



School of Engineering and Applied Science

SUSTAINABILITY ANNUAL REPORT

2023-2024



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EXECUTIVE SUMMARY

The University of Pennsylvania has committed to the goal of achieving 100% carbon neutrality by 2042, a goal we call 100 x 42. Penn's Climate and Sustainability Action Plan 3.0 represents a vision for our university's environmental future.

Penn's remarkable transformation into one of the world's premier teaching and research institutions has been fueled by enormous growth in capabilities, means, and influence. The implementation of President Amy Gutmann's Penn Compact puts the University in a strong position to address the environmental challenges ahead. Penn will continue to lead through inclusive climate change scholarship, innovative policy formation, and adoption of best practices to dramatically impact campus efficiency and reduce emissions. Through deliberate assessment, analysis, and planning, Penn is taking action to mitigate climate impacts, adapt to emerging environmental conditions, and prepare our university—and our students—to lead in a rapidly evolving world. The CSAP 3.0 recommends goals to:

- Expand the scope of sustainability research in Penn's academic centers, and connect students to Penn's abundant resources in this field;
- Continue to reduce carbon emissions and explore expanded use of renewable energy to mitigate the impacts of climate change;
- Embrace circular economy principles to reduce waste and single-use products;
- Make sustainable choices in transportation, purchasing, and business operations; and inform, educate, and empower the Penn community to participate in Penn's climate change and sustainability goals.

Penn's CSAP 3.0 goals will test the ingenuity of the campus community as we continue to reduce our ecological footprint while prioritizing environmental health and resiliency. The focus is on Penn's 100x42 carbon neutrality pledge—an ambition worthy of Penn's commitment, and feasible given the University's resources and expertise. CSAP 3.0 will translate Penn's ambitions into action and our shared values into accomplishments.



EXECUTIVE SUMMARY

Regarding sustainable practices, the School of Engineering and Applied Sciences is a well-positioned community to innovate and implement positive change.

Our academics and research exemplify the sustainably driven efforts of faculty, students, and alumni. We build and operate with intention, renovating and erecting buildings designed around green guidelines, maintaining them, and replacing inefficient parts and pieces as needed. Recycling is paramount; whenever possible, the products and materials procured by our school require recycled content in manufacturing while any waste removed from our buildings is sent to a recycling facility. For over a decade, the SEAS Green Team has engaged with the Engineering community and others to encourage sustainable initiatives and sponsor events including Climate Week, talks, bookswaps, electronic recycling and more.

SEAS sustainable accomplishments throughout the 2023-2024 year illustrate our unwavering support of the Climate Action Plan 3.0 and our dedication to a greener future.

ACADEMICS & RESEARCH

[Milestones]:

1. SEAS offers 23 courses through our **Energy & Sustainability** Minor and related Concentrations.
2. Deep Jariwala and Roy Olsson lead research in developing Temperature-resistant memory devices capable of withstanding temperatures as high as 600 degrees Celsius.
3. The Eduardo D. Glandt Chair, Professor Chinedum Osuji, works with his lab to build membranes designed to lessen the energy intensity of chemical processes and separations.

- Milestone 1.** SEAS offers an Energy & Sustainability Minor, while the departments of MSE (Material Science and Engineering) and CBE (Chemical and Biomolecular Engineering) offer Concentrations focused on energy and the environment. Combined, they offer a total of 23 courses with an enrollment of 914 students this year.
- Milestone 2.** To provide more reliable data storage in extreme temperature conditions, Deep Jariwala and Roy Olsson led researchers in the development of a new memory device capable of enduring temperatures of up to 600 degrees Celsius, which is more than double the resistance of current market products. These advancements can aid in the development of sustainable research, deep earth drilling, space exploration, and more.
- Milestone 3.** Studies show that chemical separations consume a staggering amount of our global energy, approximately 10-15%. Osuji sees sizable positive possibilities if a reduction can be made in energy used in hydrocarbon separations.



UTILITIES & OPERATIONS

[Milestones]:

1. SEAS keeps an eye on energy consumption within our buildings, noting how much of an increase or decrease was made when compared to the year prior.
2. When & where possible, SEAS buildings manage air handlers to best utilize energy usage.
3. SEAS prioritizes deskside recycling for renovated spaces and new buildings.

The school of Engineering has implemented the following practices in support of the Climate Action Plan 3.0

- Milestone 1.** Penn Engineering monitors energy consumption within our buildings to track increases or decreases in usage from year to year. We've previously focused on the main Engineering Complex. However, as we transition to an in-house energy usage tracking software, we will include all SEAS buildings moving forward in 2025.
- Milestone 2.** All applicable SEAS buildings cycle air handler equipment off on a schedule to reduce power consumption, especially on Red Days.
- Milestone 3.** For each new renovation or building, SEAS implements deskside recycling bins and centralized trash bins. Since the majority of waste generated at a desk station is recyclable, this practice increases recycling rates.



PHYSICAL ENVIRONMENT

[Milestones]:

1. All SEAS construction projects follow green guidelines.
2. SEAS has adopted bird-friendly guidelines for all exterior construction.
3. SEAS water bottle filling stations have diverted over **970,500** water bottles.

The school of Engineering has implemented the following practices in support of the Climate Action Plan 3.0

- Milestone 1.** SEAS helped to develop green guidelines for all projects that don't meet LEED requirements. These green guidelines are used for all SEAS renovation and new construction projects.
- Milestone 2.** SEAS has adopted bird friendly guidelines for all exterior renovations. These guidelines impact the design of both renovations and new construction to minimize the number of window bird strikes and reduce harm to aviary life on campus.
- Milestone 3.** SEAS requires the installation of water bottle filling stations in the renovation or new construction of buildings when replacing or addressing traditional water fountains. There is now a total of 16 water bottle filling stations installed throughout Engineering buildings.



WASTE MINIMIZATION & RECYCLING

[Milestones]:

1. The SEAS Recycling Center recycled **4.6 tons** of electronics, lightbulbs, Styrofoam, cardboard and more.
2. Approximately **3.25 tons of furniture was reused** within the SEAS community instead of being trashed or sent to a recycling facility **saving nearly \$120,000** in new furniture costs.
3. SEAS has recycled over **7.8 tons** of small renovation trash and furniture.

The school of Engineering has implemented the following practices in support of the Climate Action Plan 3.0

- Milestone 1.** Each year the SEAS Recycling Center diverts several tons of electronics, lightbulbs, Styrofoam, cardboard and more from landfills by recycling them through EForce.
- Milestone 2.** SEAS prioritizes furniture reuse programs. Prior to furniture being recycled, we check to see if a use can be found between current furniture projects and/or existing spaces where end users may have a need.
- Milestone 3.** Whether SEAS is completing a larger construction renovation or a small furniture update, whatever can't be salvaged is sent to Revolution Recovery to be recycled. This diverts several tons of waste from landfills each year.



PROCUREMENT

[Milestones]:

1. SEAS has removed water bottle offerings from many of our vending machines.
2. Furniture products procured for the SEAS community is GREENGUARD certified.
3. All carpeting purchased and installed at SEAS has a minimum of 45% recycled material, is NSF 140 and CRI Green Label Plus.

The school of Engineering has implemented the following practices in support of the Climate Action Plan 3.0

- Milestone 1.** SEAS works to become a plastic bottle free community. Water bottles have been removed from many of our vending machines and the Towne building café. Most SEAS offices also have water filtration systems in place of water delivery services.
- Milestone 2.** SEAS has standardized GREENGUARD certified furniture, ensuring a sustainability story behind all furniture purchases.
- Milestone 3.** All carpeting purchased for new buildings or the renovations of existing buildings at SEAS has a minimum of 45% recycled material, is NSF 140 and CRI Green Label Plus.

OUTREACH & ENGAGEMENT

[Milestones]:

1. The SEAS Green Team is celebrating its **13-year** anniversary and has **27 active members**.
2. The SEAS Green Team hosted a **Sustainable Catering event for Earth Week**, introducing students, faculty, and staff to a variety of event catering options. Caterers featured zero-waste packaging, a planet-friendly menu, and sustainable practices.
3. The SEAS Green Team partnered with several groups in hosting **2 webinars for Climate Week 2023**.

The school of Engineering has implemented the following practices in support of the Climate Action Plan 3.0

- Milestone 1.** The SEAS Green Team has been active for 13 years! Once a month, the team meets in person and online to discuss sustainable topics and school initiatives. The Green Team hosts and supports sustainably driven events and initiatives throughout the year.
- Milestone 2.** The SEAS Green Team participates in Earth Week every year. The university-wide initiative presents opportunities for our community to take part in cross-disciplinary events that educate and inspire action around environmental justice, climate, and nature-based solutions. This year the Green Team hosted a Sustainable Catering event that provided students, staff, and faculty with alternative green options to consider when catering future events.
- Milestone 3.** SEAS is a leading participant in Climate Week, hosting several talks/events each year focused on energy, climate, and sustainability/environmental research conducted at SEAS.

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Outreach & Engagement:

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