



School of Engineering and Applied Science

SUSTAINABILITY ANNUAL REPORT

2021-2022



CONTENTS

- 3 > CSAP 3.0 Summary
- 4 > Executive Summary
- 5 > Academics
- 6 > Utilities & Operations
- 7 > Physical Environment
- 8 > Waste Minimization & Recycling
- 9 > Procurement
- 10 > Outreach & Engagement
- 11 > Index

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 systems 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 and climate lectures, student sustainability competitions, bookswaps, electronic recycling and more.

SEAS sustainable accomplishments throughout the 2021-2022 year illustrate our unwavering support of the Climate Action Plan 3.0 and our dedication to a greener future.



ACADEMICS & RESEARCH

[Milestones]:

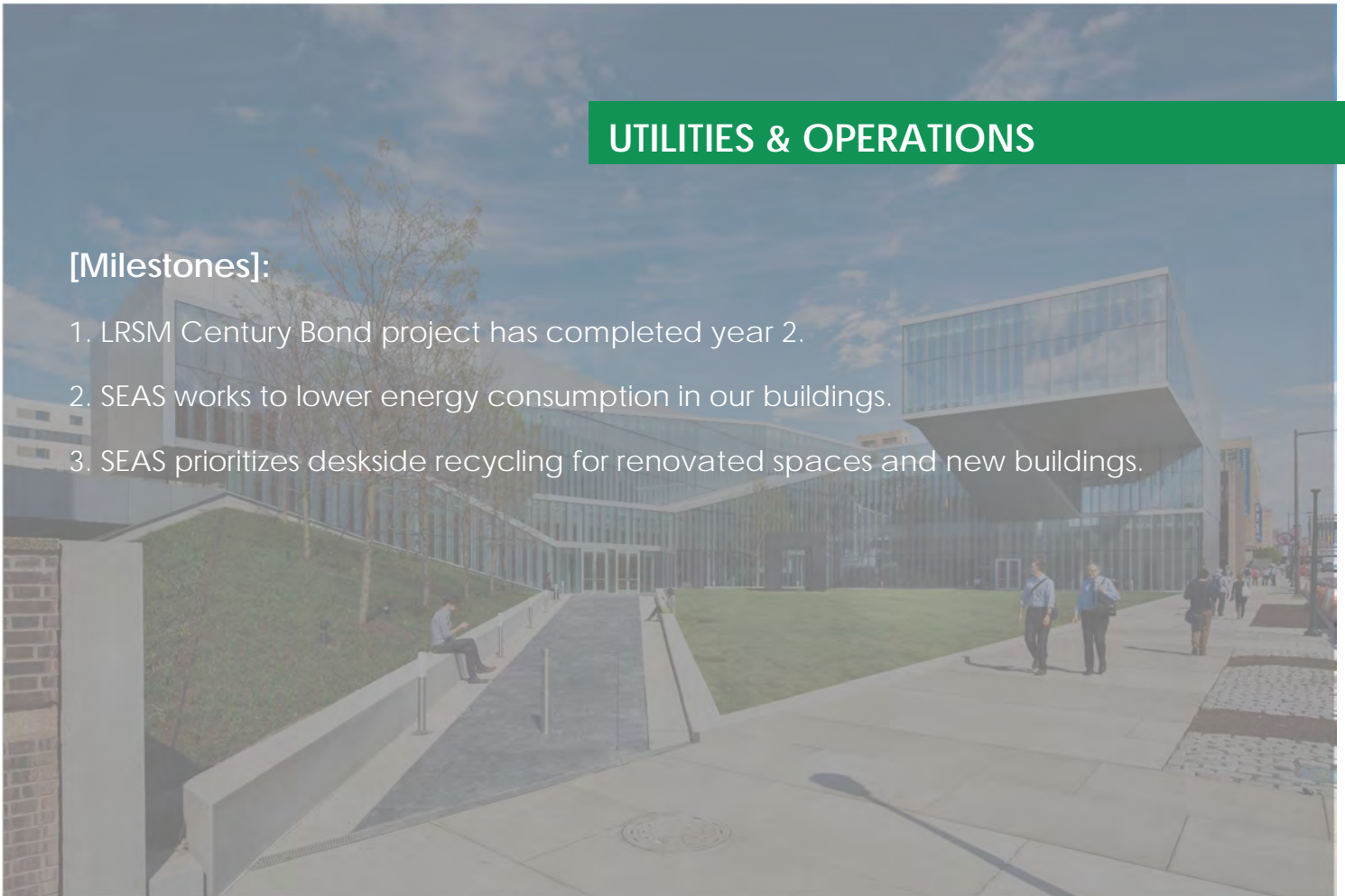
1. SEAS offers 49 classes through our **Energy & Sustainability** Minor and related Concentrations.
2. Jennifer Wilcox and Peter Psarras work to create affordable & scalable Direct Air Capture (DAC) technology.
3. 2022 President's Sustainability Prize winners, Julia Yan, Sarah Beth Gleeson, and Shoshana Weintraub, are engineering a solution for microplastic pollution.

- 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 49 classes with an enrollment of 782 students this year.
- Milestone 2.** To provide more solutions than challenges, Jennifer Wilcox and Peter Psarras aim to make DAC technologies more cost-effective and scalable. DAC facilities can be 100x more efficient at removal carbon from the air than a forest, while taking up less space. Wilcox explains “where the carbon goes” and how DAC technologies can help decarbonize industries that are unable to utilize more renewable energy resources.
- Milestone 3.** Three recent Material Science and Engineering alumni are now working to create Baleena, an invention that collects microfibers in your laundry machine. Developing their senior design project into a commercial product would aid in reducing the quantity of synthetic fibers that are currently released into the water system.

UTILITIES & OPERATIONS

[Milestones]:

1. LRSM Century Bond project has completed year 2.
2. SEAS works to lower energy consumption in our buildings.
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. LRSM Century Bond project has completed 2 years' worth of **Century Bond** renovations to replace aging HVAC equipment with high-efficiency equipment.
- Milestone 2. Penn Engineering maximizes opportunities for facilities renewal to reduce our carbon footprint. We continuously prioritize replacing our buildings' HVAC infrastructure with components and processes that achieve higher efficiencies.
- Milestone 3. For each new renovation or building, SEAS implements deskside recycling bins and centralized trash bins. The majority of waste generated at a desk station is recyclable, **therefore**, 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 **676,000** water bottles this year.

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 projects 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 buildings when replacing or addressing traditional water fountains. There is now a total of 14 water bottle filling stations installed throughout Engineering buildings.

[Milestones]:

1. The SEAS Recycling Center recycled **5.8 tons** of electronics, lightbulbs, Styrofoam, cardboard and more.
2. Approximately **5.75 tons of furniture was reused** within the SEAS community instead of being trashed or sent to a recycling facility **saving nearly \$83,000** in new furniture costs.
3. SEAS has recycled over **5.7 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, **anything that 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 plastic water bottle offerings from many of our vending machines and aims to remove all plastic offerings in the next year.
2. Furniture products procured for the SEAS community are 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.** **Engineering** 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 offices also have water filtration systems in place of water delivery services.
- Milestone 2.** SEAS has standardized on 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.

[Milestones]:

1. The SEAS Green Team is celebrating its **11 year** anniversary and has 22 active members.
2. The SEAS Green Team hosted a bookswap, collecting over **1000** books.
3. The SEAS Green Team partnered with several faculty, staff, and students in hosting 6 webinars for Climate Week 2021.

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 **over 10 years!** The team meets **monthly**, in person and online, to discuss sustainable topics and school initiatives. The Green Team hosts and supports **sustainability** driven events and initiatives throughout the year.
- Milestone 2.** The SEAS Green Team hosts **1 to 2** bookswaps per year. This year's bookswap was the first live event hosted by the Green Team since the 2020 quarantine, collecting over 1000 books for Books4Cause.
- 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.

Academics & Research:

- [Energy & Sustainability Minor](#)
- [MSE Concentration](#)
- [CBE Concentration](#)
- [Direct Air Capture \(DAC\)](#)
- [Engineering a Solution to Microplastics Pollution](#)

Physical Environment:

- [Green Guidelines](#)
- [Bird Friendly Design Guidelines](#)
- [SEAS Water Bottle Refill Station Map](#)

Outreach & Engagement:

- [SEAS Green Team](#)
- Climate Week Talks/Events
 - o [Treeswift & the Penn Journey: From Research to Startup](#)
 - o [Viper Lighting Talks: Addressing Energy Challenges Through Undergraduate Research](#)
 - o [Plastic Waste: Global Challenges and Opportunities](#)
 - o [Climate Change and Cities](#)
 - o [Sustainability and the Built Environment: Building Materials and Cooling Strategies that Combat a Warming Planet](#)
 - o [Penn Electric Racing and the Future of EV Engineering](#)