

iSEE Quarterly (iQ)

AN UPDATE FROM THE INSTITUTE FOR SUSTAINABILITY, ENERGY, AND ENVIRONMENT (ISEE)

Winter 2022

What's new at the Institute ...

New AD for Campus Sustainability on Board

iSEE is pleased to announce that [Jennifer Fraterrigo was hired as the Institute's new Associate Director for Campus Sustainability](#), effective Jan. 15.

Fraterrigo, an Associate Professor of Natural Resources & Environmental Sciences, has research expertise in the effects of environmental change and disturbance on vegetation patterns and ecosystem functioning.

"Jennifer is an outstanding researcher with a passion for environmental sustainability," iSEE Interim Director Madhu Khanna said. "She will bring her experience and expertise to provide strategic leadership for our efforts toward achieving Illinois Climate Action Plan (iCAP) goals — including making this campus carbon neutral as soon as possible."

"I also want to thank Ximing Cai for his nearly five years of leadership as Associate Director and contributions to iCAP 2020. Ximing helped streamline the iCAP process, and he was instrumental in establishing mechanisms for closing the circle between campus sustainability and iSEE's other important missions of research and education. Under his direction, we created a Campus as a Living Lab program that supports efforts by researchers to use



FRATERRIGO

MURPHY

LATAWIEC

WENDLING

campus as a test bed for research that can be scaled up to address larger sustainability challenges. Ximing leaves a strong foundation for campus sustainability programs that we continue to build upon."

Fraterrigo's primary responsibility at iSEE will be to shepherd the iCAP process, making recommendations that will further the plan's objectives.

"I am excited to get started at iSEE — and to work with all the students, faculty, staff, administrators, and community members who are devoted to making our campus a model of sustainability," Fraterrigo said. "We have made a lot of progress over the past several years, and the iCAP gives us even more lofty expectations now and in the near future. I'm proud to take on this important role."

New Managing Director

[Elizabeth Murphy became the new iSEE Managing Director](#) in January.

Murphy was serving as a Deputy

Director of the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI), and she will retain a management position in the Center as well. She replaces Jenny Kokini, who had served as Managing Director since the Institute's inception in

2013. Murphy will oversee iSEE's research project team, financial managers, proposal developers, communications team, and campus sustainability and educational personnel.

"We are going to miss Jenny, who was instrumental in iSEE's formation and building our research portfolio," Khanna said. "But we are delighted that she left us in good hands with an outstanding leader like Elizabeth."

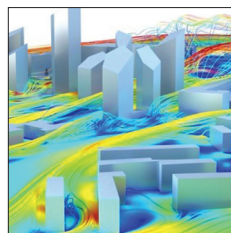
Other New Hires

- Basia Latawiec, hired in December as a Research Project Coordinator, will provide support for research team proposal development and to iSEE's multidisciplinary, multi-institutional "agrivoltaics" study funded by a four-year, \$10M grant from the U.S. Department of Agriculture.

- April Wendling, a former iSEE Communications Intern who was a Comms Associate for much of 2021, was hired in November as a full-time Specialist.

What's inside ...

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What's new at the Institute (continued) ...

iSEE, NRES Seek Levenick Resident Scholar for 2022-23

The Institute, in partnership with the Department of Natural Resources and Environmental Sciences (NRES), invites applications and nominations for the [Stuart L. and Nancy J. Levenick Resident Scholar in Sustainability Leadership for the 2022-23 academic year](#) at the University of Illinois Urbana-Champaign.

This will be the third year of this visiting scholar program, intended to bring experts from other universities, the private sector, and nonprofit organizations to share fresh perspectives and innovations with the

University of Illinois community.

Applications are welcome from scholars in a broad range of disciplines related to sustainability and the environment — including the biological sciences and physical sciences, engineering, the social sciences, and the humanities. Resident Scholars are expected to pursue their scholarship while interacting extensively with students and faculty across campus to promote multi-disciplinary research, education, and outreach. A course offering at the senior or graduate level is encouraged but not

mandatory. The duration and schedule of residency are negotiable and can range from two weeks to a full semester or more. The Resident Scholar will be provided a stipend and travel expenses.

Past scholars: molecular biologist/bio-ethicist Natalie Kofler, Director of *Editing Nature*; activist/author Catherine Coleman Flowers, Founder of the Center for Rural Enterprise and Environmental Justice; and University of Michigan nuclear energy researcher Denia Djokić, an Associate with Harvard's "Managing the Atom" project.

What's new in research ...

In the Spotlight: Sabrina Summers

In Brief ...

- Members of the [SMART-FARM team](#) and other University of Illinois researchers put hyperspectral sensors on planes to quickly and accurately detect nitrogen status and photosynthetic capacity in corn. The paper was published in December in the [Journal of Applied Earth Observation and Geoinformation](#).

- Registration is open for the sixth [Crops in silico \(Cis\)](#) Symposium & Hackathon, a virtual [event May 11-13](#).

- *Cis* researchers created a modified model to predict soybean growth and productivity as climate change increases atmospheric carbon dioxide levels and affects temperature, precipitation, extreme weather events, and soil factors. The paper was published in December in [in Silico Plants](#).

- In November, *Cis* researchers published "A Hybrid Kinetic and Constraint-Based Model of Leaf Metabolism Allows Predictions of Metabolic Fluxes in Different Environments" in [The Plant Journal](#).

Thanks to the work of [Sabrina Summers](#) and her University of Illinois research team-mates, you might be able to power your car with your dinner leftovers someday.

Summers is a second-year Ph.D. student in the Department of Agricultural and Biological Engineering (ABE) and member of iSEE's Environment-Enhancing Food-Energy-Water Systems ([E-E FEWS](#)) Project team. Led by ABE Professor Yuanhui Zhang, E-E FEWS specifically focuses on hydrothermal liquefaction (HTL), a type of thermochemical conversion that turns biomass into biocrude oil.

Before coming to the Midwest, Summers grew up in Honolulu, Hawaii, and earned two undergraduate degrees from the University of Hawaii at Manoa — one in Biological Engineering and the other in Chemistry. During her undergrad years, Summers did biomass conversion research at the Hawaii Natural Energy Institute. She was drawn more than 4,000 miles to Urbana-Champaign because of the research programs here; E-E FEWS is all about biomass — specifically in the form of food waste.

The HTL reactor puts biowaste solids through high-heat and high-pressure conditions, essentially mimicking the natural geologic conditions that create petroleum. Here's the catch: Instead of taking millions of years, this oil is ready in hours or even minutes. The biocrude oil is then processed further and used as a fossil fuel substitute.

"We take food waste, we convert it into a



bio-oil, and then we turn that into transportation fuel like diesel and jet fuel," Summers said. "That circular paradigm of waste to energy can be applicable to a lot of parts of society."

Summers's work is specifically focused on the latter half of the process: refining the biocrude oil. Before this technology can be implemented on a larger scale, more efficient ways to manage the wastewater and remove contaminants need to be found. Once scientists master this step, E-E FEWS has great potential to put climate change-curbing technology in everybody's hands.

Team members plan to host community engagement activities in the future.

What's new in research (continued) ...

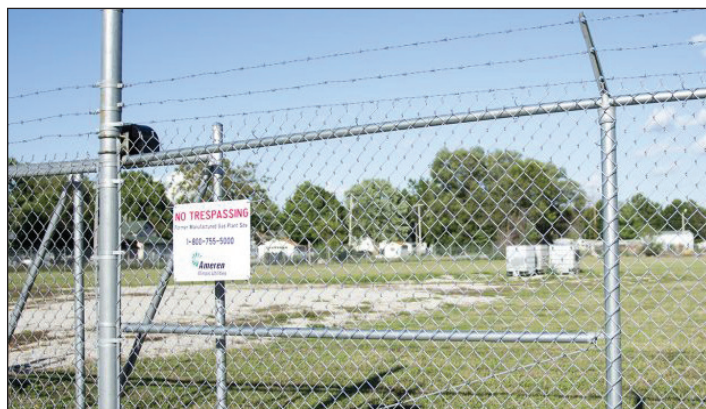
New Seed-Funded Projects Seek to Address Neighborhood, Urban Sustainability

In January, [iSEE announced](#) it will provide seed funding for two new research projects at the University of Illinois Urbana-Champaign — one addressing health disparities in neighborhoods afflicted by hazardous waste, the other developing a sophisticated urban modeling framework to advance global urban sustainability science.

The urban modeling project is funded through iSEE's 2022 interdisciplinary research initiative, and the health disparities grant is part of the Campus as a Living Laboratory (CALL) program. The projects focus on collecting preliminary data and enhancing researchers' capacity to address critical knowledge gaps and ultimately secure future funding from major external granting agencies in the federal, foundation, and private sectors.

"The University of Illinois continues to leverage its resources to combat environmental challenges and build a more sustainable society," said Jeremy Guest, iSEE Acting Associate Director for Research. "Through these grants, our scientists, engineers, and community health experts will use their skills to address climate change and environmental justice — at our doorstep and around the world."

The project selected for [interdisciplinary seed funding](#) seeks to develop a new urban modeling framework to help scientists understand the interactions between complex urban dynamics



and climate change and chart a course toward more sustainable urban environments. The project will be led by Lei Zhao, Assistant Professor of Civil and Environmental Engineering (CEE).

The new [CALL project](#) addresses health disparities in communities that once housed manufactured gas plants (MPGs), focusing on Champaign's 5th and Hill neighborhood a few blocks from the U of I campus. This project is led by CEE Assistant Professor Vishal Verma.

CABBI Profile: Himaya Mula-Michel

When the second-strongest hurricane to ever hit Louisiana swept through the state in September 2021, it left behind a trail of destruction that spared almost nothing. [Himaya \(Maia\) Mula-Michel](#), CABBI Feedstock Production scientist at the U.S. Department of Agriculture (USDA) Agricultural Research Service in Houma, La., reports that even months after the record-breaking hurricane, stores are still closed and missing traffic signs haven't been replaced. Her CABBI work as a Research Agronomist has since resumed, but Mula-Michel and her colleagues were off the grid for weeks with no electricity and Louisiana residents had to wait in long, grueling lines for gasoline to power their homes with generators.

CABBI's sugarcane crop was one of the few things in Houma seemingly unfettered by Ida. "The sugarcane is fine and

still growing!" she said.

Mula-Michel and her boss at USDA-ARS, geneticist Anna Hale, have been working to incorporate wild sugarcane traits into commercial cane varieties for conventional sugar production. Thanks to funding from CABBI, they have been able to expand this work to include the development of varieties for sustainable biofuel production. Because of the crop's resilience and ability to efficiently convert sunlight to energy, sugarcane is an ideal candidate as a biofuel feedstock.

As is, wild sugarcane is not a perfect bioenergy crop. So Hale selects genetic improvements for desirable traits like disease resistance, cold tolerance, and high biomass production. The long-term goal is to make enhanced sugarcane varieties available to farmers to grow as feedstocks for fossil fuel alternatives.



More CABBI Highlights

- U.S. Energy Secretary [Jennifer Granholm visited](#) the Integrated Bioprocessing Research Laboratory and CABBI plots at the Illinois Energy Farm on Dec. 9.
 - CABBI added a new Sustainability Theme researcher, Iowa State's Marshall McDaniel, in December, bringing the total number of faculty-level [Co-Investigators](#) to 66.
 - CABBI has begun nationwide recruitment for underserved undergraduates to participate in the Research Internship in Sustainable Bioenergy ([RISE program](#)), a paid summer internship.
 - Since October, CABBI has published 21 [scholarly papers](#), bringing its total in four-plus years to 217.
 - The Center has also raised its total of publicly available [published datasets](#) by six, to 81.

What's new in education & outreach ...

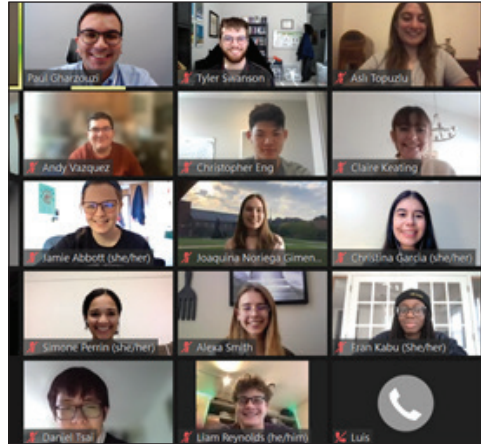
Environmental Leadership Program Launches

iSEE's first full Environmental Leadership Program (ELP) launched in January under the leadership of new [Associate Director for Education & Outreach Luis Rodríguez](#), Academic Instructor/Advisor Eric Green, and Graduate Student Paul Gharzouzi.

A cohort of 21 students began the program with a two-day intensive introduction session online before the Spring semester began, and is continuing with regular in-person meetings that feature working sessions and guest speakers from academia, industry, nonprofits, and government.

The program — supported with a generous donation from the Baum Family Fund — also includes visits to local governments and a Spring Break trip to the state Legislature in Springfield.

Throughout the semester, one of the ELP students will offer highlights from the



program. Kratika Tandon, an iSEE Communications Intern and a member of the 2022 cohort, has created a blog, "[Inside the ELP: An Immersive Experience.](#)"

Environmental Law Pioneer Plans Visit

Urbana native and University of Illinois graduate Richard Lazarus, a Professor of Environmental Law at Harvard who has argued several landmark environmental cases before the Supreme Court, will deliver a MillerComm Lecture to highlight [Earth Week 2022](#).



April's Earth Month festivities will also include two Illini Lights Out events, a trash/recycling pickup, a TED Talk: Eco-Edition, a sustainability challenge, more lectures, and several student-organized events including a Green Quad Day.

What's new in campus sustainability ...

Green Certifications Continue to Increase

Despite the continuing pandemic, the Institute's [Greener Campus Programs](#) continue to certify and re-certify offices, Greek chapters, and events:

- Three [offices](#) since early fall, including Visit Champaign County in January 2022;
- Two new [chapters](#);
- And eight new [events](#), including the Office of the Chancellor's "State of the University" discussion!

iSEE Certified Green Events include TED Talk: Eco-Editions throughout the last year and continuing in 2022. The TED Talks have drawn a mix of dozens of participants each month — including an average of more than 70 registrants in December and January!



169,814

Bulbs turned off by students through January 2022

215.7

Tons of CO₂ equivalent saved through January 2022

29,683

Dollars saved in energy bills through January 2022

Illini Lights Out: Six Spring Events!

In four Fall 2021 events, nearly 600 [Illini Lights Out \(ILO\)](#) volunteers shut off 13,942 bulbs, saving 24,050 kWh of energy, nearly 17 tons of carbon dioxide equivalent emissions, and more than \$2,000 in weekend energy bills.

Led by Intern Jenna Schaefer, iSEE

has planned six events for the spring semester. On Jan. 28, more than 60 volunteers visited 20 campus buildings, turning off 2,781 bulbs and saving about 4,800 kWh, 3.4 tons of CO₂e, and \$400.

The remaining spring dates: Feb. 11 and 25; March 25, and April 9 and 29.

