



# IQ - ISEE Quarterly

An update from the Institute for Sustainability, Energy, and Environment

What's new in research ...

## DOE Project to Measure Bioenergy Crop Carbon Emissions

The U.S. Department of Energy has awarded a \$3.3 million grant to a multidisciplinary research team at the University of Illinois at Urbana-Champaign to develop a precise system for measuring greenhouse gas emissions from commercial bioenergy crops grown in central Illinois.

The three-year project through the Institute for Sustainability, Energy, and Environment (iSEE) is expected to reduce emissions associated with ethanol and other biofuels by enabling new technology for managing bioenergy crops, improving yield, reducing overfertilization, and designing new tools for “smart farms.” The vast data collected will be publicly available and could someday lead to financial rewards for farmers who reduce emissions through sustainable crop management.

Led by Kaiyu Guan, an Assistant Professor of Natural Resources and Environmental Sciences (NRES) and a Blue Waters Professor at the National Center for Supercomputing Applications (NCSA), the team will establish the Midwest Bioenergy Crop Landscape Laboratory (MBC-Lab) to monitor emissions on three 85-acre maize and soybean fields in Champaign County.

Corn and soybeans are the two major crops marketed to biofuel producers, with more than 75 percent grown in the Midwest. But current practices to grow those crops



emit nitrous oxide (N<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>), and methane (CH<sub>4</sub>) into the atmosphere — all greenhouse gases (GHG) associated with global warming. N<sub>2</sub>O, which also degrades the Earth's ozone layer, is a product of excessive fertilizer use. And annual tilling aerates the soil, allowing microbes to break down carbon in the soil and release CO<sub>2</sub> into the air.

Ethanol and other biofuels could meet up to 5 percent of U.S. energy demand with net-zero emissions, or even “carbon negativity” — sequestering more carbon in the soil than the production process emits. But that will require new farming practices that drive down emissions and improve yield, such as adopting no-till or cover crops to stabilize

the soil or applying fertilizer at the right time and amount.

Through its Advanced Research Projects Agency-Energy (ARPA-E) program, DOE has funded a series of projects, including this one, to measure the impact of crop-management practices on yield and the environment — and to help create market incentives for efficient feedstock production.

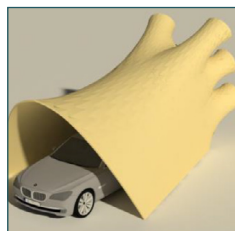
The project's other co-investigators: Evan H. DeLucia, iSEE Baum Family Director; Carl Bernacchi, a Plant Physiologist with the U.S. Department of Agriculture's Agricultural Research Service; D.K. Lee, a Crop Sciences Professor; and Jong Lee, Principal Research Scientist at NCSA.

[Read the full news release.](#)

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### New Campus as a Living Lab Projects Funded

In November, iSEE announced it had seed-funded two new “Campus as a Living Laboratory” research projects:

- Integrating a wind turbine into a parking pavilion to serve as a charging station for electric cars, bikes, or scooters.
- Studying campus commuters to help create a crowd-sourced program that might lead to ride sharing.

[Read more about these projects on the CALL web-page.](#)

*iSEE is expected to announce seed funding for several new interdisciplinary research projects — and possibly a few more CALL projects — in February and March. Stay tuned!*



## In the Spotlight: Renaissance Scientist Christy Gibson

Christy Gibson is as comfortable with words as she is with lasers. As a two-time novelist and a Sustainability Postdoctoral Researcher at the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI), she deals with both on a daily basis.

Born and raised in the Bahamas, Gibson was well into a baccalaureate program when she decided to take her educational journey from Nassau to Nashville.

“I felt pretty stagnant,” Gibson said. “The opportunities to advance in the Bahamas were very limited at that time. ... There was no way to differentiate yourself.”

At Tennessee State University, Gibson studied chemistry in conjunction with biology through a unique professional degree program. She blended her STEM concentration with an English minor to unite her passions for writing and research.

“It made sense. If you’re going to be a writer for fiction, you have to do research. If you’re going to be a scientist, you have to do research. Those were two very common themes.”

Instead of deciding between science and creative writing, Gibson remained loyal to both. By day, she channeled her love for lab-based research into a plant and soil science Master’s; by night, she poured time and energy into authoring two novels that she one day hopes to publish. Always looking to expand

her skill set, Gibson set her doctoral sights on Purdue University’s interdisciplinary graduate program.

“I had a very mixed background, and I wasn’t totally focused on one thing. I thought: ‘How do I fit in all of these things that I’ve done? I have a bit of English language and literature, I have chemistry, biology, plant and soil science — what do I do with this?’”

At Purdue, Gibson studied everything from anthropology to ecology to black carbon, all of which influenced her Ph.D. in Ecological Sciences and Engineering (ESE). In combination with her scientific versatility and interdisciplinary background, Gibson’s doctoral research on the effects of natural fire products (char) on belowground carbon (C) and nitrogen (N) cycling in forest ecosystems was instrumental to her next move: CABBI and the University of Illinois at Urbana-Champaign.

Since February 2019, Gibson has been a member of the Center’s Sustainability theme, where her work with the Carl Bernacchi Lab takes place at the groundbreaking “nexus of food and energy security.” At the University of Illinois, Gibson studies C and N cycling above- as well as belowground, and in bioenergy fields instead of forests. Her goal? To measure greenhouse gas levels across the entire ecosystem — from soil to bioenergy crops to the atmosphere.

[Read the full research profile.](#)

### New Publications

Since fall, the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI) has [published seven new papers](#) in research journals.

In addition, members of the [Stormwater & Mosquito Control](#) research team published a paper in the 2020 edition of *Ecological Entomology*. The study by Animal Biology Professor Carla Cáceres and recent Animal Biology Ph.D. graduate Chris Holmes is titled [“Predation Differentially Structures Immature Mosquito Populations in Stormwater Ponds.”](#)



What's new at the Institute ...

# NRES Levenick Chair Joins iSEE Program

In January, iSEE welcomed Jeffrey Brawn as the inaugural Stuart L. and Nancy J. Levenick Chair in Sustainability, the first endowed chair in the Department of Natural Resources and Environmental Sciences (NRES).

Part of Brawn's activities will be to organize and manage the [Levenick Resident Scholars in Sustainability Leadership Program](#) at iSEE, and the Institute looks forward to continuing its close ties with him. As the former NRES Head, Brawn served on iSEE's Steering Committee since its inception in 2013-14.

"We are extremely grateful to Stuart and Nancy Levenick for their recognition of NRES faculty and the University of Illinois as global leaders in the interdisciplinary science and practice of sustainability," College of ACES Dean Kim Kidwell said. "Dr. Brawn has been an invaluable part of the ACES leadership team ... I am delighted that he will be receiving this richly deserved honor."



**BRAWN**



**WURTH**

## Institute Hires New Communicator

In January, iSEE welcomed longtime *News-Gazette* reporter Julie Wurth as its newest Communications Specialist. Wurth, a U of I graduate, will write and edit content for the website, newsletter, social media, and scientific materials. [Read her staff profile.](#)

## iSEE Offers Teaching Sustainability Fellowships

For the second year running, iSEE has offered a teaching fellowship opportunity for U of I faculty and instructors.

The 2020 Levenick Teaching Sustainability Fellowship provides funding for Illinois instructors to integrate sustainability components into an existing course (\$1,000) or develop an entirely new course with a sustainability focus (\$2,000). The 2020 cohort will be announced by March 1; stay tuned!

[Read the full news release.](#)

What's new in education & outreach ...

## iSEE Course Offerings Expanded in '20

In addition to the usual courses iSEE offers — through its campuswide minor and environmental writing program — the Institute was able to offer two eight-week courses starting in January 2020:

- iSEE Academic Instructor/Advisor Eric Green and Sustainability Programs Coordinator Meredith Moore (pictured right) are co-teaching NRES 285: Student iCAP. Students in the course are helping iSEE develop strategies and offering their visionary input as the Institute prepares to publish the 2020 Illinois Climate Action Plan.

- Natalie Kofler, the Levenick Resident Scholar in Sustainability Leadership, is offering NRES 512: CRISPR, Geoengineering, and A.I., a seminar on ethical decision-making when it comes to genetic engineering tools.



Spring offerings also include ENV 301: Tools for Sustainability, as part of the Sustainability, Energy, and Environment Fellows Program, a campuswide minor; and ESE/ENGL 360, ESE/ENGL 477, and ESE/ENGL 498 — all courses within the undergraduate Certificate in Environmental Writing (CEW).

[Read more about iSEE course offerings.](#)

## Donor Renews Funding for Q Magazine Student Travel

iSEE will continue to offer travel stipends for University of Illinois students doing background research for *Q Magazine* articles, after a second \$5,000 donation from Janelle Joseph.

Joseph's 2019 donation helped three *Q* students do research for stories about the Gila River in the U.S. Southwest and the Hanford Reach in Washington state. These articles will appear soon in Volume 2, Issue 2.

iSEE looks forward in 2020 to assisting students in its undergraduate Certificate in Environmental Writing, thanks to Joseph's generous help.

[See Volume 2, Issue 2 of Q online — coming in February!](#)



## Upcoming Events

Earth Month is rapidly approaching, and along with it a bevy of student-organized events. One of iSEE's contributions will be two public lectures during Earth Week on April 20-24:

- The "Zero Carbon" Keeling Lecture — Katharine Hayhoe, Professor of Political Science, Director of the Climate Center, and an Associate in the Public Health Program of the Graduate School of Biomedical Sciences at Texas Tech University. The annual Charles David Keeling lecture will be presented this year via teleconference.

- iSEE's annual sponsored lecture — Somini Sengupta, *New York Times* Foreign Correspondent who has reported on climate change and glaciers.

Times, dates, and venues on both lectures are TBA; [more details will be available soon on the Sustainability Calendar.](#)

What's new in campus sustainability ...

# iSEE Offers Guide to Offset your Carbon Footprint

The University of Illinois at Urbana-Champaign is committed to becoming carbon neutral no later than 2050. To do so, the campus community must take ownership of that commitment — and faculty, students, and staff can do their part as individuals.

In November, iSEE began offering a guide to helping campus community members make the choice to do their part.

One way is to purchase carbon offsets for travel or other actions that have measurable emissions.

Offsetting your carbon footprint is becoming easier to do — and at less than \$10 for a 2,000-mile flight, it is a cost-effective way for you to personally pay for your emissions impact even if your grant or government fund won't cover offsets (many do not).



**HOW TO: OFFSET YOUR CARBON FOOTPRINT**

1. PAY CARBON OFFSET SURCHARGES WHEN PURCHASING TICKET
2. CALCULATE YOUR CARBON FOOTPRINT
3. PURCHASE OFFSETS THAT FUND VARIOUS PROJECTS
4. FILL OUT THE ISEE SURVEY TO REPORT YOUR OFFSET PURCHASE

GO.ILLINOIS.EDU/OFFSETCARBON ISEE

iSEE's webpage offers a four-step guide to calculate the amount of carbon to offset —

and to purchase high-standard offsets.

[Check it out!](#)

## Sale to Fund Future U of I Sustainability Projects

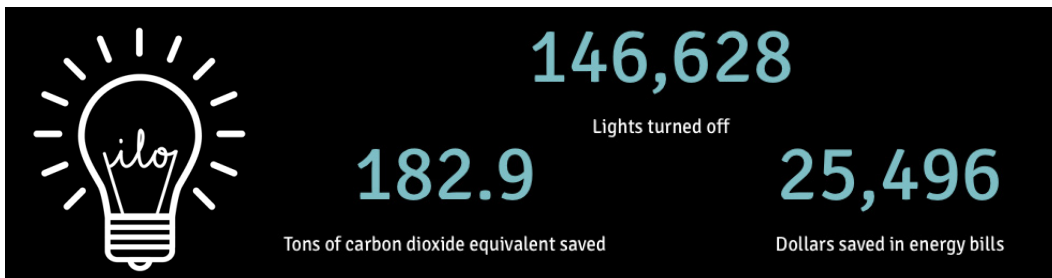
During 2019, iSEE completed a sale of the U of I campus' Verified Carbon Units (a measure of carbon dioxide or equivalent greenhouse gases (GHG) kept out of the atmosphere).

The units, accumulated during the second half of 2017, were sold as part of the Carbon Credit and Purchasing Program (C2P2) through Boston-based nonprofit Second Nature.

Proceeds from the fall sale and an earlier one in March totaled nearly \$202,000.

That amount, along with proceeds and matching funds from previous carbon sales, are being held at the campus level (the fund stood at more than \$1.06 million as of December 2019).

Funds from that account have been used, and are reserved for future use, toward campus sustainability and GHG reduction projects as determined by iSEE and Facilities & Services (F&S). By selling its accumulated carbon credits, Illinois' good work (mainly through efforts by F&S) to reduce GHG emissions will fund additional emission reductions and energy conservation projects on campus.



## Illini Lights Out Reaching New Heights

Illini Lights Out (ILO), our popular program in which students spend part of a Friday evening each month flipping switches in buildings near the Quad, continues to flourish in participation and energy and money savings.

Funded by the Student Sustainability Committee and led by Intern Taylor Holin, Fall 2019 featured six events. ILO averaged nearly 140 students per event, and students turned off 32,205 bulbs — saving more than 55,000 kilowatt-hours

(and 39.3 tons of carbon dioxide equivalent) — as well as more than \$8,300!

The totals since 2016-17 now stand at 146,628 bulbs, saving nearly 253,000 kwh (and 182.9 tons of CO<sub>2</sub>e) — and more than \$25,000.

The Spring 2020 semester ILO events started Jan. 31. More dates are set for Feb. 21, March 6 and 27, and May 1.

[Check out the latest figures on ILO on our webpage.](#)