OHIO STATE SUSTAINABILITY ACHIEVEMENTS 2020–2021

A global pandemic and a closed campus created unique challenges and opportunities for sustainability actions at Ohio State.







Sustainability at Ohio State

Ohio State is a recognized leader in developing durable solutions to the pressing challenges of sustainability and in evolving a culture of sustainability through collaborative teaching, pioneering research, comprehensive outreach, and innovative operations, practices and policies.

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INTRODUCTION

Ohio State Hosts UK Diplomats for Climate Discussion

Representatives of local government, businesses, nonprofit organizations and Ohio State gathered on June 2, 2021, to share climate successes and insights with United Kingdom diplomatic leaders as they prepared to host the U.N. Climate Change Conference, known as COP26, in November. As part of the forum, President Kristina M. Johnson emphasized the importance of collective action among local, state, national and global partners — and said addressing climate change aligns with Ohio State's land-grant mission to uplift communities. Read more



Ohio State President Kristina M. Johnson and Alan Gogbashian, Her Majesty's Consul General for Chicago, led a discussion about climate change solutions in the central Ohio community.





Ohio State, IGS Energy Launch Public-Private Initiative on Sustainable Energy

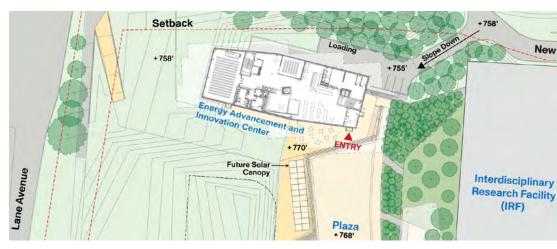
The Sustainability Institute at Ohio State announced a new collaboration with IGS Energy to support research, student engagement and other university programs promoting sustainable energy. The initiative reflects the urgency of transitioning to low-carbon options for energy to address climate change. The company will invest \$1 million over five years in sustainable energy research and student learning with an aim of developing new innovations and emerging leaders to facilitate this transition. Read more



IGS Solar rooftop site in Maryland and New Jersey

Energy Advancement and Innovation Center Underway

The Ohio State University Board of Trustees approved construction of the Energy Advancement and Innovation Center located within the Innovation District. The center will focus on finding innovative solutions for energy reduction and allow researchers to develop, demonstrate and deploy innovations in sustainable building design and performance. Construction is scheduled for completion in 2023. Read more



Energy Advancement and Innovation Center site plan



EDUCATION AND LEARNING

Support for Sustainability Curriculum Development

The Sustainability Education and Learning Committee, administered by the Sustainability Institute, includes faculty from seven different colleges who reviewed submissions for sustainability-related curriculum development. This past year, the Sustainability Institute provided support and funding for six proposals for sustainability-related minors, majors and certificate programs that are now under development.



SUSTAINS Learning Community Continues Efforts

The 2020-2021 class of SUSTAINS, with students representing six colleges, completed over a dozen events and led five unique sustainability projects. Despite the challenges of adapting programming to a mostly virtual format, SUSTAINS students explored a variety of topics while having a tangible impact on campus sustainability. Through their projects, students diverted plastic bags from the landfill, led a residential composting program, started a clothing thrift swap, grew plants in an indoor garden, and developed plans for a pollinator garden site on campus.



Students in the SUSTAINS Learning Community help with the Ohio State Student Farm's harvest. The Student Farm is one of the many ways students work to make our campus more sustainable and resilient.



Student's Project Garners 2021 President's Prize

Dominique Hadad was named one of two 2021 Ohio State President's Prize winners for her project, "Green Scope Consulting," a sustainability-focused consultation program for food-related businesses in the Columbus area. Her project was selected for its potential to make a meaningful impact on society and to further the university's mission of addressing some of the world's most important and pressing challenges.

Hadad graduated in June 2021 with a degree in industrial and systems engineering. Green Scope Consulting will use predictive analytics to help prevent unnecessary waste, leverage community resources to rescue waste and implement innovative strategies to compost necessary waste — all in an effort to cut costs for the business and propel the goals of the community. Read more

Student Entrepreneurs Share Portable Battery Invention

Four entrepreneurial Ohio State students developed a battery pack, delivery system and related phone app to replace emissions-heavy gas generators as a portable power source, and they've attracted investors to make the project a viable business called Electrion. The team (pictured, from left) includes Anita Nti, computer science; Jacob Buaful, computer science; Jacob's brother, Caleb Buaful, industrial and systems engineering; and Danny Freudiger, a mechanical engineering doctoral student. Read more



Midwest Climate Summit 'Climate Stories' Competition Yields Ohio State Winners

Five Ohio State students took honors for their artistic interpretations of climate change impacts in the Midwest Climate Summit "Climate Stories" competition. Students from 15 universities competed in four categories: visual arts, film/photography, written word and performing arts. The Midwest Climate Summit, with support from Bloomberg Philanthropies, brought together 20 leading Midwestern higher education institutions, nonprofits, local governments and businesses partnering to develop a coordinated response to the climate crisis. Read more





Undergraduate student Cindy Gail Kao's project, "The Wisdom of Trees," won first place in the visual arts category of the Midwest Climate Summit Climate Stories competition.



RESEARCH AND INNOVATION

Ohio State Leads Study to Understand Climate Change and Ecosystems

Ohio State is one of 14 universities from around the globe that have collectively been awarded \$12.5 million from the National Science Foundation to launch a new Biology Integration Institute, called EMERGE, that will focus on better understanding ecosystem and climate interactions and how they can alter everything from the landscape to greenhouse gases. Virginia Rich, microbiology, is the primary investigator for EMERGE, an ambitious five-year project that will concentrate on discovering how these processes, which sustain life and enable biological innovation, operate and interact within and between each other under dynamically changing conditions. The result will be a new "genes-to-ecosystems-to-genes" framework to create models that could help predict ecosystem response to change. Read more



Virginia Rich stands with her research gear at Stordalen Mire, a long-studied peatland in northern Sweden where permafrost thaw drives changes in the landscape, plants and microbes





University Leads Columbus Mobility, Smart Cities Research

In 2017, Columbus was declared the winner of the U.S. Department of Transportation Smart Cities Challenge. In 2021, as the program reaches its end, several of the Smart Columbus research projects directly supported by Ohio State have reached their conclusions. As the Smart Columbus lead research partner, Ohio State put financial and intellectual capital behind the program. Projects included research on autonomous vehicles, data privacy, trip planning and prenatal trip assistance:

- University researchers helped the testing and development of an autonomous shuttle in the Linden area.
- Ohio State researchers partnered with COTA to help people with cognitive disabilities and older adults use the Wayfinder App, a highly detailed, turn-by-turn navigation app specially built for people with cognitive disabilities.
- Investigators at Ohio State's Wexner Medical Center partnered with Smart Columbus to learn how to best provide pregnancy-related medical transportation assistance.
- Ohio State students engaged in Smart Columbus through multiple capstone courses.

Read more

Smart Circuit shuttle





Federal Grants Support Sustainability Research in Chemical Manufacturing, Plastics

Two research groups in the William G. Lowrie Department of Chemical and Biomolecular Engineering received funding from the highly competitive National Science Foundation's Emerging Frontiers in Research and Innovation program. Only 15 proposals were funded nationwide. Teams led by Liang-Shih Fan and Bhavik Bakshi each received \$2 million in funding. Fan will develop a small-scale modular chemical processing system to convert stranded natural gas and carbon dioxide into value-added liquid fuel products. Bakshi's multidisciplinary team will develop methods and tools for assessment, design and innovation toward sustainable and circular engineering for the elimination of end-of-life plastics. Read more

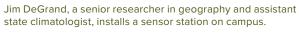
Sevov Receives NIH Funding

Christo Sevoy, chemistry and biochemistry, received \$1.8 million from the National Institutes of Health to further research on developing new synthetic methods to prepare pharmaceutically relevant compounds using electricity. The award will support his work to replace dangerous, expensive or harmful reagents with electrical energy, reducing the costs and hazards associated with large-scale production of medicinal compounds. Read more

Understanding the Urban Heat Island Effect on Ohio State's Campus

In partnership with the Office of Planning, Architecture and Real Estate, students and researchers within the Department of Geography and Byrd Polar and Climate Research Center began a study on what the urban heat island effect means for Ohio State. By classifying climate zones at the Columbus campus and installing a sensor network to monitor and measure the heat island effect, the team can explore ways to reduce its impact. Data related to the urban heat island effect will feed into metrics in Ohio State's unique Ecosystem Services Index, which defines categories for campus improvement toward the goal of increasing benefits from the campus ecosystem. Read more

state climatologist, installs a sensor station on campus.



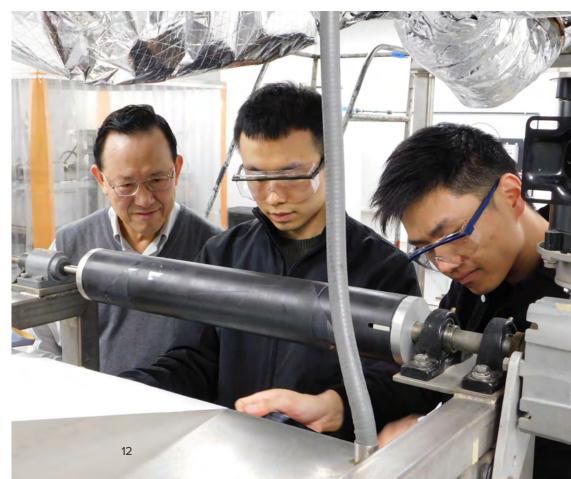


Carbon Capturing Membrane Research Moves Forward

Professor Winston Ho and Research Scientist Yang Han received \$4 million in U.S. Department of Energy National Energy Technology Laboratory funding to expand Ho's transformational carbon dioxide capturing process beyond the lab toward commercialization. Ho, chemical and biomolecular engineering and materials science and

engineering, has worked for more than 20 years to develop methods to reduce fossil fuel-generated pollution. This work involves developing a membrane that can cost-effectively capture 90% of the CO_2 emitted from coal-fired power plants. Read more

Winston Ho, graduate student Kai Chen, and Research Scientist Yang Han ('18 PhD) adjust the membrane substrate on Ho's membrane-manufacturing equipment.



Database Shows Arctic Animals Changing Behavior in Face of Climate Change

Three decades of data on animal migration and movements in the Arctic, tracked through a massive database developed by environmental engineers, shows that animals in one of Earth's coldest regions are shifting their behaviors because of climate change. Gil Bohrer, civil, environmental and geodetic engineering, developed the database and co-authored an article about it in the journal "Science." It includes more than 200 research projects from ecologists around the world tracking the movements of more than 8,000 marine and land animals from 1991 to today. Read more

An arctic fox tracked with a satellite collar carries a goose egg on Bylot Island, Nunavut.



REMADE Institute Funds Engineering Researchers

Engineering Professors Bhavik Bakshi, Jose Castro and Alan Luo received a combined \$1.9 million in research support from the REMADE Institute, a public-private partnership established by the U.S. Department of Energy. REMADE is focused on the nation's transition to a "circular economy," where Americans can fundamentally alter how we consume materials, design and use products, and preserve and extend the life of what has already been made. Bakshi and Castro will develop data and models for recycling, reusing or replacing the current nylon-based barrier film used in sheet molding composites, commonly used in automotive parts, consumer goods and electronic devices. Luo's team aims to demonstrate 100% use of recycled aluminum in die casting. Read more

Sloan Foundation Supports Agriculture, Geothermal Energy Projects

Ohio State faculty and researchers received funding from the Alfred P. Sloan Foundation to support sustainability research. Scott Demyan, environment and natural resources; Laura Lindsey, horticulture and crop science; and Klaus Lorenz, environment and natural resources, are among leaders of a team that received a \$1.5 million grant to develop and evaluate pathways to net-zero emission agriculture and cropping systems. Jeffrey Bielicki, civil, environmental and geodetic engineering and public affairs, and collaborators received a \$613,144 grant for a geothermal energy research project. Read more

Research Center Receives Funding for Complex Materials Discovery

The National Science Foundation awarded Materials Research Science and Engineering Center funding to Ohio State's Center for Emergent Materials for the third time since 2008. This \$18 million, six-year grant will support transformative science and complex materials discovery by two multidisciplinary, collaborative groups of researchers and includes funding to help ease entry into science from underrepresented groups. The researchers will develop materials that grant improved control over magnetic properties, generating new paradigms in computing and information storage. Read more



Award Winning Faculty and Staff

Kate Bartter, Sustainability Institute executive director, was awarded an Ohio State Distinguished Staff Award, the university's highest staff recognition, honoring individuals for their exceptional leadership, accomplishments and service to Ohio State. Bartter is one of 13 recipients recognized for their outstanding work in advancing the university's mission in 2021.

Michael Bisesi, College of Public Health vice dean for academic affairs and academic administration and interim chair of environmental health sciences, received the Ohio State President and Provost's Award for Distinguished Faculty Service.

Andre Carrel, civil, environmental and geodetic engineering, received an NSF CAREER Award to support his research on urban travel behavior for a richer understanding of behavioral dynamics and long-term lifestyle shifts in traveler choice models.

Katrina Cornish, horticulture and crop science, was named the College of Food, Agricultural and Environmental Sciences 2021 Senior Faculty Researcher of the Year.

Sathya Gopalakrishnan, agricultural, environmental and development economics, received a 2021 President and Provost's Award for Distinguished Faculty Service.

Suzanne Gray, environment and natural resources, received a USDA 2020 Early Career Award for Excellence in Teaching.

Rattan Lal, Distinguished University Professor at the College of Food, Agricultural and Environmental Sciences and recipient of the 50th annual World Food Prize in 2020, was honored with the addition of his name to the Rattan Lal Carbon Management and Sequestration Center at Ohio State.

Umit Ozkan, chemical and biomolecular engineering, was named Distinguished University Professor by President Kristina Johnson and other senior leaders. Distinguished Professor is the highest recognition Ohio State bestows on a faculty member for exceptional teaching, research and scholarly work.

Judit Puskas, food, agricultural and biological engineering, was named to the National Academy of Inventors and was a finalist for Ohio State Innovator of the Year.

Christo Sevov, chemistry and biochemistry, received funding from the U.S. Department of Energy's Early Career Research Program for his research to enable selective modification and control of the structure and properties of chlorinated plastics.

Linda Weavers, John C. Geupel Endowed Chair, civil, environmental and geodetic engineering, has been named a 2021 University Distinguished Scholar. The award, supported by the Office of Research, recognizes the outstanding scholarly and research accomplishments of Ohio State faculty.



Umit Ozkan meets with a doctoral student



OUTREACH AND ENGAGEMENT

Ohio State Leads Summit to Accelerate Midwest Climate Action

The Midwest Climate Summit was held across five weeks of virtual gatherings during autumn 2020. The Summit brought together Midwestern universities, local government officials, nonprofit organizations and private sector businesses to work together to find innovative and measurable ideas to solve the challenges of climate change at a local level. Summit members are continuing work to accelerate climate action in the Midwest by compiling evidence, catalyzing action, informing public knowledge and public policy, and developing the future leaders needed to sustain and expand this work. Washington University in St. Louis served as the anchor for the climate summit, and Ohio State was a founding member. In partnership with other higher education institutions, Bloomberg Philanthropies provided support for summit operations. Read more





Energy Symposium Features Energy Transition and Decarbonization

The Sustainability Institute Sustainable Energy Research Group hosted its inaugural energy symposium, "Energy Transition and Decarbonization." Researchers and energy industry experts explored the monumental challenges in the energy transition and interdisciplinary research needed to advance sustainable energy as well as steps the university is taking to address climate change. Read more

Students Foster Sustainability Awareness on Campus

During the 2020-2021 pandemic, Undergraduate Student Government and the Sustainability Council hosted virtual programs to increase sustainability awareness and engagement for students.

October 2020 marked the first official "October is Campus Sustainability Month" by the Undergraduate Student Government's Sustainability Committee, and the Sustainability Council's annual Time for Change Week was once again held in April.

Both events featured virtual programs for students to learn about sustainability at Ohio State and included topics such as water sustainability, recycling on campus, composting, and sustainability and social justice.



University Leads Effort with Navajo Nation to Improve Water and Food Security

Ohio State researchers are working with the Navajo Nation to mitigate the lack of water and food security at a time when the Navajo communities are facing new challenges due to COVID-19. The Global Water Institute is partnering with the Navajo Nation and a consortium of partners to confront the critical water crisis and improve agriculture and public health outcomes. Read more



A Native American drinks water from a pump

Students Lead Women in Sustainability Event

This year, the annual student-led Women in Sustainability event, hosted by the Sustainability Institute, was held virtually. Over 80 students and professionals tuned in for a panel discussion with sustainability leaders who are tackling issues of equity. Panelists were Laurie Stevenson, director,



Ohio Environmental Protection Agency; Crystal M.C. Davis, vice president of policy and strategic engagement, Alliance for the Great Lakes; and Lauren Koch, sustainability consultant for the Ohio State University Wexner Medical Center.

STEWARDSHIP AND OPERATIONS

University Sets New Design, Construction Policy

Ohio State adopted a new Sustainable Design and Construction policy (formerly Green Build and Energy Policy) in 2021. The policy provides sustainability requirements that project teams must adhere to, based on project scope, type and budget. The policy refers to building occupant expectations for community members to reference and follow to contribute positively to the university's sustainability goals. Read more



Solutions, Repairs Reduce Campus Water Use by 29%

In 2015, the amount of water Ohio State used in a year — about 1.3 billion gallons — could fill Ohio Stadium more than 3.5 times. Since then, the university has reduced campus water consumption by nearly 29%, or 379 million gallons, by fixing issues found during building water audits, repairing leaks in water mains and installing low-flow fixtures. Because of that marked success, the university increased its water reduction target to 10% per capita every five years, from the original 5% per capita, by 2025.

In addition to the obvious environmental benefit, these solutions have saved Ohio State over \$1.75 million in annual water purchase and sanitary sewer use costs. Read more





Sustainable Operations During a Pandemic

During the 2020-2021 academic year, university operations were impacted by the global pandemic. Many units continued their current and new sustainability efforts while dealing with the constraints of COVID-19.

- Student Life Energy Management and Sustainability launched a new Certified Green Buckeye program this year. Students living in residence halls were invited to complete a questionnaire about their sustainable behaviors and received certificates based on their actions.
- Facilities Operations and Development's (FOD)
 Refuse Division is reducing litter and carbon
 emissions thanks to more efficient trash truck
 routes. Additional staff collaboration helps
 drivers reduce time spent behind the wheel,
 freeing time for increased attention to recycling
 and composting efforts. Read more
- In addition to adding 250-300 new plants around Mirror Lake in autumn 2020, FOD Landscape Services is using coffee grounds instead of commercial fertilizer in plant beds surrounding the lake. Initial trials utilizing the coffee grounds as a fertilizer replacement demonstrated improved conditions within three weeks. Landscapers partnered with FOD's Energy Services and Sustainability team to obtain the coffee grounds from various campus dining locations. Read more



Grant Helps CABS Invest in Alternative Transit

The Campus Area Bus Service (CABS) was awarded \$679,485 from the Ohio Environmental Protection Agency to replace four diesel-powered transit buses with four new compressed natural

gas buses. With these new vehicles, the university will have transitioned over 60% of its CABS buses to the lower-emission fuel type in support of carbon reduction goals. Read more



Zero Waste Expansions

Ohio State, SWACO Test Improved Waste Management Strategies

In 2020, Ohio State and the Solid Waste Authority of Central Ohio launched a collaboration to share expertise and resources to divert waste from Franklin County's Sanitary Landfill. Ohio State's Columbus campus serves as a living laboratory to test waste diversion projects — from education and behavioral change to new recycling technologies — with the aim of scaling up successful strategies across Central Ohio. Read more

Demolition for New Inpatient Hospital Yields Big Diversion Rates

In early 2021, the North and South Cannon Drive Garages were demolished as a precursor to the new Inpatient Hospital construction project. As part of the demolition, nearly 86 million pounds of building materials were diverted from the landfill, and 98% of the waste materials, including concrete, rebar and galvanized materials, were recycled. Read more

The North and South Cannon Garages were demolished in early 2021 to make way for the new Inpatient Hospital.



Reducing Off-Campus Household Waste

Facilities Operations and Development partnered with Sustainability in Medicine and Know Food Waste to launch a composting and recycling drop-off station for students living off campus. Students who opted into the program were provided compost buckets using grants from the Ohio State Sustainability Fund and Ohio State Energy Partners. So far, participating students are recycling about 500 pounds of various materials and composting one ton of food waste through the drop-off station each week.

Finding Concrete Solutions for Sustainability

In a little more than a year, the Department of Civil, Environmental and Geodetic Engineering has diverted more than 30 tons of cement and concrete from the landfill. The department worked with Zero Waste at Facilities Operations and Development to find contacts in the industry that welcomed the waste to use for fill as aggregate in concrete and cement. Previously, the department paid FOD to break up the waste two to three times a year and haul it to a landfill. Now, Zero Waste rents the department a dumpster and takes the waste to Geiger Excavating Inc. in Columbus. The concrete comes from research projects that have a goal of extending the durability of materials used in bridges and structures. Knowlton School of Architecture also plans to take advantage of the opportunity. Read more



Matt Fetters and FOD Zero Waste student interns Kaiya Weston [left] and Olivia Severyn [right] celebrate the first cement and concrete recycling collection.

Ohio State Receives National Recognition for Zero Waste Efforts

Ohio State received high honors among Big Ten schools in the Campus Race to Zero Waste competition. In the per capita category, calculated by the amount of waste diverted from the landfill per person, the university finished first in the Big Ten conference with 15.9 pounds diverted, per capita, and ranked fourth in the landfill diversion category. Ohio State also took first place for its sustainability and zero waste employee training in the education and awareness category of the 2020 Case Study Competition of Campus Race to Zero Waste. Read more

Wexner Medical Center Sustainability News

The Ohio State University Wexner Medical Center is committed to being a responsible steward of resources through efficient operations, innovative research and ideas that promote sustainability. Key programs include:

- Telehealth: In FY20, telehealth grew from 800 encounters in the first nine months to 188,663 encounters in the last quarter. In FY21, telehealth encounters grew to 369,161 and saved patients nearly 22 million miles driven and 1 million gallons of gasoline; reduced appointment related waste by 12 tons; and avoided 7.700 metric tons of carbon dioxide.
- Nutrition services: 16% of all food purchased by the Ohio State Wexner Medical Center was sourced locally, supporting local businesses and farmers. In FY21, the medical center diverted 145 tons of pre-consumer food waste by using a digester; donated 11.1 tons of unused food; and composted 1.6 tons of pre-consumer food waste, which resulted in nearly 160 tons of food diverted from landfills.
- Operating room greenhouse gas emissions: With a goal of lowering the
 environmental impact of gases associated with anesthesia and with a special focus
 on reducing the use of desflurane, which has 10 times the global warming potential as
 another anesthetic gas called sevoflurane, the Sustainability Task Force implemented
 new practices for the Ohio State Wexner Medical Center's operating rooms, resulting
 in a 46% reduction in the greenhouse gas emissions associated with anesthetic gases
 across the health system.
- Device reprocessing: The Ohio State Wexner Medical Center is focused on reducing the environmental footprint that results from its delivery of care and has participated in a reprocessing program for single-use medical devices since 2011. The program allows the medical center to recycle and reuse single-use medical devices that would otherwise end up in landfills. The medical center diverted 23,000 pounds of waste and saved nearly \$940,000 for fiscal year 2021.
- Earth Day actions: The medical center's Green Team shredded and recycled more than 3,250 pounds of documents; encouraged healthy activities supportive of the environment; and gave away 150 native sapling trees for employees to plant during activities to celebrate Earth Day 2021. In addition, the Green Team collected 5.3 cubic yards of electronics and 50 pounds of batteries and donated more than 70 pairs of shoes to be recycled. More than 5,800 faculty and staff participated in the "Every Day is Earth Day" Your Plan for Health Challenge, in which they kept track of actions they took for the good of the Earth and their health.

Read more about sustainability at the Ohio State Wexner Medical Center.









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