<b>Poster Session</b>	
1:15 PM	1:45 PM	Current Status, Emerging Opportunities, and Policy Challenges in Bioenergy	
1:15 PM	1:30 PM	<i>How Do the Research and Public Communities View Biofuel Development?</i>	Qiankun Zhao
1:30 PM	1:45 PM	<i>An Agent-Based Model of a Cellulosic Biofuel System Involving Multiple Stakeholder Communities</i>	Pan Yang
1:45 PM	2:00 PM	Discussion and Breakout Current Status, Emerging Opportunities, and Policy Challenges in Bioenergy	Moderator
<b>2:00 PM</b>	<b>2:30 PM</b>	<b>Keynote Presentation</b>	<b>Madhu Khanna</b>
2:30 PM	3:00 PM	Question and Answer Session with the Keynote Speaker	Moderator
3:00 PM	3:20 PM	Closing Statements from the Conference Chairs	

View Some of the Exhibitors at the Conference



# KEYNOTE AND INVITED SPEAKER BIOGRAPHIES

## Keynote Speaker Biographies

### Madhu Khanna

#### *University of Illinois at Urbana-Champaign*

Dr. Madhu Khanna is the ACES Distinguished Professor of Environmental Economics in the Department of Agricultural and Consumer Economics and Associate Director of the Institute for Sustainability, Energy, and Environment, at the University of Illinois at Urbana-Champaign. She is also the Theme Leader for the Sustainability Theme in the Center for Advanced Bioenergy and Bioproducts Innovation at the University of Illinois, Urbana-Champaign. She received her Ph.D. from the University of California at Berkeley. Her research examines the incentives for adoption of efficiency-enhancing technologies, their potential for protecting the environment and the design and implications of alternative policies to induce adoption.

She has co-authored more than 150 papers, chapters and reports and co-edited two volumes of the Handbook of Bioenergy Economics and Policy. She has served as a member of the Science Advisory Board of the US Environmental Protection Agency and on the Board of Directors of the Association of Environmental and Resource Economists, the Agricultural and Applied Economics Association and the South Asian Network of Development and Environmental Economists. She has held editorial positions at several environmental and agricultural economics journals, including the American Journal of Agricultural Economics, Journal of Environmental Economics and Management and the Journal of the Association of Environmental and Resource Economists. She is currently a subject editor of GCB Bioenergy and a member of the USDOE/USDA Biomass Research and Development Technical Advisory Committee. She is a Fellow of the Agricultural and Applied Economics Association, a University of Illinois Scholar and a Leopold Leadership Fellow of the Woods Institute at Stanford University.

### Alicia Lindauer

#### *Bioenergy Technologies Office, U.S. Department of Energy*

Alicia Lindauer is a Technology Manager in the Bioenergy Technologies Office at the U.S. Department of Energy, where she manages strategic analysis and bioenergy sustainability activities. Alicia also co-leads the Co-Optimization of Fuels and Engines (Co-Optima) initiative, a joint effort with the Vehicle Technologies Office focused on improving vehicle engine efficiency, performance and emissions. Alicia is passionate about improving the environmental sustainability of biofuels and bioproducts. She joined the Bioenergy Technologies Office as a Presidential Management Fellow in 2008. She holds a master's degree from the School of Natural Resources and Environment at the University of Michigan and a bachelor's degree in Biology from Boston University with minors in Mathematics and Dance.

# KEYNOTE AND INVITED SPEAKER BIOGRAPHIES

## Invited Speaker Biographies

### Emily Heaton

*Iowa State University*

Emily Heaton received her PhD in Crop Sciences from the University of Illinois, then worked for the plant genetics company Ceres before joining Iowa State University in 2008. Her group aims to understand the growth and productivity of perennial C4 grasses, and how they can be managed to provide multiple ecosystem services, especially bioenergy.

### Steve Hartig

*Recon Associates*

Steve Hartig has almost 40 years of business leadership experience across bioenergy, specialty chemicals, and specialty materials in industries including energy, automotive, electronics, telecommunications, biomedical, and coatings. He has lived in both the US and Europe and done business on a global scale including China, Japan, and Brazil. He is presently a Senior Consultant with Recon Associates advising companies and businesses on strategy, project management, and innovation. He is also serving on Advisory Boards for two Department of Energy National Laboratories focused on next-generation biofuels and bioproducts; the Great Lakes Biofuels Research Center based at the University of Wisconsin and the Center for Advanced Biofuels and Bioproducts based at the University of Illinois.

### Thomas Richard

*Pennsylvania State University*

Tom Richard is a professor of agricultural and biological engineering and the Director of Penn State's Institutes for Energy and the Environment, where he supports a network of almost 500 faculty engaged in innovative interdisciplinary research and education on fossil and renewable energy, energy efficiency, water, climate, ecosystems and environmental health. His research and teaching focus on applications of fundamental engineering science to microbial and agricultural systems, developing market-based strategies for a more sustainable agriculture and the emerging bio-based economy. Dr. Richard currently directs the Northeast Regional Sun Grant Center for the USDA, serves on the Agricultural Science Committee of the U.S. EPA's Science Advisory Board and is the deputy technical director for the DOE's National Risk Assessment Partnership for geologic carbon sequestration. Tom is the author or co-author of over 150 research and technical publications, a Fellow of the American Society of Agricultural and Biological Engineers, and a Fellow and Past President of the Institute of Biological Engineering. He has a B.S. from the University of California at Berkeley, and M.S. and PhD degrees from Cornell University.

### Douglas Karlen

Steve Hartig has almost 40 years of business leadership experience across bioenergy, specialty chemicals, and specialty materials in industries including energy, automotive, electronics, telecommunications, biomedical, and coatings. He has lived in both the US and Europe and done business on a global scale including China, Japan, and Brazil. He is presently a Senior Consultant with Recon Associates advising companies and businesses on strategy, project management, and innovation. He is also serving on Advisory Boards for two Department of Energy National Laboratories focused on next-generation biofuels and bioproducts; the Great Lakes Biofuels Research Center based at the University of Wisconsin and the Center for Advanced Biofuels and Bioproducts based at the University of Illinois.

### Eric O'Neill

*Princeton University*



# KEYNOTE AND INVITED SPEAKER BIOGRAPHIES

## Cristina Negri

### *Argonne National Laboratory*

Cristina Negri is the Director of the Environmental Science (EVS) Division. As the Director of a scientific Division of 70+ staff, her current interests are in leading the development and execution of its strategic programmatic direction inclusive of a diverse research portfolio in environmental sciences. In her more than 25 years as a scientist at Argonne, she conducted and directed laboratory to full-scale multidisciplinary projects developing technologies and concepts for environmental remediation and stewardship, including soil remediation and water treatment. She has researched sustainable technologies for urban and agricultural environmental improvement. Cristina's research to integrate bioenergy within working agricultural landscapes addresses the food, energy, water, and land nexus. Her work focuses on developing sustainable, multifunctional landscape concepts, which aim, by design, at the creation of ecosystems services. Her interests are in systems approaches where industrial ecology concepts are applied to water and land management and green infrastructure.

Cristina is a Fellow with CASE at the University of Chicago. She is also a Fellow of the Northwestern University—Argonne Institute of Science and Engineering. She earned her Dottore in Scienze Agrarie Degree (Agricultural Sciences) at the University of Milan in Milan, Italy.

## Joel Stone

### *ConVergInce Advisers*

Joel is the President of ConVergInce Advisers and serves as Executive Vice President Strategy for Lee Enterprises Consultants, the world's premier bioeconomy consulting group. He has been a long-term visionary and respected leader in commercialization of industrial biotechnology. Joel is presently providing services for fermentation and downstream recovery to develop and commercialize the emerging synthetic biology products including commercialization assistance for advanced technology clients in renewable chemicals, biochemicals, biofuels, and agricultural and biobased ingredients for food, fragrance and consumer products. Joel is the former President of Green Biologics Inc. where he led the development of the commercial platform of the company in North America for renewable n-butanol and acetone for use in the renewable specialty and performance chemical markets. Previously he was responsible for leading several biofuel companies to commercial success where he has built and started up nearly a half billion gallons of biofuel capacity. He has provided executive leadership at companies including ASAlliances Biofuels, Osage BioEnergy, Abengoa, Balchem Corporation, Opta Food Ingredients, and Genencor (now Dupont Biosciences). He has provided oversight for complex technologies and chemical processes at both pilot and development scale, and commercial scale. Joel holds a B.S. in Chemical Engineering from Virginia Polytechnic University; and an M.S. in Chemical and Biochemical Engineering from the University of Pennsylvania. He previously served on the Board of Green Biologics, and presently serves on the Board of Fermentum, serves as a Board Advisor for the Biorenewable Deployment Consortium, and serves on the Advisory Board for Business Climate Leaders. Joel has twice been listed in Biofuels Digests top 100 in the bioeconomy. In 2019 he was selected as the inaugural "Champion for Industry" award from Thomas.net.

## Karen O'Brien

### *Gevo Inc.*

As Sustainability Engineering Manager at Gevo, Karen is involved in every aspect of Gevo's sustainability projects. From sustainable aviation fuel to wind turbines to regenerative agriculture practices and Blockchain, Karen and her team at Gevo find the most innovative and sustainable methods to produce advanced renewable fuels. Karen has a degree from the Colorado School of Mines in Chemical and Biochemical Engineering.

# CODE OF CONDUCT

## CODE OF CONDUCT

AICHE's volunteers are the core of the Institute and make all of its programs, conferences and educational efforts possible. These offerings provide excellent opportunities for AIChE members and meeting attendees to gain greater technical expertise, grow their networks, and enhance their careers. AIChE events provide engineers, scientists, and students a platform to present, discuss, publish and exhibit their discoveries and technical advances.

At all times, volunteers and meeting attendees should act in accordance with AIChE's Code of Ethics, upholding and advancing the integrity, honor and dignity of the chemical engineering profession. AIChE's Board of Directors has developed these guidelines to foster a positive environment of trust, respect, open communications, and ethical behavior. These guidelines apply to meetings, conferences, workshops, courses and other events organized by AIChE or any of its entities and also to volunteers who conduct other business and affairs on behalf of AIChE.

### SPECIFICALLY:

1. Volunteers and meeting attendees should understand and support AIChE's Code of Ethics.
2. Volunteers and meeting attendees should contribute to a collegial, inclusive, positive and respectful environment for fellow volunteers and attendees, and other stakeholders, including AIChE staff.
3. Volunteers and meeting attendees should avoid making inappropriate statements or taking inappropriate action based on race, gender, age, religion, ethnicity, nationality, sexual orientation, gender expression, gender identity, marital status, political affiliation, presence of disabilities, or educational background. We should show consistent respect for colleagues, regardless of discipline, employment status, and organizations for which they work, whether industry, academia, or government.
4. Disruptive, harassing or other inappropriate statements or behavior toward other volunteers, members, and other stakeholders, including AIChE staff, is unacceptable.
5. Volunteers and meeting attendees should obey all applicable laws and regulations of the relevant governmental authorities while volunteering or attending meetings. Volunteers and meeting attendees taking part in any AIChE event, including the Chem-E-Car Competition®, should also comply with all applicable safety guidelines.

Any violations of the foregoing should be reported to the President or the Executive Director of the Institute.