



IQ - ISEE Quarterly

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

What's new in research ...

\$7M+ in Grants Since Spring

In the past six months, iSEE has announced that it helped secure more than \$7 million in research funding. The highlights:

\$5M for Energy Crops Study

A U of I Crop Scientist will lead a team of researchers on a five-year study of new crops that could contribute to the production of affordable, sustainable sources for market-ready fuels and other valuable products.



LEE

U of I College of Agricultural, Consumer, and Environmental Sciences (ACES) Crop Sciences Associate Professor D.K. Lee and his collaborators were awarded \$5 million from the U.S. Department of Energy (DOE) for a study titled "Next-Generation Feedstocks for the Emerging Bioeconomy." Other team members in the study funded by the DOE's Bioenergy Technologies Office (BETO) are from the U.S. Department of Agriculture's Agricultural Research Service, Iowa State University, South Dakota State University, Argonne National Laboratory, Idaho National Laboratory, and Antares Group Inc. They will collaborate with

industry partners POET-DSM Advanced Biofuels LLC, Engenuity Worldwide LLC, and The Climate Corp.

The team will assess field-scale yield of advanced switchgrass varieties such as "Independence" — which was developed by Lee — for pre-commercialization. Team members also will examine other warm-season perennial grasses such as switchgrass blends, big bluestem, prairie cordgrass, and Miscanthus.

\$1M+ for Grazing Study

iSEE Visiting Research Scientist Nuria Gomez-Casanovas and iSEE Baum Family Director Evan H. DeLucia, a Professor of Plant Biology, will receive \$1,045,560 from Arizona State University for a study titled "Can Adaptive Multi-Paddock Grazing Management Increase the Net Greenhouse Gas Sink Strength and Water Use Efficiency of Grazed Pastures?"



GOMEZ-CASANOVAS

Gomez-Casanovas and DeLucia are part of a collaborative effort to study if a new grazing practice can help sequester carbon in soils.

Nearly \$600K for CACHE

The Center for Applied Collaboration on Human Environments (CACHE), led by Civil and Environmental Engineering Professor Tami Bond, received \$599,951 from the National Science Foundation to explore the complex chemistry



BOND

that happens in wood in the moments just before it bursts into flames. In a study titled "Pre-Ignition Biomass Emissions: Causes and Characterization," the CACHE team will develop an ignition chamber in which to light fires and measure the rate and amount of gases and particles generated from fuels during ignition.

\$495K+ for Mosquito Study

iSEE Stormwater and Mosquito Control project lead Brian Allan, an Associate Professor of Entomology, is a co-PI with Allison Gardner of the University of Maine, for a study titled "Coupled Dynamics of Tourism and Mosquito-Borne Disease Transmission in the Americas."



ALLAN

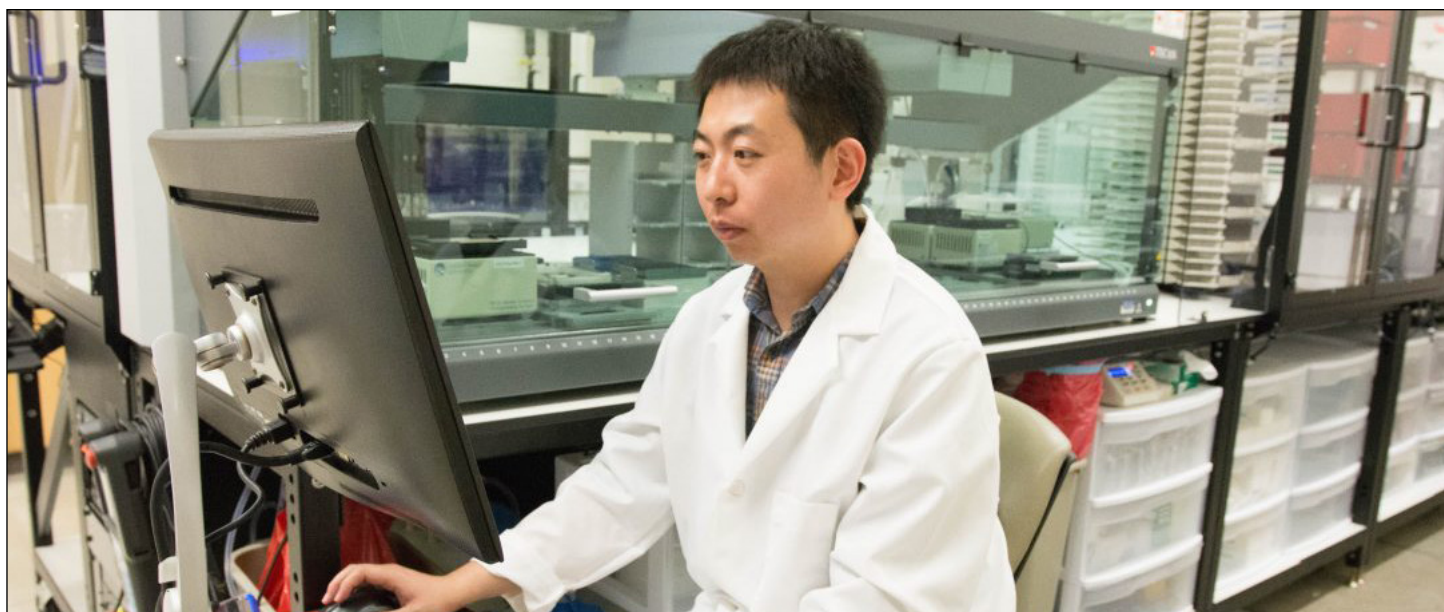
What's inside ...

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In the Spotlight: CABBI's Tong Si

While most children were building race tracks, Lego cities, and sandcastles, Tong Si was really interested in one thing: tearing them apart. Fascinated at a young age by what things are made of, he liked to break things apart to figure out how they worked. Si naturally got into biosystems design as a young adult.

A Center for Advanced Bioenergy and Bioproducts Innovation (CABBI) and Carl R. Woese Institute for Genomic Biology (IGB) Postdoctoral Research Fellow at the University of Illinois at Urbana-Champaign, he now uses his lifelong skill set to study micro-organisms such as yeast.

“In my presentations I always make the joke that yeast can be used for baking bread, right?” he says. “And you use carbon dioxide to make ethanol. If you combine yeast and carbon dioxide, you can make the most important thing to a scientific researcher: beer.”

Jokes aside, what Si — and the scientists he's working with at CABBI — are doing is groundbreaking. Si has been at Illinois for nine years — a fact he's proud of.

“I like being at this university. What I'm really fond of is the interdisciplinary research,” he says. “I really like that we're combining new technologies in each field; we're working together to see what kind of cool things we can do. This university is re-

Quick CABBI updates

More from CABBI:

- Since its inception and through late October, the Center has claimed [two inventions](#) and [published 15 papers](#) in scholarly journals.

- [CABBI personnel](#) continues to grow and is now at well more than 150 scientists, postdoctoral researchers, students, technicians, and professionals to support three research themes: Feedstock Production; Conversion; and Sustainability.

- CABBI began a new monthly [colloquium series](#), in which postdocs share their work with people from all three research themes.

- [Outreach efforts](#) at Illinois and its 17 partner institutions have reached K-12 students, high schoolers, farmers, and more.



ally good at collaboration. As long as you have an idea, you can reach out to anyone.”

Si currently works with *Saccharomyces cerevisiae* — commonly known as baker's

or brewer's yeast — in the laboratories of Steven L. Miller Chair of Chemical and Biomolecular Engineering Huimin Zhao and James R. Eiszner Family Chair of Chemistry Jonathan Sweedler.

He describes the lab space as a manufacturing plant, except the primary source of labor is a robot doing the work of 50 graduate students, called the iBioFAB, short for the Illinois Biological Foundry for Advanced Biomanufacturing. At the “factory,” Si and his colleagues are growing yeast, then breaking it apart to look at it to better understand its genome — and to create a better, stronger microbe.

“People are using yeast to produce biofuels and ethanol, but we want to expand and produce more things than just ethanol,” he says.

Si has been a part of the Center since it launched in December 2017. Si's transformative microorganism research fits directly under the CABBI Conversion theme. Scientists and researchers working in this theme are engineering living organisms, like baker's yeast and oleaginous (high oil content) yeasts, in collaboration with other researchers working with plants (sorghum, sugarcane, miscanthus, and others) to efficiently produce more sustainable products such as biodiesel, alternative fuels, oleochemicals, and alcohols.

[Full profile on the CABBI website.](#)

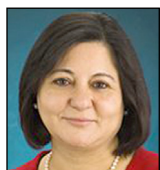
What's new in research (continued) ...

New Campus as a Living Lab Project: Agrivoltaics

iSEE's Campus as a Living Laboratory research initiative added a third project, and the Institute helped facilitate a major funding proposal to the National Science Foundation for this new project, which proposes to use the 21-acre Illinois Solar Farm as a test site.

This project will investigate a strategy called agrivoltaics, by which crop production and photovoltaics can be merged within a landscape to increase the total energy output toward food and energy production and to do so with less water and in an ecologically and environmentally sustainable manner.

According to PI Madhu Khanna, agrivoltaics can increase the food and energy output per land area while reducing demands for water, based on the ability of solar panels to alter the plant growth environment to increase landscape water use efficiency (WUE) while marginally decreasing crop production but significantly increasing renewable fuel production relative to existing land use.



KHANNA

The agrivoltaics team proposes to integrate economic models with an ecosystem model altered to include an agrivoltaic ecosystem. These coupled models will be used to investigate the energy output per land area and impacts on water use and water quality, and to spatially analyze agrivoltaics relative to the current ecosystem across the Midwestern U.S. Additionally, the team will address social acceptance and create an outreach plan using the most effective strategies to promote K-12 interest in challenges facing the interface of food, energy, and water resources.

Other members of the Agrivoltaics team include U of I faculty members Carl Bernacchi, Bruce Branham, Evan H. DeLucia, Kaiyu Guan, Praveen Kumar, H. Chad Lane, Nenad Miljkovic, as well as Nuria Gomez-Casanovas, a Visiting Research Specialist at iSEE, and Bin Peng, a Postdoc at the National Center for Supercomputing Applications.

[Read more about Campus as a Living Lab](#) and [this project](#).



Gift Helps Boost Ag for Food Team

The iSEE seed-funded Agroforestry for Food team was able to add support for Undergraduate Student Interns during Summer 2018 thanks to a \$5,000 gift by Janelle Joseph.

This donation allowed the A4F team to hire Interns Dylan Raye-Leonard and Anna Krehbiel (above) to assist Principal Investigator Sarah Taylor Lovell and Co-PI Wendy Yang.

"The gift was super-helpful for our project this summer, when we needed it most on the farm site," Lovell said. [Read more](#).

What's new at iSEE ...

New CABBI Program Manager, Communications Specialist

In August, the Institute was pleased to name Elizabeth Murphy as Program Manager for the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI).

Murphy's duties include running day-to-day operations at CABBI, helping the directors with budgets and reporting to the U.S. Department of Energy. She also is helping iSEE develop and submit research funding proposals to federal agencies.

Murphy, who previously served as a CABBI Research Coordinator, replaced Ank Michielsens, who moved to England with her family. The Center hired Michael Ponte and Anna Fedders to join Anya Knecht as Research Coordinators under Murphy's leadership.

Additionally, iSEE welcomed Jordan Goebig as its new Communications Specialist in May. Goebig will work with Communi-

cations and Public Affairs Director Tony Mancuso as the primary content producer for iSEE's websites and publications. She will write and illustrate news and feature articles on iSEE's research, education, outreach, and campus sustainability efforts — as well as for the Institute's affiliated research centers such as CABBI.

Goebig previously worked as Assistant Director at the Illinois Property Assessment Institute and as a Program Coordinator for the American Lung Association. In both positions, she crafted diverse messages using a variety of multimedia platforms. She continues to be the Production Manager for Droi Media, a video production company.

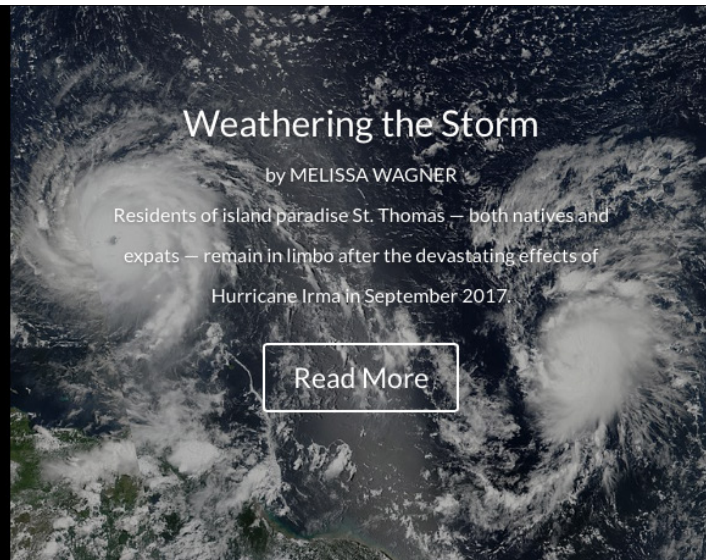
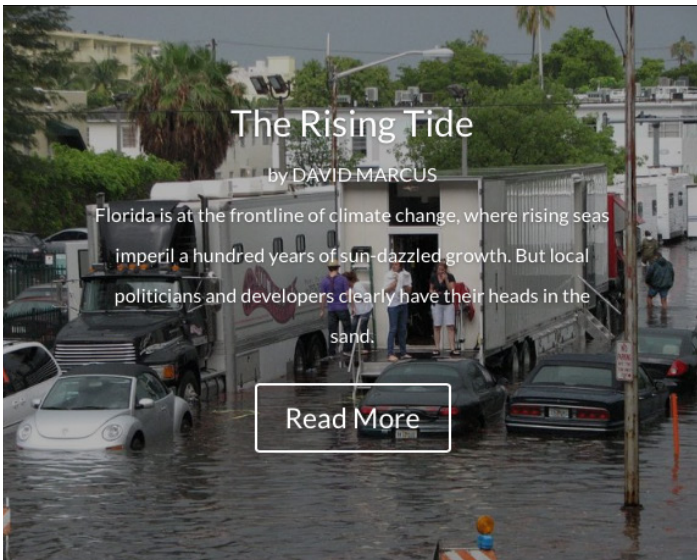
Goebig replaces Olivia Harris, who moved to New York in June. The iSEE communications team also includes interns Molly Gates and Jenna Kurtzweil.



MURPHY



GOEBIG



Institute Publishes *Q Magazine*, a New Student Environmental Publication

In September, iSEE announced publication of the first online issue of *Q Magazine*, featuring articles by University of Illinois students enrolled in the Undergraduate Certificate in Environmental Writing.

Q is the first student-written, professionally produced publication of its kind — and is “at the cutting edge of student environmental journalism,” said Gillen Wood, iSEE Associate Director for Education and Outreach. “Students in our Certificate in Environmental Writing (CEW) work with a specific purpose: to turn data into narrative.

“We expect them to raise vital questions about our environmental future — and to find answers through engagement with current environmental science, politics, and policy.”

Wind, waves, and high water drive the lead stories in the inaugural edition of *Q*.



Magazine

English major David Marcus investigates how climate change and rising water are threatening doom for South Florida and other coastal communities, while journalism major Melissa Wagner explores the devastating impact of Hurricane Irma on the Caribbean island paradise of St. Thomas.

Other stories include the life and legacy of Chicago’s Hazel Johnson, known as “The Mother of Environmental Justice”; the history of the iconic bison on the U.S. prairies; the pharmaceutical potential of fungi; an anthropomorphic look at ants; and the

environmental costs of clean dishes (our addiction to dish soap ...).

Headed by Wood, the Langan Professorial Scholar of Environmental Humanities, the CEW is an interdisciplinary sustainability program co-sponsored by iSEE, the School for Earth, Society, and Environment (SESE), and the Department of English.

Q Magazine’s editorial board consists of Wood, SESE Clinical Associate Professor Rob Kanter, a student editor, and the Institute’s communications staff. iSEE will publish two online issues each year, with a glossy print version published annually. Through *Q*, student writers will learn invaluable communications skills, experience public exposure of their writing, and have polished, professional work to show to potential employers.

[Read all the stories on the Q website.](#)

iSEE Launches ‘Teaching Sustainability’ Portal

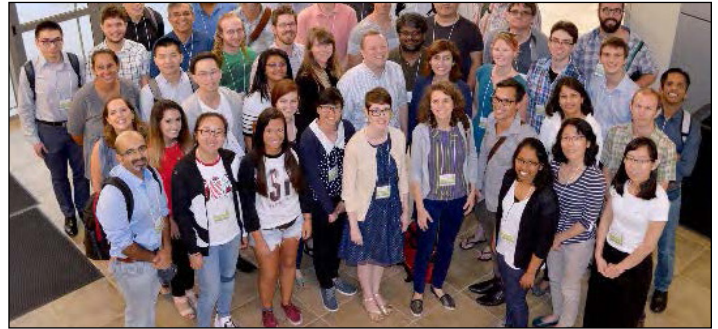
At the Campus Sustainability Celebration in October, iSEE announced the launch of its Teaching Sustainability web-pages.

This new portal will be an online platform to provide educational materials and tools, workshops, and networking

opportunities for faculty and instructors who want to integrate sustainability into their courses and teaching. iSEE is creating a listserv for sustainability educators, and will strive to help instructors find guest speakers and other materials to make the job easier. [Visit the portal.](#)



What's new in outreach ...



Hundreds Attend Research, Campus Sustainability Events

In Summer and Fall 2018, iSEE, its researchers, and its affiliated centers hosted several scientific meetings as well as major public events. Among them were the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI) Annual Retreat (above left), convening more than 140 CABBI scientists from Illinois and 17 partner institutions; the late July Crops *in silico* Symposium, Workshop, and Hackathon (above right), a meeting of plant modelers, experimentalists, and computer scientists featuring 55 registrants from 27 institutions and nine countries; iSEE Congress 2018 'Sustainable Cities' (below left), with more than 400 registrants discussing the issues facing urban transportation, housing, food, water, infrastructure, and public health; the Campus Sustainability Celebration (below right) during Sustainability Week in October, attended by more than 100 people and featuring updates on progress toward Illinois Climate Action Plan goals, a ceremony for good energy savers on campus, and more; and a workshop for dozens of researchers hosted by the Center for Applied Collaboration on Human Environments (CACHE).



What's new in campus sustainability ...

iSEE Website Now Features Greener Campus Portal

In August, iSEE launched its Certified Green Office Program 6.0 — along with a new Certified Green Laboratory Program — and the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI) was the inaugural CGLP recipient.

“For almost five years, the Certified Green Office Program has provided offices and departments across campus an opportunity to make the University of Illinois more sustainable,” iSEE Sustainability Programs Coordinator Micah Kenfield



said. “Given that research laboratories are one of campus’s biggest utility consumers, the new Certified Green Lab Program is a natural complement.”

Both programs are part of a new Greener Campus portal on the iSEE website. CGOP and CGLP will be joined later this school year by the Certified Green Chapter and Certified Green RSO programs, offering guided opportunities for student groups to actively participate in campus sustainability efforts. [View the portal.](#)

New Campus Kudos

The University of Illinois at Urbana-Champaign recently earned two new honors:

- In August, the campus took first place in the academia category of the International Laboratory Freezer Challenge after 45 labs in 17 buildings took energy-saving steps.



- In October, Illinois became the first Big Ten Conference campus — and 53rd overall — to be recognized as a Bee Campus USA for its efforts to make the world safer for pollinators through extensive habitat improvements, awareness efforts, and engagement strategies.



[Read more on our website.](#)

What's new with the Student Sustainability Committee (SSC) ...

Committee's First Sustainability Forum on Resource Use

From recycling at Quad Day to touring Abbott Power Plant, the Student Sustainability Committee (SSC) started the 2018-19 year off actively.

The Committee continues to prioritize environmental stewardship and student impact by hosting different programmatic opportunities. For example, SSC arranged its first Sustainability Forum at which students from across campus explored resource use.

Illini Union Director Jamie Singson presented on methods to overcome challenges. He demonstrated his personal experience leveraging relationships between the University of Illinois and local Native American tribes to reverse lead leakage in regional waterways.

Whether collaborating with campus partners at a kickoff retreat or hosting a Socially Responsible Investing Workshop during Sustainability Week on Oct. 26, SSC stays focused on its mission to improve environmental stewardship, inspire change, and impact students on campus.

Primarily a funding board, SSC continues to accept and evaluate project proposals. SSC received 39 proposals — totaling \$3.1M in requests — by its Sept. 24 fall deadline. Projects range from student-led carbon gardens to faculty-led recycling programs.

During the next few months, the com-



mittee will review and select proposals for funding.

Additionally, SSC approved one micro grant in September that went to a student-led project: The Student Sustainability Leadership Council (SSLC) received \$500 to bring a guest speaker to campus

who specializes in clean energy.

The next funding deadline for student-led proposals under \$10,000 is Nov. 28. SSC will have a funding deadline for all projects in February 2019.

[For application details, please visit the SSC website.](#)

What's new with the Student Sustainability Leadership Council (SSLC) ... Rejuvenated Group Organizes Sustainability Quad Day

After its revival in Spring 2018, the Student Sustainability Leadership Council (SSLC) strives to give student leaders from across campus a space to collaborate and interact.

Joey Kreiling returns as the President of SSLC for 2018-19, and Jonah Messinger begins his first year with SSLC as the Vice President. Together, they support sustainability-oriented student leaders via monthly meetings, an email listserv, planned events,

and committee memberships.

Most recently, SSLC organized a Sustainability Quad Day during Sustainability Week, at which environmental student organizations networked and recruited on the Main Quad.

SSLC continues to gain momentum as the Council members try fresh strategies to engage students in sustainability issues on campus.