July 2016

ILLINOIS

iQ: iSEE Quarterly

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

Coming soon to the Institute ...

The Levenick-Caterpillar Collaboratory

iSEE is planning a state-of-the-art learning and communications space within its home at the National Soybean Research Laboratory on the University of Illinois campus.

The new space is partially funded by Caterpillar, which matched a $500,000 gift from Illinois alumnus Stu Levenick and his wife Nancy to fund the Levenick iSEE Fellows program to support the Institute's research, education, and communications missions.

The Levenick-Caterpillar Collaboratory will be used by:

— Levenick iSEE Research Fellows and Scholars to attain "actionable" research goals — helping solve the world's current and future sustainability-, energy-, and environment-related issues;

— Levenick iSEE Teaching Fellows and Scholars to reach their educational goals in a collaborative environment that enhances the learning experience;

— Sustainability, Energy, and Environment Fellows — those enrolled in the new academic minor through iSEE — to learn and work together in classes and in their capstone research experiences;

— students, faculty, and staff working toward Illinois Climate Action Plan (iCAP) goals to meet and think creatively about keeping the Urbana-Champaign campus on the cutting edge of green campuses worldwide;

— scholars needing a teleconferencing venue that will allow participation in major events the world over; and

— U of I students, faculty, and staff needing a state-of-the-art video, sound, and design studio — an outlet for communicating groundbreaking research and campus sustainability work at Illinois.

For more about the Levenick iSEE Fellows Program and the Levenicks' gift, please visit the iSEE website.

What's inside ...

STUDENT SUSTAINABILITY COMMITTEE
ssc.sustainability.illinois.edu

What's new in research ...

New: Center for Applied Collaboration on Human Environments

In early 2016, the Department of Civil and Environmental Engineering (CEE), College of Engineering (CoE), and iSEE provided seed funding for creation of the Center for Applied Collaboration on Human Environments (CACHE).

At the heart of CACHE's mission is a desire to learn how basic services within a home — energy, sanitation, and drinking water — impact human health and the environment. Research initiatives in three thrust areas build upon one another to shape understanding of emissions at scales as small as one household system and as large as worldwide. By examining the small scale, physical and social scientists can tailor technologies and education strategies to achieve lasting improvements in human environments; and by examining collective knowledge of many small-scale studies, they can create increasingly accurate scenarios for future emissions levels regionally and worldwide.

Led by MacArthur Fellow and Illinois CEE Professor Tami Bond, CACHE integrates initiatives on modeling and sensing, global and regional scenario modeling, and the elucidation of social and technical principles governing interactions between humans and technology. Its ultimate goals are to chart plausible paths toward a better future and to provide tools and understanding that allow people to walk those paths. More on the new Center on the iSEE research webpage.

In the Spotlight: Enrique Daza

As a Ph.D. Candidate in Bioengineering and a Masters of Business Administration (MBA) Student, Enrique Daza blends twin passions for scientific innovation and implementing those innovations to the marketplace.

In Bioengineering Professor Dipanjan Pan's research lab, he is the chief "particle cook" and a small-scale experiment runner for an iSEE-funded project that seeks to improve the efficiency and reduce the toxicity of conventional oil spill treatments with nanoparticle technology.

He sees himself and other researchers as scientific entrepreneurs.

"The definition of an entrepreneur is someone who sees where there is a problem and attempts to address that problem," he said. "In this case, we see that oil spills are absolutely an issue.

"We want to fix the issue of oil spill contamination in our oceans and in our large bodies of water with nanomaterial, which is something that hasn't really been investigated on the mass scale. That's what we're really trying to get at."

Enrique can claim the "Eureka!" moment that solved the first problem while developing the complete Nano-CarboScavenger. When Pan's team decided to try to tackle the oil spill problem, each member went separate ways to test procedures for making a nanoparticle that would work, he said.

Alone late at night in Illinois' Biomedical Research Center at Urbana's Carle Foundation Hospital, he observed a test batch of nanoparticles behaving in a way he hadn't seen before.

"The next day, I showed Dr. Pan, and he was ecstatic," Daza said. "The whole team swung into action with more tests to run and getting other researchers on the phone. All the planning happened in one day.

"It was just a feeling like 'Alright! Let's go, and let's get things done and get it published.' "

The end result of the team's collaboration was a nanoparticle with a carbon core and two molecular oil-trapping shells that is hundreds of times smaller than most human cells. It addresses oil pollution in two ways: trapping refined oils like gasoline between the outer shells and the carbon core; and dispersing heavier, "dirtier" crude oils.

Dispersing is the process of breaking down a large slick of oil into smaller blobs that microorganisms found in large water bodies can digest into non-polluting components. Historically, this process has been accomplished by pouring millions of gallons of a liquid chemical called a dispersant into spill zones (7.5 million liters of liquid dispersant was added to the Gulf of Mexico during the Deepwater Horizon spill). Although dispersants stop the harmful effects of the oil, they are reported to have negative environmental impacts on their own.

That's why Daza is particularly excited about developing a solid dispersant. Unlike a liquid, which becomes part of the water, the nanoparticle power can float on top of the water after dispersing the oil — meaning it can be scooped off the top after use, he said.

"There's no possible way you're going to get every single tiny nanoparticle (back out) in the end," he said. "We designed it that it will be safe after we spread it on to the crude oil.

"Whatever is left over the fish can eat, and they'll be fine."

Read the full profile on Daza on the iSEE website.

More about the Nano-CarboScavenger Project can also be found on the website.

What's new in campus sustainability ...

Biomass Boiler Coming Soon to Energy Farm

An iSEE-led project is now underway to integrate a biomass-fueled heating system into the main greenhouse at the campus Energy Farm.

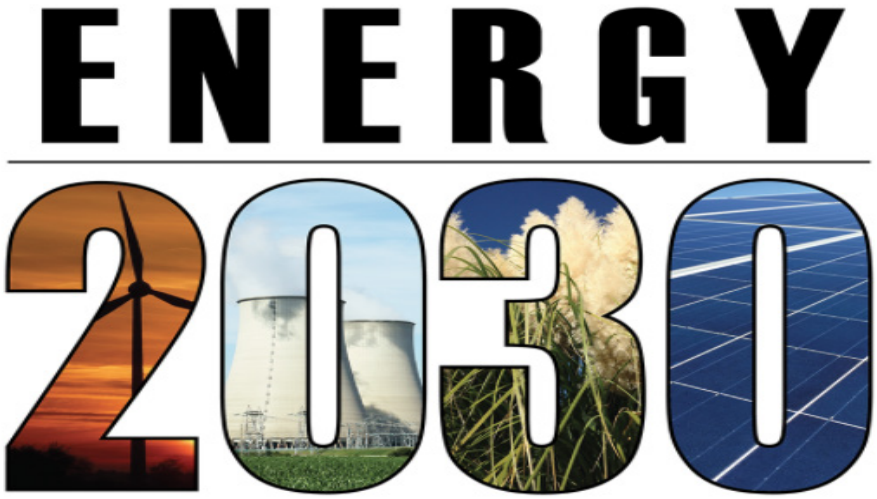
In this greenhouse, researchers study energy crops for tropical climates — a climate that is expensive to recreate using propane in the middle of Illinois' winter months. The new 198 kW boiler will instead burn part of the farm's energy crop harvest to generate hot water, which will be piped through the greenhouse and help maintain the warm conditions needed to conduct research without any net greenhouse gas emissions.

Ben McCall, iSEE's Associate Director for Campus Sustainability, says contractors have already been engaged and are beginning work this summer. The boiler should be fully operational by January.

If all goes smoothly, the Energy Farm may consider expanding the system to serve other greenhouses, and iSEE hopes that this will be a model for future biomass energy options on campus.

The purchase of the boiler and its installation are being supported by the Student Sustainability Committee (SSC), the Illinois Clean Energy Community Foundation (ICECF), the Dudley Smith Initiative, and proceeds from the 2015 campus sale of verified carbon credits to Chevrolet.

What's new in outreach ...



Four Keynote Speakers to Highlight Congress

With a topic as immense and important as energy as the focus for the 2016 Congress, iSEE is expanding its offerings to include four keynotes and seven plenary sessions.

The keynote speakers for the Congress, set for Sept. 12-14 at the Alice Campbell Alumni Center:

• **Steven Koonin**, Director of New York University's Center for Urban Science and Progress and former Under Secretary for Science at the U.S. Department of Energy.

• **KR Sridhar**, Founder, Chairman, and CEO of Bloom Energy, and former Director of the Space Technologies Laboratory at the University of Arizona.

• **Daniel Sperling**, Founding Director of the Institute of Transportation studies at the University of California Davis; and

• **Jonathan Mingle**, an environmental journalist and author of "Fire and Ice: Soot, Solidarity and Survival on the Roof of the World," which tells the story of black carbon pollution and its health and climate impacts through the eyes of residents of the Indian village of Kumik.

View the Congress webpage with a tentative agenda, speaker and session moderator info, and accommodations. CLICK HERE TO REGISTER!

What's new on social media ...

Keep Up to Date with iSEE, I-Bike, Styrecyle, SSC

There's more going on in campus sustainability, education, and research than we can ever fit into a single newsletter or quarterly report.

Follow the Institute and associated organizations online to see some of the amazing things we are accomplishing on this campus!

iSEE
Facebook: iSEEatUofI
Twitter: @sustainILLINOIS
YouTube: bit.ly/iSEEyt
LinkedIn: groups/8519947

Styrecycle
Facebook: Styrecycle

I-Bike
Facebook: I-Bike-University-of-Illinois-Bike-Share-Program

Student Sustainability Committee (SSC)
Facebook: UIUCssc
Twitter: @ssc_uiuc

Ken Butler and his bandmates perform during the April 2016 Sonified Sustainability Festival, which received supporting funds from the Student Sustainability Committee in 2015-16.

Sonified Sustainability Festival photo

SSC's 2015-16 Year in Review: New Projects; Big Year for Student Involvement

The Student Sustainability Committee had a very successful fiscal year, ending the 2015-2016 cycle with over $3,000,000 in requests and $750,000 in new projects funded. A complete summary of these projects may be found on the SSC website.

SSC's successes went far beyond the projects it funded, though. For the first time, the Committee partnered with the first-year seminar course GCL127, "Sustainable Design Across the Disciplines," to make the SSC application process a hands-on exercise for students. SSC also partnered with the residence halls for Sustainability Week and Earth Month, ensuring that dozens of residential floors were educated about campus sustainability and how to live a greener lifestyle.

And the Committee even received regional recognition from WCIA-TV, the Decatur Herald & Review, and Smile Politely for its positive role in supporting campus sustainability.

Funding Application Periods Upcoming!

Do you have an idea to make campus more sustainable? This fall, the Student Sustainability Committee will once again fund sustainable projects submitted by members of the campus community. For more information, including how to apply, please visit SSC's website and click on the "Funding Process" tab.

Several past SSC-funded projects saw successful implementation:

- The Solar Farm, to which SSC contributed more than $1 million, opened in fall 2015 and has already begun contributing clean energy to campus.
- The Sonified Sustainability Festival, the first of its kind at the U of I, reached thousands of students, faculty, staff, and community members with a series of artistic performances.
- And on a potentially lighter note, the SSC-funded sustainable compost toilet at Allerton Park has received national attention and became a destination in its own right.

Most importantly, though, this past year was a banner year for student involvement. SSC saw its best year yet for student-led small project applications, with more than half the approved projects proposed by students. SSC members were a part of several major campus events, including speaking at the grand opening of the Solar Farm and the Earth Day celebration of Illinois' designation as a Tree Campus USA.

As SSC moves forward into the 2016-2017 cycle, its members hope to see even greater successes ahead.