Postsecondary Sustainability Award Nominee Presentation Form

ELIGIBILITY CERTIFICATIONS

College or University Certifications
The signature of college or university President (or equivalent) on the next page certifies that each of the statements below concerning the institution’s eligibility and compliance with the following requirements is true and correct to the best of their knowledge.

1. The college or university has been evaluated and selected from among institutions within the Nominating Authority’s jurisdiction, based on high achievement in the three ED-GRS Pillars: 1) reduced environmental impact and costs; 2) improved health and wellness; and 3) effective environmental and sustainability education.

2. The college or university is providing the U.S. Department of Education Office of Civil Rights (OCR) access to information necessary to investigate a civil rights complaint or to conduct a compliance review.

3. OCR has not issued a violation letter of findings to the college or university concluding that the nominated college or university has violated one or more of the civil rights statutes. A violation letter of findings will not be considered outstanding if OCR has accepted a corrective action plan to remedy the violation.

4. The U.S. Department of Justice does not have a pending suit alleging that the college or university has violated one or more of the civil rights statutes or the Constitution’s equal protection clause.

5. There are no findings by Federal Student Aid of violations in respect to the administration of Title IV student aid funds.

6. The college or university is in good standing with its regional or national accreditor.

7. The college or university meets all applicable federal, state, local and tribal health, environmental and safety requirements in law, regulations and policy and is willing to undergo EPA on-site verification.

8. The college or university has in place is willing to provide a link to or copy of a non-discrimination policy. The U.S. Department of Education reserves the right to disqualify a nomination and/or rescind an award if unlawful discrimination is later discovered.

U.S. Department of Education Green Ribbon Schools Postsecondary Sustainability Award

Name of President/Chancellor: Dr. Mung Chiang, President

(Specify: Ms., Miss, Mrs., Dr., Mr., etc.) (As it should appear in the official records)

Official College or University Name: Purdue University

(As it should appear on an award)

I have reviewed the information in this application and certify that to the best of my knowledge all information is accurate.

(Representative/Chancellor’s Signature) Date: 1-23-2023
Nominating Authority’s Certifications

The signature by the Nominating Authority on this page certifies that each of the statements below concerning the college or university’s eligibility and compliance with the following requirements is true and correct to the best of the Authority’s knowledge.

1. The college or university has been evaluated and selected from among institutions within the Nominating Authority’s jurisdiction, based on high achievement in the three ED-GRS Pillars: 1) reduced environmental impact and costs; 2) improved health and wellness; and 3) effective environmental and sustainability education.
2. The college or university meets all applicable federal, state, local and tribal health, environmental and safety requirements in law, regulations and policy and is willing to undergo EPA on-site verification.

Name of Nominating Agency: Indiana Commission for Higher Education

Name of Nominating Authority: Mr. Sean Tierney

(Specify: Ms., Miss, Mrs., Dr., Mr., Other)

I have reviewed the information in this application and certify to the best of my knowledge that the school meets the provisions above.

Sean Tierney

(Date: 1/31/23)

(Nominating Authority’s Signature)

SUBMISSION

The nomination package, including the signed certifications, narrative summary, documentation of evaluation in the three Pillars, and photos should be submitted online according to the instructions in the Nominee Submission Procedure.

OMB Control Number: 1860-0509
Expiration Date: December 31, 2023

Public Burden Statement

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless such collection displays a valid OMB control number. The valid OMB control number for this information collection is 1860-0509. Public reporting burden for this collection of information is estimated to average 37 hours per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. The obligation to respond to this collection is required to obtain or retain benefit P.L. 107-110, Sec. 501, Innovative Programs and Parental Choice Provisions. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the U.S. Department of Education, 400 Maryland Ave., SW, Washington, DC 20202-4536 or email ICDOcketMgr@ed.gov and reference the OMB Control Number 1860-0509. Note: Please do not return the completed ED-Green Ribbon Schools application to this address.
Nominee Information
School, District, or Postsecondary Institution Name: Purdue University
Category of Nomination (Early Learning Center, School, District, or Postsecondary): Postsecondary

Address: 610 Purdue Mall City: West Lafayette State: IN Zip: 47907 Twitter: https://www.twitter.com/LifeAtPurdue
Facebook: https://www.facebook.com/PurdueUniversity/

Top official (School=Principal; District=Superintendent; IHE= President): Title (Mr./Ms./Mrs./ Dr.): Dr. First Name: Mung Last Name: Chiang Position/Role (Principal/ Superintendent/ President): President Email: president@purdue.edu Phone: 765-494-0965

Lead Applicant (if different) Title (Mr./Ms./Mrs./ Dr.): Mr. First Name: Anthony Last Name: Gillund Position/Role (Teacher/ Sustainability Director/ Facilities Director): Sustainability Director Email: agillund@purdue.edu Phone: 765-494-3911

Check all that apply:
Early Learning [☐] Charter [☐] Community College [☐]
Elementary [☐] Magnet [☐] Career and Technical [☐]
Middle [☐] Non-Public [☐] Urban [☐]
High [☒] Two-Year [☐] Rural [☐]
Public [☒] Four-Year [☒] Suburban [☐]

Provide percentages, if any are relevant to your school, district, or institution:
Pell Recipients: 12.67% Free and Reduced Price Lunch: N/A
Minority: 11.40% Graduation Rate: 65.6%
Limited English Proficient: N/A Attendance Rate: N/A

Provide the following, if relevant:
Total Enrolled: 37,949 Number of Schools: 13 Buildings: 362 Campuses: 1
Summary Narrative

Sustainability exists within the fabric of Purdue University’s West Lafayette campus, from the planning, construction and operations of the university’s physical environment to academic programs and transformative research. In April 2020, the Campus Planning, Architecture and Sustainability department launched a new Physical Facilities Sustainability Master Plan that consists of 13 actionable and measurable goals across five major categories: Energy, Water, Materials, Buildings and Grounds. Purdue University grew by more than 2.3 million square feet from fiscal year 2011 to fiscal year 2022 (FY11 to FY22); however, the university was able to reduce its domestic water use by more than 277 million gallons (27% reduction) and its energy use intensity – a measurement of energy consumed per square foot per year – by more than 10% in the same timeframe. Over 50,000 tons of materials were diverted through recycling, composting and reuse over the past decade. As of FY22, the university has increased bicycle infrastructure more than 100% from the FY14 baseline year with the addition of 6.75 miles of bicycle infrastructure and is consistently recognized as a Bicycle Friendly University. Over the past three years, Purdue has planted 1,882 trees on the West Lafayette campus and has been a Tree Campus USA for 13 consecutive years. Purdue’s Consultant’s Handbook contains guidelines in a vast array of areas impacting indoor or outdoor environmental quality, and the university’s Building Services staff clean residential, dining and daycare areas to an APPA level 2, while most academic spaces are supported at an APPA 3 level. Purdue’s Environmental Health and Safety team plays a significant role in the collection and disposal of chemical and environmental contaminants, and they, along with other campus departments were integral to the Protect Purdue initiative, created in early 2020 to serve as the comprehensive strategy to keep the campus and community safe by limiting the spread of COVID-19. A series of operational modifications were made to enhance air filtration, increase cleaning and disinfecting and more. Grounds department staff are responsible for maintaining the iconic appearance of the West Lafayette campus grounds and provide multiple services including pest control and refuse and recycling, among others. Horticulture Park, a 24-acre forested park provides a vital space for outdoor physical activity and serves as a “living laboratory.” Purdue’s Environmental and Ecological Engineering program is currently ranked #11 in undergraduate environmental engineering programs in the United States, and Purdue’s Institute for a Sustainable Future has nearly 250 faculty affiliates across 45 university departments who have been actively engaged in sustainability research. Purdue has partnered with Duke Energy to jointly explore the feasibility of using advanced nuclear energy to meet the campus community’s long-term energy needs. Several Purdue departments and student organizations collaborate to plan events and activities to promote sustainability initiatives including Earth Week. Purdue is home to more than 1,000 clubs and student organizations including many associated with sustainability and environmental education.
Pillar I: Reduce Environmental Impact and Costs

Reducing or Eliminating Greenhouse Gas Emissions
Purdue University has made great strides in reducing greenhouse gas emissions and increasing building energy efficiency on the West Lafayette campus. Purdue’s 2020 Physical Facilities Sustainability Master Plan illustrates the university’s progress and commitment. As an example, energy goal #1 of the plan is to reduce Scope 1 and 2 carbon emissions by 50% by FY25, with FY11 as the baseline year. Purdue’s greenhouse gas emissions reduction as of FY22 showed nearly a 15% reduction in Scope 1 and 2 emissions from the baseline. This reduction is primarily due to changes to the fuel source used at the university owned and operated Wade Utility Plant. Three boilers at Wade were transitioned from coal fuel to natural gas, and the one remaining coal boiler is compatible with alternative fuels, including biomass and tire-derived fuel. Additional emissions reductions have been achieved through investments to improve the energy and utility efficiency of campus buildings that have reduced the energy demand.

Purdue’s Wade Utility Plant is a combined heat and power (CHP) system that makes the most of fuel by producing thermal energy and power concurrently, which results in less greenhouse gases than if they were produced separately. These types of systems are usually approximately 75% thermally efficient whereas conventional electricity generation is about 35% efficient. The CHP system is an integral part of reducing overall energy consumption, greenhouse gas emissions and utility costs.

In an effort to further increase the reliability of energy generation and reduce costs, the university partnered with Duke Energy, Indiana to site a 16-megawatt natural gas-powered combined heat and power (CHP) plant next to the Wade Utility Plant. The Duke Energy CHP Plant provides electricity for the company’s customers, and Purdue purchases what otherwise would have been wasted steam to provide heat and hot water to campus facilities. Operations at the Duke Energy CHP Plant commenced in March 2022; at which time the plant began supplying approximately 40% of the steam required by the university annually, which eliminates approximately 50,000 metric tons of greenhouse gas emissions from the university’s carbon footprint.

Purdue continues to be forward thinking, evaluating future energy generation opportunities that provide safe, reliable and affordable energy capabilities to meet the West Lafayette campus long-term steam and power generation needs while reducing greenhouse gas emissions to achieve university sustainability goals. In 2022, Purdue’s Administrative Operations organization and the College of Engineering’s School of Nuclear Engineering partnered with Duke Energy Indiana and other industry experts to conduct a study to determine the feasibility of transforming Purdue’s existing combined heat and power system into a new system that uses advanced nuclear technology. A final report will be completed in early 2023.

Another goal from Purdue’s 2020 Physical Facilities Sustainability Master Plan is to cap total energy consumption at FY11 levels in order to show no net gain in total energy consumption and become more efficient on a square footage basis as the campus evolves. Between the goal baseline and FY22, the university grew by more than 2.3 million square feet; however, the university was able to reduce its energy use intensity – a measurement of energy consumed per square foot per year – by more than 10%. The efficiency gained is attributed to multiple efforts including the new construction, renovation, and energy conservation measures within buildings. These energy conservation measures implemented throughout the goal timeline include the installation of active sensing or “Smart Lab” systems in many campus laboratory buildings that allow for the optimization of air exchanges, building controls optimization and retro-commissioning of campus heating, ventilation and air conditioning (HVAC) systems, steam and condensate insulation upgrades, installation of variable frequency drives, LED lighting upgrades and low flow fixtures, among others.

Acknowledging that Purdue must continue to evolve to provide best-in-class facilities to support its academic mission, the university has created guidelines to ensure new facilities are as energy-efficient as is practical and to improve the efficiency of existing buildings. For over a decade, new construction projects on the West Lafayette campus have typically pursued Leadership in Energy and Environmental Design (LEED) certification, a green building rating system
that drives down the impact of the built environment in a number of areas including energy. In 2020, the Physical Facilities Sustainability Master Plan reaffirmed this approach by making it a requirement for all capital projects with a total cost greater than $10,000,000 to achieve LEED Silver certification at minimum. As of FY22, the university has 12 LEED-certified buildings with six new projects in various phases of design and construction currently pursuing seeking LEED Silver certification level or higher.

Improving Water Quality, Efficiency and Conservation
The university has fully metered all campus buildings greater than 10,000 GSF for energy and domestic water, which allows for the identification of high-use energy and water facilities. Several projects and initiatives have been implemented as a result, along with changes to individual building use. Most notably, wasteful, single-pass cooling (as opposed closed-loop cooling) used for HVAC units, ice-making machines, electrical room condensers and steam ejector vacuum generators has been eliminated. In addition, current building codes and LEED requirements for indoor water use mandate the installation of “low-flow” sinks, faucets, showerheads and urinals. Purdue’s energy and utilities efficiency program, known as Purdue SAVES, has for years been used to fund a number of utility efficiency projects, including purchasing hundreds of low flow 1.8 gallon per minute showerheads that replaced 2.5 gallon per minute showerheads in campus residence halls. Overall, the university has reduced domestic water use by more than 277 million gallons (~27% reduction) from FY11 to FY22, despite as mentioned previously, the 2.3 million square foot increase in physical campus space.

Campus comprehensive rainwater management guidelines incorporate green infrastructure and mandate the use of low impact development practices for all new construction, major renovations and development projects. The university’s Sustainable Stormwater Modification Design initiative was created in 2009 and identifies key recommendations and strategies for long-term water stewardship with campus development. The plan was updated in 2020 to include a stormwater management “kit of parts,” which presents green infrastructure options that can be incorporated into future capital improvement projects within various campus landscape typologies. Each element was designed to meet county stormwater standards, reduce runoff entering the drainage system at critical points and provide co-benefits beyond stormwater management. The kit has been integrated into larger open space planning efforts to guide the selection of appropriate stormwater best management practices for a given campus typology, open space feature or capital project. Purdue has nearly 30 locations where stormwater best-management-practices have been implemented, including permeable pavers, bio-infiltration planters, bioswales, porous asphalt, green roofs and rain gardens. One prime example of major water quality and stormwater management accomplishments include the Horticulture Building rain garden. This project disconnected the Horticulture Building’s downspouts from the stormwater sewers and diverts roof runoff to native-planting rain gardens, designed as part of student curriculum.

Reducing Waste Production
As part of the 2020 Physical Facilities Sustainability Master Plan, the university has three goals related to materials and waste:

1. Achieve an annual campus waste recycling rate of 50% by FY25,
2. Require all construction projects with a project cost greater than $5,000,000 to recycle at least 75% of their construction and demolition waste by FY25, and
3. Recycle, reuse or refurbish 100% of institutional e-waste by FY25.

Purdue has made significant strides in each of these goals through the initiatives across multiple departments.

For waste goal #1, the university has diverted over 50,000 tons of materials over the past decade and achieved a 32% diversion rate in FY22. These successes are due to a number of initiatives across multiple departments. For instance, Purdue’s Dining and Culinary department reduced food waste through recycling cooking oil and donating unused food to the ACE Campus Food Pantry and the local Food Finders Foodbank. They also collaborate with the West Lafayette Water Resource Recovery Facility (WRRF), which accepts all food scraps from Purdue’s dine-in locations. In FY22 alone, more than 370,000 pounds of food scraps were collected and transported to the Water Resource Recovery Facility,
where an anaerobic digester uses food scraps to produce methane gas to power the turbines that produce the facility’s electricity.

Another prime example of the university’s efforts to recycle is demonstrated by the Grounds department. In FY22, Grounds was responsible for recycling more than 950 tons of materials, including processing and baling approximately 221 tons of cardboard, mixed paper and office paper, which was sold back to paper manufacturers to offset a portion of recycling operation costs and help create a circular economy. Notably, although not measured in waste goal #1, Grounds has been diverting an average of 2,000 tons per year of mixed organic waste (e.g. leaves, animal bedding, landscaping debris) to an on-campus compost operation.

Related to waste goal #2, the university’s 12 LEED-certified buildings have surpassed the goal of recycling 75% of waste, achieving an overall 82% average diversion rate. Three additional buildings currently in construction that are pursuing LEED certification are each tracking to have a landfill diversion rate of 85% or higher.

Waste goal #3 of recycling, reusing or refurbishing 100% of institutional e-waste has been achieved for more than a decade and will continue to be successfully implemented. All university assets, including electronics, be decommissioned are handled by the university Surplus Store. The Surplus Store’s objective is to earn the highest value possible for university materials taken out of a department’s use, which includes the redistribution of assets within the university, generation of revenue by selling merchandise to the public and avoidance of landfill costs through waste recycling or reuse. In FY22, the Surplus Store recycled nearly 500 tons of materials including 250 tons of metals and over 200 tons of mixed recycling.

In addition to the waste reduction goals outlined in the Physical Facilities Sustainability Master Plan, the university’s Environmental Health and Safety group mange the handling, storage and disposal of hazardous waste. In 2021 alone, Environmental Health and Safety ensured the university disposed of its 245,000 pounds of hazardous waste appropriately and worked with researchers and laboratories to ensure they remain compliant with state and federal regulations. In 2021, there were nearly 80 successful compliance inspections by entities such as the Drug Enforcement Agency and the Indiana State Board of Pharmacy.

Using Alternative Transportation
Numerous initiatives promote alternative transportation to, from and throughout campus. Collaborations with transportation businesses have allowed the university to provide more sustainable modes of transportation and reduce the impact of student and employee commuting. An “unlimited access” agreement with the Greater Lafayette Public Transportation Corporation gives Purdue students, faculty and staff unlimited, fare-free access to CityBus, the local bus service system. Additionally, the university partnered with a company called Spin to provide a scooter-share program to the campus and surrounding communities. This collaboration features improved mobility programming and research opportunities using shared data. For those driving to and from campus, the university has preferred parking locations for low-emission vehicles, several level 2 electric vehicle charging stations and a program that allows faculty and staff to save on parking permit pricing as an incentive for carpooling.

As part of the 2020 Physical Facilities Sustainability Master Plan, the university has a goal to increase bicycle infrastructure on campus by 100% by FY25, with FY14 as the baseline year. As of FY22, the university has already surpassed this goal, increasing bicycle infrastructure across campus by 6.75 miles. In addition to achieving this goal, the university has also improved the quality of almost 1.5 miles of bicycle infrastructure, including upgrading sharrows to bike lanes and providing separated bicycle infrastructure such as a dedicated cycle track along a recently redeveloped portion of State Street, a major campus thoroughfare. Additionally, each year since 2015, Purdue has been recognized with a Bicycle Friendly University award from the League of American Bicyclists. This award has a number of requirements beyond bicycle infrastructure including the requirement to educate the campus community along with those who bike, walk and drive through campus.
The Third Street corridor renovation is another example of promoting alternative transportation. In 2020, the $1 million project transformed the vehicle-centric street into a safer, pedestrian-focused corridor. Vehicular traffic was eliminated in one of the busiest areas between student residences and the main academic campus. The new look and feel of Third Street align with Purdue’s West Lafayette Campus Master Plan to create a safer and more attractive pedestrian zone for pedestrians and bicyclists. Other components of the project include the addition of plants, outside furniture and a new student engagement zone to meet, mingle and play outdoor games.

**Ecologically and Educationally Beneficial Uses of Grounds**

Purdue’s campus grounds are designed, maintained and used in a number of beneficial ways from environmental, ecological and educational perspectives. Since the Purdue Arboretum was developed in 2008, it has played an integral role in turning the campus into an outdoor living laboratory that enhances learning and discovery. Working together, the Purdue Arboretum and the Grounds department design, plant and maintain landscape in a way that enhances the educational, research and outreach missions of the university. They also promote environmental sustainability and increase campus beauty through unique collections of plants, gardens, art works, walking trails and green spaces that are available to the campus and surrounding communities.

Another goal of the 2020 Physical Facilities Sustainability Master Plan is to plant at least 365 new trees per year, totaling 1,869 new trees planted by FY25. The year Purdue was founded, 1869, is the basis for this number. Purdue’s president commended the goal but emphasized it should be larger, at which time the number of total trees to be planted was doubled to 3,738. Through the efforts of the Grounds department, Purdue Arboretum and other collaborators, including student and community volunteers, the university has surpassed the original 1,869 goal with 1,882 trees planted over the past three fiscal years. The university is on pace to achieve the doubled target by FY25.

The university understands how trees are a critical element to creating vibrant, open spaces and healthy ecosystems on campus. The efforts have been recognized by the Arbor Day Foundation with a 2022 Tree Campus USA Award for the 13th consecutive year. The award requirements include five core standards that promote tree health and student involvement. Those standards are maintaining a tree advisory committee, creating a campus tree care plan, dedicating annual expenditures for a campus tree program, holding an Arbor Day observance and providing a student learning project.
Integrating a School Environmental Health Program and Promoting Sound Health and Wellness Practices
Purdue University is committed to providing students, faculty, staff and visitors a safe and healthy campus and workplace. As such, the university integrates health and wellness trainings, programs and other opportunities into Purdue’s learning, discovery and engagement mission. For instance, all Purdue employees are required to complete annual Title IX training to aid in the reduction of discrimination through education and training of appropriate reporting procedures. Also, an Alcohol and Drug-Free Campus and Workplace Policy is in place for faculty, staff and students. Purdue recognizes the health risks associated with controlled substance use and alcohol misuse and how misuse diminishes workplace and campus safety. Additionally, Purdue is committed to supporting students and employees who seek treatment for these conditions and provides resources within the policy, such as information on the Employee Assistance Program that offers free and confidential services to employees who experience alcohol or drug problems. The Employee Assistance Program also offers counselors with expertise in marriage and adult relationships, parent-child relationships, stress, depression, elder caregiving, anxiety and panic disorders and a number of other topics where they related to an employee’s personal life, family or job.

A variety of campus departments and organizations promote health and wellness through standard operating procedures. For instance, the Environmental Health and Safety department developed and maintains the Integrated Safety Plan, which serves as the strategic plan for campus safety and provides a structure to communicate environmental, health and safety issues across the university. This department provides training, consultation, emergency response and waste removal, while overseeing the following programs: construction health and safety, environmental health, hazardous materials management, industrial hygiene, injury prevention, laser safety, occupational safety and radiation safety. Additionally, staff monitor regulatory compliance with various federal, state and university regulations involving environmental, health and safety issues.

Indoor and Outdoor Environmental Quality
Purdue has a number of standards set in place for the design of university spaces to enhance the indoor and outdoor environmental quality of the university’s built environment. The Consultant’s Handbook (CHB) is a university publication designed as a concise and easily referenced handbook to outline the administrative and technical nuances involved in providing professional services to Purdue. The CHB contains guidelines in a vast array of areas impacting indoor or outdoor environmental quality including Thermal and Moisture Protection, Openings, Furniture, HVAC Air Cleaning Devices, and Exterior Site Furnishings to name a few. An additional example includes Division 26 Electrical which calls attention to utilizing photosensors to take advantage of daylight harvesting opportunities.

As mentioned previously, the university’s new construction and major renovation projects over $10,000,000 must achieve LEED Silver Certification. As part of the certification process, projects must achieve the LEED prerequisite for minimum indoor air quality performance for mechanically ventilated spaces. This prerequisite can be achieved through a few options, of which the university utilizes the option of designing the space to meet ASHRAE Standard 62.1-2010. LEED projects must also achieve the prerequisite for environmental tobacco smoke control, which prohibits smoking inside the building. This prerequisite is easily achieved as the university has a Smoke-Free policy for the West Lafayette campus. LEED projects can also pursue scoring credits across multiple indoor environmental quality aspects, and most of our new facilities achieve the enhanced indoor air quality credit by incorporating multiple strategies to minimize and control the entry of pollutants into the building; such as using increased ventilation, carbon dioxide monitoring, and exterior contamination prevention through items such as roll-out matt sizes and cleaning frequencies.

Cleaning and Maintenance
Purdue’s Building Services department operates 24/7 and is responsible for the cleanliness of all academic and administrative buildings on the West Lafayette campus. This includes classrooms and lecture halls, instructional and research laboratories, libraries, lobbies and common areas and conference rooms, among other locations. University Building Services operations are based on APPA (originally standing for Association of Physical Plant Administrators)
work time study matrices that have been established from over 25 years of data drawn from maintenance and custodial operations in educational facilities across the nation and create guidelines to help clarify cleanliness through university and specific terms and standards. APPA standards also incorporate many guidelines and track very closely with ISSA (The Worldwide Cleaning Industry Association) standards and cleaning times. APPA’s cleanliness has five levels with level 1 being the cleanest. Residential, dining and daycare areas are cleaned to an APPA level 2, while most academic spaces are supported at an APPA 3 level. Custodians follow a detailed Standard Cleaning Frequencies program that outlines cleaning services, such as floor maintenance, restroom cleaning, dusting, disinfecting, intake vent cleaning and others, and the frequency at which each should be provided. They also assist with the collection of trash and mixed recyclables from common areas and offices.

The Operations and Maintenance department is responsible for the maintenance and stewardship of university features and facilities and consists of Central Shops, Teams and Zones Maintenance. Central Shops is made up of more than 10 skilled trades, including carpentry, masonry, paint, plumbing and refrigeration, roofing and others. Teams is responsible for internal construction services for small projects typically valued at less than $100,000 and includes the services of several skilled trades. Zones Maintenance is broken down into eight academic zones and four residential zones. Each zone is a defined area of campus that includes designated buildings within the scope. Zones staff are responsible for the maintenance of plumbing, electrical, carpentry, refrigeration and indoor air quality, indoor air handling systems, drinking fountains and classrooms. The campus uses a network of building deputies, a designated staff member for each Purdue facility, to help identify and arrange for these repairs and services. Students and staff may also use an online maintenance and service request portal, known as the Fix It Portal, to submit non-emergency work orders.

Mold and Moisture and Thermal and Acoustical Comfort
The Purdue Environmental Health and Safety team includes experts who provide technical assistance performing air sampling as needed for internal spaces and measures parameters including temperature, relative humidity, carbon dioxide and carbon monoxide. Particulate matter and total volatile organic compounds are also measured. Temperature and relative humidity are largely comfort parameters but do also play a role in the potential for microbial growth. Carbon dioxide is produced by the occupants and is used as an indicator of the outside air supply and effectiveness of air supply distribution within the space. Investigations may also include mold and bacteria concentrations.

In the event of a plumbing failure, flood or water leak, personnel will notify the necessary emergency, maintenance, clean-up and insurance representatives. Once the safety of all individuals has been secured, the process of cleaning up and repairing any damage caused by the flooding would begin. This may involve using specialized equipment to remove water from the building, drying out the affected areas, and making any necessary repairs to the building’s structure or electrical and plumbing systems. The university uses wet vacuums to remove water accumulation, wall and cavity drying systems, commercial dehumidifiers, axial air movers and an infrared camera to identify potentially moist areas by detecting temperature differences at the surface of materials. The crew members are professionally trained in structural drying with a holistic understanding of the scientific and technical principles involved in the structural drying process.

Purdue’s Energy and Utilities Energy Management (EM) group is responsible for implementing, operating and maintaining the building automation systems (BAS) on campus. The Purdue West Lafayette campus currently utilizes over 100,000 control points to operate the heating, ventilation and air conditioning (HVAC) systems on campus to provide a safe, reliable and resilient environment for campus students, staff and research purposes in an energy-efficient manner. The reliability of the BAS is heavily dependent on the communications and the configurations of the numerous controllers starting with the thermostat on the wall, back to the air handling unit, onto the campus network, back to the servers, and finally to the console operators. Should a building occupant wish to adjust the temperature in their office, residence hall room or laboratory, they may use the previously-described Fix It Portal to submit a
temperature adjustment request to the Operations and Maintenance department, and technicians will adjust the temperature within a pre-approved range.

**Chemical and Environmental Contaminants**
Since Purdue is a major research institution, it is not uncommon for faculty and students to work with chemicals and other harmful materials while conducting research. As mentioned previously, the Environmental Health and Safety department plays a significant role in the collection and disposal of chemical and environmental contaminants. Purdue’s hazardous waste containers are stored in satellite accumulation areas. These defined areas are used to manage waste in laboratories and shops by providing safe and effective means to accumulate chemical or hazardous waste before removal by Environmental Health and Safety personnel. To help ensure the safety of the campus community, the department provides labeling, container size and storage guidelines for satellite accumulation areas.

**Ventilation**
An initiative called Protect Purdue was created in early 2020 to serve as the comprehensive strategy to keep the campus and community safe by limiting the spread of COVID-19. It is driven by the latest guidance from the Centers for Disease Control and Prevention, the Indiana Department of Health and other scientific organizations. Each part of this effort is aimed at offering the safest experience for the university to protect all members of the Purdue community, especially the most vulnerable, from the serious consequences of COVID-19. A few examples of operational modifications that were implemented at the suggestion of this team to ensure the safety of the campus community include re-programming the run schedules of 600 air handling units (AHU) to run 24/7, re-programmed 37 AHUs to maximize outdoor air and air changes per hour when classes were in session in large classrooms and high-occupancy areas, upgraded more than 150 AHU filters to at least MERV13 and used 130 plug-in HEPA units in higher capacity instructional areas (defined as 60 or more students) that rely on operable windows for outside air. This team was also responsible for limiting the spread of COVID-19 by providing critical supplies, environmental health and public safety services, IT service reliability and facility readiness that supported social distancing, disinfecting/sanitizing, sampling/testing and isolation and quarantine housing.

**Pests and Pesticide**
Grounds department staff are responsible for maintaining the iconic appearance of the West Lafayette campus grounds and provide multiple services including the removal of pests within academic, administrative and residential buildings. Hand weeding and companion planting are two approaches that are commonly used without the requirement of chemicals for weeds. Pest services are provided with an integrated pest management system, which combines biological, cultural, physical and chemical tools in a way that minimizes economic, health and environmental risks. Staff identify which pests to target and determine the best eradication approach for each. Non-chemical options are prioritized as the first treatment option and may include insecticidal soap. If this method fails, then the least-toxic pesticides are used with higher toxicity pesticides or baits serving as a last resort. When a chemical application is required, spot spraying is used instead of a general full coverage approach. Chemical solutions can cause allergic reactions to people and damage to the environment. Staff who apply regulated pesticides must maintain their Indiana 3A and/or 3B certifications where 3A covers pesticide or fertilizer applications to ornamental plantings, and 3B covers pesticides or fertilizers on turf areas.

**Nutrition and Outdoors Physical Activity**
One of the outdoor areas that promotes health and wellness to the campus and community is Horticulture Park, a 24-acre forested park that is part of the Purdue Arboretum. The park, located on the western edge of campus near U.S. 231, supports university research, education, conservation, wellness and respite to all. It is open year-round and offers more than 300 types of trees and plants, Todd’s Creek and streams, wildlife and bat houses. Paved walkways and unpaved trails with benches and bridges, open green space, picnic tables and nearby parking encourage gathering, physical activity, socialization, reduced stress and a way to connect with nature.
Purdue’s Recreation and Wellness, or RecWell, division provides the campus community with recreational and wellness activities that contribute to learning and the pursuit of an active, healthy lifestyle. RecWell’s spaces include group fitness classes; open-recreation courts and fitness equipment; indoor and outdoor spaces for more than 88 varsity, club and intramural sports; and a demonstration kitchen to learn about cooking, creating and food safety. The multi-award-winning France A. Córdova Recreational Sports Center houses all amenities RecWell has to offer, including the university’s wellness suite with massage, physical therapy, nutrition, financial and other wellbeing programs. Additionally, RecWell provides nutrition counseling services. One-on-one nutrition counseling appointments are available for students to meet with a registered dietitian or nutrition coach at no cost.

The Dining and Culinary department crafts a residential dining experience that fosters community building, which is an essential support system for the well-being of students. The department provides ample opportunity for eating healthy with a variety of nutritious foods offered both in the dining courts and in On-the-GO! locations on campus. Dining and Culinary advises that the best way to create a wholesome meal is to follow the MyPlate guidelines outlined by the US Department of Agriculture. Additionally, a dietitian is available to help students meet their nutrition goals. Staff are dedicated to minimizing the risk of exposure to food allergens and apply labels to food products to assist with making informed choices. Labels include the top nine allergens – eggs, fish, milk, peanuts, shellfish, sesame, soy, tree nuts and wheat – plus coconut and gluten. A number of dining courts have a specialty station that is dedicated to allergen-free foods and other build-your-own stations, allowing greater customization options. In support of Purdue’s diverse population and special dietary needs, vegan and vegetarian options are labeled with special icons. Dedicated vegan and vegetarian stations are included in some dining courts, along with other customization stations. Additionally, Halal food is offered for lunch and dinner in Windsor Dining Court.

Staff Health Promotion
Human Resources - Benefits created the Healthy Boiler Wellness Program to offer a full spectrum of benefits and resources aimed at improving overall health and wellness of university employees and their families. As wellness is multi-faceted, the program focuses on behavioral health, financial wellness, physical health, social wellness and work-life integration. Employees and their families are encouraged to take full advantage of benefit offerings, including notable programs such as the Healthy Boiler Incentive Program. It offers financial incentives to employees and covered spouses for participating in a proactive approach to healthcare, such as receiving preventive care and screenings.

Counseling, Psychological and Social Services
To ensure the health and wellbeing of the student population, the university offers resources including self-education, therapy, medication, exercise, community, habit development, coping strategies and intervention. One example is the availability of on-campus Counseling and Psychological Services (CAPS), which is made up of a team of multiculturally sensitive professionals who provide comprehensive psychological services to students in need of assistance. CAPS offers educational workshops, group treatment, short-term individual therapy, substance use evaluations, care management, specialist consultation, case management, emergency response and psychiatric consultation. Many of the services are provided to students at no charge. CAPS staff created a robust suite of materials to help students navigate a time of change and uncertainty during the COVID-19 pandemic, including resources for anxiety, isolation, grief, social distancing and other mental health concerns.
Pillar III: Ensure Effective Environmental and Sustainability Education

Interdisciplinary Learning about Key Relationships between Dynamic Environmental, Energy and Human Systems Curriculum

Purdue University consists of 11 colleges with more than 200 majors. Of the degree programs, many have a primary and direct focus on sustainability, such as the Environmental and Ecological Engineering program, currently ranked #11 in undergraduate environmental engineering programs in the United States. This program contains a modern approach to environmental engineering that strives to teach students to approach problems from a broad systems perspective for addressing environmental issues, with a focus on ecological interactions and resilient designs that take into account complexity and connectivity between systems. In the undergraduate curriculum, this philosophy drives the early focus on systems thinking and understanding. This philosophy leads to the inclusion of significant course requirements in ecology, sustainability and industrial ecology.

In the FY22, the West Lafayette campus offered more than 45 courses directly focused on sustainability and nearly 170 more that are inclusive of sustainability by incorporating a unit or module on sustainability, a sustainability challenge or sustainability focused activities. These courses span across 35 different departments including Agricultural and Biological Engineering, Nuclear Engineering, Botany and Plant Pathology, Health Sciences, Anthropology, Political Science and Economics to name a few.

An example of a sustainability focused ungraduated course is the Environmental Ethics, Policy, and Sustainability course within the English department. This course is interdisciplinary and designed to open new pathways into ethical and eco-critical inquiry in the Anthropocene age. The course analyzes disciplinary differences in approaching the ethical, the human and environmental problems such as sustainability, development, biodiversity, global security and climate change.

An example of a sustainability focused graduate course is titled Topics In Environmentally Sustainable Construction, Design And Development offered in Construction Management. This course explores environmental sustainability in all its forms, starting with the historical and theoretical basis and continuing through an understanding of sustainable building construction, design, development and renewable energy strategies/management tools and how these can be applied in practice.

Purdue University also utilizes its infrastructure and operations as a living laboratory for applied student learning. Purdue has had numerous living laboratory projects contributing to understanding or advancing sustainability on campus through a multitude of different methods from class projects, thesis projects, published works, among others. A prime example of a sustainability initiative utilizing the campus as a living laboratory is a student team of landscape architecture students that participated in the 2020 Campus RainWorks Challenge, looking at improving stormwater management. The team specifically looked at the Purdue Agricultural Mall, an underutilized space on campus and a prime site for redesigning and implementing green infrastructure technologies. A visible and interactive solution creates new spaces that not only better cater to pedestrian flow and education of sustainable stormwater management but will also support Purdue’s goals in the 50-year master plan, set to take campus completely off the current combined sewer system, eliminating its contribution to combined sewer overflow (CSO) events.

In addition to sustainability related coursework at West Lafayette, Purdue also has a number of immersive, sustainability-focused education study programs. One example is the Sustainable Development Studies program in Costa Rica where for one semester students design and conduct a rigorous field research project and learn how Costa Ricans are creatively addressing conservation and development issues. Students gain practical skills in the field including GIS use and applications, species identification, habitat and biodiversity assessment, forest soundscape techniques, songbird mist-netting, tourism impact assessment methods, basic Spanish language skills, research design and implementation, quantitative and qualitative data collection and analysis, and research presentation. Additionally,
the experience includes exploring the cloud forests of Monteverde to study tropical ecology and sustainable land management and a behind-the-scenes visit to a local coffee farm and sustainable permaculture homestead to learn how Costa Ricans have successfully combined agriculture and conservation.

Research
Drawing on the United Nations Sustainable Development Goals, Purdue’s Institute for a Sustainable Future fosters and promotes research, partnerships and engagement in areas including the environment, climate, food-energy-water security, and sustainability. The complex, multi-factor and pressing nature of the challenges and opportunities that humanity faces in these areas requires a collaborative, transdisciplinary approach. This Institute supports the research and development needed to provide viable solutions to grand challenges in these areas by connecting faculty and researchers with one another and by forging linkages between disciplines and communities within Purdue and beyond. In this way, the Institute aligns with Purdue’s land grant mission of building human capital, advancing research focused on the world’s most important problems and engaging deeply with university partners.

Prior to the Institute’s formation in 2022, the Climate Change Research Center and the Center for the Environment served to facilitate and promote interdisciplinary environmental research at Purdue and beyond. For more than a decade, these centers worked to approach complex, multi-disciplinary environmental problems—often collaborating with one another. With the inception of the Institute for a Sustainable Future, resources from these centers will continue to be directed towards support for, and engagement with, faculty, researchers, and partners.

The Institute’s faculty affiliates include nearly 250 faculty across 45 university departments who have been actively engaged in sustainability research, given talks, organized events, led research teams, and/or received research, travel and proposal support. The Institute supports academic research by providing key research support services for faculty across campus including: research conceptualization including identifying potential funding sources for environmental projects, project development, and project implementation and promotion. Additionally, the Institute also provides funds to faculty for travel to advance their research development.

Purdue’s Institute for a Sustainable Future specifically supports undergraduate research through the Discovery Park Undergraduate Research Internship (DURI) program. The DURI program is designed to involve Purdue undergraduates in the interdisciplinary research environment of Purdue’s cutting-edge research centers and institutes. The program provides opportunities for students to work with researchers on research projects that involve combining two or more disciplinary strengths. Offered three times a year, the DURI program funds 3-4 sustainability projects as submitted by faculty on a competitive basis. These opportunities come with funding for the selected student ranging from $500-$1000. Some recent projects include:

- Nanostructured Membrane Heat Exchanger for Efficient Air Conditioning
- Recycling of fiber reinforced polymer composite for construction applications
- On the Use of Machine Learning for Causal Inference in Extreme Weather Events
- Design, Planning, and Fabrication of Greenery on Buildings for Urban Environmental Sustainability
- Data Collection and Analysis of Smart Building
- Heat waves and their role in the food energy water security nexus

Collaboration
Looking to future energy generation opportunities, Purdue has partnered with Duke Energy to jointly explore the feasibility of using advanced nuclear energy to meet the campus community’s long-term energy needs. With interest rising worldwide in new technologies that are reliable and carbon-free, Purdue and Duke Energy are studying power produced through Small Modular Reactors (SMRs), a move that may be unprecedented for a college campus and a potential fit for Purdue’s energy needs. In addition to the feasibility study, Purdue and Duke Energy are hosting the Understanding Tomorrow’s Nuclear Energy lecture series designed for all audiences from industry experts to students and community members to learn more about the study and nuclear energy. In total, the four lectures hosted to date have over 3,000 views, both in person and online, and additional lectures are still to come in early 2023.
Use of Environment and Sustainability to Develop STEM Content, Knowledge and Thinking Skills / Civic Knowledge and Skills Applied to Environmental and Sustainability Education

Engagement
Purdue’s Office of Campus Planning, Architecture and Sustainability (CPAS) has a website that details current initiatives, campus events, and resources for students, staff and faculty. Additionally, CPAS works with numerous other campus groups to implement multiple sustainability education campaigns throughout the year. For instance, the Purdue Farmers Market is hosted at the Memorial Mall on the West Lafayette campus every Thursday typically from June through October. The Market brings in more than 25 local vendors, and during the market, CPAS hosts an informational tent where the CPAS interns educate the campus community about sustainability efforts and protocols, such as proper recycling. Another CPAS sustainability education event is Earth Week, where several departments and student organizations collaborate to plan events and activities to promote sustainability initiatives. The 2022 Earth Week included a tree planting event hosted by the Grounds department and the Purdue Arboretum. Dozens of volunteers participated and were educated about the benefits of trees, how tree plantings are part of the university sustainability goals and training on proper planting technique to increase the likelihood of tree survival.

Clubs
Purdue has numerous co-curricular programs and initiatives that contribute to students learning about sustainability outside of the formal classroom. These programs and initiatives engage students by integrating sustainability into their lives, experiential learning experiences, and campus culture. With more than 1,000 clubs and student organizations on campus, many are associated with sustainability and environmental education, including:

1. Boiler Green Initiative – an organization focused on sustainability with backgrounds from a variety of disciplines on campus. The club consists of two project committees- recycling and water management. Projects range from volunteer work to the planning and implementation of semester-long projects.

2. Purdue Student Sustainability Council – an organization working to bring awareness, action and sustainable change to Purdue’s campus and the Greater Lafayette area. Their active committees include Erase the Waste, Friday Night Lights, Climate, Outreach, Precious Plastics, Textile Waste, and Blog. PSSC hosts monthly all-member meetings and various other events throughout the semester, with a goal of spreading the word about sustainability on Purdue’s campus and across the state of Indiana.

3. The Environmental Science Club – a student organization focused on increasing environmental education, awareness, and community involvement. The organization hosts lectures from professors and other field experts at bi-monthly meetings, community projects usually with local land trusts that focus on giving club members hands-on experience in restoration and management techniques, and outdoor outings like hiking and kayaking trips.

4. The Purdue Student Farm – a small, sustainable farm that grows vegetables and herbs using the principles that naturally govern balanced ecosystems. The day-to-day farm operations are managed by several student groups: those enrolled in the "Small Farms Experience" courses, volunteers involved in the Purdue Student Farm Organization, part-time undergraduate interns, and full-time undergraduate summer interns. The farm offers a Boilermaker Seasonal Vegetable Pass, which allows the campus community to purchase a bag of locally, student-grown vegetables each week.

Learning Communities
To bolster student comradery and education success, Purdue offers numerous learning communities. These communities generally offer classes with students in the same living space, out-of-class programs and trips such as to the university’s ropes course which is a wonderful opportunity for bonding, leadership and team building, and involvement opportunities with the local community, to name a few. Sustainability-focused learning communities, like the Nature of Wild Things and Animalia, provide a living environment where you can enhance your understanding of the natural environment and examine environmental ethics. The Nature of Wild Things allows students to learn more about Aquatic Sciences, Forestry, and Wildlife and participate in field activities like electrofishing, forest management, and more. The Animalia learning community is centered around animal sciences and allows students to visit research...
centers, attend educational excursions, and participate in social activities and service-learning experiences like Boo at the Zoo and Almost Home Humane Shelter.
Photos

1. Construction on the Chaney Hale Hall of Science, one of Purdue’s most recent LEED-certified facilities, was completed in 2020, and this centrally-located, student-focused laboratory building brings together the chemistry and biology disciplines and includes 33 laboratories serving first and second year undergraduates.

2. A member of the Expanded Disinfecting Operations Team (EDOT), a team formed to help combat the spread of COVID-19, uses a handheld sprayer to disinfect a handrail at the Purdue Krach Leadership Center in 2021.

3. 
In Fall 2022, students have embraced the design of the Third Street corridor, which created a safer and more attractive pedestrian zone for walkers and bicyclists by eliminating vehicular traffic from this critical, quarter-mile stretch that connects the residential portion of the West Lafayette campus to the main academic core.

4.

The second annual Purdue Day of Service in 2022 rallied volunteers from the university and local community to plant 325 trees in Horticulture Park on the Purdue West Lafayette campus, up drastically from the 62 trees planted at the inaugural event in 2021.

5.

Dr. Maria Korsnick, president and CEO of the Nuclear Energy Institute, talked with Dr. Seungjin Kim, the Capt. James McCarthy, Jr. and Cheryl E. McCarthy Head of the School of Nuclear Engineering at Purdue, during her lecture, A New Landscape for New Nuclear, held on Oct. 5, 2022 at the West Lafayette campus and livestreamed as part of the Understanding Tomorrow’s Nuclear Energy lecture series hosted by Purdue University and Duke Energy.
The Purdue Sustainability department staffs a tent at the final Farmers Market of 2022 and provides education on new campus recycling and landfill signs and answers questions from students and staff on recycling and sustainability initiatives.