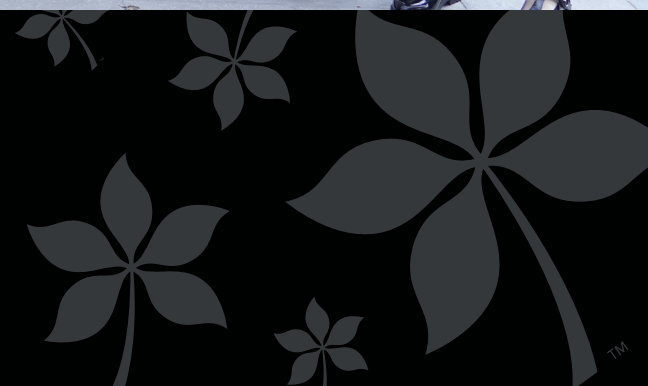


# SUSTAINABILITY INSTITUTE AT OHIO STATE

## 2023 – 2024 Annual Report



Faculty Director: Elena Irwin  
Executive Director: Kate Bartter



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# Message from the Directors



**Kate Bartter**  
Executive Director



**Elena Irwin**  
Faculty Director  
Distinguished Professor of Food, Agricultural, and  
Environmental Sciences in Economics & Sustainability

Momentum is the force that propels the good into the great, and the great into the enduring.

Over the past two years, the Sustainability Institute at Ohio State has been building momentum with countless partners and supporters, achieving new programmatic success.

Throughout this report, successes are documented across Ohio State's academic enterprise: new sustainability innovations and research collaborations, new curricular programs and courses, and new community partners.

Beyond these examples and the underlying data demonstrating wider achievement, there is gaining vision for Ohio State's role in demonstrating institutional leadership.

Under a new initiative titled Advancing Sustainability at Ohio State, faculty, students and staff have provided their aspirations and practical input on how the university can ascend into a leading institution for sustainability research, education, and community engagement.

This effort led off with a focus on education and workforce development, building upon the strong curriculum-based work that the Sustainability Education and Learning Committee had already invested in over the previous two years.

Informed by internal and external sustainability experts and practitioners, current and former students, teaching faculty and others, an expanded vision emerged for Ohio State, charting a course to establish itself as distinct among the nation's leaders in sustainability education.

Soon after, similar efforts focused on sustainability research and community engagement were underway and the many individuals involved in the process were working together to hone a new desired future condition for sustainability work at Ohio State. Those efforts will conclude over the next fiscal year, culminating in a combined integrated vision of actions to leverage the best of what Ohio State already does and expand upon what it could do to help make our communities, our economies, and our planet more resilient and sustainable.

Regardless of what challenges lay ahead, we are proud of what we have collectively accomplished so far with so many, and are excited about the direction all that momentum is propelling us towards into the future.

Thank you for the work you do, and we look forward to continuing this work with you.

# Our Mission

The Sustainability Institute integrates, supports and leads sustainability across the university enterprise in ways that:

**Promote** sustainability and resilience teaching and learning that are integrated across colleges and inclusive of various disciplines and ideas.

**Catalyze** interdisciplinary research that drives discovery and innovations in sustainable and resilient systems, technologies, policies and actions.

**Engage** public and private sector partners in Ohio, the nation and around the world to develop and apply sustainable solutions that improve well-being.

**Integrate** sustainability scholarship with campus activities, including opportunities for students from a variety of disciplines to engage in research and experiential learning using the campus as a living laboratory and test bed.

**Provide** a competitive advantage in attracting exceptional new talent, students, partnerships and resource investments to the university.

## Building a more sustainable and resilient future for all



## SI GOAL 1:

### Establish Ohio State as a leading public institution of sustainability research and applications.

The Sustainability Institute (SI) grew its affiliated faculty community to 338 through FY24, representing 13 different colleges and four campuses, demonstrating broad interest in sustainability research across disciplines.

These affiliated faculty achieved 433 externally funded sustainability research proposal awards across FY23 and FY24, totaling over \$247 million in funding.

Through a variety of ways, SI directly supported the development of many of those proposals, including writing portions of the grant proposals, conducting broader impacts consultations, recruiting research partners, connecting researchers to external resources, and even helping the State of Ohio's Department of Development initiate a research RFP that led to two separate successful funding awards to university faculty.

While there are many examples of SI's support for advancing sustainability research funding proposals, some highlights include:

#### **A moonshot moment for the Great Lakes**

Leveraging an SI Seed Grant to build a multi-university and external partner research team collaboration and holistic research concept, John Lenhart, civil, environmental and geodetic engineering, is now leading Ohio State's participation in a \$160 million NSF Regional Innovation Engine to remove contaminants from the Great Lakes and repurpose them into beneficial uses.

#### **FLEETS for All for equitable infrastructure transitions**

To mitigate climate change, many communities are working to transition their transportation and energy systems to renewable energy sources. However, some communities often encounter barriers when shifting to newer, electrified energy and transportation systems. Jeff Bielicki, civil, environmental and geodetic engineering and public affairs, director of the EmPOWERment PhD training program, and SI faculty research lead for sustainable energy, is the principal investigator of the Facilitating Local Electrified Energy and Transportation Services for All (FLEETS for All) project, which received \$1.12 million from the U.S. Environmental Protection Agency to determine how to alleviate some of these challenges and improve the quality of life for residents of these communities. SI staff worked to connect Bielicki with external resources to cultivate project partners on the proposal.

#### **Climate-ready workforce development**

Lorrayne Miralha, food, agricultural, and environmental sciences, won a \$4.9 million grant through the U.S. Department of Commerce and NOAA to train Ohio's water industry workforce in managing climate change impacts on Lake Erie's coastal community water resources and infrastructure. SI staff and faculty leads provided proposal development support, helping to improve the proposal prior to submission.

To further help support sustainability research during this same time frame, SI awarded 45 research grants to faculty, through a combination of seed grants, proposal development grants, and targeted investments in key topics. These internal grant awards totaled \$833,993 in value. These grants have catalyzed research in areas such as climate resiliency, water quality improvement, sustainable packaging and manufacturing materials, and electric vehicle challenges including equitable adoption for all income levels and beneficial battery recycling, among other research topics.

Some examples include:

### **Development of low-cost direct recycling process of lithium-ion battery cathodes**

Led by Jung-Hyun Kim, mechanical and aerospace engineering, this project aims to upcycle aged electric vehicle cathode materials into advanced lithium and manganese cathodes that have higher energy with lower cost.

### **Remediation of acid mine drainage using pervious concrete**

Lisa Burris, civil environmental and geodetic engineering, is leading a research team to expand successful laboratory testing of pervious concrete's ability to correct acid mine drainage (AMD) pollution. The previous testing demonstrated the ability to remove >99% of several dissolved heavy metals from AMD. The funded research will take the project into the field, using an in-stream filter to assess scalability of the technology.

### **Development of biobased packaging film made from food waste**

Melvin Pascall, food science and technology, is leading a research team exploring the development of a biobased packaging film made from citrus peels and containing anaerobic non-pathogenic *Clostridium acetobutylicum* spores designed to speed the material's degradation in landfills.

- \$247.3 M externally funded research awards to SI affiliated faculty
- 338 SI affiliated faculty and researchers
- 45 research grants totaling \$834,000 awarded by SI to university faculty and researchers



Shang Zhai, mechanical and aerospace engineering and earth sciences, is using an SI seed grant to explore a process to sequester carbon dioxide and co-produce high purity silica and clean hydrogen from iron and steel slags and their associated waste heat. Image: Adobe Stock.



## SI GOAL 2:

### Educate and empower Ohio State students to become leaders, professionals and engaged citizens.

At Ohio State, classroom teaching and extracurricular engagement are both essential to enhance the student sustainability experience.

#### Advancing Sustainability Education and Workforce Development

In January 2023, The Ohio State University launched an initiative to develop a new vision for advancing sustainability education, research and community engagement throughout the university's academic enterprise. This effort began by focusing on sustainability education and workforce development, involving 26 faculty members from across the university who collected and reviewed over 31,500 data points through surveys and interviews to develop a [visioning paper](#) in June 2023. The visioning paper outlines a suite of recommendations on how the university can distinguish itself among the nation's leaders in sustainability education by 2040, through a portfolio of marquee programs and learning opportunities that enhance and expand existing offerings.

#### Curriculum Support

The Sustainability Education and Learning Committee (SELC) leadership team created three subcommittees to implement the work outlined in the sustainability education and workforce development visioning process. These subcommittees launched in FY24, engage faculty from across the university, and cover the following topics:

- Undergraduate sustainability education, led by Dr. Jeff Sharp, School of Environment and Natural Resources
- Graduate and professional sustainability education, led by Dr. Michael Bisesi, College of Public Health

- Pedagogy, led by Dr. Maria Conroy, City and Regional Planning

SELC outlined initial goals and work for each subcommittee to help with creating new master's level curricula, build new strategies for recruitment and yield in sustainability programs at the undergraduate level, and to create a faculty sustainability learning community in partnership with the Drake Institute on Teaching and Learning.

Through SELC, facilitated by SI, funding support was provided for the development of a new sustainability academic program and two GE sustainability theme courses during FY23 and FY24. This included course revisions to incorporate sustainability content into FRIT 3061: Mediterranean Food Cultures and the development of a new course



With an SI Student Grant award, SUSTAINS member Treg Sibert launched the Container Gardens at OSU, which aims to promote urban agricultural education and donate produce to communities in need. During the pilot phase, two gardens were installed on the north side of Ohio State's Columbus campus, with each garden hosting 15 distinct species to produce nearly 40 pounds of healthy food.

titled: Sustainability and Environment in Middle Eastern Literature and Film within the Department of Near Eastern and South Asian Languages and Cultures (NESA). A certificate program in Climate Change and Environmental Justice is also currently under development via faculty leads from Social Work and English.

### **SUSTAINS Living Learning Community**

In partnership with the Office of Student Life, SI leads the SUSTAINS Living Learning Community, a cohort of sustainability-minded undergraduate students pursuing a variety of degrees across different disciplines that live in community on the Columbus campus with dedicated sustainability coursework, project development, and community service, and professional development event expectations.

In addition to developing the SUSTAINS coursework, during FY23 and FY24, SI supported SUSTAINS through the establishment of seven campus sustainability projects, 36 campus sustainability events, and 31 community service and professional development events. Notably, SI coordinated the annual SUSTAINS professional development trip, going to Chicago in FY23 and Washington, D.C. in FY24. During these trips, students network with private companies, non-profit organizations, and government agencies to explore various career paths in the environmental and sustainability field. Highlights from the trips included meetings with the World Wildlife Fund, Electrification Coalition, Plant Chicago and the Midwest Energy Efficiency Alliance.

### **SI Student Grant**

The SI Student Grant Program provides Ohio State students of any level and any discipline opportunities to lead and implement a campus sustainability project or advance their sustainability research project with up to \$5,000 in funding. During FY23 and FY24, SI awarded funding to 21 proposals, totaling over \$80,000.

Those awards included SI's support for Sherifat Alabi, an agricultural communication, education, and leadership doctoral student, to elevate the voices

of small-scale regenerative farmers in Ohio. With the SI Student Grant, Alabi created a series of bi-weekly podcasts titled "Regenerative Champions" to highlight the stories and experiences of BIPOC farmers implementing sustainable agricultural practices.

Abigail Flamm, a civil and environmental engineering master's student, used an SI Student Grant to research treatment for arsenic contamination of private wells in Licking County, Ohio. Flamm's work employed socio-technological evaluation to deploy a community education campaign to bring awareness to a point-of-use arsenic filtering tool and to test the effectiveness and barriers to wider public adoption of filtering tools.

### **Co-Curricular Engagement**

In FY23 and FY24, SI facilitated 70 student engagement events, one of which was the Midwest Climate Summit.

With the support of Bloomberg Philanthropies' American Cities Climate Challenge program, Ohio State and Washington University in St. Louis founded the Midwest Climate Summit in 2019. The Summit is now an annual event led by the Midwest Climate Collaborative, an umbrella organization which has grown to include over 75 members seeking to develop climate solutions throughout the Midwest.

SI has enabled Ohio State student participation in the Summit since its inception, including opportunities to serve on the event's planning committee, conduct program presentations, and even win awards in the event's student contests. This included SI's sponsorship of three Ohio State students to attend and present at the 2024 Midwest Climate Summit in Indianapolis, engaging in topics such as local sustainability initiatives and climate communication.

Also in FY24, SI Core Faculty member Bart Elmore and SI Affiliated Faculty member Nick Breyfogle pioneered Ohio State's first study abroad program for the annual United Nations Climate Summit (COP). Their first cohort of 10

undergraduate students attended COP28 in Dubai, United Arab Emirates, observing and engaging in the international negotiations. The students also connected with government delegates, public officials, corporate and non-profit leaders, and cultural, environmental, and educational organizations from around the world. SI helped arrange a gathering for the program with Columbus Mayor Andrew Ginther, who was representing the U.S. Conference of Mayors (USCM) at the COP. In turn, Mayor Ginther and the USCM helped the students obtain additional Blue Zone passes, enabling greater access to the COP proceedings.

- 32 Sustainability Education and Learning Committee and Subcommittee faculty members
- 70 student engagement events facilitated or co-facilitated by SI
- 21 student sustainability grants awarded



## SI GOAL 3:

### Accelerate campus sustainability progress and living lab opportunities.

#### Sustainable Operations

SI helped the university further its resource stewardship goals through private sector collaborations and campus enhancements. One example of this work was funding SI provided to the Department of Athletics for the installation of an innovative sustainable groundwater harvesting hub system at the Covelli Center. This system will collect groundwater infiltration for reuse within the center's cooling systems to enhance efficiency and reduce potable water demand. Overall, the system will be able to save 5.2 million gallons of potable water per year for current and future cooling demands in the Covelli Center and surrounding facilities. If successful, the university will consider installing similar systems elsewhere on campus to scale the water savings.

SI also granted Dining Services \$43,000 to pilot and run its ReusePass program, where dining customers reuse to-go meal containers from Columbus campus Traditions locations. Through the 2023-2024 Academic Year, the program had a 98.58% container return rate, saving over 250,000 single-use, disposable containers from the landfill and over \$42,000 in packaging costs. Combined, this saved over 25,000 pounds of waste from the landfill. The success of this program has made it an integral operation of Dining Services today and serves as a model that other colleges and universities are now emulating.

#### Campus as Living Lab

SI promotes living lab opportunities to help students engage with their environments, provide researchers with advanced data and state-of-the-art equipment, and advance sustainable operations throughout the university. In FY23 and FY24, SI facilitated or

supported 16 living lab projects and seven courses with living labs and project-learning opportunities, while establishing 14 community-based experiential learning projects.

In FY24, SI supported SI Core Faculty Ryan Winston and his team of graduate researchers with \$50,000 to work with Advanced Drainage Systems (ADS) and CampusParc to install three low-impact development (LID) units to treat water drainage from Columbus campus parking lots before entering the stormwater system. SI cultivated additional technical and financial support for this living lab project from both ADS and CampusParc. The research project will enable at least one Environmental Science graduate degree, and potentially more.

Jennings Hall is home to one of Ohio State's existing living labs but is in need of renovation to improve functionality and usability. In FY24, the Department



SI provided a \$155,000 grant to Ohio State's Lima Campus to expand its regenerative agriculture farm. Led by Vinayak Shedekar, food, agricultural and biological engineering, the farm is an active research lab and an educational demonstration site for the regional agricultural community.

of Evolution, Ecology and Organismal Biology received funding support from SI to expand the living lab opportunities within the Jennings Hall courtyard, which includes upgrading a self-watering system that reuses stormwater for plantings, expands shading for more extensive use as an outdoor classroom, and adds signage for plant identification. These enhancements aim to promote sustainable water practices, expand campus green infrastructure, and foster educational opportunities.

- 26 living lab learning and research projects supported or facilitated by SI
- 7 classes and programs with living lab component supported or facilitated by SI
- 14 community-based experiential learning projects supported or facilitated by SI



## SI GOAL 4:

### Grow the resources available to support sustainability and resilience research, teaching, outreach and engagement.

SI collaborates with public, private, and nonprofit sector entities to accelerate research, strengthen educational and operational resources, and engage Ohio State's students, faculty, and staff with real-world sustainability challenges.

This work includes engaging leaders within the business community to help achieve shared sustainability goals through university research, student talent development and opportunities to use the campus as a living laboratory as a test bed for new approaches.

As one example, IGS Energy began collaborating with Ohio State through SI in 2021. By 2024, three separate research projects were underway, centered on the joint priority focus areas of electrification, carbon management, residential solar and batteries, and understanding consumer demand for renewable energy.

These research projects include modeling future supply and pricing of voluntary market carbon offsets, understanding motivators for residential and community solar purchase decisions, and studying how behind-the-meter distributed solar contributes to sustainable energy use. Faculty and graduate students within the College of Food, Agricultural and Environmental Sciences, School of Environment and Natural Resources, and John Glenn College of Public Affairs are leading these research efforts.

In a broader sustainability engagement effort, in FY23, the U.S. Environmental Protection Agency awarded the City of Columbus and Mid-Ohio Regional Planning Commission (MORPC) a climate pollution reduction planning grant to develop a strategy to address climate emissions across 10 central Ohio counties. SI worked with the city and MORPC to involve Dr. Darryl Hood with the

College of Public Health as a subgrantee to lead the planning grant's required engagement of low income and disadvantaged communities throughout the region. Dr. Hood and his students have conducted numerous community activities to ensure the plan's implementation actions reflect local ambitions and concerns from residents within these impacted neighborhoods.

- \$958,650 raised from external sources for sustainability teaching and learning
- \$270,900 raised from external sources for sustainable campus operations



In addition to supporting campus living labs, Advanced Drainage Systems (ADS) has helped Ohio State improve its campus waste landfill diversion rate, which now stands at 41%, through support for the university's Recycle Right campaign. With funding support from ADS, Ohio State's Zero Waste team analyzed waste streams from 15 campus buildings and student awareness of proper recycling and disposal practices, prompting the installation of 100 backboard signs for recycling and waste bins to provide increased awareness and education of proper recycling behavior.

## SI GOAL 5:

### Catalyze a culture of sustainability.

Sustainability at Ohio State is not only channeled through the university's research, teaching and operational activities, but also through the university's culture, campus and community engagement. As one of the most comprehensive research institutions in the world, Ohio State is in a pivotal position to innovate new solutions to sustainability challenges and disseminate knowledge to the broader public and practitioner communities in fulfillment of the university's land grant mission.

To further immerse a broader audience in sustainability discussions and learning, SI teamed with units from across the university and external partners to offer programming geared towards building community and more inclusive networks.

Collaborating with the Translational Data Analytics Institute to host the Interdisciplinary Research Fall Forum in FY23 represented one of these moments. This forum featured faculty, student and private sector speakers and facilitated dialogue on topics such as water and land systems modeling, issues in energy systems, and opportunities for data science to support climate solutions.

Inviting a wider community into Ohio State's sustainability efforts and helping to better understand the sustainability needs of surrounding communities are key reasons SI serves as a connector to local and regional networks, including SI staff who serve on the City of Columbus' Sustainable Columbus Committee, MORPC's Sustainability Advisory Committee and Smart Columbus' Sustainability Leaders Group. In FY24, SI organized a series of discussions with these entities to facilitate community input for Ohio State's Environmental History Initiative study abroad program to the annual United Nations Climate Change Conference, also known as the Conference of the Parties (COP).

To increase awareness of sustainability news and initiatives occurring across the university, SI actively runs daily programming and sustainability communications pieces. In FY23 and FY24, SI crafted 36 original stories on sustainability research and initiatives happening at Ohio State, increased its social media following by 8.5% from FY22, and delivered 41 bi-monthly newsletters for the university's internal community and quarterly newsletters for audiences external to the university.

- 13 Ohio State colleges that have faculty affiliated with SI
- 21 campus units awarded an Ohio State Sustainability Fund grant
- Supported 13 sustainability events



Ohio State's Environmental History Initiative faculty members Nick Breyfogle and Bart Elmore collected feedback on COP29 priorities from central Ohio businesses, non-profit organizations, and local government agencies during engagement sessions SI organized on and off campus.

## SI Core Faculty

**Yongyang Cai**, Agricultural, Environmental, and Development Economics

**Chen Chen**, Integrated Systems Engineering

**Zhenhua Chen**, City and Regional Planning

**Jordan Clark**, Civil, Environmental, and Geodetic Engineering, *Joint Appointment with:* Food, Agricultural, and Biological Engineering

**Karen Dannemiller**, Civil, Environmental, and Geodetic Engineering, *Joint Appointment with:* Environmental Health Sciences

**Scott Demyan**, School of Environment and Natural Resources

**Grant Donnelly**, Marketing and Logistics

**Sean Downey**, Anthropology

**Jennifer Eaglin**, History

**Bartow Elmore**, History

**Jonathan Fresnedo-Ramirez**, Horticulture and Crop Science

**Daniel Gingerich**, Civil, Environmental, and Geodetic Engineering, *Joint Appointment with:* Integrated Systems Engineering

**Matthew Hamilton**, School of Environment and Natural Resources

**John Horack**, Mechanical and Aerospace Engineering, *Joint Appointment with:* Public Affairs

**Huyen (TK) Le**, Geography

**Eden Lin**, Philosophy

**Yanlan Liu**, School of Earth Sciences, *Joint Appointment with:* School of Environment and Natural Resources

**Daniela Miteva**, Agricultural, Environmental, and Development Economics

**Joel Paulson**, Chemical and Biomolecular Engineering

**Judit Puskas**, Food, Agricultural and Biological Engineering

**Christopher Rea**, Public Affairs

**Christo Sevov**, Chemistry and Biochemistry

**Nicole Sintov**, School of Environment and Natural Resources

**Xiaoguang (William) Wang**, Chemical and Biomolecular Engineering

**Mark Weir**, Environmental Health Sciences

**Ryan Winston**, Food, Agricultural and Biological Engineering, *Joint Appointment with:* Civil, Environmental, and Geodetic Engineering

## SI Faculty Advisory Board

**Dave Cole**, School of Earth Sciences

**Grant Donnelly**, Marketing and Logistics

**Bartow Elmore**, History

**Darryl Hood**, Environmental Health Sciences

**John Horack**, Mechanical and Aerospace Engineering, *Joint Appointment with:* Public Affairs

**Ian Howat**, School of Earth Sciences

**Allison MacKay**, Civil, Environmental and Geodetic Engineering

**Lauren Pintor**, School of Environment and Natural Resources

**Alan Randall**, Agricultural, Environmental and Development Economics

**Piers Turner**, Philosophy

# SI Staff Members

**Elena Irwin**, Faculty Director, Distinguished Professor of Food, Agricultural and Environmental Sciences in Economics & Sustainability

**Kate Bartter**, Executive Director

**Kathy Jackson**, Program Assistant

**Gina Jaquet**, Director, Sustainability Education and Learning

**Josh Knights**, Director of Partnerships

**Kim McIlwaine**, Executive Assistant

**Courtney Price**, Research Development Specialist

**Liz Quigley**, Co-Curricular and Community Initiatives Program Manager

**Mike Shelton**, Associate Director

**Katie Zimmerman**, EmPOWERment Program Manager

**Yixuan Wang**, Graduate Research Associate

**Claire Huffman**, Teaching and Learning Student Intern

**Reily Jacobs Bell**, Administrative Student Assistant & Communications Intern

**Ananya Muddappa**, Graphic Design Student Assistant

Special thanks to Christine Andreeva, Student Communications Assistant, for the writing and development of this Annual Report, and to Ananya Muddappa, Graphic Design Student Assistant, for the design and layout of this Annual Report.





**THE OHIO STATE  
UNIVERSITY**

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**The Sustainability Institute at Ohio State**  
174 W. 18th Avenue, Suite 3018  
Columbus, OH 43210

si.osu.edu  
@OhioStSustain

