



Institute for Sustainability,
Energy, and Environment

University of Illinois
at Urbana-Champaign



Annual Report 2017-18



Actionable Research ...

OVERVIEW

From the Director: Big News for iSEE, Campus in 2017-18

As the Institute for Sustainability, Energy, and Environment (iSEE) approaches its fifth anniversary here at the University of Illinois, I'm pleased to note that its influence can be felt across campus in a very positive way.

In 2017-18, iSEE, working with the Carl R. Woese Institute for Genomic Biology (IGB), built what is now a \$115 million Bioenergy Research Center from the ground up. The Center for Advanced Bioenergy and Bioproducts Innovation (CABBI), funded by the U.S. Department of Energy, employs more than 140 scientists from Illinois and partner institutions. iSEE's other research centers and projects also attracted external funding.

On the education and outreach front, our campuswide sustainability minor and a new environmental writing program have gained enrollment — and attendance at our annual Congress and other iSEE-sponsored events has grown, too.

Campus sustainability programs such as Illini

Lights Out, the Certified Green Office Program, and other green initiatives continue to expand and help campus conserve energy and money.

In the past year, our Institute has begun closing the circle among its three missions: interdisciplinary research, education and outreach, and campus sustainability. A new iSEE Critical Conversations series brings researchers together with external stakeholders to discuss “wicked” world sustainability problems, and our new Campus as a Living Lab seed funding program will work to bring major external funding to the U of I that will benefit not only researchers but also the campus sustainability programs, initiatives, and sites that will be used as part of the research.

We are proud of this recent year, and we are excited about what is coming next. Stay tuned!

Sincerely,

Evan H. DeLucia,

Baum Family Director, iSEE



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Thanks to iSEE's Major Benefactors ...

The Institute's missions receive continued support from:

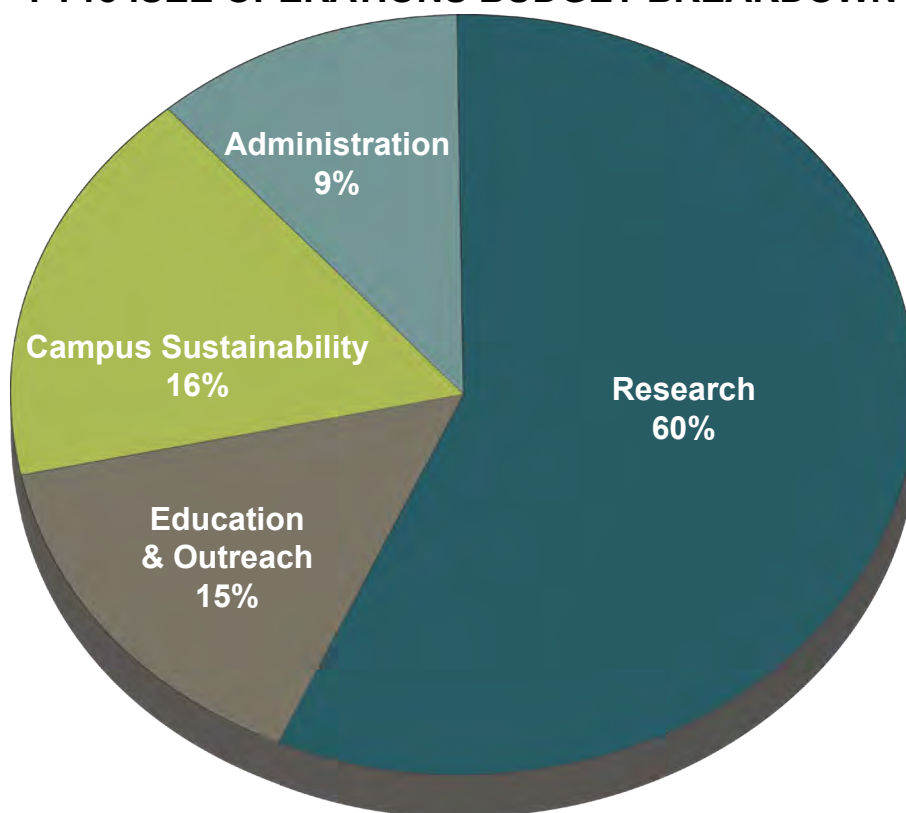
- iSEE founding benefactor the Alvin H. Baum Family Fund, under the administrative leadership of Joel Friedman. The Baum Fund has given more than \$2 million to support iSEE and its Baum Family Director, Evan H. DeLucia. Baum also supported iSEE's predecessors, the Center for a Sustainable Environment and the Environmental Change Institute. In 2017-18, the Fund gave an additional \$100,000 for use by iSEE for its new Critical Conversations forum series (*more on Critical Conversations, page 27*) and for use to support students in the sustainability



minor capstone research experience (*more about the SEE Fellows Program, page 30*).

• Illinois alumnus Stuart L. Levenick and wife Nancy J. Levenick of Peoria, whose \$500,000 endowment in 2014 supports the Levenick iSEE Fellows Program of scholars, research fellows, teaching fellows, and environmental and policy fellows (*more on researchers, page 26; teaching fellows, page 30*). A \$436,079 gift match by Caterpillar Inc. in 2015 — along with \$100,000 from the Student Sustainability Committee (SSC) in 2016-17 — is helping build the iSEE Collaboratory, a new facility for education, communications, and collaboration to support the Fellows and iSEE (*more on the Collaboratory, pages 48-49*).

FY18 iSEE OPERATIONS BUDGET BREAKDOWN



Carbon Units Sale to Fund Future Campus Sustainability Projects

In Spring 2018, iSEE brought in more than \$236,000 when it brokered the sale of the University of Illinois at Urbana-Champaign's 2017 Verified Carbon Units (VCUs) through Second Nature's

Carbon Credit and Purchasing Program (C2P2).

The sale will fund future projects to reduce greenhouse gas emissions on campus (*more on the sale, page 41*).

External Grant Requests

During 2017-18, the Institute submitted or supported proposals to external granting agencies of more than **\$19.6 million** in support of its own research, Illinois research teams, and new collaborative centers.

Five proposals, bringing in nearly **\$13.4 million** to the University of Illinois and partners have been funded thus far, including:

- An additional **\$11 million** from the U.S. Department of Energy (DOE) in the first-year budget for the Center for Advanced Bioenergy and Bio-products Innovation (CABBI), a new DOE Bioenergy Research Center.
- The National Science Foundation (NSF) awarded the Center for Applied Collaboration on Human Environments (CACHE) **\$599,951** (*more on CACHE, pages 10-11*).
- The U.S. Department of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA) announced a grant for **\$460,000** (out of \$500,000 requested) to support the Agroforestry for Food project (*more on A4F, pages 18-19*).
- The National Science Foundation (NSF) Division of Environmental Biology awarded **\$800,000** (out of \$1,063,448 requested) to support the Stormwater and Mosquito Control project. In a separate funding announcement, the NSF also awarded \$1,576,788 to former team member Allison Gardner (now at the University of Maine), along with Illinois team members. Of that, **\$495,139** is coming to Illinois.

iSEE also submitted or supported the following:

- CACHE submitted a \$1.4 million funding proposal to the International Development Research Centre, which is still pending. CACHE was part of two unsuccessful proposals: \$265,348 to DOE; and \$82,800 to Wuppertal Institute for Climate, Environment and Energy.
- A \$5 million proposal to DOE for a team led by Crop Sciences Professor DoKyoung Lee for a study titled "Next Generation Feedstocks for the Emerging Bioeconomy"; that grant is pending.
- A \$3 million proposal to NSF for Civil and Environmental Engineering Professor Ximing Cai and four others for a study titled "NRT-INFEWS:

Gift Supports A4F Project

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 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.

See photos of the Interns on page 19.

Enhancing Food-Energy-Water System Resilience in Agriculture-Dominated Watersheds Through Resource Recovery and Reuse"; that grant is pending.

- \$1,545,560 to Arizona State University for iSEE Baum Family Director Evan H. DeLucia and another researcher for a study titled "Can Adaptive Multi-Paddock Grazing Management Increase the Greenhouse Gas Sink Strength and Water Use Efficiency of Grazed Pastures?"; that grant is pending.

- \$5.2 million to USDA NIFA for Plant Biology and Crop Sciences Associate Professor Carl Bernacchi and six others for a study titled "Linking Physiology & Hydrology for Water-Resilient Landscapes in the U.S. Corn Belt"; that grant was not funded.

- \$926,054 to NSF for DeLucia for a study titled "Collaborative Research: How will Intensification of the Hydrological Cycle Alter Greenhouse Gas Dynamics in Mesic Soils?"; that grant was not funded.

Added to the more than \$228 million applied for in FY14-17, iSEE has made or facilitated more than **\$247.6 million** in funding requests thus far, with more than **\$122.4 million** funded and more than **\$10.9 million** pending.

RESEARCH

iSEE-affiliated Center



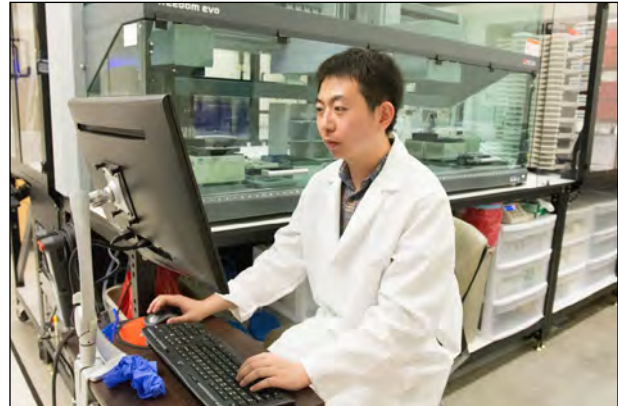
The Center for Advanced Bioenergy and Bioproducts Innovation (CABBI) was announced in Fall 2017 by the U.S. Department of Energy (DOE) as the nation's fourth Bioenergy Research Center (BRC). Originally awarded \$104 million over five years, the Center's funding eventually increased to \$115M. It officially started Dec. 1, 2017, and iSEE personnel spent much of the first six months setting up administrative groups and policies, such as:

- The Executive Committee, composed of Director Evan H. DeLucia; the Associate Directors for Science & Technology, Research & Development, and Operations; one Leader and two Deputy Leaders in each of the three scientific themes (Feedstock Production, Conversion, and Sustainability); and the Science Integration Committee (SInC) Chair.

- The SInC, made up of the Chair, the Deputy Director for R&D, and one representative of each theme, will 1) ensure effective communication and integration among themes, Illinois researchers, external partners, and other BRCs; 2) evaluate existing integration efforts within the CABBI research; and 3) identify new opportunities.

- A Strategic Advisory Board (SAB), chaired by DeLucia and made up of representatives from the other BRCs as well as academic, government, and industry experts in bioenergy and bioproduct thematic areas of feedstocks, conversion, and sustainability. This Board will convene annually to objectively evaluate the Center's research progress, guide future scientific directions, and ensure that CABBI projects remain in alignment with CABBI, DOE, and stakeholder priorities. In addition, a Governance Board is being put in place to review and evaluate strategic directions.

- A Program Manager, Research Coordinators, and a Theme Secretary were hired to help each scientific theme with logistics, space, meetings, reporting, publishing, and more. A Lab Manager was hired to



Jordan Goebig / iSEE

Postdoctoral Research Fellow Tong Si works in the CABBI Conversion theme in a laboratory at the Carl R. Woese Institute for Genomic Biology.

oversee work at the Carl R. Woese Institute for Genomic Biology (IGB).

- Annual objectives were submitted to DOE, and internally CABBI has a list of Key Results under each objective so progress can be tracked. Each key result links to one of the 59 PIs. Also, the themes were split into 18 sub-groups, all working on specific objectives.

- Postdoc mentoring plans were established, and CABBI has orientation sessions for all new hires.

- An Industrial Affiliates Program is still under development. The program is a joint effort between the Integrated Bioprocessing Research Laboratory (IBRL) and CABBI to engage industry in cutting-edge bioprocessing technologies and to provide the necessary means to de-risk new intellectual property for efficient and successful transitions to commercialization.

Center updates on research, events, outreach, publications, and more can be found at cabbi.bio.

First-year Research Progress ...

More than 70 postdocs and graduate students



Olivia Harris / ISEE

CABBI Director Evan H. DeLucia gives an overview of the Center during the Feb. 1, 2018, kickoff meeting.

have been hired to support the 59 PIs working on CABBI (*listing of CABBI employees on pages 8-9*). Many of the Illinois-based scientists have moved into lab space at IGB and have already begun their work on feedstocks, conversion, and sustainability. In addition, at the end of May, 800+ genotypes of bioenergy sorghum were planted on the Energy Farm in Urbana, and four lines were established in Iowa.

In the Sustainability theme, trials have begun, and models are being updated and recalibrated to incoming data for compatibility with economic modeling. Continual coordination of sampling is underway for CABBI bioenergy crops. Feedstock theme researchers are meeting regularly to share information about each scientist's capabilities and to formulate plans for improving the bioenergy value of *Miscanthus*, sorghum, and sugarcane by incorporating new genetic traits and modifying existing traits. This process incorporates work in the lab, computer modeling, and field trials. The Conversion theme team meets regularly to discuss each researcher's strengths — as well as a plan for optimizing the production of biofuels and bioproducts through automation and modeling.

Events and Outreach ...

A monthly CABBI Colloquium began in June 2018 as a way for postdoctoral researchers to communicate what they are doing in the lab — and to connect with other researchers and tie their work into the big pictures of their own and other CABBI themes, and even to the BRC program.

CABBI began outreach efforts as well, including participation in the International Genetically Engineered Machine (iGEM) Foundation competition at MIT, and plans to participate in Agronomy Day and World of Genomics in 2018 and Genome Day 2019.

A February kickoff meeting was attended by Congressional and University of Illinois dignitaries — after which CABBI scientists met to discuss near- and long-term goals and to break into subtheme research groups. In July 2018, more than 140 scientists gathered at CABBI's annual retreat to continue the discussions — and to start on Year 2 objectives.

Publications in 2017-18 ...

Through June 2018, CABBI scientists had published six papers in scholarly journals with dozens more on the way.

WE
ARE
CABBI



CENTER FOR ADVANCED BIOENERGY
AND BIOPRODUCTS INNOVATION

STRATEGIC ADVISORY BOARD (SAB)

Katherine Armstrong	Steve Hartig	Douglas Landis	Robert Schmidt	Ellen V
Joel Cherry	Jennifer Holmgren	Aindrila Mukhopadhyay	Will Schroeder	
Katayoon Dehesh	Udaya Kalluri	Jennifer Pett-Ridge	Greg Stephanopoulos	

Vijay Singh
Deputy Director, Science & Technology

FEEDSTOCK DEVELOPMENT

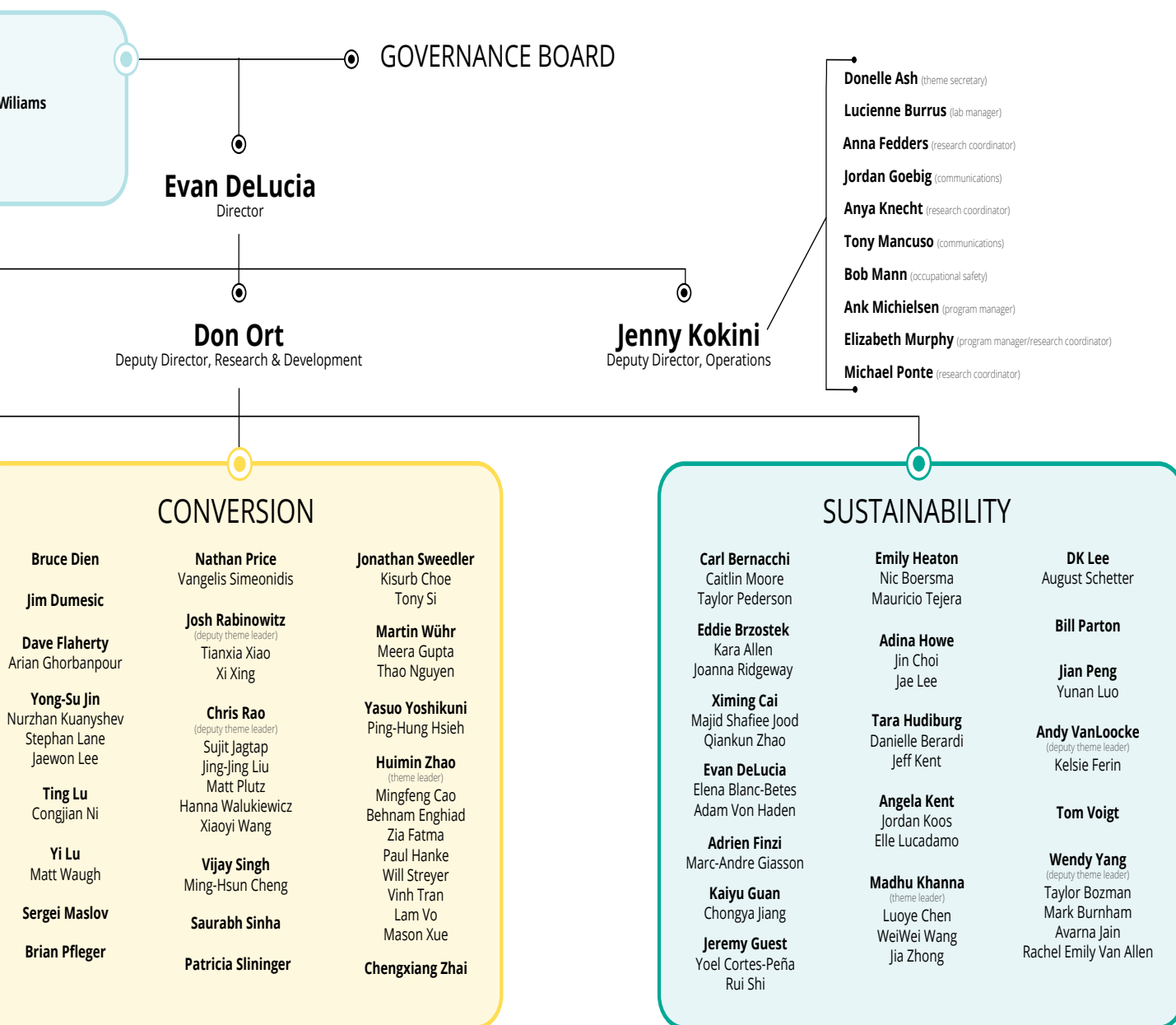
Lisa Ainsworth Shuai Li	Tom Clemente Truyen Quach	Dan Rokhsar Therese Mitros
Fredy Altpeter Baskaran Kannan Guangbin Luo Tufan Oz Duoduo Wang	Anna Hale Maia Mula-Michel	Erik Sacks Nick LaBonte Sarah Lipps Joe Zimmerman
Brian Baldwin	Matt Hudson (deputy theme leader) Jacob Heldenbrand Dan Lanier	Jörg Schwender
Ed Cahoon Hae Jin Kim Tara Nazareus Ki Youl Park	Andrew Leakey	John Shanklin
Amy Marshall-Colón Sachin Heerah Madara Hetti Arachchilage	Chang-Jun Liu	Tony Studer Robert Twohey
Li-Qing Chen Xueyi Xue Ya-Chi Yu	Steve Long	Kankshita Swaminathan (deputy theme leader) Mohammad Belaffif Brandon James Tony Trieu
	Steve Moose (theme leader)	Changcheng Xu
	Don Ort Sang Yeol Kim	
	Nancy Reichert	

Ximing Cai (Chair)

2017-18 CABBI PARTNERS



AGRICULTURE AND BIOPRODUCTS INNOVATION TEAM



Science Integration Committee (SInC)

Don Ort Madhu Khanna Chris Rao Kankshita Swaminathan

PARTNER INSTITUTIONS



iSEE-affiliated Center



Center for Applied Collaboration on Human Environments

The Center for Applied Collaboration on Human Environments (CACHE) was established in early 2016 by seed funding from iSEE, the Department of Civil and Environmental Engineering (CEE), and the College of Engineering. In its second full year directed by CEE Professor Tami Bond, the Center supported ongoing research to identify and mitigate environmental consequences caused by and found within households, communities, and cities.

Read more about CACHE and its projects at publish.illinois.edu/humanenvironments/.

Second-year Research Progress ...

- CACHE-affiliated researchers in the United States partnered with implementers from the Centre for Rural Technology in Nepal (CRT-N) on the emPOWER Collective Pilot Project, working with the nearly 100 residents of a village in the Kavre District of Nepal to explore how personal agency affects aspirations for basic community services and to evaluate how these aspirations affect the long-term sustainability of development interventions.

After a preliminary visit to engage local leadership and benchmark household energy behaviors, partners at CRT-N conducted a two-day personal agency training workshop for 30 village residents. In September, the team revisited the village to gauge how residents' perspectives may have changed since the empowerment training. During this visit, researchers learned about an unanticipated delivery of new cookstoves to each house in the village. This unexpected event led to focus groups discussing energy needs, as residents reacted to the cookstoves that they had not chosen.

Phase One of emPOWER will close with 12



monthly visits to mentor residents on their personal action plans and observe the effect of agency-based training. Based on the findings of the pilot project, the team is eager to keep pursuing transformational engagement around indoor air quality, energy use, and health.

Funding Applications ...

- In December 2017, the National Science



Foundation (NSF) awarded CACHE \$599,951 to explore the complex chemistry 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 research 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. From these data, researchers

will build a virtual model to replicate real-scale ignition — a whole log, for example — for further exploration of the circumstances that result in either high or low emissions.

- In April 2018, the emPOWER group submitted a \$1.4 million funding proposal titled “Enhancing Energy Security and Climate Resilience by Coupling Personal Agency Training with a Flexible Basket of Technological Solutions” to the International Development Research Centre.

- CACHE was part of two other proposals in the past year that were not awarded:

- o A \$265,348 proposal (Cornell was the lead institution) to the U.S. Department of Energy titled “Constraining Aerosol Deposition to the Ocean Estimates Using GEOTRACES Data and Models”; and

- o An \$82,800 proposal (Minergy Nepal was the lead institution) to Wuppertal Institute for Climate, Environment and Energy titled “Building Energy-Resilient Communities through Personal Agency, Whole-Community Energy, and Inclusion”.

- A future proposal in the making: The CACHE Sustainable Performance of Healthy and Efficient Residential Environments (SPHERE) thrust intends to apply for a National Science Foundation Engineering Research Center grant to improve quality of life at home through the interacting air, water, and human systems in residences — with an emphasis on low-income settings. That proposal will be made by Bond, along with CEE Professor Helen Nguyen, Paul Francisco of the University of Illinois Applied Research Institute, Daniel Giammar of Washington University in St. Louis, and John Volckens of Colorado State University.

Publications in 2017-18 ...

- In December 2017, CACHE postdoc Nick Lam and Bond published “Seasonal Fuel consumption, Stoves, and End-uses in Rural Households of the Far-western Development Region of Nepal” in *Environmental Research Letters*. Working with collaborators at CRT-N and the Berkeley Air Monitoring Group, Lam delved into the total energy needs of rural families in Western Nepal and the social interplay between those needs and the technologies and fuel sources required to meet them.

iSEE-affiliated Center



iSEE researchers, partnered with the Leverhulme Centre for Climate Change Mitigation (LC3M) at the University of Sheffield in the UK, have been exploring the potential of enhanced weathering in agricultural soils since 2016. The natural weathering of silicate rocks, which absorbs atmospheric carbon dioxide (CO_2) and traps it in the ocean as bicarbonate, can be enhanced by grinding the material to increase surface area. The ground rock (basalt) is applied to agricultural soils at the University of Illinois Energy Farm, where temperature, moisture, and plant/microbe interactions combine to release silica, phosphate, and cations that buffer soil pH and have the potential to improve crop production while bicarbonate reactions remove CO_2 from the atmosphere.

The Illinois team consists of Plant Biology Professor Evan H. DeLucia, Plant Biology and Crop Sciences Associate Professor Carl Bernacchi, iSEE Postdoctoral Research Associate Ilsa Kantola, Department of Plant Biology Technician Michael Masters, and two field technicians, Haley Ware, an undergraduate student in Natural Resources and Environmental Sciences, and Konrad Taube, a 2015 U of I graduate in Molecular and Cellular Biology.

Collaborators at the Univer-



sity of Sheffield and the University of Southampton, and James Cook University in Queensland, Australia, are applying basalt to greenhouse experiments, sugarcane, and oil palm to measure rates of weathering and the effects of basalt application in

tropical and subtropical agriculture.

Read more about Illinois research for the Centre at lc3m.org/research/theme-3/.

Research Progress ...

- The 2017 research season

commenced with the first field-scale application of basalt to the Illinois Energy Farm plots. About 198 metric tons of crushed rock sourced from Pennsylvania were applied to and tilled into maize fields equipped for measuring soil respiration and nitrous oxide

nutrient content in the crop. Tile drains beneath the 3.8-hectare fields at the Energy Farm measured flow rates and sampled water flowing through the vadose zone for laboratory analysis of major cations and strontium isotopes, which help calculate the

salt-treated maize plots compared to controls, as had been previously observed in a 2016 pilot study. As N_2O represents a loss of nitrogen that would fertilize crops, reduced N_2O emissions are a potential benefit to both atmosphere and agriculture. Soil pH increased more rapidly in basalt-treated maize plots after application than in controls in 2017, and pH remained higher in basalt-treated plots at the end of the growing season. Initial measurements for 2018 indicate that the trend is continuing in the second year of basalt treatment. N_2O and yield data are being used to develop DayCent models for the effects of long-term basalt application on greenhouse gas balances and agricultural productivity. These models are informed by years of data from the Energy Farm and can be adjusted for other regions by changing soil properties, climate conditions, and crop characteristics.

- The second annual basalt treatment was applied to the maize plots in Fall 2017, and the first application was made to the perennial *Miscanthus* plots in Spring 2018. Applications will occur for five growing seasons in each crop. Tile drain water and soil sampling occurred in both crops over the winter and spring months, and the 2018 field season commenced in late April.

(N_2O) production, for collecting soil water, and for collecting eddy covariance data. Soil collected throughout the season was analyzed for acidity, carbon content, and nitrogen content, while peak season and end-of-season tissue sampling provided biomass and

rate of basalt weathering in the soil. More than 10 million liters of drainage water passed through the sampling system in 2016-17.

- In the first year of field-scale research, the emission of N_2O , a greenhouse gas produced by soil microbes, was reduced in ba-

Publications in 2017-18 ...

- “Farming with Crops and Rocks to Address Global Climate, Food and Soil Security” was published in February 2018 by DeLucia, Kantola, Leverhulme Director David Beerling, and others in *Nature Plants*.



Thematic Research: Climate Solutions

Crops *in silico*

This project seeks to computationally mimic the growth and development of crops at the molecular, cellular, plant, and ecosystem levels to increase food yield sustainably while anticipating climate change-related conditions such as less water and nutrients.

The team is creating an *in silico* — computer simulation — platform that links models across different biological scales and that integrates all sorts of models into one user-friendly platform.

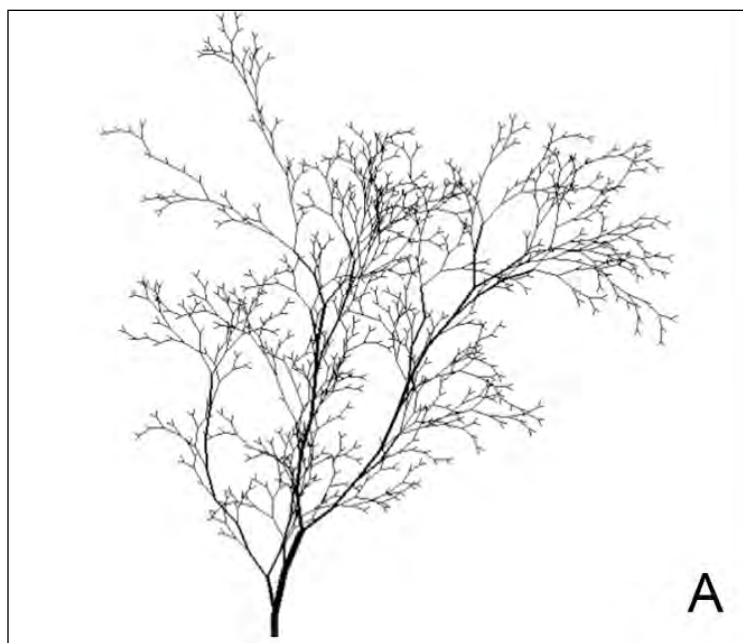
Third-year Research Progress ...

The Crops *in silico* (Cis) team improved the accuracy of its individual and integrated plant biological models. Phenological detail was added to the data visualization. Specific highlights include:

- The protein expression data from Stuti Shrivastava's gene-level model was used as an input in the molecular nitrate transporter model developed by Balaji Panneerselvam to determine nitrate uptake rate under fluctuating soil nitrate concentration.

- Kavya Kannan improved her gene-level model of the metabolite pools of photosynthesis in response to anticipated elevations of atmospheric carbon dioxide due to climate change. The model now accounts for mRNA translation and degradation rates. This model was merged with Yu Wang's metabolic model, which contains both the dark and the light reactions of photosynthesis, to simulate leaf photosynthesis rate and metabolite concentrations under ambient and elevated CO₂. Additionally, a gene regulatory network was constructed using gene expression data in response to CO₂ in soybean leaves. This network can identify transcription factors regulating genes involved in photosynthesis.

- The rendering of plant- and canopy-level data derived from the system model and measured field



data of soybeans over the course of a growing season was updated by AJ Christensen to include seed pod development and leaf senescence. Christensen used the geometric data both for this imagery and as input to the photosynthesis model and then rendered with colors indicating light absorption across the canopy. The data-driven plant geometry model is now implemented in an open-source tool called “L-Py” which opens up these visualization techniques to researchers without commercial graphics tools.

Read a longer update at bit.ly/Cropsinsilico.

Publications in 2017-18 ...

- “Use of Computational Modeling Combined with Advanced Visualization to Develop Strategies for the Design of Crop Ideotypes to Address Food Security” was published in May 2018 by Principal Investigator Amy Marshall-Colón and three other team members in *Nutrition Reviews*.

Cis Symposium & Workshop ...

The third annual event was July 31-Aug. 2, 2018, at NCSA and included a Hackathon, featuring short tutorials alternating with practical exercise that will guide participants through model integration using a prototype framework that enables communication, orchestration, and transformation. Computer programmers, software developers, interface designers, and plant biologists worked side by side during the one-day hands-on event.



Examples of L-systems to model plant architecture: (A) a fractal tree generated from Horton-Strahler branching patterns; (B) peach trees modeled under different water stress using L-PEACH; and (C) a photorealistic sunflower model. L-systems can be used to address a breadth of biological questions related to the evolution of plant morphology over development and in response to environmental perturbations.

2017-18 CROPS *IN SILICO* TEAM Principal Investigators and Co-PIs

Stephen P. Long (PI)	Professor, Crop Sciences and Plant Biology
Amy Marshall-Colón (PI)	Assistant Professor, Plant Biology
Donna Cox	Professor, Art + Design; NCSA Director, Advanced Scientific Visualization Laboratory
John Hart	Professor, Computer Science
Christine Kirkpatrick	Executive Director, National Data Service, NCSA
Diwakar Shukla	Assistant Professor, Chemical and Biomolecular Engineering
Matthew Turk	Assistant Prof, Info Sciences; Assistant Research Prof, Astronomy; Research Scientist, NCSA

Operating Team: Scientists, Postdocs, and Students

Kalina Borkiewicz	Visualization Programmer, Advanced Visualization Lab, NCSA
AJ Christensen	Visualization Programmer, Advanced Visualization Lab, NCSA
Colleen Heinemann	Ph.D. Candidate, Data Analytics and Information Visualization, Informatics Institute
Kavya Kannan	Ph.D. Candidate, Plant Biology
Arjuna Lal	Undergraduate, Chemical and Biomolecular Engineering
Mike Lambert	Research Programmer, Advanced Visualization Lab, NCSA
Meagan Lang	Research Scientist, National Center for Supercomputing Applications (NCSA)
Jonathan Lynch	Professor, Plant Science, Penn State University
Justin McGrath	Research Scientist, Carl R. Woese Institute for Genomic Biology (IGB)
Balaji Panneerselvam	Postdoctoral Researcher, Chemical and Biomolecular Engineering
Stuti Shrivastava	Ph.D. Candidate, Plant Biology
Yu Wang	Postdoctoral Researcher, IGB
Xiyu Yang	Ph.D. Candidate, Horticulture, Penn State University

Advisers

Gabrielle Allen	Associate Professor, Astronomy; NCSA Director, Computing and Data Sciences
Daniel Katz	Assistant Director, Scientific Software and Applications, NCSA
Bertram Ludäscher	Professor, Library and Information Science; Director, Center for Informatics Research
Donald Ort	Professor, Plant Biology
H. Edward Seidel	Director, National Center for Supercomputing Applications (NCSA)
Xinguang Zhu	Group Leader, Institute of Computational Biology, Chinese Academy of Science

Project Manager

Floor Boerwinkel	Grant Program Manager
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Thematic Research: Energy Transitions

Stored Solar Stove

By developing a technology to collect, concentrate, store, and recover abundantly available solar thermal energy at near-flame temperatures, this project hopes to eliminate harmful emissions from cooking with a product called Sun Buckets.

Fourth-year Research Progress ...

According to Principal Investigator Bruce Elliott-Litchfield, some milestones were reached in 2017-18:

- Sun Buckets Chief Engineering Officer Matthew Alonso completed his Ph.D. in Agricultural and Biological Engineering in May 2018 with his work on solar storage materials, and Samantha Lindgren won a prestigious Link Energy Fellowship for 2018-20 as one of three chosen among 118 applicants. Lindgren's project is titled "The Role of Namibian Youth in the Advancement of Sustainable Energy," and she will receive \$29,500 a year for her continued Ph.D. work with Sun Buckets.

- The group reached an agreement with the Indian Oil Corp. to sell 10 prototypes and field test in India. "We hope that this is the first stage of a multistage project with India's largest energy company," Elliott-Litchfield said.

- Sun Buckets sold eight prototypes to campus Dining Services for use in the Lincoln Avenue Residence Hall's dining hall "Field of Greens," again with hopes that this is the first stage of a multistage project.

- In August 2018, Sun Buckets will send a team



ABOVE: Sun Buckets Chief Engineering Officer Matthew Alonso, left, explains the charging process to a Loving Shepherd Ministries (LSM) employee during a visit to Les Cayes, Haiti. **RIGHT:** Haitian families are learning to charge and use the stored solar cookers.

to field test and demonstrate prototypes in the UN-HCR Kakuma Refugee Camp in northern Kenya. Also in August, the same thing will be going on in Somaliland, Somalia.

- Sun Buckets continues to operate a successful field trial in Les Cayes, Haiti.

Read more on the project at bit.ly/sunbuckets.

2017-18 STORED SOLAR STOVE TEAM

Principal Investigators and Co-PIs

Bruce Elliott-Litchfield (PI)	Emeritus Professor, Agricultural and Biological Engineering (ABE), and Sun Buckets CEO
Tami Bond	Professor, Civil and Environmental Engineering (CEE)
Madhu Viswanathan	Professor, Business
Joe Bradley	Teaching Associate, Illinois Engineering First-Year-Experience (IEFX), and Sun Buckets CFO

Operating Team: Students

Matthew Alonso	Ph.D. Graduate, ABE, and Sun Buckets Chief Engineering Officer
Samantha Lindgren	Ph.D. Candidate, ABE, and Sun Buckets Advisor
Maria Jones	Visiting Project Specialist, Ag. and Consumer Econ., and Sun Buckets Dir. of Int'l Marketing
Robert Wright	Graduate student, Sun Buckets Brand Manager
Blake Banks	Undergraduate, ABE, and Sun Buckets Intern
Ezra Wallon	Undergraduate, ABE, and Sun Buckets Intern



Thematic Research: Secure & Sustainable Agriculture

Agroforestry for Food

Agroforestry is farming with fruit- and nut-bearing perennial trees and shrubs rather than resource-intensive annual crops like corn and soybeans. This project examines the ecological, economic, and climate benefits of perennial mixed-crop agriculture.

The 30-acre Agroforestry for Food (A4F) project site on the Illinois Energy Farm features roughly 12,000 nut and fruit trees and shrubs of 10 different species. Forage crops like alfalfa and hay grow between the rows of trees and bushes.

Fourth-year Research Progress ...

The team reports the following accomplishments:

- Maintenance of the Multifunctional Woody Polyculture (MWP) Field Trial continues to require substantial effort and labor to control weeds, manage insect pests, fertilize individual trees and shrubs, and harvest hay, but we hope the labor commitment will decrease in coming years as the trees and shrubs grow larger. Already, though, the site serves as a popular location for field tours with various groups.

- Research and outreach suggest that the greatest opportunities for increasing adoption of agroforestry in the near term is through conservation programs that target sensitive lands. In particular, the Windbreak Program in the Conservation Reserve Program (CRP) is mostly compatible with the design of our systems, except for the restrictions on harvesting during the period that the land is in the program.

- Co-PI Wendy Yang and others initiated the USDA-funded study testing the hypothesis that fertilization could improve the life cycle environmental implications of transitioning from corn-soybean

rotations to woody polycultures by accelerating time to productivity and increasing yields while inducing minimal increases in soil nitrous oxide emissions as well as nitrogen and phosphorus leaching.

- Co-PI Jeremy Guest's group developed a model for testing life cycle impacts of a variety of agroforestry scenarios based on National Agricultural Statistics Survey data. That team is analyzing tradeoffs between yields and environmental impacts in farmer decision-making.

- Co-PI Michelle Wander's group is continuing to work on soil analyses, using a visiting scholar to assist. Graduate student Dane Hunter is studying the influences of community composition and management on resource capture within alley or companion cropped systems.

- Partnerships have been developed with the Savanna Institute to enhance PerennialMap.org as an effort to strengthen and expand an integrated community of researchers and Midwest farmers.

Read more about the project at bit.ly/ag4food.



The Agroforestry for Food team has installed instrumentation to measure nutrients in the soil at the site.

ect at bit.ly/ag4food.

Funding Applications ...

- In March 2018, the U.S. Department of Agriculture's National Institute of Food and Agriculture (NIFA) announced a grant for \$460,000 to support research led by A4F Principal Investigator Sarah Taylor Lovell, Andrew Margenot, and Alexandra Harmon-Threatt.

Publications in 2017-18 ...

- "Frontiers in Alley Cropping: Transformative Solutions for Temperate Agriculture" was published in March 2018 by Lovell and several team members in *Global Change Biology*.



Undergraduates Dylan Raye-Leonard, left, and Anna Krehbiel were hired to work on the Agroforestry for Food farm site in 2018 thanks to a generous \$5,000 donation from Janelle Joseph.

2017-18 AGROFORESTRY FOR FOOD TEAM

Principal Investigators and Co-PIs

Sarah Taylor Lovell (PI)	Associate Professor, Crop Sciences
Nick Paulson	Associate Professor, Agricultural and Consumer Economics (ACE)
Michelle Wander	Professor, Natural Resources and Environmental Sciences (NRES)
Wendy Yang	Assistant Professor, Plant Biology
Jeremy Guest	Assistant Professor, Civil and Environmental Engineering (CEE)
Bruce Branham	Professor, Crop Sciences

Operating Team: Staff, Postdocs, and Students

Michael Douglass	Research Specialist, Crop Sciences
Jessica Mulcrone	iSEE Field Technician, U.S. Department of Agriculture study
William Eddy	Postdoctoral Researcher, Plant Biology
Dane Hunter	Ph.D. Candidate, Natural Resources and Environmental Sciences (NRES)
Ronald Revord	Ph.D. Candidate, Crop Sciences
Ian Goller	M.S. Candidate, Environmental Engineering
Erik Stanek	M.S. Candidate, Crop Sciences
Eric Wolske	M.S. Candidate, Crop Sciences
Osenkyerewa Bannerman-Blankson	Undergraduate, Molecular and Cellular Biology: Work Study/Hourly
Taylor Bozman	Undergraduate, Integrative Biology: Work Study/Hourly
Sylvia Gewont	Undergraduate, Agricultural and Consumer Economics: Work Study/Hourly
Audrey Gomez	Undergraduate, Bioengineering and Pre-Medicine: Work Study/Hourly
Sharell Hicks	Undergraduate, Molecular and Cellular Biology: Work Study/Hourly
Anna Krehbiel	Undergraduate, Environmental Economics and Policy: Work Study/Hourly
Mary Marsh	Undergraduate, Anthropology: Work Study/Hourly
Belen Muñiz	Undergraduate, Integrative Biology: Work Study/Hourly
Mary Jane Oviatt	Undergraduate, Food Science and Human Nutrition: Site Outreach and Data Mgr.
Dylan Raye-Leonard	Undergraduate, Crop Sciences: Research Assistant
Kathleen Ross	Undergraduate, Molecular and Cellular Biology: Work Study/Hourly
Brianna Sarley	Undergraduate, Molecular and Cellular Biology: Work Study/Hourly
Emina Sipic	Undergraduate, Biology: Work Study/Hourly

Thematic Research: Water & Land Stewardship

Smart Water Disinfection

This project seeks a more detailed understanding of how viruses in drinking water sources become noninfectious after contact with common disinfection treatments, including ultraviolet (UV) light exposure and chlorine.

The hope is to find new ways to control viruses at the molecular level; researchers are also creating a real-time sensor that can be dipped into a water sample and indicate if infectious viruses are present.

Fourth-year Research Progress ...

Principal Investigator Benito J. Mariñas reports several technical advances in 2017-18, including:

- Ultraviolet (UV) irradiation at three wavelength ranges — assessed with peak emissions at 224, 254, and 280 nanometers — helped destroy the effects of human adenovirus E1A, a waterborne virus that causes respiratory and other illnesses. The UV treatment disrupted hexon mRNA transcription, and DNA replication, but for each wavelength range different mechanisms seemed to drive these inhibitions.

- UV224 had little effect on the genome integrity after UV exposure but caused a structural modification of the capsid that might disrupt genome delivery into the host cell nucleus.

- Conversely, UV254 and UV280 did not greatly affect the viral capsid, but produced genome modifications that might disrupt mRNA transcription and DNA replication.

- Additionally, the occurrence of genome repair, particularly for UV254 and UV280, was observed by analyzing and comparing the production of late gene mRNA synthesis and DNA replication at different postinfection times. These results indicate that other regions of the genome that were not assessed in this work might be damaged during UV exposure and have different sensitivities to UV light emitted at different wavelengths.

- The combined application of monochromatic low-pressure (LP) UV light and monochloramine was assessed to control adenovirus and to evaluate synergistic interactions between both disinfectants. LP UV and monochloramine have limited capabilities to control human adenovirus when applied indi-



ABOVE: Grad student Anisa Hardin performs a microbiological test to detect coliform bacteria in water samples taken from different sources throughout the community of Los Duros in Orocovis, Puerto Rico. **AT RIGHT:** Kelley Goncalves, right, and Rachel Banoff perform a quality assessment from a water source used in Los Duros.

vidually, but exploring the sequential and simultaneous application of these disinfectants could address particular needs in drinking water treatment disinfection processes. A synergistic effect was observed using a simultaneous configuration to control human adenovirus as simultaneous use of monochloramine and LP UV displayed a faster inactivation rate compared to the added contribution of both disinfectants acting independently.

Read more about the project at bit.ly/smrtwtrdis.

Publications in 2017-18 ...

- “Adenovirus Replication Cycle Disruption from Exposure to Polychromatic Ultraviolet Irradiation” was published in February 2018 by Mariñas and other team members in *Environmental Science & Technology*.



2017-18 SMART WATER DISINFECTION TEAM Principal Investigators and Co-PIs

Benito Mariñas (PI)	Professor and Head, Civil and Environmental Engineering (CEE)
Yi Lu	Professor, Chemistry
Joanna Shisler	Associate Professor, Microbiology
Madhu Viswanathan	Professor, Business
Operating Team: Students	
Bernardo Vazquez Bravo	Ph.D. Graduate/Academic Hourly Researcher, Environmental Engineering
Kelley Goncalves	Ph.D. Candidate, Molecular and Cellular Biology
Wen Cong	M.S. Candidate, Civil and Environmental and Engineering (CEE)
Anisa Nicole Hardin	M.S. Candidate, Environmental and Civil Engineering
David Patel	MBA Candidate

Thematic Research: Water & Land Stewardship

Stormwater & Mosquito Control

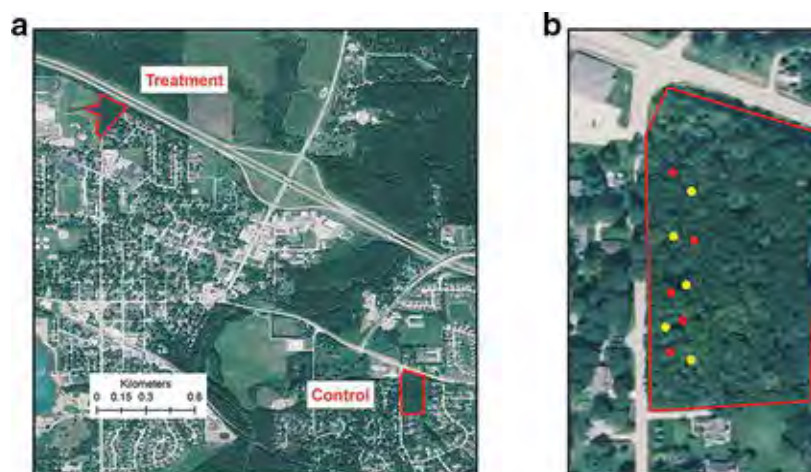
This project studies how “green infrastructure” — technologies that manage stormwater, runoff, and contaminants — can be used to limit the number of aquatic breeding habitats for mosquitoes to keep their numbers low.

The team also studies how to “starve” larvae, thus controlling mosquito populations.

Third-year Research Progress ...

Principal Investigator Brian Allan reports the following developments:

- “We have made substantial progress in an ambitious project to forecast for the continental U.S. what will be the extent of the adoption of green stormwater infrastructure and what likely will be the impact of the widespread adoption of green infrastructural practices for mosquito control. As part of this effort we have created a novel quantitative method for estimating variation in runoff due



to stormwater practices, an analytical approach we refer to as a ‘composite curve number’, which will greatly alleviate the data burden for estimation of stormwater runoff volume. We have prepared a manuscript from this undertaking that is close to submission.”

- Additionally, the team developed a novel method for estimating the distribution of “built-up” area in urban ecosystems using remotely sensed data, and the manuscript describing this new method was recently published.

- Stormwater and Mosquito Control team members have started a research program using “social sensing” (i.e., the use of geo-located social media activity data) to model networks of human movements and contacts to recreate the pattern of the spread of the Zika virus in the Americas and apply this to future outbreaks. Early accomplishments from the team’s research include a new quantitative

2017-18 STORMWATER & MOSQUITO CONTROL TEAM

Principal Investigators and Co-PIs

Brian Allan (PI)	Associate Professor, Entomology
Carla Cáceres	Professor, Animal Biology; Director, School of Integrative Biology
Juma Muturi	Research Scientist, U.S. Department of Agriculture
Marilyn O'Hara Ruiz	Clinical Associate Professor, Pathobiology
Arthur Schmidt	Research Assistant Professor, Civil and Environmental Engineering (CEE)
Shaowen Wang	Professor, Geography and Geographic Information Science (GIS)

Operating Team: Faculty, Scientists, Postdocs, and Students

Derek Wildman	Professor, Molecular and Integrative Physiology
Anand Padmanabhan	Senior Research Scientist, CyberInfrastructure and Geospatial Information Laboratory
Andrew Mackay	Vector Ecologist, Medical Entomology Laboratory, Illinois Natural History Survey (INHS)
Brandon Lieberthal	Postdoctoral Researcher, iSEE
Aiman Soliman	Postdoctoral Researcher, Supercomputing Applications
Chris Holmes	Ph.D. Candidate, Animal Biology
Surendra Karki	Ph.D. Candidate, Pathobiology
Do Hyup Kim	Ph.D. Candidate, Entomology
Allison Parker	Ph.D. Candidate, Entomology
Elijah Juma	M.S. Candidate, Entomology



From the August 2017 publication by Allison Gardner, Brian Allan, and others: Maps of spatial configuration of study locations in Mahomet, Ill., (a) and CDC light traps (yellow) and infusion-baited gravid traps (red) at the Control (b) and Treatment (c) sites. Photographs of the Treatment site before (d) and after (e) honeysuckle removal.

method for estimating the shift from travel-associated to local transmission of Zika virus, and the application of this to understanding the spread of Zika through a network model using high-resolution epidemiological data from Columbia.

- “Several of our field-based projects into the effects of stormwater management practices on mosquito-borne disease risk have matured, and we have recently submitted a manuscript from research led by Allison Gardner on the use of native vegetation as an ecological trap for mosquito control.”
- The team is finalizing a report on research led by Andrew Mackay into the effects of green stormwater infrastructure on mosquito populations from a study performed in Aurora, Ill.
- “Finally, our findings to date have motivated several additional field and laboratory studies, including surveys of green and conventional stormwater infrastructure here in Illinois to explore the consequences of the adoption of green technologies for mosquito control and the impact of the stormwater environment on the assembly of the mosquito microbiome. These additional efforts in part form the Ph.D. research of several graduate students affil-

iated with our project, including Elijah Juma, Chris Holmes, and Allison Parker, the latter of whom has submitted the first manuscript from her research.”

Read more on the project at bit.ly/stormmosq.

Funding Applications ...

- The National Science Foundation (NSF) Division of Environmental Biology awarded \$800,000 to Co-PI Carla Cáceres, along with Allan, Allison Hansen, and Juma Muturi.
- The NSF also awarded \$1,576,788 to former team member Allison Gardner (now at the University of Maine), along with Allan and Co-PI Shaowen Wang.

Publications in 2017-18 ...

- “Quantifying the Geographic Distribution of Building Coverage across the U.S. for Urban Sustainability Studies,” published in June 2018 by Allan and other team members in *Computers, Environment and Urban Systems*.
- “Large-scale Removal of Invasive Honeysuckle Decreases Mosquito and Avian Host Abundance,” published in August 2017 by Allan and other team members in *EcoHealth*.

Thematic Research: Sustainable Infrastructure

Critical Infrastructure & Transportation

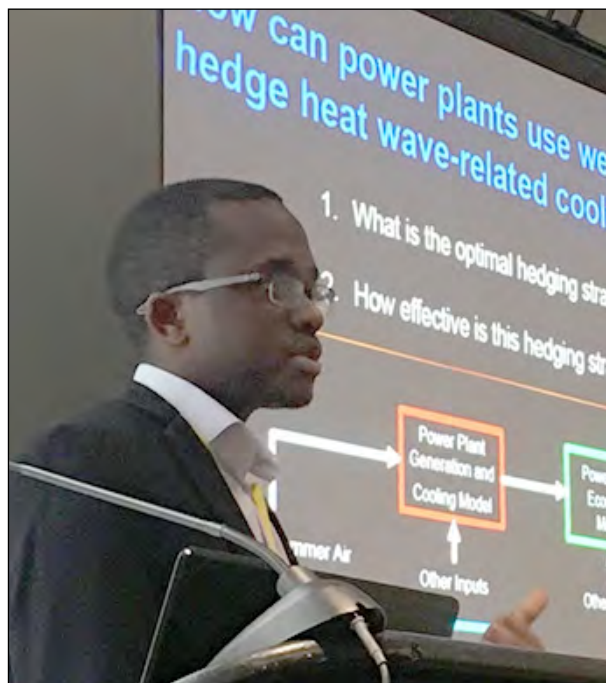
The availability of water and fuel, in energy production methods and regulation, and in community interactions make the interdependencies between critical infrastructure systems in the United States an important topic.

This project focuses on developing an analytical framework for modeling and analyzing these Interdependent Critical Infrastructure (ICI) systems, incorporating both renewable energy and national transportation systems. The results will be used to create a wealth of knowledge to drive future energy and environmental policies, infrastructure design and management, and educational curricula.

Third-year Research Progress ...

PI Ximing Cai reports the following:

- Team members developed a bi-level optimization method for decision making involved in interdependent infrastructural systems. The method is institutionally realistic in representing the hierarchy of decision making agents.
- Researchers also completed the work on quantifying the effects of droughts and heat waves on the electric power grid. Main takeaways (based on William Lubega's dissertation): adjustments in thermal variances at individual power plants can help maintain electric grid reliability in response to droughts and heat waves; index insurance contracts can help mitigate water-related risks to power plants; and cooling water demand is inelastic for power plants.
- Scientists developed a partial dynamic equilibrium transportation model to study the consumers choice of alternative vehicle models given the preferences for demand for vehicle miles traveled and their response to the policy incentives at the national scale. The model includes flex-fuel vehicles, hybrid vehicles (HBV), plug-in hybrid electric vehicles (PHEV), battery electric vehicles (BEV), and the cost and other



Ph.D. Candidate William Lubega presented his work on financial instruments for mitigating cooling water risk at power plants at the World Environmental and Water Resources Congress in Sacramento, Calif.

constraints in using these vehicles given the availability of charging stations. One highlight of this study is to include the distributional characteristics of consumers' preferences for the vehicles in the model to circumvent the "all-or-nothing" technology choice that simple linear optimization generates. By working with Co-PI Yanfeng Ouyang's group, the team was able to simulate consumer incentives for purchase of electric vehicles under alternative assumptions about availability and ease of charging these vehicles and goals for greenhouse gas reduction.

- Team members developed a theoretical framework to analyze automobile manufacturers' profit-maximizing vehicle pricing strategies under

imperfect competition and Corporate Average Fuel Economy (CAFE) standards. The framework shows that manufacturers have incentives to strategically set relative prices of flex fuel vehicles (FFVs) and high fuel economy models depending on their fuel types, fuel economy, and the relative regulatory stringency each model and manufacturer faces. In addition, it shows that manufacturers overprice conventional vehicles (CVs) and low fuel economy vehicles and underprice FFVs and high fuel economy vehicles to comply with the CAFE standards — and that this relative-price alteration attenuates as market power strengthens.

- Researchers estimated a reduced-form price-setting equation for 4,932 vehicle models offered in the U.S. from 2012 to '16 and found that CVs and low fuel-economy vehicles are implicitly overpriced while FFVs and high fuel-economy vehicles are underpriced. For those model years, the mean implicit tax on CVs ranged from \$736 to \$1,945; the mean subsidy on FFVs ranged from \$10 to \$1,806. The study also found that the attenuation effect through market power is heterogeneous across fuel economy and fuel type.

- Team members identified the major barriers of the electric vehicle (EV) market, the spatial distribution patterns of current EV charging stations in the U.S., and the spatiotemporal patterns of current EV charging stations. They also analyzed the factors on the cluster pattern of the EV stations, including non-stationary spatial relationships between EV sales (or EV densities) and other social and economic indicators.

- Scientists modeled interdependent transportation and power systems under dynamic super-charging demand of EVs where the travel demand

and power system base load vary over time. The team formulated a systemwide total cost minimization problem for the coupled networks, and a joint pricing scheme was developed to achieve systemwide optimization for the coupled networks. Numerical experiments were conducted to demonstrate that the proposed joint dynamic pricing scheme outperforms the myopic as well as static pricing strategies.

- ICI team members are developing an integrated model for multilayer decision support including EV choices, investment on power systems and transportation facilities, and economic incentives under resource and environmental constraints and vehicle and energy market uncertainty. This ongoing task integrates the work from all subgroups, and the model will be applied to a region/city for EV development.

Read more on the project at bit.ly/ICI-project.

Publications in 2017-18 ...

- “Hierarchical Decision-Modeling Framework to Meet Environmental Objectives in Biofuel Development,” published in Summer 2018 by Cai and other team members in *Journal of Water Resources Planning and Management*.

- “Dynamic Operations and Pricing of Electric Unmanned Aerial Vehicle Systems and Power Networks,” published in Summer 2018 by Ouyang and other team members in *Transportation Research Part C: Emerging Technologies*.

- “Multicriterion Optimal Electric Drive Vehicle Selection Based on Lifecycle Emission and Lifecycle Cost,” published in January 2018 by Cai, PI Madhu Khanna, and other team members in *International Journal of Energy Research*.

Seven more manuscripts are also in preparation.

2017-18 CRITICAL INFRASTRUCTURE & TRANSPORTATION TEAM

Principal Investigators and Co-PIs

Ximing Cai (PI)	Professor, Civil and Environmental Engineering (CEE)
Madhu Khanna (PI)	Professor, Agricultural and Consumer Economics (ACE)
Yanfeng Ouyang	Associate Professor, Civil and Environmental Engineering (CEE)
Ashlynn Stillwell	Assistant Professor, Civil and Environmental Engineering (CEE)

Operating Team: Faculty, Scientists, Postdocs, and Students

Shaowen Wang	Professor, Geography and Geographic Information Science
Chao Lei	Postdoctoral Research Associate, Civil and Environmental Engineering (CEE)
Zhe Zhang	Postdoctoral Research Associate, National Center for Supercomputing Applications (NCSA)
William Lubega	Ph.D. Candidate, Civil and Environmental Engineering (CEE)
Hiroshi Matsushima	Ph.D. Candidate, Agricultural and Consumer Economics (ACE)
Majid Shafiee-Jood	Ph.D. Candidate, Civil and Environmental Engineering (CEE)
Jia Zhong	Ph.D. Candidate, Agricultural and Consumer Economics (ACE)
Grace Wackerman	Undergraduate, Electrical and Computer Engineering (ECE)

Other Research Initiatives ...

Through seed-funded projects, affiliated centers, and further scientific endeavors, iSEE has brought together researchers from across the Illinois campus. Here are updates on a few of them:

Nano-CarboScavenger Project Update

Researchers developed a particle that adsorbs oil and allows it to be removed from bodies of water. Co-Principal Investigator BK Sharma, a Senior Research Engineer at the Illinois Sustainable



SHARMA

Technology Center (ISTC), offers a quick update three years after iSEE funded this project:

- “Apart from oil remediation, the next work we have done is on chemical contaminant removal using these nanoparticles, and a manuscript has been submitted for publication on that work,” he said.

- Sharma’s team is looking at the potential of using these nanoparticles as additives in lubricants, such as engine oil, hydraulic oils, etc.

PI Dipanjan Pan, an Associate Professor of Bioengineering, and other team members continue to look at the nanoparticles’ biomedical applications, including cancer treatment.

Resilient Communities Project Update

Brought together in 2015-17 by iSEE, which helped facilitate a grant from the U.S. Army Construction Engineering Research Laboratory (CERL), this team studied how communities react and adapt to major weather events or human actions such as military incursions. The project was led by Civil and Environmental Engineering Associate Professors Yanfeng Ouyang and Paolo Gardoni, and Law and Philosophy Associate Professor Colleen Murphy.

Following up on research partially funded by the CERL grant, team members continue to publish their findings on infrastructure and epidemics.

Water, Energy, Global Change Scholars

In the hopes of bringing together researchers from across campus on teams that will pursue external funding opportunities, iSEE has developed

a method of coalescing experts in particular areas where campus is strongest.

Among those:

- The Illinois Energy Scholars website, a listing of more than 120 energy experts on the University of Illinois’ Urbana-Champaign campus across dozens of disciplines, continues to add members. The website energy.illinois.edu



also features dozens of centers and laboratories doing energy research. The Energy Scholars are headed by Rizwan Uddin, Professor and Head of Nuclear, Plasma, and Radiological Engineering.

- The website water.illinois.edu includes more than 105 water scholars and dozens of labs and centers from across campus, sorted into four disciplines. The Water Scholars are headed by Kevin O’Brien, Director of ISTC.



- A third Illinois Scholars website is on the way: The Institute has moved ahead with plans to coalesce the Illinois Global Climate Change Scholars. A Global Climate Change Council was formed to steer the next steps for the Scholars, and Natural Resources and Environmental Sciences Professor Angela Kent was elected Chair of the Council. The Scholars already have an email listserv to share research opportunities, and the Council will work with iSEE to get a “Global Climate Change at Illinois” website up and running this year.



KENT

Levenick iSEE Research Fellows

Levenick iSEE Research Fellow Erica Myers, an Assistant Professor of Agricultural and Consumer Economics (ACE), and Levenick iSEE Research Scholar Mateus Nogueira Meirelles de Souza, a Ph.D. Candidate in ACE, continue to research “Behavioral Interventions for Campus Energy Consumption.”

Their ongoing project is to identify behavioral energy savings opportunities and educational campaigns for campus community members (*more about the Levenick gift, page 4.*)



iSEE Critical Conversations: Discussing ‘Wicked’ Issues

On May 3-4, 2018, iSEE hosted academics, industry and agricultural leaders, nonprofits, and government and NGO representatives in downtown Chicago’s University Club for a conversation on the nitrogen reduction challenge.

This safe space for a frank, unattributed discussion (pictured above) was a positive step toward exploring the issues in reducing runoff from agricultural land into streams, which has caused a major hypoxic zone in the Gulf of Mexico.

Keynote speaker Jason Weller (right) of Land O’ Lakes SUSTAIN got the conversation started the evening of May 3, and three panel and breakout sessions continued the discussion the next day. The goal of this multi-stakeholder event was to create a collaborative network that can develop a research agenda geared toward finding actionable solutions. iSEE is aiming to identify current gaps in scientific knowledge, key economic and social barriers, and



market and policy solutions for sustainably achieving a significant reduction in nitrogen runoff.

The Critical Conversation was paid for by a generous donation from the Alvin H. Baum Family Fund, iSEE’s founding benefactor. The Baum Fund is administered by Joel Friedman (*more on the Baum Fund, page 4*).

iSEE created its Critical Conversations series to address “wicked” problems — ones that are difficult to solve because of incomplete, contradictory, and changing requirements that are

often difficult to recognize.

Each forum will generate two products: 1) a scholarly article outlining the consensus solution or key next steps in pursuing a solution; and 2) an op-ed piece submitted to a prominent national media outlet for public dissemination.

iSEE will request proposals from researchers across campus for future Critical Conversation subjects.

Read more at sustainability.illinois.edu/outreach/critical-conversations/.

Campus as a Living Lab:

Launched in February 2018, iSEE's Campus as a Living Lab program is designed to link campus sustainability targets to national and global sustainability, energy, and environment challenges — turning campus into a test bed for solutions to real-world problems.

Said iSEE's Baum Family Director Evan H. DeLucia: "I'm excited to see two of iSEE's mission areas — research and campus sustainability — furthered, and we are delighted to create new opportunities for faculty and student researchers."

When a specific call for proposals from a national granting agency on research (and extension) projects is posted, iSEE will provide quick seed money for promising faculty-led teams that will engage with sustainability issues on campus or in neighborhood communities for their proposal development.

Specifically, iSEE wants to leverage this seed money to attract external funds that are relevant to objectives from the Illinois Climate Action Plan (iCAP) — thereby bringing external funding in from granting agencies or organizations to bolster both the University's research profile and a campus sustainability goal.

The U of I has committed to promoting campus sustainability via hundreds of projects on campus. More than 700 of these iCAP projects — categorized into energy, water, transportation, building and space, procurement and waste reduction, education, extension,



Olivia Harris/iSEE

More than 100 Illinois faculty, staff, and administrators met in early October 2017 to discuss more closely tying campus sustainability projects to research and education. The event culminated in iSEE announcing a seed funding program: Faculty can receive up to \$30,000 to be used toward submitting a \$1 million-plus research proposal to a major granting agency for a project that would also be tied to a campus sustainability effort.

and general research — are online for public assessment. These projects, many based on unique facilities or programs on campus, have great value for developing research and education projects targeting external resources; on the other hand, the realization of many campus sustainability objectives will need research support.

In 2017-18, iSEE mapped the relevance of iCAP projects to a number of national research programs, which allows campus researchers to identify existing

and/or ongoing efforts that can be incorporated into their proposal development for a particular national program. A report describing the iCAP projects and the links between those projects to major national research programs can be found on the iSEE website.

The purpose of this seed funding program is to encourage faculty to use campus sustainability projects as a test bed for research and education, and to submit proposals for external funding of at least \$1 million.

New Funding Initiative



Successful seed funding proposals will earn a team up to \$30,000 to help prepare the external grant proposals.

“Transforming university campuses into ‘living labs’ is a timely and important campaign,” said Ximing Cai, iSEE’s Associate Director for Campus Sustainability. “Sustainability isn’t just happening ‘out there;’ it’s a consideration every day right here on our campus. By using our own facilities and community as a miniature model of the world at large, we can learn things that will make this campus better, but also make the world better.”

More at sustainability.illinois.edu/campus-as-a-living-laboratory-research-campus-sustainability-working-together/.

First Two Proposals Funded

In May, iSEE announced plans to seed fund the first two sustainability research projects in its Campus as a Living Lab program at the University of Illinois at Urbana-Champaign:

Thermochemical Batteries Project

Led by Sanjiv Sinha, a Professor of Mechanical Science and Engineering, along with others from his department and the Illinois Sustainable Technology Center (ISTC), this team will harness heat energy currently going to waste (just being exhausted into the air) from industrial sources for other purposes like space heating. The team will create a battery pack capable of storing heat through a series of chemical reactions.



SINHA

The team won’t have to go far to test the prototypes: “The Abbott Plant on campus has multiple waste heat loss points that could benefit from thermal storage,” the collaborators wrote. “The proposed storage system needs to be designed for multiple scenarios, several of which arise in power plants. ... Broadly, space heating is a large part of the campus’ energy use. In the long term, thermal storage offers the possibility of unique improvements in efficient use and reduced costs for the entire campus.”

Environment-Enhancing FEW Systems

Led by Bioengineering

Professor Yuanhui Zhang, researchers from across campus will test a system that can deliver renewable energy, clean water, and bonus organic fertilizers for agriculture.

A process called hydrothermal liquefaction (HTL) sits at the heart of the project.

Biowaste solids like campus food scraps or dried manures are exposed to high heat and pressure, replicating the geological process that created fossil fuels millennia ago.

While the energy-rich molecules become biocrude oil, other nutrient-rich parts can be used as fertilizers for food production. Meanwhile, algae will eat up all the pollutants in the liquid parts of the biowaste and leave behind clean water, and that algae can also be “fed” with the leftover nutrients from the HTL step. At the end of their lifespan, the algae will serve as an input for HTL.

The team will rely on the E2-Energy Demonstration Lab at the South Farm Swine Research Center, a Crop Sciences greenhouse, HTL reactors built by the Department of Agricultural and Biological Engineering, and wastewater treatment at the Urbana-Champaign Sanitary District.



ZHANG

EDUCATION & OUTREACH



Mike Nicholus of Accenture, second from left, met in person with Illinois students — from left, Hannah McCullough, Aaron Portante, Lucia Dunderman, and Olivia Yu — who collaborated on a capstone research project for Accenture as part of their requirements to complete the SEE FP undergraduate minor. In Fall 2017, more than a dozen students did their capstone projects for campus sustainability initiatives, corporate partners like Accenture, and nongovernment organizations in ENV5 492 — the inaugural course that completes the SEE Fellows campuswide minor.

Campuswide Sustainability Minor Continues to Grow

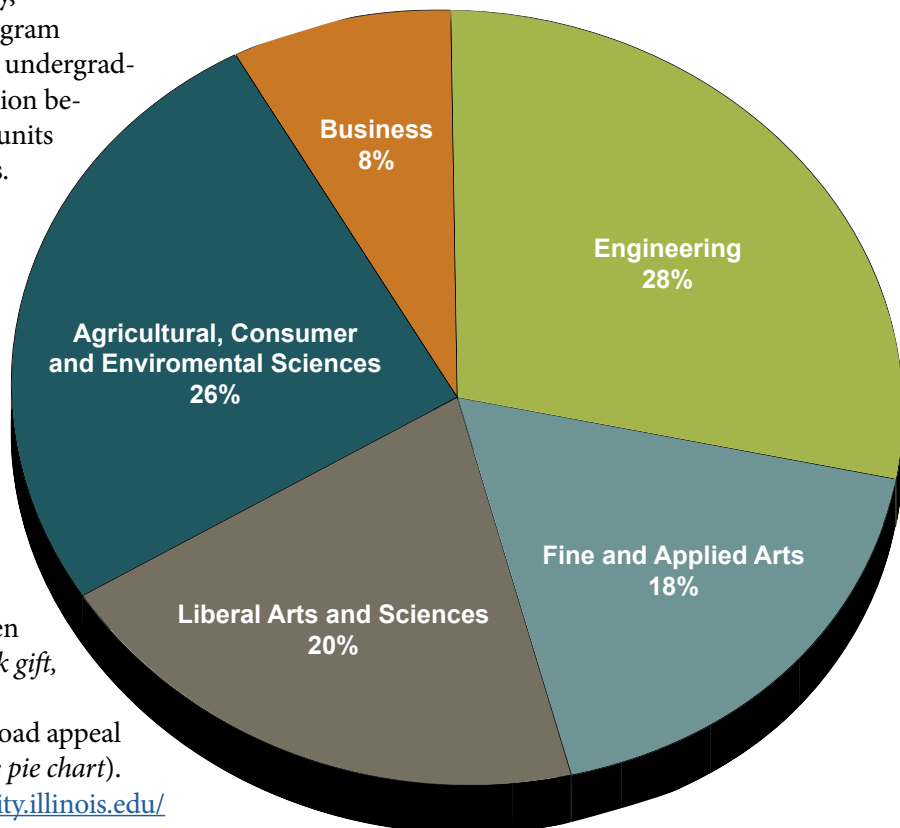
Enrollment has surpassed 90 in the Sustainability, Energy, and Environment Fellows Program (SEE FP), an interdisciplinary undergraduate minor that is a collaboration between iSEE and six academic units from across the U of I campus.

More than two dozen Illinois students have now graduated with the minor, which began about three years ago — and enrollment in Spring 2018 was nearly at 30 students. Among its 16-18 credit hours, the minor features a capstone research project in the culminating ENV5 492 course taught by iSEE Levenick Teaching Fellows Jeffery Roesler and Ken Paige (*more about the Levenick gift, page 4*).

The SEE FP has shown broad appeal across the Illinois campus (*see pie chart*).

Learn more at sustainability.illinois.edu/education/sustainability-minor/.

SEE FP ENROLLMENT BY MAJOR COLLEGE





Students' Environmental Writing Pieces to Populate Magazine Website

During the 2017-18 academic year, more than 85 University of Illinois students enrolled in courses within the new undergraduate Certificate in Environmental Writing (CEW), a collaboration between iSEE, the School for Earth, Society, and Environment, and the Department of English.

In Spring 2018, English Professor Gillen D'Arcy Wood worked with more than a dozen students in the CEW capstone course ESE/ENGL 498, "Environmental Writing for Publication."

The top articles from that and other CEW courses will be a part of the first issue of *Q Magazine*, which will be published online in Fall 2018 in an effort led by Wood, SESE Lecturer Rob Kanter,



Magazine

Student Editor Katherine Watson, and iSEE communications staff. Topics covered in the first issue: climate change and the rising seas (including pieces on the future of coastlines and hurricane recovery); the history of environmentalism (a feature on an Illinois woman known as "the Mother of Environmental Justice"); the living world (short items on ants, fungi and bison); and "your stuff" — exploring everyday items that have environmental implications the user might not be aware of (in this case, dish soap).

The *Q Magazine* website will be up and running soon at q.sustainability.illinois.edu.

Read more about the CEW at sustainability.illinois.edu/cew/.



Tony Mancuso/iSEE

More than 210 people attended the iSEE Congress 2017 opening keynote by former White House Science Advisor John Holdren titled 'Investing in Climate Change Resilience: Insights from Science, Engineering, and Economics'.

2017 iSEE Congress Attracts Record Registration; '18 Event on Cities

Each year, iSEE hosts a major scientific Congress on a specific global challenge related to its research themes. Leading local, national, and international experts from different disciplines come together to discuss new scientific and policy directions and potential future problem-solving collaborations.

iSEE Congress 2017

The fourth iSEE Congress — “Building Resilience to Climate Change” — set a new record with more than 450 registrants. Keynote addresses by former White House Science Advisor John Holdren and noted climate change journalist and author Justin Gillis were attended by 200-250 people each.

The event offered discussions on how to keep a growing population fed, healthy, safe, and on the grid as increasing temperatures affect agriculture

and ecosystems, and extreme weather and other climate-related factors put homes and lives in danger. The event received funding from the Office of the Vice Chancellor for Research as part of its symposium series in honor of the Illinois Sesquicentennial — “The Research University at 150: Celebrating the History and the Future of Interdisciplinary Research at Illinois”.



iSEE Congress 2018

“Sustainable Cities” is set for Oct. 3-5 at the Illini Union. This year’s event will focus on the strategies for meeting our growing urban transportation, housing, and food needs sustainably and for making our cities more resilient to climate change.

iSEE Congress 2018 is supported by generous funding from several academic units. Read more at sustainability.illinois.edu/iSEE-congress-2018/.



Olivia Harris photos/iSEE

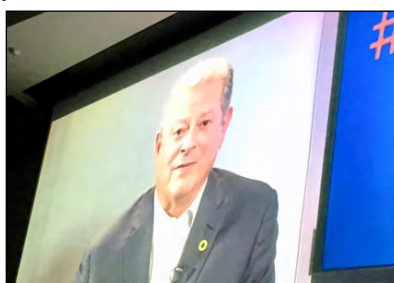
More than 100 students, staff, and faculty attended the Campus Sustainability Celebration in October 2017, above, part of Sustainability Week. Another highlight was the Student Sustainability Committee-sponsored screening of ‘An Inconvenient Sequel’ featuring a live Q&A via teleconference with former Vice President Al Gore, below.

Sustainability Week: ‘Next Steps,’ Gore

For Campus Sustainability Week 2017, iSEE invited students, staff, and faculty to brainstorm one (or more) habit they could begin in the fall semester to take a “Next Step” in their personal sustainability. More than 700 pledged actions; you still can do so at publish.illinois.edu/mynextstep.

Sustainability Week kicked off a little early with Illini Lights Out (*more on page 41*) on Friday, Oct. 20, at which 50 student volunteers turned off 4,972 light bulbs to save energy in campus buildings all weekend long.

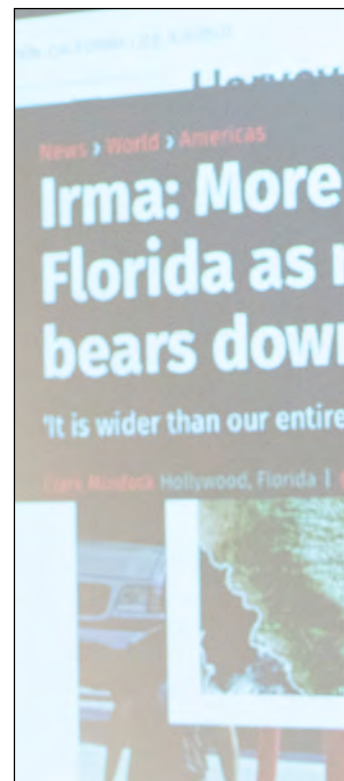
During the following week, participants took a tour of a biomass boiler facility at the Illinois



Energy Farm, “jumped for their lunch” at the Shell Synergy Truck, and watched “An Inconvenient Sequel,” taking a behind-the-scenes look at former Vice President Al Gore’s latest efforts to fuel a renewable energy revolution. The film and Q&A with Gore were sponsored by the Student Sustainability Committee (SSC; *more on pages 42-43*).

iSEE and Facilities & Services (F&S) hosted the second annual Campus Sustainability Celebration on Oct. 25 at the Alice Campbell Alumni Center. More than 100 students, staff, and faculty gathered to learn more about campus sustainability efforts and the grassroots organizations and clubs supporting them. At the event, F&S awarded nearly \$170,000 to winners to the 2017 Energy Conservation Incentive Program (ECIP), and iSEE’s Sustainability Working Advisory Teams (SWATeams; *more on pages 38-39*) offered updates on campus progress toward goals in the Illinois Climate Action Plan (iCAP).

Earth Month 2018:



Olivia Harris and Molly Gates photos/iSEE

ABOVE LEFT: Planting a tree on the Quad on Arbor Day. ABOVE RIGHT: Joggers collect waste during the 'Plogging' event. RIGHT: Eban Goodstein delivers the 2018 Keeling Lecture. BELOW RIGHT: Bill McKibben discusses 'Building a Better Environmental Movement'.

University groups across campus dedicated April 2018 to the Earth in a celebration of the planet that sustains us.

Primarily led by Students for Environmental Concerns (SECS), the events scheduled during Earth Month included a cleanup of Boneyard Creek and other areas around C-U, a showcase and speaker session dedicated to water, a tour of Common Ground Food Co-op and cooking class, bike safety and registration events, and more.

Other highlights of Earth Week included iSEE's event called "Plogging" — in which joggers stopped to pick up trash along their campus route. Earth Month culminated with the April 27 Arbor Day celebration. Facilities

& Services and iSEE planted a tree on the Main Quadrangle as the U of I marked its third straight year of being noted as a Tree Campus USA.

In addition, iSEE, the Schools of Chemical Sciences and Earth, Society and Environment, the Departments of Atmospheric Sciences and Chemistry, the Student Sustainability Committee (SSC), the Office of the Vice Chancellor for Research, and the University YMCA worked together to bring a major slate of Earth Month speakers to campus. More than 750 people attended the five lectures.

Keeling Lecture 2018

Eban Goodstein, Director of the Center for Environmental Policy at Bard College and Found-

er of the Green House Network, delivered the 2018 Charles David Keeling Lecture, "Climate Change Turns 30: Tribalism and Sustainability," on April 25 in the NCSA Auditorium. Goodstein argues that climate change action will increasingly occupy the center of an expansive tribalism, a global political, civil society and business movement for a sustainable future. View the full lecture, sponsored by iSEE, SCS, SESE, Chemistry, and Atmospheric Sciences, at youtu.be/kRFvKiyaSSA.

MillerComm Lecture

Noted climate expert Michael Mann, Distinguished Professor of Meteorology at Penn State University and Director of the Earth System Science Center (ESSC),

What a Fun Run!



delivered a Center for Advanced Studies MillerComm Lecture titled "A Return to the Madhouse: Climate Change Denial in the Age of Trump" on April 6 at the Levis Faculty Center. Mann examined the evidence of climate change, the reasons we should care, and the absurd efforts by special interest groups and politicians to confuse the public and deny a problem even exists.

Additional Speakers

- The Y's Friday Forum Series on Building a Better Environment hosted author, activist, and founder of 350.org Bill McKibben, who gave an April 13 talk titled "Building a Better Environmental Movement" that included reminiscences of his time as an

environmental activist on Illinois' campus.

- The Department of Atmospheric Sciences' Yoshi Ogura Lecture was given by Ed Zipser, Professor of Atmospheric Sciences at the University of Utah. Zipser's April 24 talk was titled "Organization of Deep Convections into Large Mesoscale Systems".

- In honor of the U of I's 150th anniversary, the Office of the Vice Chancellor for Research hosted a symposium, "Illinois 150: The 21st Century University and Research for the Public Good". The highlight was an April 10 keynote address by environmental writer Amitav Ghosh, based on his book titled "The Great De-rangement: Climate Change and the Unthinkable."



Campus Sustainability Leadership

2017-18 SUSTAINABILITY COUNCIL

The Sustainability Council is made up of top-tier leaders on the University of Illinois' Urbana-Champaign campus with the Chancellor as its Chair. It provides strategic direction and oversight of campus sustainability initiatives, including major campus policies regarding sustainability, energy conservation, and eco-friendly practices. The 2017-18 Council members:



NAME	TITLE
Robert J. Jones (Chair)	Chancellor, University of Illinois at Urbana-Champaign
Evan H. DeLucia (Vice Chair)	Baum Family Director, Institute for Sustainability, Energy, and Environment (iSEE)
John Wilkin	Interim Vice Chancellor for Academic Affairs and Provost
Andreas Cangellaris	Interim Vice Chancellor for Academic Affairs and Provost
Barry Benson	Vice Chancellor for Advancement
Danita Young	Vice Chancellor for Student Affairs
Susan Martinis	Interim Vice Chancellor for Research
Tamer Basar	Interim Dean, College of Engineering
Jeffrey Brown	Dean, Gies College of Business; Director, Center for Business & Public Policy
Kim Kidwell	Dean, College of Agricultural, Consumer, and Environmental Sciences
Feng Sheng Hu	Dean, College of Liberal Arts & Sciences
Helen Coleman	Interim Executive Director, Facilities & Services
Gay Miller	Chair, Senate Executive Committee
Raneem Shamseldin	President, Illinois Student Senate
Nick Heyek	Chair, Student Sustainability Committee (SSC)
Ximing Cai (Nonvoting)	Associate Director for Campus Sustainability, iSEE; Chair, iCAP Working Group
Jenny Kokini (Secretary)	Managing Director, iSEE

2017-18 iCAP WORKING GROUP

The Illinois Climate Action Plan Working Group (iWG) is made up of representatives from major stakeholder groups across campus. The iWG was tasked with a) reviewing Sustainability Working Advisory Team (SWATeam) recommendations and transmitting them to the affected units or to the Sustainability Council, as appropriate; and b) initiating a process for meeting 2015 iCAP goals. The 2017-18 members:

NAME	TITLE
Ximing Cai (Chair)	iSEE Associate Director for Campus Sustainability — representing iSEE
Morgan White	Associate Director of Facilities & Services (F&S), Sustainability — representing F&S
Laurence Uphoff	Senior Associate Director of Illini Union — representing Student Affairs
Matthew Tomaszewski	Associate Provost for Capital Planning — representing Office of the Provost
John Dallesasse	Chair of Senate Committee on Campus Operations — representing Academic Senate
Nick Heyek	Chair, Student Sustainability Committee (SSC) — representing students
Joey Kreiling	Co-President, Student Sustainability Leadership Council — representing students
Matt Moy	Co-President, Student Sustainability Leadership Council — representing students
Rob Fritz	Beckman Institute Director of Facilities — representing college-level facility managers
Sean Reeder	Interim Dir. of Capital Prog./Real Estate Serv. — representing Business & Financial Services
Scott Willenbrock	Provost Fellow for Sustainability
Micah Kenfield (Secretary)	iSEE Sustainability Programs Coordinator

Campus Sustainability Leadership

2017-18 CHAMPAIGN COUNTY CLIMATE RESILIENCE TASK FORCE

The Champaign County Climate Resilience Task Force (CCCRTF) includes professors and subject matter experts at the University of Illinois, representatives from local organizations such as Carle Foundation Hospital, the Champaign County Emergency Management Association, the cities of Champaign and Urbana, and other relevant groups.

From April 2017 to April 2018, the group developed a framework for a campus and community climate resilience assessment and planning. Task Force efforts included establishing the formal scope and vision for the committee, reviewing climate projections for the immediate region to establish what climate hazards are most relevant to the Champaign County area, and evaluating areas of greatest strength and need for the campus and community to prepare for climate change impacts.

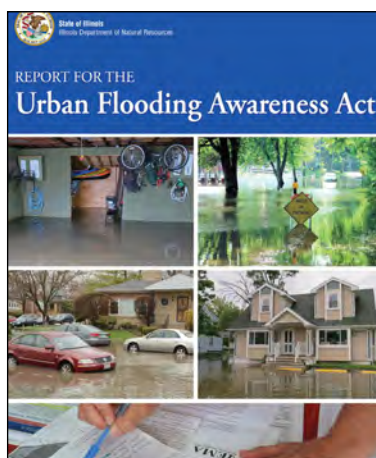
A resilience framework was established identifying key climate hazards and key resilience indicators for future planning. While climate change will undoubtedly impact Champaign County in

a number of ways, the key hazards identified by the CCCRTF that require immediate attention are extreme weather variability, rainfall flooding, severe storms, and climate-related health hazards.

With a rough, malleable framework established for future resilience planning, the Task Force has identified three goals for 2018-19:

- a Joint Resilience Proclamation between the University and the cities of Champaign and Urbana to declare shared commitment to creating a more resilient community and formally establish a joint advisory committee to develop recommendations for future resilience planning for Champaign County;
- to begin to monitor resilience indicators and conduct formal assessment of the community's current baseline preparedness; and
- to begin identifying short- to midterm recommendations for the University of Illinois to enhance its resilience to climate change impacts through integration with the next edition of the Illinois Climate Action Plan (iCAP).

The 2017-18 Task Force members:



NAME	TITLE
Jim Angel	State Climatologist
Tina-Marie Ansong	City of Champaign Associate Planner
Rita Black	Champaign County Regional Planning Commission
John Dwyer	Champaign County Emergency Management Agency
Paolo Gardoni	Professor of Civil & Environmental Engineering, University of Illinois
Nancy Holm	Assistant Director of Illinois Sustainable Technology Center
Micah Kenfield	Sustainability Programs Coordinator at iSEE, University of Illinois
Madhu Khanna	Associate Director of Education & Outreach at iSEE, University of Illinois
Warren Lavey	Adjunct Assistant Professor at the School of Earth, Society, and Environment, University of Illinois
Sally McConkey	Senior Professional Scientist at Illinois State Water Survey
Timothy Meneely	Doctor of Family Medicine at Carle Foundation Hospital
Susan Monte	Champaign County Regional Planning Commission Planner
Marilyn O'Hara Ruiz	Clinical Associate Professor of Pathobiology, University of Illinois
Lacey Rains	City of Champaign Sustainability Planner
Holly Rosencranz	Assistant Professor of Clinical Medicine, University of Illinois
Scott Tess	City of Urbana Environmental Sustainability Manager
Morgan White	Associate Director Facilities & Services, Sustainability, University of Illinois
Gillen D'Arcy Wood	Associate Director of Education & Outreach at iSEE, University of Illinois
Bev Wilson	Associate Professor of Urban and Regional Planning, University of Illinois
Don Wuebbles	Professor of Atmospheric Sciences, University of Illinois

Campus Sustainability Leadership

2017-18 SUSTAINABILITY WORKING ADVISORY TEAMS

Each fall, iSEE charges six teams consisting of faculty, staff, and students to examine six broad themes within the Illinois Climate Action Plan (iCAP). These Sustainability Working Advisory Teams (SWA-Teams) recommend concrete steps the campus should take to meet iCAP targets. The 2017-18 teams:

ENERGY CONSERVATION AND BUILDING STANDARDS	
Name	Title
Marian Huhman (Chair)	Adjunct Assistant Professor, Communication
Yun Kyu Yi	Assistant Professor, Architecture
Dave Boehm	Associate Director of Operations, Maintenance and Alterations, Facilities & Services
Karl Helmink	Associate Director of Energy Conservation and Retrocommissioning, Facilities & Services
Andrea Martinez Gonzalez	Ph.D. Candidate, Communication
Swarnali Sanyal	Ph.D. Candidate, Atmospheric Sciences
Ashwini Shetty	M.S. Candidate, Civil Engineering
Carol Lin (Clerk)	Undergraduate Student, Materials Science and Engineering
ENERGY GENERATION, PURCHASING, AND DISTRIBUTION	
Name	Title
Xinlei Wang (Chair)	Professor, Agricultural and Biological Engineering
Yu-Feng Forrest Lin	Director, Illinois Water Resources Center; Clinical Prof., Civil and Env't. Engineering, NRES
Mike Larson	Director of Utility Operations, Facilities & Services
Tim Mies	Operations Director, Illinois Energy Farm
Yogesh Bhandari	M.S. Candidate, Engineering in Energy Systems
Christopher Hillebrand	M.S. Candidate, Engineering in Energy Systems
Krish Saxena	M.S. Candidate, Civil and Environmental Engineering
Carol Lin (Clerk)	Undergraduate Student, Materials Science and Engineering
TRANSPORTATION	
Name	Title
Yanfeng Ouyang (Chair)	Professor, Civil and Environmental Engineering
Julie Cidell	Associate Professor, Geography and Geographic Information Science
Peter Varney	Director of Transportation & Automotive Services, Facilities & Services
Lily Wilcock	Active Transportation Coordinator, Facilities & Services
Tulsi Chudgar	Undergraduate Student, Civil and Environmental Engineering
Ankit Singhai	M.S. Candidate, Civil and Environmental Engineering
Rebecca Laurent (Clerk)	Undergraduate Student, Political Science
WATER AND STORMWATER	
Name	Title
Art Schmidt (Chair)	Research Assistant Professor, Civil and Environmental Engineering
Rabin Bhattarai	Assistant Professor, Agricultural and Biological Engineering
Keith Erickson	Associate Director of Utilities and Energy, Facilities & Services
Kishore Rajagopalan	Associate Director for Applied Research, Illinois Sustainable Technology Center
John Berens	M.S. Candidate, Civil Engineering
Lauren Excell	Undergraduate Student, Civil Engineering
Bridget Flynn	Undergraduate Student, Finance
Colleen Williams (Clerk)	Undergraduate Student, Agricultural and Biological Engineering
PURCHASING, WASTE, AND RECYCLING	
Name	Title
Timothy Stark (Chair)	Professor, Geotechnical Engineering
Warren Lavey	Adjunct Professor, Natural Resources and Environmental Sciences
Brad Henson	Director of Purchasing, Office of Business and Financial Services
Joy Scrogum	Emerging Technologies Resource Specialist, Illinois Sustainable Technology Center
Ireland Flannery	Undergraduate Student, Undecided
Fanxing Liu	Undergraduate Student, Civil and Environmental Engineering
Rebecca Laurent (Clerk)	Undergraduate Student, Political Science
AGRICULTURE, LAND USE, FOOD, AND SEQUESTRATION	
Name	Title
Reid David Christianson (Chair)	Research Assistant Professor, Crop Sciences
Bruce Branham	Professor, Crop Sciences
Thurman Etchison	Food Service Administrator, University Housing
Brent Lewis	Campus Landscape Architect, Facilities & Services
Joseph Edwards	M.S. Candidate, Ecology, Evolution, and Conservation Biology
Adriana Noboa	Undergraduate Student, Agricultural and Biological Engineering and Horticulture
Colleen Williams (Clerk)	Undergraduate Student, Agricultural and Biological Engineering

Campus Sustainability Process: Faculty, Staff, Students, and Administration Work Together

iSEE drafted campus sustainability procedures more than four years ago, in which most proposals for new initiatives or programs come up through the Sustainability Working Advisory Teams (SWATeams; *see page 38*) to midlevel campus managers in the iCAP Working Group (iWG; *page 36*). The large budgetary or policy implications go through the Sustainability Council (*page 36*).

In 2017-18, SWATeams submitted a dozen recommendations to the iWG and saw successful implementation of an additional six recommendations from previous years' submissions. A few highlights:

Solar Farm 2.0

One 2015 Illinois Climate Action Plan (iCAP) objective is to expand on-campus solar energy production, generating 25,000 MWh/year by FY25. The Energy Generation, Purchasing, and Distribution (EGEN) SWATeam and the iWG recommended expanding the existing solar farm or a new large-scale solar installation. At a December 2017 Sustainability Council meeting, Chancellor Robert J. Jones directed Facilities & Services to solicit proposals for a second solar farm. An ad hoc advisory committee has been formed to provide input and guidance.

Best Management Plan for South Farms

The Agriculture, Land Use, Food, and Sequestration SWATeam recommended forming a plan for sustainable practices in the operations of the University's non-research farm lands that would account for crop rotations, soil management, nutrient application, and pest management. The iWG in turn asked the Dean of the College of Agricultural, Consumer, and Environmental Sciences (ACES) to form a committee of farm managers, ACES faculty, Prairie Research Institute and Illinois Water Scholars, and students to offer detailed recommendations, costs of implementation, and estimated reductions in greenhouse gas emissions from adopted practices.

Certified Green Labs

In FY17, the Energy Conservation and Building Standards (ECBS) SWATeam recommended campus implement a Green Labs Program that would

More about Campus Sustainability Teams and Leadership ...

Sustainability Council: sustainability.illinois.edu/sustainability-council/

iWG: sustainability.illinois.edu/icap-working-group/

SWATeams: sustainability.illinois.edu/swateams/

CCCRTF: sustainability.illinois.edu/champaign-county-climate-resilience-task-force/

include “energy conservation through analysis of fume hood usage, a Shut the Sash fume hood initiative, freezer and refrigerator management, space efficiency and utilization, water conservation, recycling (e.g., batteries, Styrofoam), and collaboration and education of effective energy efficiency and sustainable methods for management of lab chemicals and hazardous waste disposal.” The iWG supported this recommendation, and during FY18 the Student Sustainability Committee (SSC) showed its support by funding associated student interns.

iSEE will initiate a Certified Green Labs Program, much like the existing Certified Green Office Program (*more on CGOP, page 40*). The space efficiency efforts will be led through the campuswide space inventory update. Additionally, F&S Energy Conservation staff will continue looking for conservation opportunities in research labs, such as the recent Energy Performance Contract and programs like the International Freezer Challenge.

Greener Parking Lot

When a team of dedicated and enthusiastic students won the national EPA RainWorks Challenge, the Water and Stormwater SWATeam immediately recommended implementing the team's proposed “Campus Hydro ReDesigned” project. The iWG in turn recommended that the Parking Department do a feasibility study for Lot F4, incorporating the green infrastructure from the conceptualization completed by the students.

U of I Accolades

Among the national recognition for sustainability the Illinois campus received in 2017-18:

- In April 2018, the University of Illinois at Urbana-Champaign earned its third straight designation as an official Tree Campus USA by the Arbor Day Foundation for its commitment to effective urban forestry. To care for its more than 20,000 trees, campus maintains a tree advisory committee and a campus tree-care plan.



- In April 2018, environmental nonprofit Second Nature recognized the U of I for advancing climate action in higher education with two financial planning-related efforts for campus sustainability: 1) a commitment to a revolving fund worth at least \$1 million to support campus sustainability projects; and 2) participation in Second Nature's Carbon Credit and Purchasing Program (*more, pages 4, 41*).

- Illinois placed 56th overall out of more than 200 four-year higher education institutions — and third among Big Ten universities — that applied to Sierra Club Magazine's "Cool Schools" contest in 2017.

- The Association for the Advancement of Sustainability in Higher Education (AASHE) recognized Illinois for an innovative, high-impact initiative in its 2017 Sustainable Campus Index: Fresh Press, in which agricultural residue from the Sustainable Student Farm is used to create paper that is sold on campus, with students involved in growing, harvesting and manufacturing the paper products. The AASHE index also featured a full-page photo of the Illinois Solar Farm.



iSEE Certifies 21 Green Offices

The University of Illinois at Urbana-Champaign's McKinley Health Center was the largest campus entity to earn the prestigious Gold Level Certification through iSEE's Certified Green Office Program in 2017-18. More than 150 people took the pledge to make McKinley (above) more sustainable.

iSEE has now certified 56 offices. Besides McKinley, 20 other offices received Gold Certification during the past year:



- La Casa Cultural Latina;
- Newmark Laboratory - B220;
- Department of Communication;
- Office of Technology Management;
- Department of Asian American Studies;
- Department of Natural Resources and Environmental Sciences;
- Disability Resources and Educational Services;
- Administrative Information Technology Services (AITS);
- Center for African Studies;
- Center for East Asian & Pacific Studies;
- Center for Global Studies;
- Center for Latin American & Caribbean Studies;
- Center for South Asian & Middle Eastern Studies;
- European Union Center;
- Illinois Abroad & Global Exchange;
- International Student & Scholar Studies – Scholar Office;
- International Studies Building;
- Lemann Institute for Brazilian Studies;
- Russian, East European & Eurasia Center; and
- Facilities & Services (F&S) Customer Relations and Communications.

More at sustainability.illinois.edu/certified-green-office-program/.

Illini Lights Out Sets New Records

For the second year in a row, Illini Lights Out is one of the most popular ways to make a difference on the University of Illinois' Urbana-Champaign campus.

During eight events in the 2017-18 school year, an average of 87 student volunteers per event turned off a total of 36,301 lights to save almost \$6,000 in energy costs — bringing the two-year total to 62,354 lights, 88.2 tons of carbon dioxide equivalent, and more than \$9,300 in savings.

iSEE Campus Sustainability Interns Claire Kredens and Vince Spagnola led the events with both record turnout and record energy savings.

And more good news: The Student Sustainability Committee (SSC; *more on pages 42-43*) has granted iSEE \$10,000 to grow



and continue the Illini Lights Out program in 2018-19. With both interns back for another year of organizing, iSEE is looking forward to a bright future of student involvement and energy savings.

Illini Lights Out started as a one-off initiative by the Ener-

gy Conservation and Building Standards Sustainability Working Advisory Team (*more, pages 38-39*) in spring 2016 and became monthly in 2016-17 with SSC support.

More at sustainability.illinois.edu/programs/illini-lights-out/.

Sale, Program Help Fund More Sustainability Efforts

As part of its ongoing dedication to reducing its environmental footprint, the University of Illinois at Urbana-Champaign sold its 2017 Verified Carbon Units (VCUs) through Second Nature's Carbon Credit and Purchasing Program (C2P2).

Proceeds from this sale, brokered by iSEE, exceed \$236,000.

The largest investment of C2P2 profits to date was a contribution of \$750,000 to help increase the campus Revolving Loan Fund (RLF), an internal funding source for utility conservation projects with payback periods of less than 10 years.

Other activities financed through C2P2 sales include the Certified Green Office Program (*see page 40*), which engages hundreds of campus staff members and other employees in effecting change at a departmental level, and the Campus Tree Inventory, which impacts the U of I's commitment to a healthy tree population as a three-time Tree

Campus USA designee (*see page 40*).

"Continued participation in the C2P2 program has been a major win for our ability to pursue new and cutting-edge methods to reduce our environmental impact," said Ximing Cai, iSEE's Associate Director for Campus Sustainability.

More on the sale on page 4.

Campus as a Living Lab Program

iSEE will also help bolster campus sustainability sites and efforts with its Campus as a Living Lab program (*see pages 28-29*), in which researchers will seek major grants from external funding agencies and organizations to use campus facilities and projects as part of new research thrusts.

Through this program, not only will the funding benefit solutions toward grand world challenges, but it also will benefit efforts on campus to conserve energy and resources.

SSC: Funding Big and Small Sustainability Initiatives in '17-18

The Student Sustainability Committee (SSC) received 80 project proposals in 2017-18 — including 44 student-led proposals — totaling almost \$4 million in requested funding.

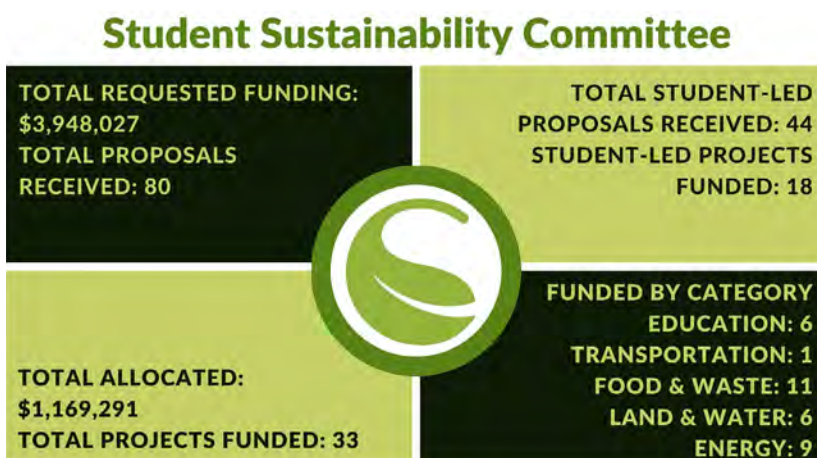
SSC recommended 33 projects for funding, including one transportation project, six land and water projects, six education projects, nine energy projects, and 11 food and waste projects.

One highly student-driven project includes enhancing learning opportunities at the Southern Arboretum Woodlands (SAW). Using \$40,000 from SSC, this project will transform the SAW into a campus and community resource through collective and ethical natural resource management. Students will continue suppressing invasive plant species and establishing native plants.

In total, the committee recommended \$1,169,291 for the 2017-18 funding cycle. Food and waste as well as energy had the most submitted proposals with 23 each. These categories also had the most engagement at the SSC working group meetings. For a full list of SSC-funded projects, please visit ssc.sustainability.illinois.edu.

New Micro Grant Initiative

SSC recognizes that some student-led projects require funding quickly. Therefore, the Micro Grant Initiative was launched in late Spring 2018 to address student-led project proposals for less than \$500.



The Micro Grant aspires to:

- provide funding to project leaders within one month of an application submission;

- increase opportunities for students to use the Sustainable Campus Environment Fee;
- increase financial support for same-semester programming initiatives; and

- expand outreach by making funding more accessible to all student groups.

SSC received and funded two Micro Grants in April 2018: \$200 to support Eco-Olympics by increasing energy conservation awareness with digital signage; and \$500 to Design for America, co-sponsoring a Social Hack event that explores sustainability in design thinking.

Students Approve Fees

Every four years, both the Sustainable Campus Environment Fee and the Cleaner Energy Technologies Fee go to referendum. In March 2018, Illinois students voted to renew both

fees, for an additional four years, approving them by 82% and 87%, respectively. Additionally, SSC leadership presented to the Student Fee Advisory Committee, which reviews the components of student-initiated fees and makes recommendations to the Vice Chancellor for Student Affairs about renewals and changes. That Committee will provide feedback in Fall 2018.

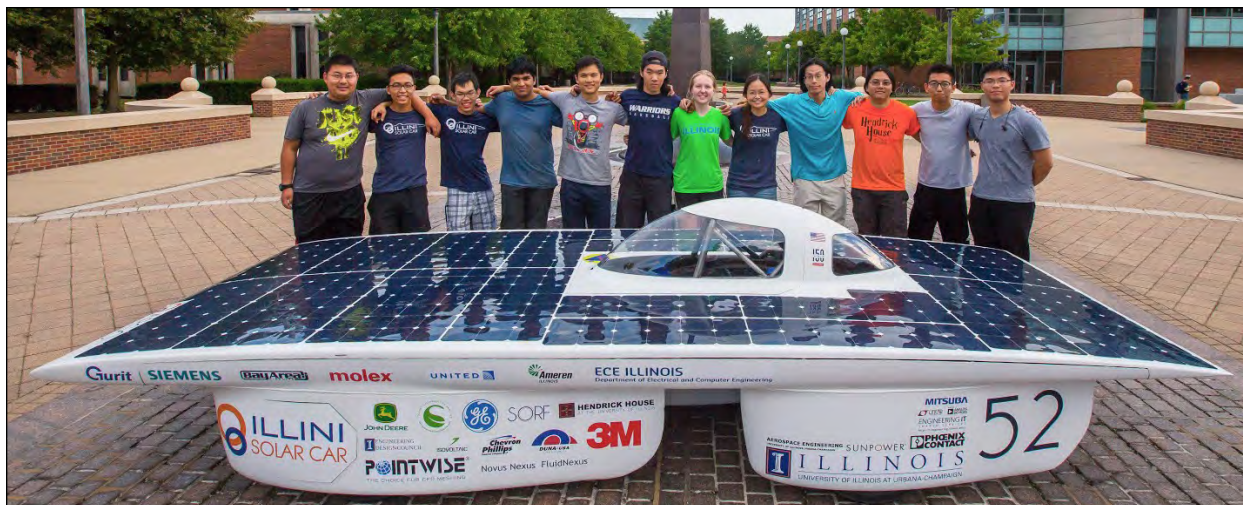
Outreach

While primarily a funding board, SSC strives to use its connections, funded projects, and knowledge to bring awareness to environmental stewardship.

During Fall 2017, the Committee offered a tour of the Illinois Energy Farm to see the new biomass boiler partially funded by SSC.

Members also tabled at Quad Day, individual program resource fairs, and the inaugural Fresh Check Day.

Participating in Sustainability Week, SSC screened “An Incon-



The Student Sustainability Committee (SSC) helped sponsor the Illini Solar Car project. The team's first car — 'Argo' — was completed in August 2017.

venient Sequel” and hosted a live webcast Q&A with Former Vice President Al Gore.

During Spring 2018, SSC co-sponsored the fourth annual Sustainability Shorts Film

Festival and a screening of ‘Free to Ride.’ In collaboration with Explore ACES and the Department of Food Science & Human Nutrition, SSC hosted tours of the FSHN Pilot Plant. Partic-

ipants explored flour milling and hot sauce production, using campus-grown produce. For the month of March, SSC held joint office hours with the Student Organization Resource Fee (SORF).

2017-18 STUDENT SUSTAINABILITY COMMITTEE

STUDENTS

Name	Year, Major	SSC Title
Nick Heyek	Junior, Mathematics	Vice Chair - Internal (Fall); Chair (Spring)
Julia Chang	M.S. Candidate, Civil and Environmental Engineering	Chair (Fall)
Adrian Chendra	Freshman, Undecided	Vice Chair - External (Spring)
Sarah Angelbeck	Freshman, Electrical and Computer Engineering	Vice Chair - Internal (Spring)
MJ Oviatt	Senior, Natural Resources and Environmental Sciences	Communications Coordinator
Olivia Yu	Senior, Natural Resources and Environmental Sciences	Treasurer
Rebecca Laurent	Junior, Political Science	Education Working Group Chair
Rebecca Ambresh	Senior, Geology	Energy Working Group Co-Chair
Chen Zhang	Senior, Civil and Environmental Engineering	Energy Working Group Co-Chair
Bryan Parthum	Ph.D. Candidate, Agricultural and Consumer Economics	Land & Water Working Group Chair
Zishen Ye	Junior, Political Science, Urban and Regional Planning	Transportation Working Group Chair
Justin Vozzo	Junior, Natural Resources and Environmental Sciences	Food & Waste Working Group Co-Chair
Ece Gulkirpik	M.S. Candidate, Food Science and Human Nutrition	Food & Waste Working Group Co-Chair (Spring)
Ashley Yu	Senior, Statistics, Agricultural and Consumer Economics	Vice Chair - External (Fall)
Jack Javier	Junior, Earth, Society, and Env'tal Sustainability, Economics	Food & Waste Working Group Co-Chair (Fall)

FACULTY/STAFF ADVISORS

Name	Title	Department/Division
Morgan White	Associate Director of Sustainability	Facilities & Services
Joseph Youakim	Electrical Engineer	Facilities & Services
Laurel Reed Rosch	Associate Director of Student Programs and Activities	Illini Union
Ximing Cai	Professor, Civil and Environmental Engineering	iSEE Associate Director for Campus Sustainability
Clara Bosak-Schroeder	Assistant Professor	Classics
Charles Abbas	Adjunct Professor	Food Science and Human Nutrition
Andrew Stumpf	Associate Quaternary Geologist	Prairie Research Institute
Julie Cidell	Associate Professor	Geography and Geographic Information Science
Michelle Wander	Professor	Natural Resources and Environmental Science
Beverly Smith	Assistant Director	Native American House

SSLC: iSEE's Window into Student-Led Initiatives

After a brief hiatus, the Student Sustainability Leadership Council (SSLC) returned in Spring 2018, led by Co-Presidents Joey Kreiling (Class of 2021) and Matt Moy (Class of 2018).

SSLC is iSEE's finger on the pulse of student-led initiatives in sustainability as student leaders interact and collaborate while serving as a two-way conduit of information and concerns about campus sustainability with the Institute.

SSLC members come together to discuss campus policies and develop leadership skills. These students represent leadership from numerous organizations focused on sustainability and the environment, such as Illinois Solar Decathlon and Red Bison. SSLC Meetings often feature guest speakers. For example, Leah Berti gave a presentation in April called "Use the Bin" that described the importance of recycling and how the process works on campus.

Beyond biweekly meetings, SSLC participated in community efforts such as the April 7 Boneyard Creek Community Day, which engages the community in awareness and responsibility of naturalizing and sustaining our waterways through organized litter cleanup, education, and removal of invasive species to restore natural habitat and showcase the

value of a healthy ecosystem. SSLC members volunteered alongside the Champaign Park District and Facilities & Services, among others, to pick up litter that clogs storm drains causing local flooding and ends up in streams, harming aquatic life.

SSLC takes pride in not only developing student leaders, but actively contributing to the local community's environmental efforts.

With the relaunch, SSLC has its own listserv, distributing information and opportunities quickly to students interested in sustainability. Student organizations also can market upcoming events and recruit

volunteers for initiatives. Faculty and staff can offer opportunities to students as well.

By improving communication between the different student organizations, SSLC extends its impact and ability to help campus reach its sustainability goals.

Participating SSLC organizations include Illinois Solar Decathlon; Eco-Olympics; ActGreen; Students for Environmental Concerns; the Student Sustainability Committee; Red Bison; the Sustainability Living-Learning Community; the Illinois Biodiesel Initiative; the Illinois Student Government Committee on Environmental Sustainability; Alpha Phi Omega; the Green Observer; and Beyond Coal.



MOY



IBI uses this engine to test the biodiesel it manufactures.

Illinois Biodiesel Initiative Moving Operations to Bioprocessing Lab

iSEE's work as an "incubator" for the Illinois Biodiesel Initiative (IBI) student group has proven a success.

For more than a year, the Institute provided financial logistics to purchase reactants and sell final products for IBI, a group that received funding from the Student Sustainability Committee (SSC) to process waste cooking

oil from campus Dining Services into biodiesel for the University fleet as well as glycerin hand soap. In 2017-18, IBI's bioreactors were located in Noyes Laboratory.

Now, IBI is moving its operations into the newly completed Illinois Bioprocessing Research Laboratory (IBRL), where the students will continue to sustainably convert waste into fuel.

Leadership Team Bolstered as iSEE's Reach is Extended

In May, it was announced that Madhu Khanna, ACES Distinguished Professor of Agricultural and Consumer Economics, will be iSEE's new Associate Director for Research.

Baum Family Director Evan H. DeLucia, who had led the Institute's research initiatives, recently took on the Director role for the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI), a collaborative effort between iSEE, the Carl R. Woese Institute for Genomic Biology, and 17 partner institutions (*more about CABBI, pages 6-9*).

"Bringing CABBI into

this campus, and our Institute, was a major boost to our University," DeLucia said, "but taking on a U.S. Department of Energy Bioenergy Research Center means that iSEE needed to expand its footprint so that all of its research initiatives are supported."

DeLucia will concentrate his efforts on supporting iSEE's missions by securing external funding from granting agencies and philanthropy. Khanna, formerly the Associate Director for Education and Outreach, now takes on the research role.

Said DeLucia: "I am confident in Madhu's abilities to bring similar successes to our research profile, as she has a prolific research portfolio."

The new Associate Director for Education and Outreach will be English Professor Gillen D'Arcy Wood, the Langan Professorial Scholar of Environmental Humanities of English. Wood recently started the undergraduate Certificate in Environmental Writing program through iSEE, the Department of English, and the School of Earth, Society, and Environment — and he will continue to lead that effort along with editing the new *Q Magazine*, a student environmental publication (*more about Q, page 32*).

"We are excited to have Gillen on board," De-

Lucia said. "iSEE is even more interdisciplinary in its leadership with associate directors from three of the University's largest colleges (Agricultural, Consumer, and Environmental Sciences; Engineering; Liberal Arts and Sciences), and we will continue reaching campuswide in all aspects of our mission."

Ximing Cai, the Lovell Endowed Professor of Civil and Environmental Engineering, will remain the Associate Director for Campus Sustainability, a job he took on in Spring 2017. Cai's initiatives

include a new Campus as a Living Lab research program that ties campus sustainability

projects and programs to research — and future external grant opportunities (*more, pages 28-29, 41*).

Cai's predecessor, Chemistry Professor Ben McCall, recently was selected to be the first Executive Director of the University of Dayton's Hanley Sustainability Institute.

Additionally, iSEE welcomed Jordan Goebig as its new Communications Specialist in May. Goebig will work with Communications and Public Affairs Director Tony Mancuso as the primary content producer for iSEE's websites and publications. Goebig 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.

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

Goebig replaces Olivia Harris, who moved to New York in June.



KHANNA



DeLUCIA



WOOD



CAI



GOEBIG



Micah Kenfield/iSEE

From left, iSEE Interns Vince Spagnola, Claire Kredens, Katie Watson, and Molly Gates pause for a photo op while working the Earth Week 'Plogging' event in April 2018.

2017-18 iSEE DIRECTORS, STAFF

Name	Title
Evan H. DeLucia	Baum Family Director
Ximing Cai	Associate Director, Campus Sustainability
Madhu Khanna	Associate Director, Education & Outreach / Associate Director, Research*
Gillen D'Arcy Wood	Faculty Affiliate, Certificate in Environmental Writing / Associate Director, Education & Outreach*
Ben McCall	Assistant Director, Special Projects^
Jenny Kokini	Managing Director
Morgan White	Associate Director of Facilities & Services (F&S), Sustainability
Micah Kenfield	Sustainability Programs Coordinator
Ank Michielsen	Proposal Developer / Program Manager, Center for Advanced Bioenergy and Bioproducts Innovation
Cathy Liebowitz	Student Sustainability Committee (SSC) Coordinator
Tony Mancuso	Communications and Public Affairs Director
Amy Rosenbery	Office Administrator
Olivia Harris	Communications Specialist@
Jordan Goebig	Communications Specialist%
Laura Schultz	Senior Intern%
Claire Kredens	Student Intern for Campus Sustainability
Vince Spagnola	Student Intern for Campus Sustainability
Katie Watson	Student Intern for Communications / Q Magazine Student Editor@
Molly Gates	Student Intern for Communications
Sarthak Prasad	Illinois Climate Action Plan Working Group Clerk@
Rebecca Laurent	Sustainability Working Advisory Team Clerk (TRAN, PWR)
Carol Lin	Sustainability Working Advisory Team Clerk (ECBS, EGEN)
Colleen Williams	Sustainability Working Advisory Team Clerk (ALUFS, WSW)

* New iSEE title as of May 2018; ^ iSEE appointment ended December 2017; @ left iSEE Summer 2018;
% Joined iSEE Summer 2018

Our People from Across Campus

2017-18 iSEE STEERING COMMITTEE MEMBERS

Name	Title	Academic Unit
Brian Allan*	Associate Professor	Department of Entomology
German Bollero	Professor/Head	Department of Crop Sciences
Jeffrey Brawn	Professor/Head	Department of Natural Resources and Environmental Sciences
Carla Cáceres	Professor/Director	Department of Animal Biology/School of Integrative Biology
Arnab Chakraborty	Associate Professor	Department of Urban and Regional Planning
Don Fullerton	Professor	Department of Finance
Praveen Kumar	Professor	Department of Civil and Environmental Engineering
Wen-Tso Liu	Professor	Department of Civil and Environmental Engineering
Sarah Taylor Lovell*	Associate Professor	Department of Crop Sciences
Stephen P. Long*	Professor	Departments of Crop Sciences and Plant Biology
Benito Mariñas*	Professor/Head	Department of Civil and Environmental Engineering
Stephen Marshak	Professor/Director	Department of Geology/School of Earth, Society and Environment
Dipanjan Pan*	Associate Professor	Department of Bioengineering
Jesse Ribot	Professor	Department of Geography and Geographic Information Systems
Peter Sauer	Professor	Department of Electrical and Computer Engineering
Murugesu Sivapalan	Professor	Department of Civil and Environmental Engineering
Rizwan Uddin	Professor/Head	Department of Nuclear, Plasma and Radiological Engineering
Gillen D'Arcy Wood	Professor	Department of English
Donald Wuebbles	Professor	Department of Atmospheric Sciences
Nick Heyek	Undergraduate (Student Sustainability Committee Chair)	

* Primary Investigator on iSEE-funded project (see pages 14-26)

2017-18 iSEE FACULTY AFFILIATES

Brian Allan, Associate Professor, Entomology
German Bollero, Professor and Head, Crop Sciences
Bruce Branham, Professor, Crop Sciences
Jeff Brawn, Professor and Head, Natural Resources and Environmental Sciences
Carla Cáceres, Professor, Animal Biology; Director, School of Integrative Biology
Ximing Cai, Professor, Civil and Environmental Engineering; Associate Director, iSEE
Arnab Chakraborty, Associate Professor, Urban and Regional Planning
Don Fullerton, Professor, Finance
Jeremy Guest, Assistant Professor, Civil and Environmental Engineering
Madhu Khanna, Professor, Agricultural and Consumer Economics; Associate Director, iSEE
Praveen Kumar, Professor, Civil and Environmental Engineering
Bruce Elliott-Litchfield, Emeritus Professor, Agricultural and Biological Engineering
Stephen P. Long, Professor, Plant Biology and Crop Sciences
Sarah Taylor Lovell, Associate Professor, Crop Sciences
Yi Lu, Professor, Chemistry, Biochemistry, Bioengineering, and Materials Science and Engineering
Benito Mariñas, Professor and Head, Civil and Environmental Engineering
Stephen Marshak, Professor, Geology; Director, School of Earth, Society & Environment
Amy Marshall-Colón, Assistant Professor, Plant Biology

Ben McCall, Professor, Chemistry and Astronomy; Assistant Director, iSEE
James O'Dwyer, Assistant Professor, Plant Biology
Yanfeng Ouyang, Professor, Civil and Environmental Engineering
Dipanjan Pan, Associate Professor, Bioengineering
Nick Paulson, Associate Professor, Agricultural and Consumer Economics
Jesse Ribot, Professor, Geography and Geographic Information Science
Peter Sauer, Professor, Electrical and Computer Engineering
Edward Seidel, Professor, Physics and Astronomy; former Director, National Center for Supercomputing Applications
Joanna Shisler, Associate Professor, Microbiology
Ashlynn Stillwell, Assistant Professor, Civil and Environmental Engineering
Rizwan Uddin, Professor, Nuclear, Plasma, and Radiological Engineering
Madhu Viswanathan, Professor of Business
Michelle Wander, Professor, Natural Resources and Environmental Sciences
Shaowen Wang, Professor, Geography and Geographic Information Science
Scott Willenbrock, Professor, Physics
Gillen D'Arcy Wood, Professor, English; Associate Director, iSEE
Wendy Yang, Assistant Professor, Plant Biology and Geology



The iSEE Collaboratory:

Construction is on target to be completed by Dec. 1, 2018, on the iSEE Collaboratory, a space for experiential learning, a collaboration incubator, and a communications media laboratory that will serve up to 500 students each year.

The first classes in the Collaboratory's new i-flex classroom at the National Soybean Research Center will begin in Spring 2019. The facility will also provide space for student organizations to facilitate group activities, with state-of-the-art communications capabilities for research, collaboration, and conferencing. By providing advanced teleconferencing capabilities, the Collaboratory will reduce campus carbon emissions derived from travel.

The \$1 million project was funded through a \$436,079 gift from Caterpillar, Inc. (which matched a donation for iSEE fellowships from Stu and Nancy Levenick; *see more on pages 4, 26, and 30*), the Office

of the Provost, and the Student Sustainability Committee (SSC), which paid for the final \$100,000.

The Collaboratory will feature dual-camera, high-definition (HD) video and multiple wide-screen HD monitors. The media/communications center will be used for the production of multimedia pieces describing new sustainability solutions and technical advances developed by students in iSEE and will be equipped with still, graphic, video, and audio communications capabilities.

The classroom will be used by instructors, including those for the undergraduate minor Sustainability, Energy, and Environment Fellows Program and the undergraduate Certificate in Environmental Writing (*see more about both programs on pages 30-31*). The space will also be used by Levenick iSEE Fellows and other iSEE researchers and scholars for meetings, teleconferencing, and communications.



Coming in December!



Jordan Goebig/iSEE

ABOVE: Nancy and Stu Levenick and iSEE Baum Family Director Evan H. DeLucia visit the construction area on the third floor at the National Soybean Research Center building, where the iSEE Collaboratory and media center will open by Dec. 1. The Levenicks were instrumental in the funding of the new facility. **TOP:** An architectural concept drawing of the Collaboratory classroom.

Keep Up with iSEE and its Partners

Contact iSEE directly, check us out online, or engage with us on social media. Here's how:

CONTACT US

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iSEE mailing address: 1101 W. Peabody, Suite 350 (NSRC), MC-635 Urbana, IL 61801

iSEE email address: sustainability@illinois.edu

Campus sustainability email address: campus-sustainability@illinois.edu

Certified Green Office Program email address: greenoffice@illinois.edu

Illini Lights Out email address: illinilightsout@illinois.edu

Sustainability, Energy, and Environment Fellows Program email address: see-fellows@illinois.edu

Student Sustainability Committee (SSC) office phone: 217-300-6429

SSC mailing address: 1101 W. Peabody, Room 291 (NSRC), MC-635 Urbana, IL 61801

SSC email address: sustainability-committee@illinois.edu

Center for Advanced Bioenergy and Bioproducts Innovation (CABBI) office phone: 217-333-4178

CABBI mailing address: 1206 W. Gregory Drive (Carl R. Woese Institute for Genomic Biology), MC-195 Urbana, IL 61801

CABBI email address: cabbi-bio@illinois.edu

ON THE WEB

iSEE main website: sustainability.illinois.edu

Energy at Illinois website: energy.illinois.edu

Water at Illinois website: water.illinois.edu

iCAP Portal website: icap.sustainability.illinois.edu

Student Sustainability Committee (SSC) website: ssc.sustainability.illinois.edu

CABBI website: cabbi.bio

Center for Applied Collaborations on Human Environments (CACHE) website: publish.illinois.edu/humanenvironments

Leverhulme Centre for Climate Change Mitigation (LC3M) website: lc3m.org/research/theme-3/

Agroforestry for Food website: agroforestry4food.com

Crops *in silico* website: cropsinsilico.org

Sun Buckets website: sunbuckets.com

Cooking with Sun Buckets blog: cookingwithsunbuckets.com

FACEBOOK

iSEE Facebook page: facebook.com/iSEEatUofI

Sustainability @ Illinois Facebook group page: facebook.com/groups/123074238038372/

SSC Facebook page: facebook.com/UIUCssc

Agroforestry for Food Facebook page: facebook.com/AgroforestryForFood

Sun Buckets Facebook page: facebook.com/Sun-Buckets

TWITTER

iSEE Twitter page: twitter.com/sustainILLINOIS

SSC Twitter page: twitter.com/ssc_uiuc

CABBI Twitter page: twitter.com/CABBIbio

Agroforestry for Food Twitter page: twitter.com/Agroforestry4Food

OTHER SOCIAL MEDIA

iSEE YouTube channel: bit.ly/iSEEt

iSEE LinkedIn page: linkedin.com/groups/8519947

iSEE Instagram page: instagram.com/sustainillinois/

iSEE Snapchat channel: sustainillinois

**University of Illinois
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**Office of the Vice
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