2013-14 Annual Report

ISEE

Actionable research ...

Institute for Sustainability, Energy, and Environment
University of Illinois at Urbana-Champaign

“Sustainability is meeting the needs of the present without compromising the ability of future generations to meet their own needs.”

About this report

The University of Illinois is internationally renowned for its research expertise on issues related to climate, water, food, alternative energy generation and storage — along with significant interdisciplinary research on the ways these issues intersect.

To better harness these strengths for the greater benefit of people the world over, the University launched the Institute for Sustainability, Energy, and Environment (*i*SEE) in December 2013 and commissioned it to act as a central hub for research and education on its namesake topics, as well as to guide Urbana-Champaign campus sustainability efforts.

Although *i*SEE is less than a year old, this "annual" report documents the accomplishments thus far. Under the leadership of Director Evan DeLucia, we have created a strong foundation upon which to build an innovative institute to tackle the challenges of growing demand for energy and food — and ensuring a safe and productive environment — while fostering an ethos of sustainability.

The Institute for Sustainability, Energy, and Environment drives actionable research, exercises a strong commitment to campus sustainability, and facilitates programming to educate the next generation of sustainability leaders.

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Our vision ...

With the world population projected to increase rapidly in the coming decades, we want to find solutions for the ever-growing demand for food, water and energy while ensuring a safe, productive and sustainable environment for all global citizens.

Our mission ...

To foster actionable, interdisciplinary research to address fundamental challenges in sustainability, energy and environment; to provide national and international leadership in these areas through interdisciplinary education and outreach activities; and to develop and implement strategies for a sustainable environment on the University of Illinois campus and beyond.

From the desk of the director

Our world's population has crossed the 7 billion mark and according to one projection may reach 16 billion by the year 2100. As a result, the biggest challenges we face as a society in the next 20 to 50 years will revolve around meeting society's needs safely while preserving the environment We, as a pre-eminent research university, consider it our responsibility to tackle these challenges.

And so, in 2013, the Institute for Sustainability, Energy, and Environment was formed at the University of Illinois Urbana-Champaign. Its primary mission is to conduct "actionable" research — that is, research aimed at solving real-world issues both now and for the future — using an interdisciplinary approach that looks at issues from numerous scientific and social viewpoints.

But beyond bringing the brightest minds together to research and solve world problems, *i*SEE has other critical missions:

1. to bring smart, passionate campus community members together to make Illinois a model of sustainability, energy efficiency and eco-friendliness for the world to emulate — with a top priority of having a carbon-neutral campus by 2050;

2. to educate students to become employable leaders in fields involving sustainability, energy, and environment — and to be good Earth citizens who make good decisions in their personal and professional lives — when they leave campus; and

3. to bring experts from campus, the nation and abroad together for real-world dialogue about the world's current and future sustainability, energy, and environmental needs.

In less than a year from its inception, our Institute has already built a strong foundation to reach all of its major goals. While hiring staff and moving into new office space, *i*SEE has funded three major interdisciplinary research projects; built teams to lead campus sustainability efforts; begun work on a sustainability minor; and planned its first major conference.

This report offers a glance back at the progress we've made, but rest assured that we at *i*SEE are looking ahead. You can expect bigger, better things in the days and years to come as we push to become an international leader in sustainability, energy, and environment.

— Evan DeLucia, *i*SEE Director

Our name explained: A brief history

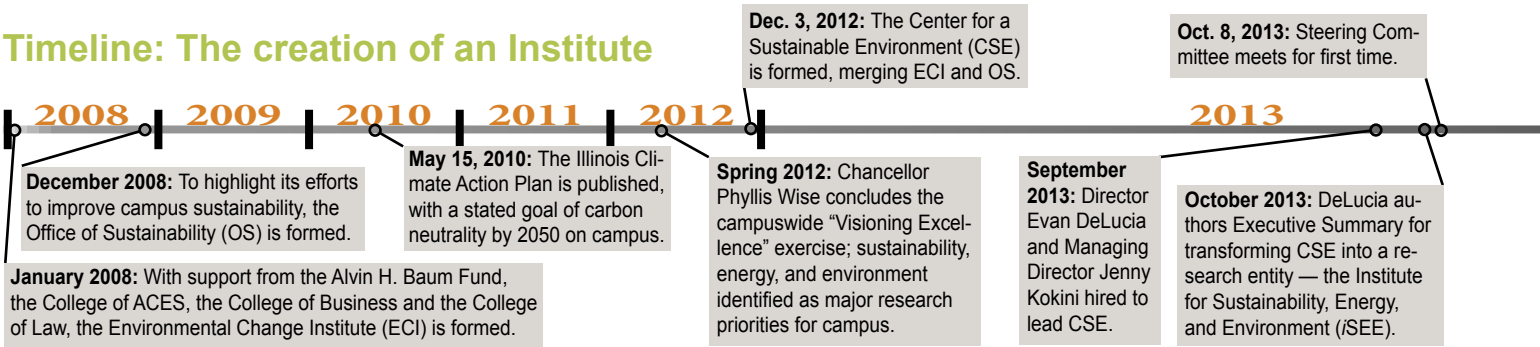
The Institute for Sustainability, Energy, and Environment (*i*SEE) was officially established on Dec. 16, 2013, by the University of Illinois Board of Trustees with approval by the Illinois Board of Higher Education. Here is a little background:

Director Evan DeLucia and Managing Director Jenny Kokini were hired in September 2013 to lead and transform the Center for a Sustainable Environment (CSE) into an institute.

The first action was to submit a proposal to the Senate Educational Policy Committee to change the name to "institute," which is widely recognized in academia as meaning "a flagship research organization." The term commands attention and denotes a high level of importance on a university campus. In becoming an institute, *i*SEE declared its position as a leader in the fields of sustainability, energy, and environment.

According to the October 2013 Executive Summary authored by DeLucia, the Institute "will create the organizational structure and paradigms that will draw together and further enable existing strengths, coalesce our current [campus] resources, and address essential gaps in advancing discovery, learning, and engagement. The Institute will heighten our visibility and help Illinois achieve its goal of becoming a world leader in this global priority."

Timeline: The creation of an Institute

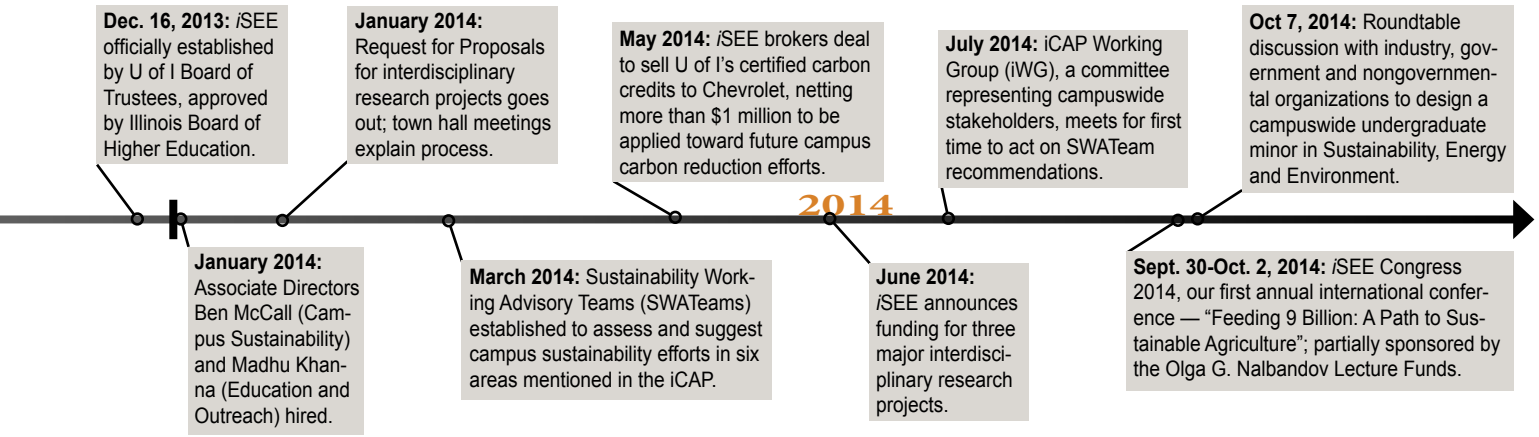


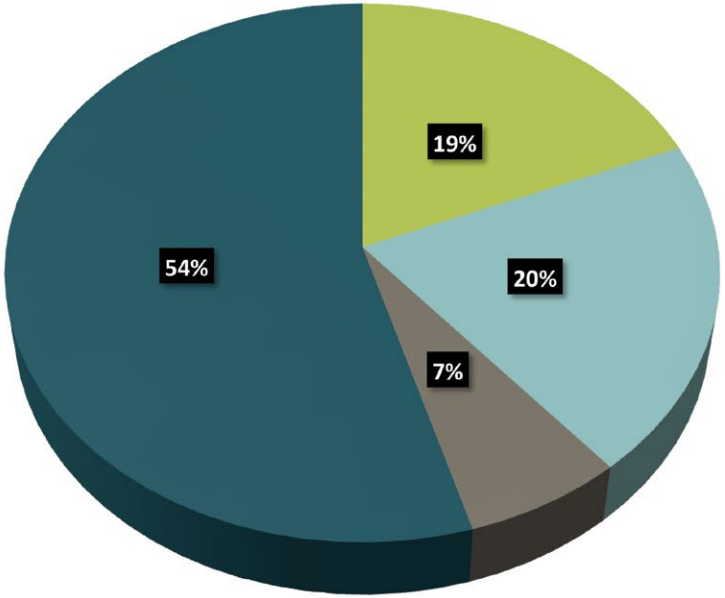
Steering Committee

The *i*SEE Steering Committee was formed shortly after the Institute's establishment to ensure that *i*SEE's activities are synergistic with other campus efforts in the area of sustainability. The Committee is made up of 14 faculty members at the top of their respective fields, and the chair of the Student Sustainability Committee. No two members share the same area of research — perfectly embodying *i*SEE's vision of interdisciplinary collaboration. Along with DeLucia, the Committee guides the vision and mission of the Institute.

Faculty member, department/unit

German Bollero, Crop Sciences
Jeff Brawn, Natural Resources & Environmental Science
Arnab Chakraborty, Urban & Regional Planning
Robert Finley, Prairie Research Institute
Don Fullerton, Finance
Sharon Hammes-Schiffer, Chemistry
Praveen Kumar, Civil & Environmental Engineering
Wen-Tso Liu, Civil & Environmental Engineering
Stephen Long, Institute for Genomic Biology
Stephen Marshak, School of Earth, Society, Environment
Jesse Ribot, Geography, Geographic Information Systems
Peter Sauer, Electrical & Computer Engineering
Rizwan Uddin, Nuclear, Plasma, Radiological Engineering
Don Wuebbles, Atmospheric Sciences





Our operations

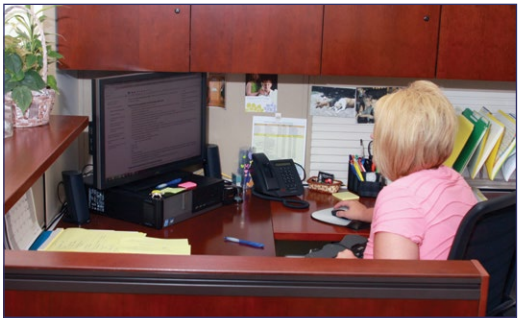
The Institute's total revenue in Fiscal Year 2013-14 was $1.6 million. As you can see in the chart to the left, 93 percent of *i*SEE's spending has gone toward research, campus sustainability, and education and outreach.

Founding benefactor

Work at the Institute is supported by a generous gift from the Alvin H. Baum Family Fund under the administrative leadership of Joel Friedman. The Baum Fund previously supported *i*SEE's predecessors: the Center for a Sustainable Environment, and the Environmental Change Institute.

New spaces

In May 2014, *i*SEE moved into a new home at 1101 W. Peabody, Urbana. The Institute, which has a main office in Suite 350, has room to grow and already boasts a state-of-the-art conference room, collaboration spaces, and individual offices.



New faces: The Institute staff

Evan DeLucia, Director

Jenny Kokini,
Managing Director

Ben McCall,
Associate Director
for Campus Sustainability

Madhu Khanna,
Associate Director
for Education & Outreach

Morgan Johnston,
Associate Director
of Sustainability,
Facilities & Services

Stephanie Lage,
Assistant Director

Tony Mancuso,
Communications
and Public Affairs
Coordinator

Amy Rosenbery,
Office Manager

Nishant Makhijani, Student Intern for Campus Sustain-ability

Olivia Harris, Student Intern for Communi-cations & Marketing

Andrew Walsh, Student Intern for Education & Outreach

Research

The Institute's primary mission is to support "actionable research" — science that progresses toward real-world solutions that can have near-immediate and lasting impact. To achieve this, *i*SEE will deploy Illinois' world-renowned academic strengths and interdisciplinary collaboration under five research themes identified by the Institute's steering committee: Climate Solutions; Energy Transitions; Sustainable Infrastructure; Water and Land Stewardship; and Secure and Sustainable Agriculture.

Call for proposals

To launch its research portfolio, the Institute developed a plan to offer significant internal seed grants. In January 2014, *i*SEE developed its first request for proposals (RFP). Above all, this RFP had two key stipulations:

1) proposals submitted must address a globally significant sustainability challenge in at least one of the Institute's five research themes; and

2) teams should have researchers from multiple disciplines.

From the first RFP, the Institute received 30 preliminary white paper proposals. Thirteen of those groups later sent full proposals for further consideration. On June 25, 2014, *i*SEE announced that more than $940,000 was awarded to three projects representing four of the five research themes.

Research project: Smart Water Disinfection

Civil and Environmental Engineering Professor Benito Mariñas' project, titled "Smart Water Disinfection: A Holistic Approach from Benchside to Marketplace," fits into two of *i*SEE's research themes: Water and Land Stewardship; and Sustainable Infrastructure.

Through this research, Mariñas (pictured at right) and his group will develop new technologies that will afford the basic human right of access to clean water in emerging countries. The central ideas of this research are to advance understanding of pathogen infectivity; develop an innovative sensor to detect infective pathogens; and create sound business strategies to get the disinfection system into local markets.

With equivalent research expenses in excess of $400,000 from *i*SEE over three years, Mariñas' team will develop a pathogen detection and treatment system for infected water.

"Smart disinfection systems with real-time sensors are critical in immediately detecting pathogens and removing contamination threats," Mariñas wrote in his proposal. "Our proposed holistic approach will finally enable truly sustainable solutions to the safe water challenges plaguing 780 million people and resulting in 1.8 million deaths and many millions more cases of chronic malnutrition each year worldwide."

Research project: Woody Polyculture

Crop Sciences Assistant Professor Sarah Taylor Lovell's "Multifunctional Woody Polyculture for Sustainable Food Production" project fits into the *i*SEE research theme of Secure and Sustainable Agriculture.

Lovell (pictured at right) and co-workers will test new agriculture systems that provide abundant, affordable food products while improving the ecology of agricultural landscapes. They will evaluate the viability of layers of tree and hedge crops with perennial yields — instead of annual herbaceous crops like corn and soybeans.

With more than $400,000 in equivalent research funding from *i*SEE over three years, a new research farm with several 1-acre plots will be established to study the transition from conventional agriculture to sustainable agricultural systems based on sound ecological principles. Researchers also will compare the environmental, social and economic impact of perennial vs. annual farming.

Though improvements to our agricultural systems — such as cover crops, precision management and organic production — are being studied, "transformative solutions are needed to overcome critical challenges to the sustainability of food production," Lovell wrote in her proposal. Those challenges include a lack of resilience in normal crops, the loss of soil quantity and quality, the prevalence of inorganic chemicals in freshwater, and deteriorating biodiversity and ecosystem resilience, "all of which are exacerbated by global climate change and growing domestic and global populations in need of a reliable food supply."

Research project: Stored Solar Stoves

Agricultural and Biological Engineering Professor Bruce Elliott-Litchfield's project, titled "Solutions for the Global Cooking Problem: Developing Stored Solar Stoves," fits into *i*SEE's Energy Transitions research theme.

Litchfield (pictured at right) and fellow researchers will create a clean, fuel-free, efficient household cooking system to improve the lives of people in developing nations. They will study the temperatures and physical configurations needed for a stove that can be used at night without burning a fire. The project will also study feasible means of energy concentration and collection for the stove, research preferable energy storage innovations, and establish how best to recover and use the stored energy.

Bolstered by $140,000 in *i*SEE funding over two years, the group will develop prototype cooking systems for field testing.

"Initial work will focus on cooking, and later on space heating, water purification, food preservation, generation of electricity, and other applications," Litchfield wrote in his proposal. Outcomes from the research could "provide the basis for a generic energy solution that can be employed for multiple purposes beyond cooking — a dire need in poverty contexts around the world."

Outreach: Scholars program

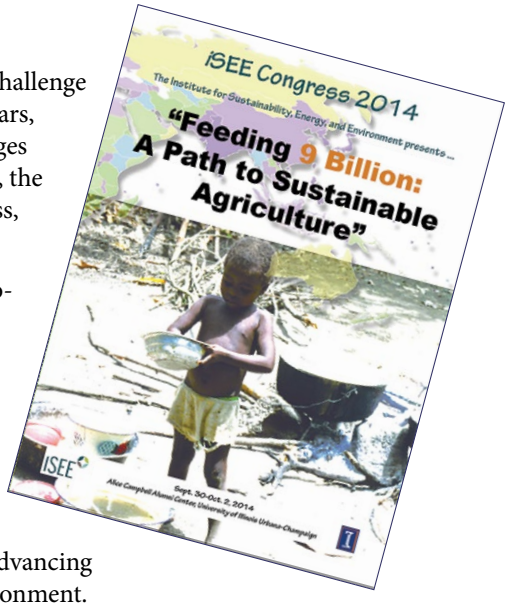
The University of Illinois has hundreds of faculty already working on research that falls under *i*SEE's five major research themes. Because of the diversity of departments and variety of research facilities, however, many are unaware of the work their fellow faculty members are doing. The collaborative research the Institute hopes to fund will never come about if campus researchers remain unaware of possible connections and shared interests.

The Scholars Program was developed to solve this challenge and to foster "uncommon dialogues" among colleagues. In spring and summer 2014, we began compiling a comprehensive list of faculty performing research that could fall under the Institute's themes.

In April 2014, Director Evan DeLucia invited our collected contacts in the water field to a meeting of the minds. At this meeting, attendees discovered some of the common threads underlying everyone's research and made the acquaintance of dozens of fellow experts in the field.

Future scholars meetings are planned for fall 2014.

Outreach: *i*SEE Congress



Each year, *i*SEE will host a major scientific congress to highlight a significant global challenge in sustainability, energy, and environment, and bring together leading international scholars, industry leaders and policy makers to discuss the current state of knowledge, key challenges and a research agenda for the future to address them. From Sept. 30 through Oct. 2, 2014, the University of Illinois Urbana-Champaign campus will be the site of the first *i*SEE Congress, "Feeding 9 Billion: A Path to Sustainable Agriculture."

This conference will bring together globally renowned experts on climate change, ecosystem science, hydrology, food security, technology-enabled agriculture, and socio-economic dimensions of food production. Twenty-two speakers representing 14 universities and organizations will share their knowledge of how current research is addressing the challenge of providing safe, healthy food to a growing human population while maintaining balance with Earth's ecological systems.

The Congress will engage faculty and students across campus in a dialogue on issues of societal importance. It will provide networking opportunities with leading thinkers to catalyze research collaborations and position Illinois as an institution that is advancing and shaping the future research agenda in the areas of sustainability, energy and the environment.

The Congress is *i*SEE's primary outreach event for fall 2014, and it is sponsored in part this year by a generous gift from the Olga G. Nalbandov Lecture Funds at the University of Illinois at Urbana-Champaign. The event will become an annual occurrence with a new global sustainability issue as a focus topic each year.

Education: Campuswide minor in sustainability

A key piece of the Institute's mission is to prepare the next generation of leaders in sustainability. To that end, its first education initiative is the development of a campuswide undergraduate minor in sustainability.

This minor, named the Sustainability, Energy, and Environment (SEE) Fellows Program, will promote systems-level thinking about issues of sustainability. Students will develop an integrative understanding of sustainability and understand the trade-offs, barriers, and implications for sustainable decision making. The minor will replace the existing Environmental Fellows Program and provide a broader opportunity for interdisciplinary education, internships, and capstone research projects in the area of sustainability.

Beginning spring 2014, consultations were held with a group of undergraduate academic advisers to discuss the design of the minor and coursework requirements. Five academic units — Agricultural and Consumer Economics, Civil and Environmental Engineering, Natural Resources and Environmental Sciences, School of Earth, Society and the Environment, and School of Integrative Biology — have agreed to serve as core participants in developing and offering this minor. Further meetings with unit heads and academic advisors are ongoing in preparation of an official proposal submission to the Academic Senate in fall 2014 for approval of this minor.

An early October roundtable discussion is being organized with leading corporate, government agency and NGO employers to identify the skills and training that students need to make a professional contribution to developing a sustainable future for our planet.

The minor will be offered for the first time during the fall 2015 semester.

Campus Sustainability

Campus administration has set challenging goals for increasing energy efficiency, local food purchasing, and recycling. The 2010 Illinois Climate Action Plan (iCAP) provided a roadmap of strategies and initiatives for accomplishing these goals, but now, nearly five years later, we believe it is time for an update.

SWATeams

In collaboration with Facilities & Services, *i*SEE established six Sustainability Working Advisory Teams (SWATeams) consisting of faculty, staff, and students to examine campus progress in six broad themes within the iCAP. Reports of campus progress toward meeting its pre-2015 iCAP targets were completed in April 2014 and presented at an iCAP forum that month. Now, the SWATeams will generate recommended revisions to the iCAP, and these will be reviewed by the iCAP Working Group.

The SWATeams:

- Energy Conservation and Building Standards
- Energy Generation, Purchasing, and Distribution
- Transportation
- Agriculture, Land Use, Food, and Sequestration
- Water and Stormwater
- Purchasing, Waste, and Recycling

A new iCAP will be written by the end of the 2014 calendar year, with adjusted goals and new strategies for accomplishing the next step toward becoming a carbon-neutral campus by 2050.

iCAP Working Group

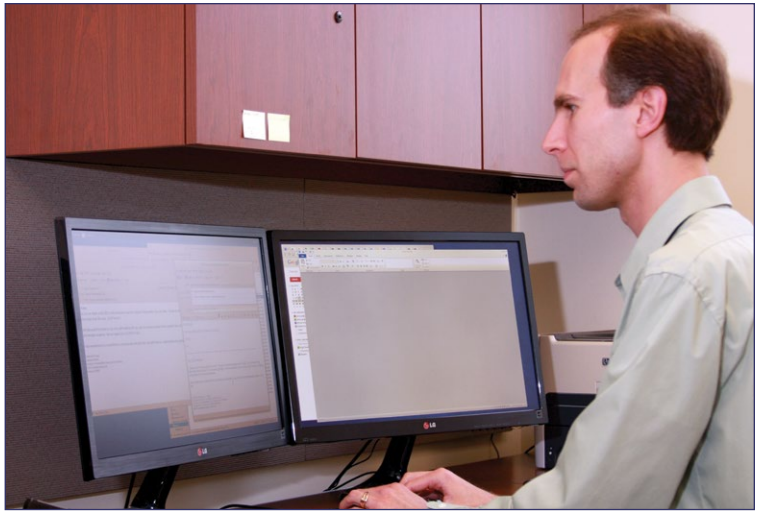
On June 4, 2014, a formal procedure for evaluating, endorsing, and implementing SWATeam recommendations was approved by campus administration. An iCAP Working Group (iWG) — made up of representatives from major stakeholder groups across campus — will review SWATeam recommendations with low- and medium-level financial and policy impact and send them to the affected units.

For improvements with high financial and policy impact, the iWG will review and send further recommendations to the Sustainability Council — a group at the highest level of campus administration — for approval and implementation.

Campus Sustainability: Chevrolet carbon credit purchase

In May 2014, in a deal brokered by *i*SEE, Chevrolet agreed to purchase an estimated 150,000 metric tons of certified carbon credits from the University of Illinois at Urbana-Champaign and retire them on behalf of the environment. The credits, created through dramatic greenhouse gas emission reductions on campus in the past several years, were made possible in large part by efforts from Facilities & Services (F&S) — including the retrocommissioning of more than 50 campus buildings to improve heating and air conditioning systems.

Between the money from Chevrolet and a match provided by campus leadership, the final amount of the sale is likely to be worth more than $1 million (the total number of carbon credits will be determined later in 2014). The funds will be held at the campus level, and *i*SEE will work with F&S to allocate them for future campus projects that will further drive down greenhouse gas emissions.



Campus Sustainability: SSLC

The Student Sustainability Leadership Council (SSLC) is *i*SEE's finger on the pulse of student-led initiatives in sustainability. SSLC — made up of the leaders from numerous campus student organizations focused on sustainability and environment — is a place for student leaders to interact and collaborate. It is also the bridge between *i*SEE and the student body, serving as a two-way conduit of information and concerns about campus sustainability issues.

Our students want a voice in the decisions being made about how their campus reduces its environmental footprint. In the long run, the SSLC will foster deep collaboration between campus leadership and the student body in this arena.

Campus Sustainability: Awards

The Institute for Sustainability, Energy, and Environment and its predecessors have worked with campus administration to champion progress toward a green campus. For its efforts, the Urbana-Champaign campus has received the following awards:

• **Two-time Princeton Review Green Honor Roll member.** The campus is one of 24 institutions of higher learning with a perfect score and the only one in the Big Ten. The Princeton Review evaluates more than 800 schools each year.

• **2013 Gold Level Compact School.** Gov. Pat Quinn and the Green Governments Coordinating Council recognized the campus as a continued top achiever within the Illinois Campus Sustainability Compact program. The U of I began participating in the program at a Gold Level in 2010 and has retained this level with continued progress toward campus sustainability goals.

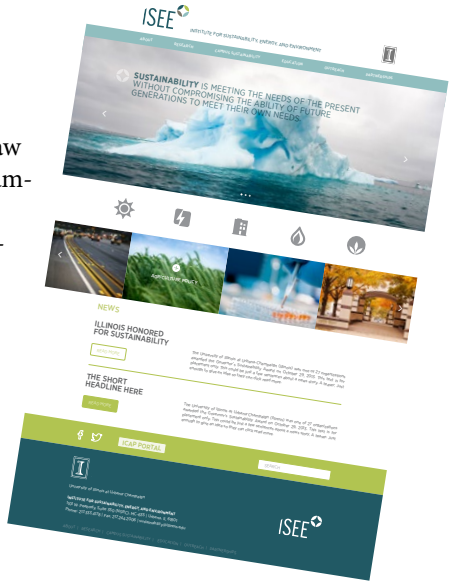
• **Governor's 2013 Sustainability Award.** The U of I campus was one of 27 organizations (and only four educational institutions) to earn this award on Oct. 29, 2013, for a commitment to environmental excellence through outstanding and innovative sustainability practices. Illinois was recognized for its reduction of energy and water consumption as well as for waste diversion.

• **Sierra Club Cool Schools 2013.** Illinois is the No. 1 Big Ten green school and 28th overall out of 162 four-year higher education facilities that applied to the Sierra Club Magazine contest. Campuses completed an extensive questionnaire about their sustainability practices.

• **STARS Gold Level 2013.** The campus earned honors in the Sustainability Tracking, Assessment & Rating System (STARS), the nation's most comprehensive such system. STARS is a self-reporting framework, and institutions are rated Platinum, Gold, Silver, Bronze, or Reporter. To date, no school has earned Platinum.

Marketing

In June and July 2014, the Institute for Sustainability, Energy, and Environment underwent rebranding to solidify its identity and create a strong, consistent image that will make *i*SEE a recognized world leader. The cornerstone of the new look is a revamped website intended to draw greater attention to the research, education, outreach, and campus sustainability work on this campus. A cross-platform, more user-friendly interface will encourage exploration and learning for potential donors, corporate partners, government entities — and of course current and prospective faculty, students, staff and administrators.



News releases generated by *i*SEE have resulted in local TV, radio and newspaper articles, features on the campus homepage and in Inside Illinois — as well as on the Chancellor's Blog. Institute news has been featured in an international bulletin, and a release on the campus carbon credits sale brokered by the Institute was picked up by the Associated Press and appeared in dozens of state newspapers as well as in the Seattle Post-Intelligencer, the San Francisco Chronicle and the Houston Chronicle.

The Institute is active on social media and boasts more than 1,400 followers on its @sustainILLINOIS Twitter account.

Contact us

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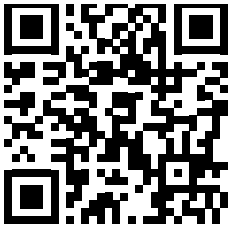

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