



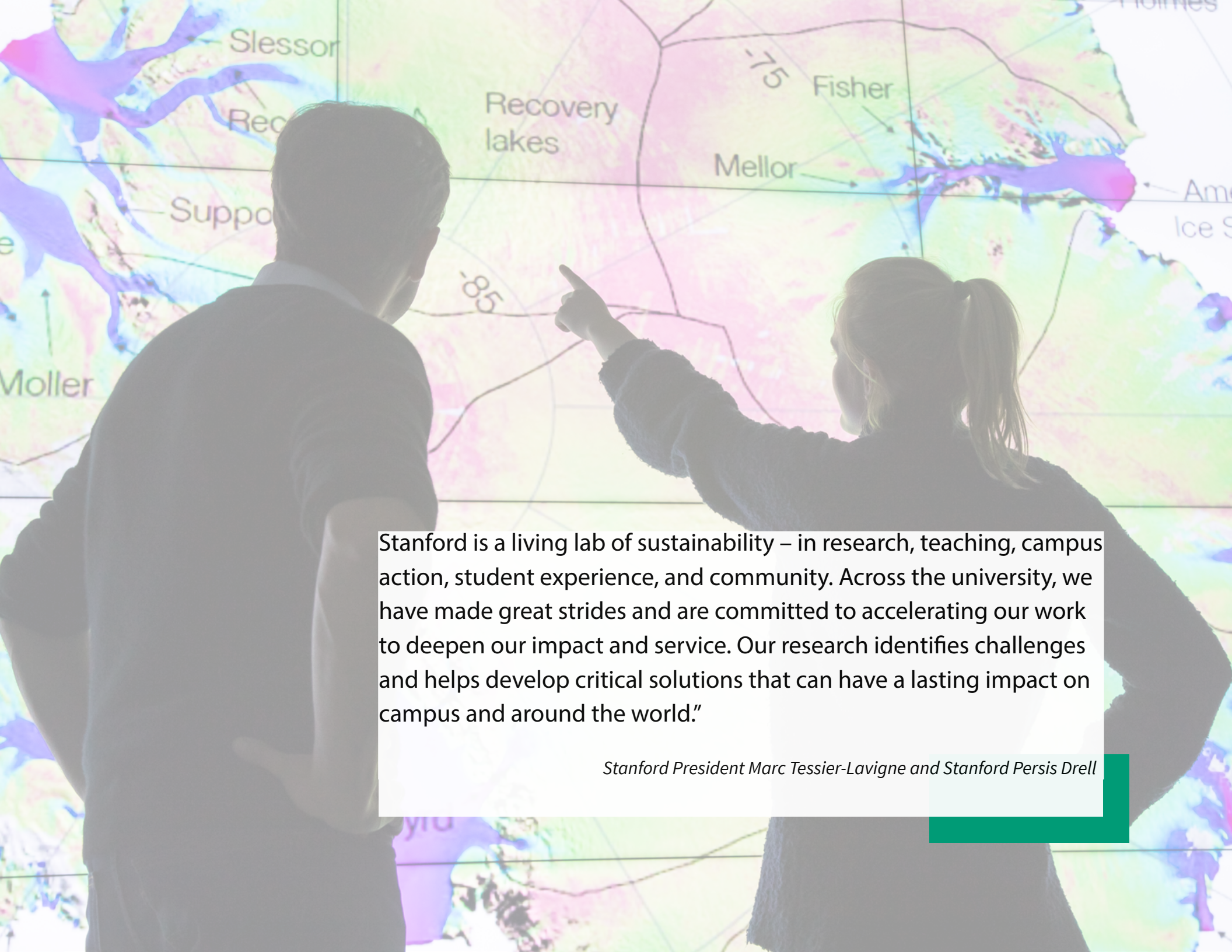
SUSTAINABILITY



AT STANFORD

2019-20 Year In Review





Stanford is a living lab of sustainability – in research, teaching, campus action, student experience, and community. Across the university, we have made great strides and are committed to accelerating our work to deepen our impact and service. Our research identifies challenges and helps develop critical solutions that can have a lasting impact on campus and around the world.”

Stanford President Marc Tessier-Lavigne and Stanford Persis Drell

Amidst an unprecedented year, climate change remains a challenge for which 2020 was a defining year of action. Returning to the original definition of sustainability, with its triple bottom line—environment, economy, and equity—this year has seen critical momentum and that re-establishes the whole picture of sustainability as a fundamental priority for society. Stanford continues to work toward a more sustainable future with vigor and determination, and the university has deeply embedded sustainability across all aspects of campus life. There have been significant shifts toward new paradigms.

This year, as a key outcome of its Long-Range Vision process, the university announced a [school focused on climate and sustainability](#) to accelerate Stanford's impact. The school aims to align resources across disciplines and expand the university's [function as a living laboratory](#). Stanford has also made significant progress toward its goals of reducing campus emissions by 80% and diverting 90% of its waste from the landfill.

The 2019-20 fiscal year represents a significant shift in how communities engage with each other and the world around them. Stanford has embraced the global shifts with resilience and builds on its strong foundation of driving innovation in advancing comprehensive, systematic changes to model and develop a truly sustainable campus in action. For example, to improve infrastructure resiliency in 2019, the university expanded its [energy system cooling capacity](#) to eliminate disruption to teaching and research.

Through the [IDEAL initiative](#), a focus on expanding

equitable access and cultivating a culture of inclusion will only continue to grow. Sustainable Stanford is committed to expanding its partnership with those focused on environmental justice in the years ahead.

Throughout the uncertainty and shifts, new programmatic initiatives for the coming decade have been incubated this year. We have begun our work in the following areas that will be highlighted throughout this report:

1. Deeper decarbonization
2. Zero waste by 2030
3. Climate resilience
4. Digitization of operations
5. Robust community engagement

The spirit of our community and its commitment to grappling with crucial global challenges persist unfettered. We remain united on our path to progress, and we continue to align our efforts around the UN Sustainable Development Guidelines. In this report, we are privileged to share highlights from more than 35 academic and operational departments that work together to run efficiency and conservation programs that reduce Stanford's collective environmental footprint and model sustainable cities in action.



Fahmida A. Bangert
Director, Sustainability and SEM Business Services
Department of Sustainability and Energy Management

2019-2020 Year in Review

#1

Ranking
Research
Institution

In 2019, Stanford renewed its Platinum rating through the Sustainability Tracking, Assessment, & Rating System (STARS) of the national Association for the Advancement of Sustainability in Higher Education (AASHE). With a weighted rating of 88% across criteria for academia, administration, operations, and coordination, **Stanford earned the highest place among research institutions in the United States at the time, among 940+ reporting institutions.**

[View more awards Stanford has earned this year](#)



2019-2020 Year in Review

Thinking globally, acting locally. UN Sustainable Development Goals

In 2015, the United Nations adopted a plan to help create a prosperous future for the planet and guide its work through 2030. The agenda establishes [17 Sustainable Development Goals \(SDGs\)](#) toward which countries are working. The SDGs cover a broad range of topics and help countries and industries consider the impacts of their operations in a uniform manner. Throughout this report, you will see icons where Stanford's work to innovate solutions maps and aligns with the SDGs.



Bridging Disciplines in Research and Academia

Stanford emphasizes deep collaboration in its transformative research and learning approach to influence future leaders at a global scale. The university's commitment to sustainability empowers ambitious research collaborations that contribute to a deeper understanding of the subject around the world. During the pandemic, the interconnected nature of sustainability as a discipline has never been more apparent.

In 2019-20, building on this rich history of interdisciplinary work, Stanford doubled down on its commitment with the announcement of a [school of sustainability](#) accelerating climate solutions. The announcement is a key outcome of the Long-Range Vision process, which started in 2017 and emphasized sustainability as a critical area of focus for the university. The school will amplify Stanford's contributions in education, research, and impact, and will support and expand "campus as a living lab" projects to model sustainability solutions in action.



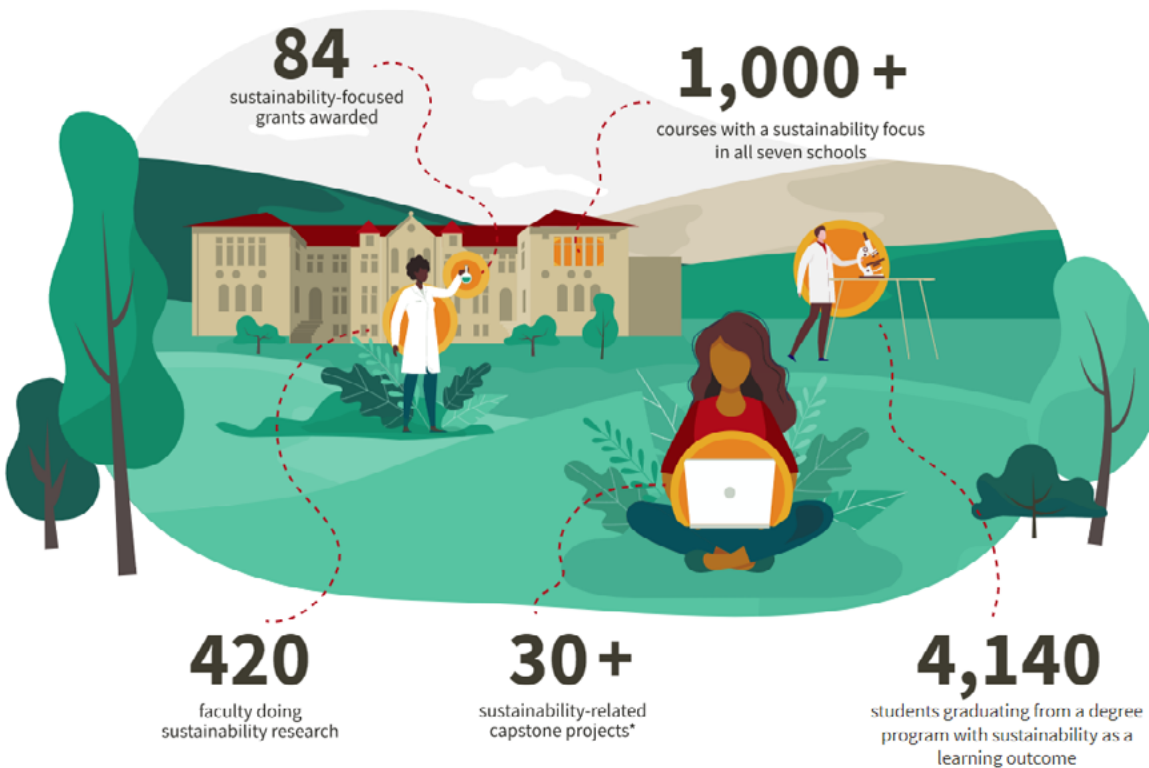
As planning for the new school gets under way, sustainability-focused research and education progresses across all seven existing schools at Stanford. This work continued seamlessly in March when Governor Newsom implemented California's shelter-in-place order. Within the week, all instruction had transitioned online, allowing the Stanford community to remain [connected from anywhere](#) and encouraging [resilience and innovation](#) among us all.

In 2019-20, nearly 30 community-engaged learning courses connected Stanford students with local organizations to develop innovative solutions. Across disciplines, Stanford regularly partners with local and regional communities on research and other projects that have broad implications beyond the Stanford campus. During 2019-20, Stanford faculty, staff and students have been actively involved in the formation of the Northern California Environmental Justice Network for Community-Academic Partnerships, which brings together representatives of universities and community organizations working to advance environmental justice. The network hosts regular workshops to promote knowledge sharing and collaboration on community-engaged projects. These kinds of partnerships are just one example of how Stanford solutions contribute broadly to the health and well-being of the world at large.

Bridging Disciplines in Research and Academia

In 2020, Stanford announced a school focused on sustainability and climate. The school will engage everyone addressing climate and sustainability at Stanford in a newly expanded, integrated, and impact-focused community.

Across all seven schools at Stanford, sustainability-related efforts in 2019-20 included:



Academic Partners

[Stanford Woods Institute for the Environment](#)

[Precourt Institute for Energy](#)

[Haas Center for Public Service](#)

[Hasso Plattner Institute of Design](#)

[Graduate School of Business](#)

[Graduate School of Education](#)

[School of Earth, Energy, & Environmental Sciences](#)

[School of Engineering](#)

[School of Humanities and Sciences](#)

[School of Law](#)

[School of Medicine](#)

Expansive Evaluation, Conservation, and Engagement Programs

Supporting resilient infrastructure and cultivating a spirit of resiliency in individuals are critical to the mission of the Office of Sustainability and Business Services (the Office). The Office aggregates campus sustainability programs to reduce the university's environmental footprint in a systematic way. In 2019-20, its programs saved \$1.4 million and significantly supported strategic initiatives to propel Stanford forward as a living laboratory and as a leader in climate resilience. In addition, the Office supported the campus COVID recovery response, contributing to global efforts to understand the links between the pandemic and the environment. The Office has collected monthly data since shelter-in-place began in March to understand how largely virtual operations impact campus resource consumption, revealing significant reductions across all categories, as well as insight into building and system performance with reduced populations.

The Office's holistic approach embraces detailed analysis of campus performance to inform comprehensive planning and programs for improvement. The Office continues to steward progress toward the two sustainability targets laid out in the Long-Range Vision: becoming 80% carbon free by 2025 and reaching zero waste (defined as 90% diversion or higher) by 2030. Through a comprehensive vulnerability assessment to address risks, Stanford is also preparing to both adapt (respond to the impacts of climate

change) and be resilient (prepare for and recover from adverse impacts) in the coming decades to synch with the realities of the changed climate.

In 2019, the Office began to explore strategies to reduce campus emissions further, with plans to phase out natural gas-powered equipment. The next frontier of decarbonization lies in Scope 3 emissions accounting, program development, and systematic reduction of carbon in several aspects of the university's travel footprint and supply chain; an initial inventory is under way.

The data-driven nature of the Office's work is underscored by the Business Systems initiative, which integrates dispersed data sets for greater insight and efficiency in operations, while setting the foundation for Stanford to lead as a "smart campus" with sensors and tools for more sophisticated analytics, predictive maintenance, and forecasting. In 2019-20, a critical tool that exemplifies this work is the real-time Central Energy Facility [capacity dashboard](#), which allows the campus community to view real-time heating and cooling consumption compared to available capacity of the system.



Expansive Evaluation, Conservation, and Engagement Programs

With technology continuously advancing as a critical asset in managing campus infrastructure, the Business Systems work is actively accelerating the university's "[smart campus](#)" capabilities.

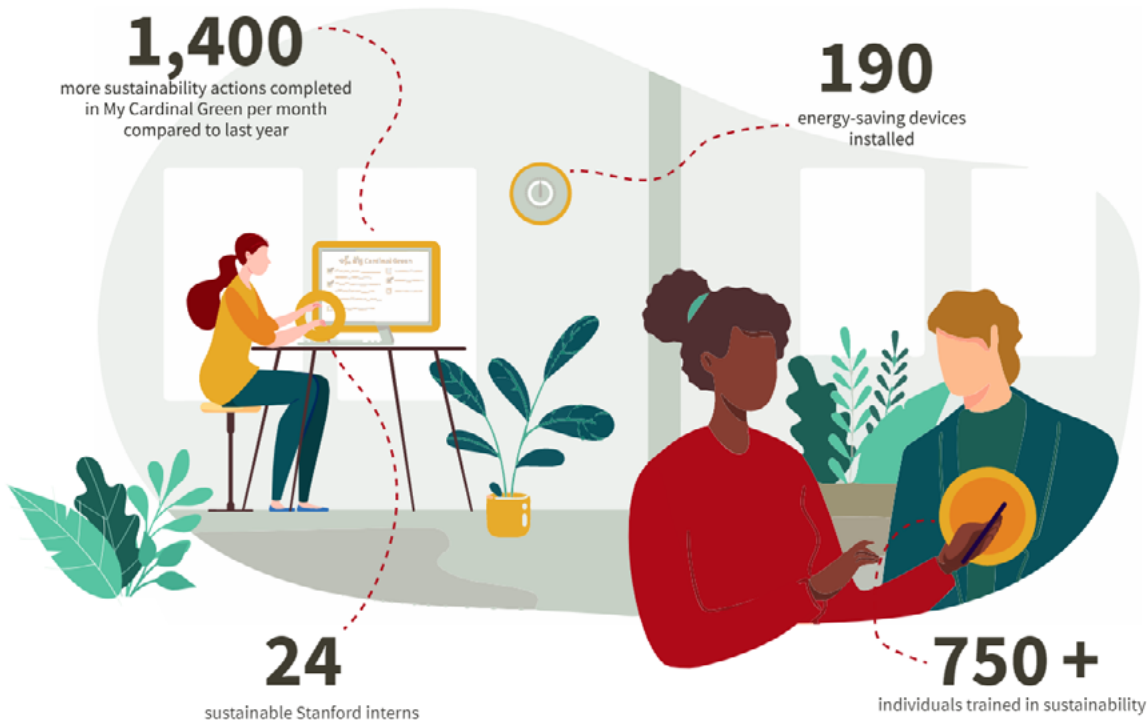
While individual departments manage specific infrastructure programs, since 2017 the [My Cardinal Green](#) program has provided a streamlined pathway for the campus community to engage with and practice sustainable behaviors. The program provides personalized conservation suggestions for students, staff, and faculty, including targeted opportunities for [labs](#), [offices](#), [IT infrastructure](#), [events](#), and [custom student projects](#). This year, My Cardinal Green users have completed an average of 1,400 more actions per month compared to last year. In addition, the platform now includes more than 30 recommendations to support sustainability while working from home. My Cardinal Green has established the framework through which to engage our various university communities in a personal way, and the next steps will aim to broaden participation and integration within them. This engagement is necessary to model a sustainable campus in action and ensure that our community members are also sustainable citizens in the world at large.



Expansive Evaluation, Conservation, and Engagement Programs

Savings from the Office's comprehensive conservation programs in 2019-20 total nearly \$1.4 million, equal to the annual savings from some large building retrofit projects.

Streamlining and Digitizing Sustainability



2019-2020 Highlights

[Student Research Projects Spark Further Analysis of Scope 3 Emissions](#)

[Supporting Recovery and Tracking Impacts from COVID-19](#)

[Showcasing Resiliency for Earth Day](#)

[Students Advancing Environmental Justice](#)



A Carbon-Free and Resilient Energy Supply

In September 2019, to improve infrastructure resiliency during heat waves and to eliminate disruption to teaching and research, the university installed additional equipment to expand the cooling capacity of the Central Energy Facility by 35%. Additional temporary equipment came online in June 2020, nearly doubling the capacity of the system. A permanent expansion will come online in 2022.

This cooling capacity offers zero curtailment or disruption of the heat recovery-based heating systems of the [Stanford Energy System Innovations \(SESI\)](#) program, which came online in 2015. SESI enables the transition of the campus energy supply from a fossil fuel system to an electrically powered heating and cooling system that will allow the university to reach its target of reducing Scope 1 and Scope 2 emissions by 80% in 2021—four years ahead of the goal. At that point, Stanford will rely on 100% renewable electricity to power the campus. Through SESI, the campus has been able to model environmentally and economically sustainable heating and cooling systems at a district level.

More than 6 million additional square feet rely on Stanford's Central Energy Facility today than in 2015. More than 50% of this new square footage came online this year and belongs to new buildings associated with Stanford Hospital & Clinics. In providing hot and chilled water to new spaces, the Central

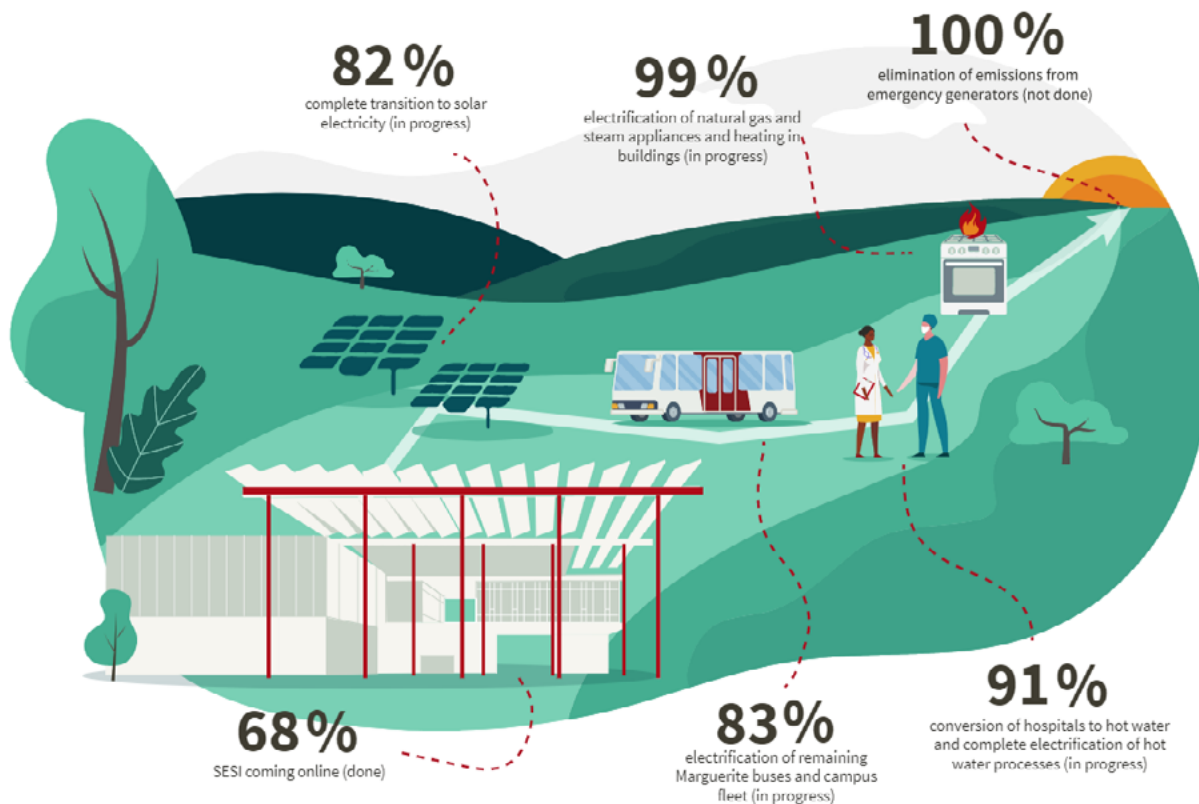
Energy Facility achieves economies of scale that make the energy supply system even more sustainable.

Stanford's energy transformation puts it at the forefront of universities on the path to carbon neutrality, leaving a minimal percentage of Scope 1 and 2 emissions to eliminate. After [conducting deep analysis](#) to understand and strategize solutions for eliminating these remaining emissions sources, in the year ahead the university will undertake specific programs to decarbonize. One such program will assist departments with replacing natural gas equipment in buildings with more sustainable electric alternatives.



A Carbon-Free and Resilient Energy Supply

In 2019, Stanford powered the campus with 66% renewable electricity, and it will utilize 100% renewable electricity by the end of 2021.



2019-2020 Highlights

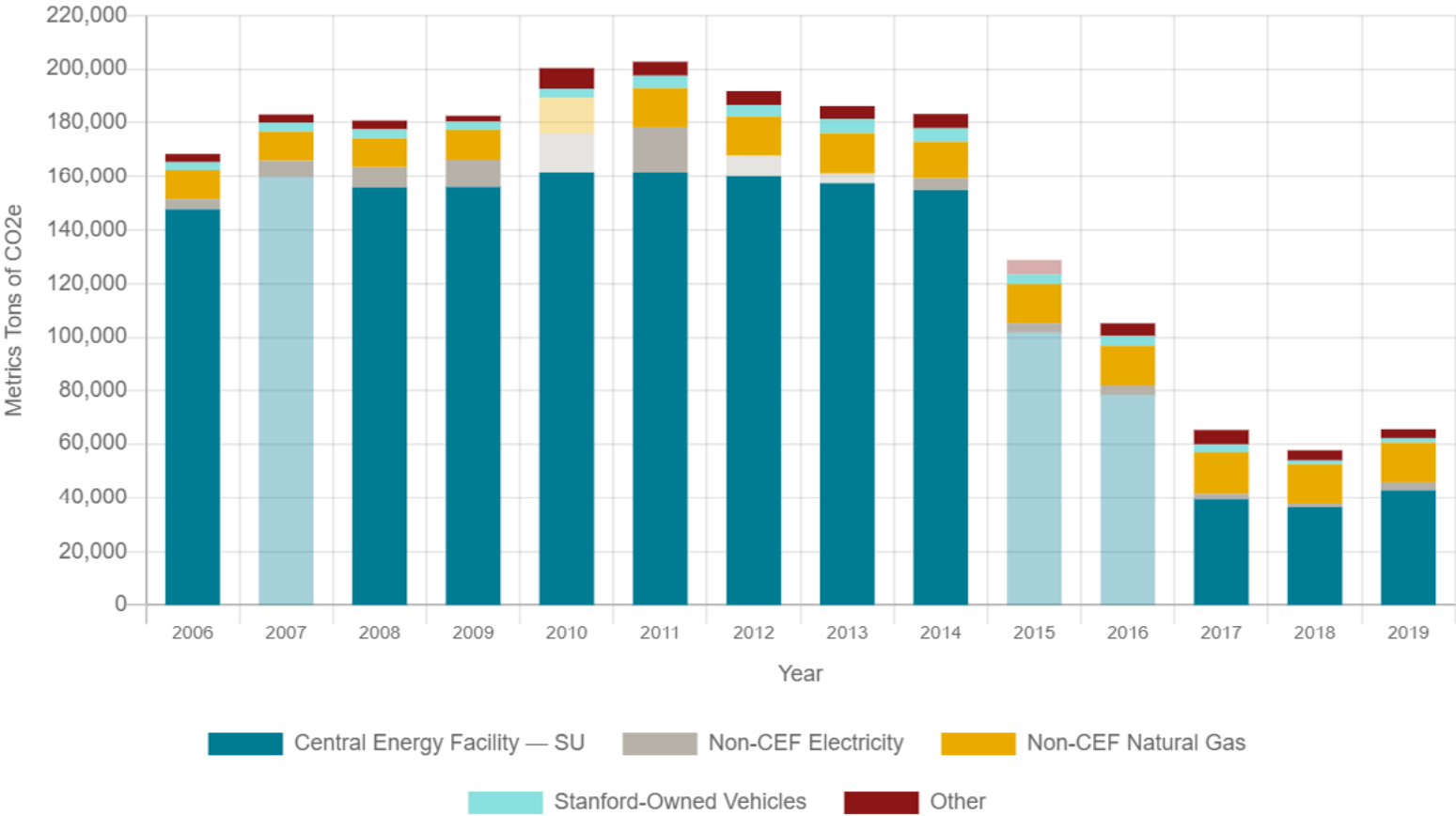
[SESI System Expands to East Campus](#)

[Accelerating Stanford's Transition to Net Zero](#)

[Charting Stanford's Path to Zero Scope 1 and 2 Emissions](#)

A Carbon-Free and Resilient Energy Supply

Publicly Reported Historical GHG Emissions



This chart depicts Stanford’s publicly reported and third-party verified Scope 1 and 2 emissions over time. These are the emissions associated with Stanford’s building energy consumption, fleet fuel usage, and process and fugitive emissions. The chart does not include indirect Scope 3 emissions associated with commuters and air travel. [View Scope 3 emissions trends here.](#)

Pioneering Energy Management Solutions

Stanford has long been a leader in developing solutions to deliver maximum efficiency in existing buildings. To model sustainability while supporting the complex needs of its broadly focused research initiatives, Stanford implements comprehensive, innovative energy management solutions that increasingly incorporate digital technologies to automate efficiency.

The [Facilities Energy Management \(FEM\)](#) team utilizes multiple dynamic operating systems and efficiency programs to optimize energy consumption in existing buildings, and incorporates best practices into all new buildings. More than 40 buildings on the main campus now rely on a new building automation system equipped with advanced fault detection and diagnostic tools. These tools enable smart analytics on multiple fronts, including building commissioning, new-construction post-occupancy studies, chilled and hot water return temperature management, chilled water resilience planning, and even tracking of COVID modes for air handlers.

To complement the progress enabled by SESI, demand-side management programs like the [Whole Building Energy Retrofit Program \(WBERP\)](#) and the [Energy Retrofit](#)

[Program \(ERP\)](#) have accounted for energy savings of nearly 10%, cumulatively estimated at \$15 million based on current utility rates, since their inception. This year, facilities teams moved quickly to respond to the shelter-in-place restrictions and were able to shut off heating and cooling in 135 unoccupied buildings for several weeks—and in some cases several months. This allowed for significant reductions in energy consumption to support empty spaces, as well as the launch of the COOLER program, through which FEM has begun chilled water load experiments in unoccupied spaces during this time. FEM also worked closely with Environmental Health and Safety (EH&S) to develop guidelines for increasing building ventilation levels without excessively impacting energy costs and changing settings in the building automation systems to meet the guidelines.



Pioneering Energy Management Solutions

In 2019-20, more than 85 Energy Retrofit Projects saved more than \$265,000 in energy costs. As of 2019, Stanford has reduced energy intensity on campus 32% from a 2000 baseline.



1	\$863	10	0	6	▼
5	\$771	10	0	6	▼
1	£458	10	0	6	▼
2	\$446	10	10	6	▼



2019-2020 Highlights

[Bing Nursery School Gets the Light](#)

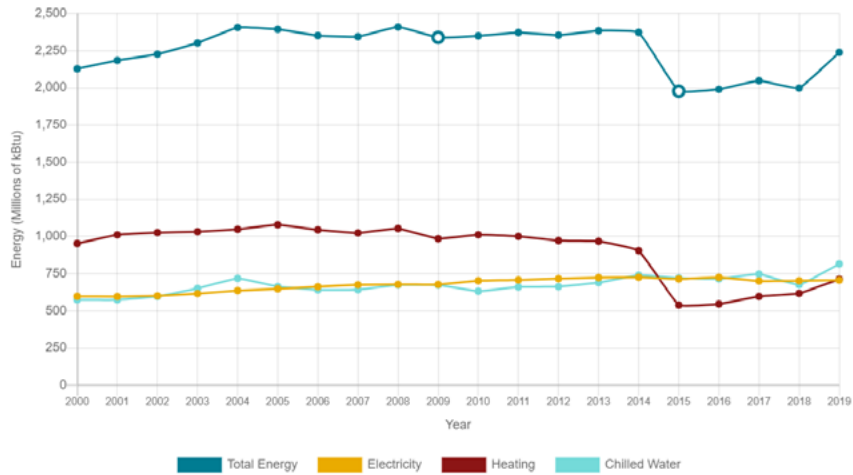
[New Analytics Tool Proactively Identifies Savings](#)

[School of Medicine Building Less “Exhausted”](#)

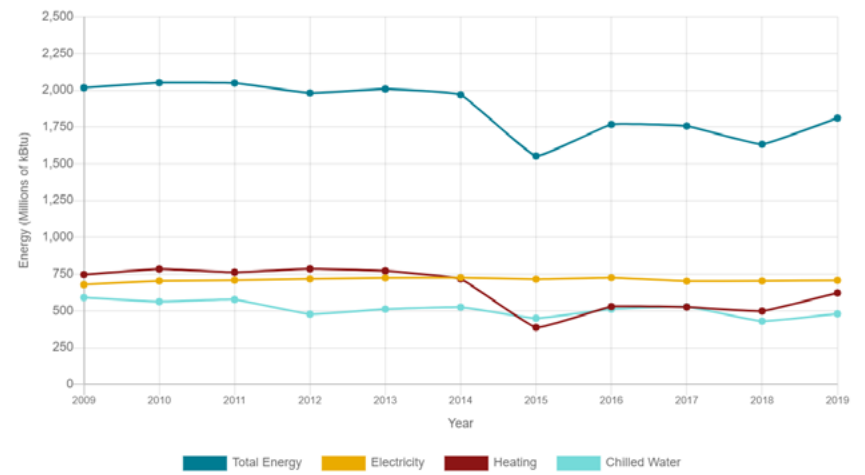
Pioneering Energy Management Solutions

Energy Demand Charts

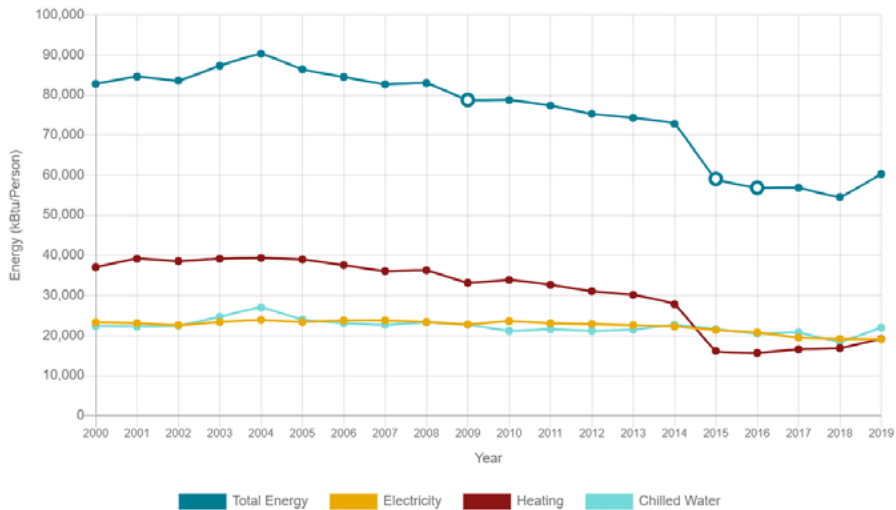
Total



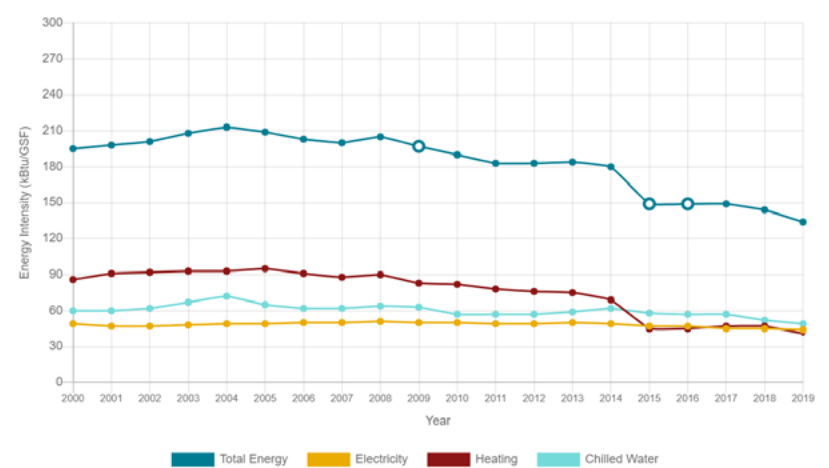
Total Without Hospital



Per Capita



Energy Intensity



Stewarding Vital Water Resources

Stanford has an expansive history of efficient water management practices, stewarded by the [Water Resources and Civil Infrastructure \(WRCI\)](#) group, which also manages water quality, water systems infrastructure, roads, bridges and dams on university land. The group proactively works to meet the needs of both the university community and the ecological systems it encompasses.

WRCI is looking ahead to secure water resiliency for the future of the campus. Since the start of its water conservation program in 2001, the campus has reduced total potable water use by 44%.

In 2019, water consumption largely remained steady, following [significant reductions by all major campus water customers](#) compared to pre-drought baselines. Potable water consumption also declined significantly following building shutdowns due to shelter-in-place regulations.

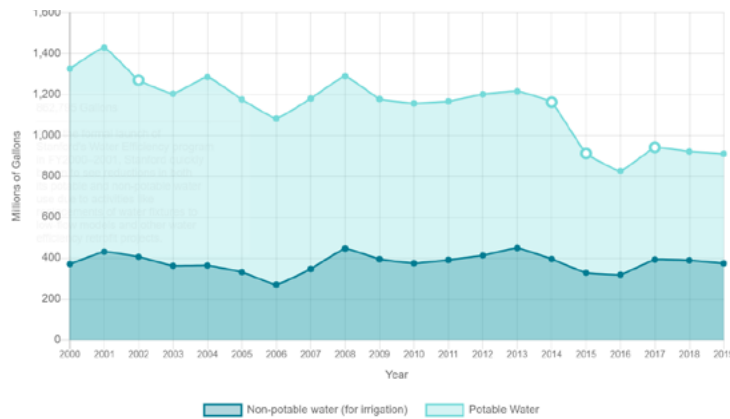


Stewarding Vital Water Resources

In 2019, potable water use increased by 1% and nonpotable water use decreased by 4% from the previous year.

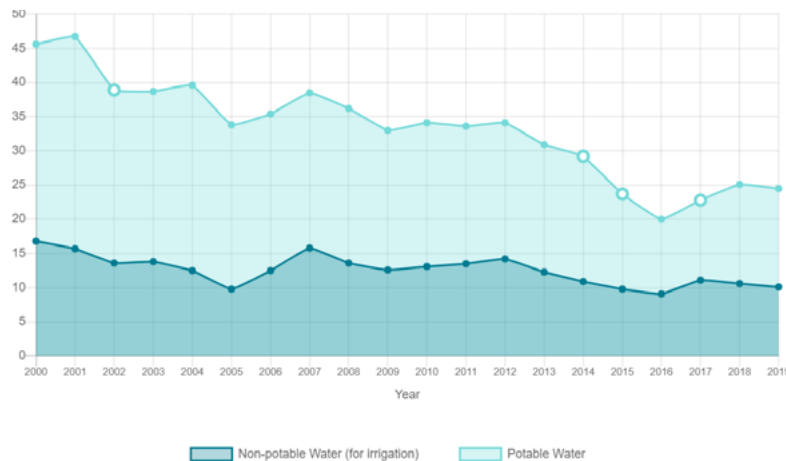
Water Consumption Trends

Total



The individual point labels on this chart reflect non-potable and potable water consumption totals, respectively. Together, they comprise total water consumption.

Per Capita



2019-2020 Highlights

[New Data Management Tool Saves Water](#)

[Athletics Department Pilots Low-Flow Showerheads for Savings](#)

[New Stormwater Retention Area Can Be Explored Virtually](#)



Increasing Waste Diversion

Stanford is actively progressing on its path toward diverting more than 90% of waste from the landfill by 2030. Through expansive reuse, recycling, and composting programs, the university has reduced the total amount of material going to landfill to 8,970 tons in 2019, for a diversion rate of 66%, compared to a peak of 14,000 tons sent to landfill in 1998. With a significantly reduced population on campus in the wake of local shelter-in-place laws, the campus generated an average of 1,300 fewer tons of waste each month than during the same period the prior year. Managing campus resources in a way that prioritizes sustainable purchasing, reduction, and reuse, followed by recycling and composting, is critical to achieve the zero waste goal.

In 2019, Stanford published its [Zero Waste Feasibility Study](#), outlining the process to evaluate the university's existing waste infrastructure and key solutions to reach its target of zero waste by 2030. Stanford identified source reduction efforts and efficiency opportunities throughout its waste system, and the study further refined these efforts into a multistep, data-driven pathway to zero waste. A Zero Waste Systems Manager joined the Office team to implement the plan and begin pilot programs to deploy the new waste system in buildings. The pilot programs build on the success of the systems implemented at the Redwood City campus, which opened in March 2019.

Solutions that will be piloted on the main campus in academic year 2020-21 reduce touch points and include moving to single-stream recycling; removing desk-side collection and opting for central waste stations; adding compost bins to breakrooms and kitchens; adding paper towel compost collection to restrooms; and streamlining the custodial collection process. As the university progresses through its recovery, the centralized systems will also minimize the number of individuals interacting with the overall process and allow for greater sanitization. While the dramatically reduced population of building occupants has paused the timeline of the initial pilots, the Office is working closely with the university's procurement team to encourage contract language that supports waste minimization goals.

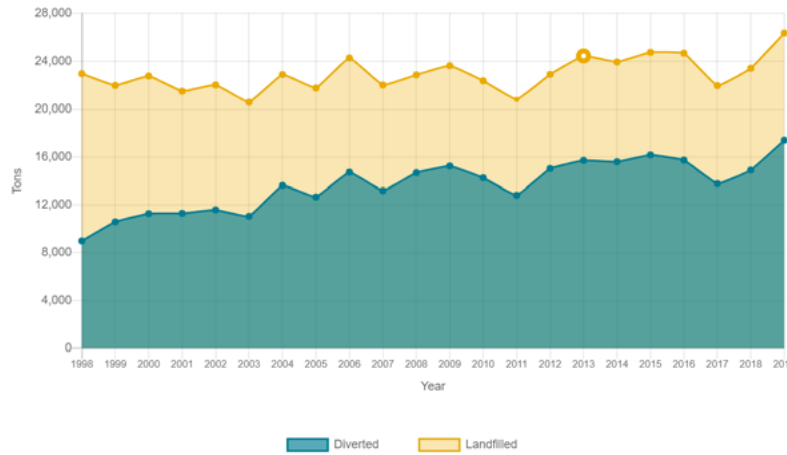


Increasing Waste Diversion

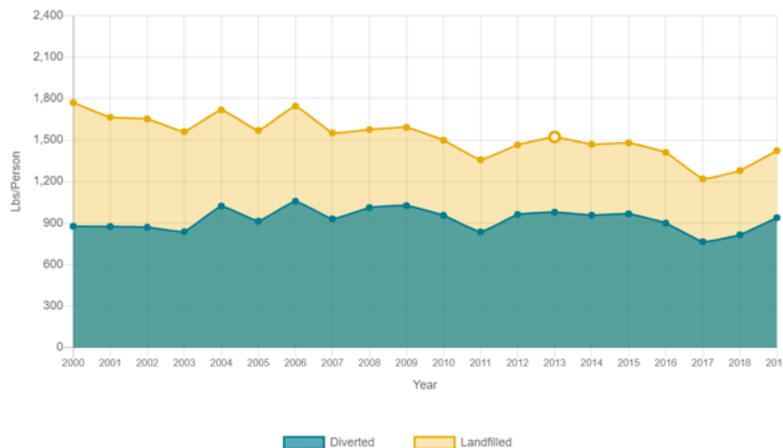
In 2019, Stanford recovered 2,500 more tons of waste than in 2018, including 177 more tons of reusable materials, 73 more tons of recyclables, 486 more tons of organics, and 1,726 more tons of construction and demolition material.

Waste Consumption Trends

Total



Per Capita



2019-2020 Highlights

[Stanford Wins Top Place for Reducing Food Waste](#)

[Students Supporting Food Recovery Increase Collection](#)

[Partnership with IDEO Promotes Reusables](#)

Living and Dining Sustainably

[Residential & Dining Enterprises \(R&DE\)](#) is home to 13,000 students and serves 18,000 meals per day across its more than 300 facilities for dining, catering, hospitality, and residences. R&DE collaborates with faculty, students, and staff to foster behavior change, reduce energy and water consumption and waste production, educate students through teaching academic classes, and integrate long-term sustainable thinking into how it operates. R&DE prioritizes local, organic, humanely raised, and fairly traded food, as well as food from family-owned farms and sustainable fisheries. R&DE's efforts directly influence student learning and the overall campus culture, as well as the lives of Stanford's students as they move into new communities after graduation.

This year, R&DE opened the largest residential project in the Bay Area, with enough beds to house 2,400 students. The four 10-story buildings each have a four-stream waste chute to promote waste sorting, and students received free composting buckets, with compostable bags supplied year round. There are specific collection points for e-waste and composting of pizza boxes on the ground floors. Students have access to a free green cleaning solution and laundry detergent in their laundry rooms; the product is made with natural ozone and safely converts back to drinkable water after seven days. An advanced lighting system controls lights in all common areas so hallways, huddle rooms, and lounges are only fully lit when students are using them.

R&DE continues to use an advanced analytics program to provide real-time insight into building operations related to energy, water, and waste. Using the tool, this year R&DE launched a new Cardinal Comfort campaign that aimed to reduce energy used for winter heating by 10% while ensuring students remain comfortable. It exceeded that goal, with a total reduction in hot water usage of 10.5%, or 4 million kBtu.

R&DE is a critical partner in achieving the university's zero waste and climate goals. Across its eateries and cafes, R&DE expanded its food waste reduction initiatives in 2019-20, utilizing multilevel strategies centered on source reduction, food waste monitoring, consumer education campaigns, and food recovery and donation initiatives. R&DE continues to partner with the Loaves and Fishes "A La Carte" food rescue program to donate excess food from dining halls, cafes, and concessions to local organizations. This year, R&DE also launched a pilot pop-up food pantry program for undergraduate and graduate students and their affiliates who self-identify as food insecure, in collaboration with the Graduate Student Council, ASSU, and the Stanford Solidarity Network. The program has distributed over 100,000 pounds of food to the Stanford community since its inception in August 2019.



Living and Dining Sustainably

Additionally, when the governor issued California's shelter-in-place mandate in March, thousands of students had to move out quite suddenly. When they returned to campus months later to officially pack up their belongings, R&DE collected more than four trailers of material to donate to Goodwill.

Over 75 students worked with R&DE in 2019-20 to perform research, test new ideas, educate their peers, and implement sustainability projects in their living and eating spaces.



2019-2020 Highlights

[Interns Take on Cardinal Comfort to Save Energy](#)

[Pop-Up Food Pantry Connects Stanford Community to Food Resources](#)

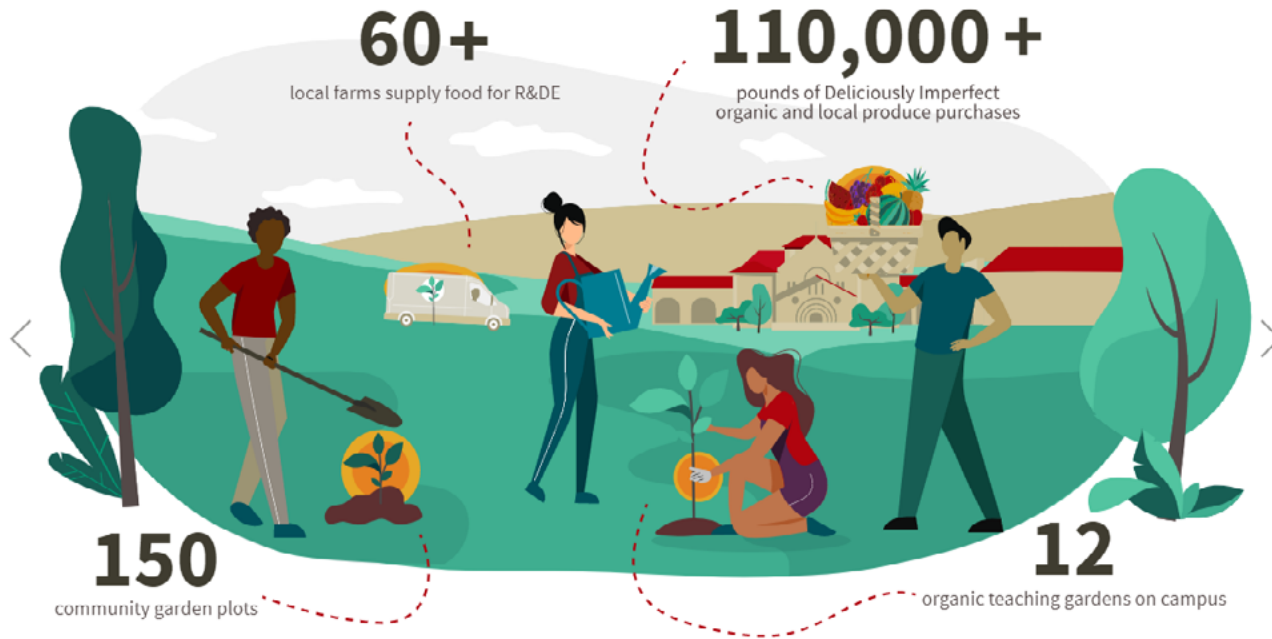
[Roble Hall is the First Landfill Dumpster-Free Residence on Campus](#)

[Stanford Wins Top Place for Reducing Food Waste](#)

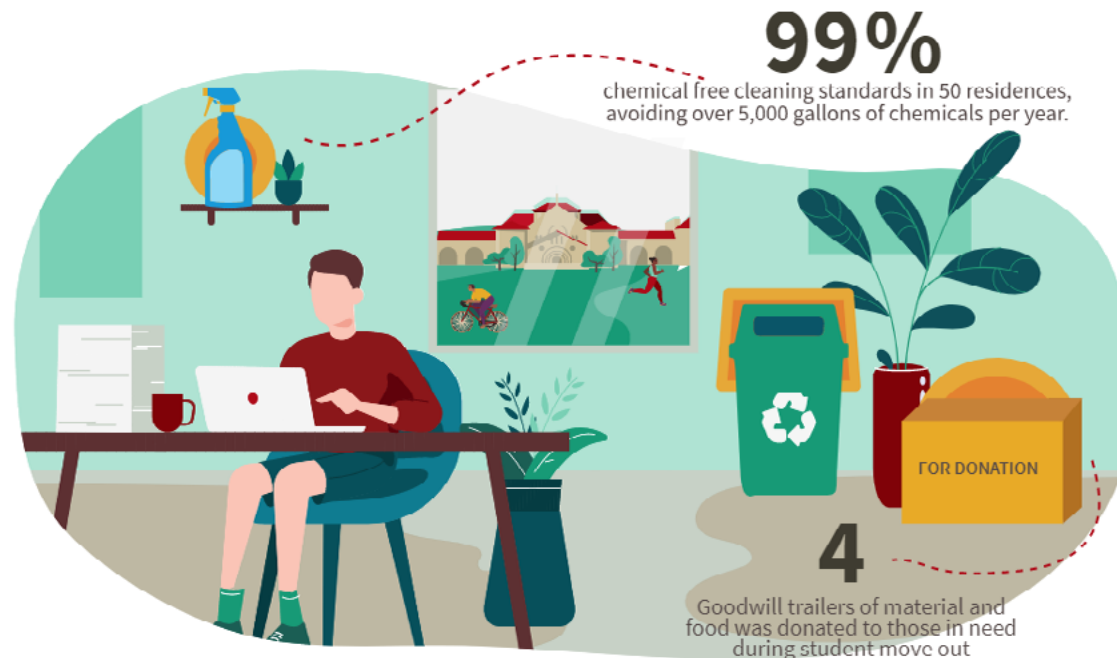
[Students Supporting Food Recovery Increase Collections](#)



Living and Dining Sustainably



2019-20 Culture of Excellence



Building Design and Construction

The built environment at Stanford is critical in supporting the academic mission, providing appealing, functional spaces that enable cross-disciplinary collaboration to connect research, practice, and action around some of the world's most pressing challenges. [The Department of Project Management \(DPM\)](#) oversees major construction on campus and continually works to elevate the application of sustainable practices in building and design. Its [holistic method of benchmarking](#) drives improvement so that each new building coming online performs better than the last. Lessons learned from post-occupancy studies of each new building inform the target-setting process for future buildings.

In 2019, three major research buildings—Bass Biology, Chem-H, and the BioMedical Innovations building—came online and help showcase Stanford's infrastructure innovations, with sustainability features like LED lighting, occupancy sensors, and low-flow water fixtures included throughout. While construction paused in many areas during shelter-in-place, the new Escondido Village residences, designed for sustainability, opened on time in summer 2020. Stanford's Project Delivery Process highlights its commitment to developing best-in-class facilities that foster connections among researchers while maximizing sustainability and continually seeking to improve. For example, sustainability and resiliency



best practices have been among the early considerations for the new Bridge Building at the former Herrin site, set to come online in 2022.

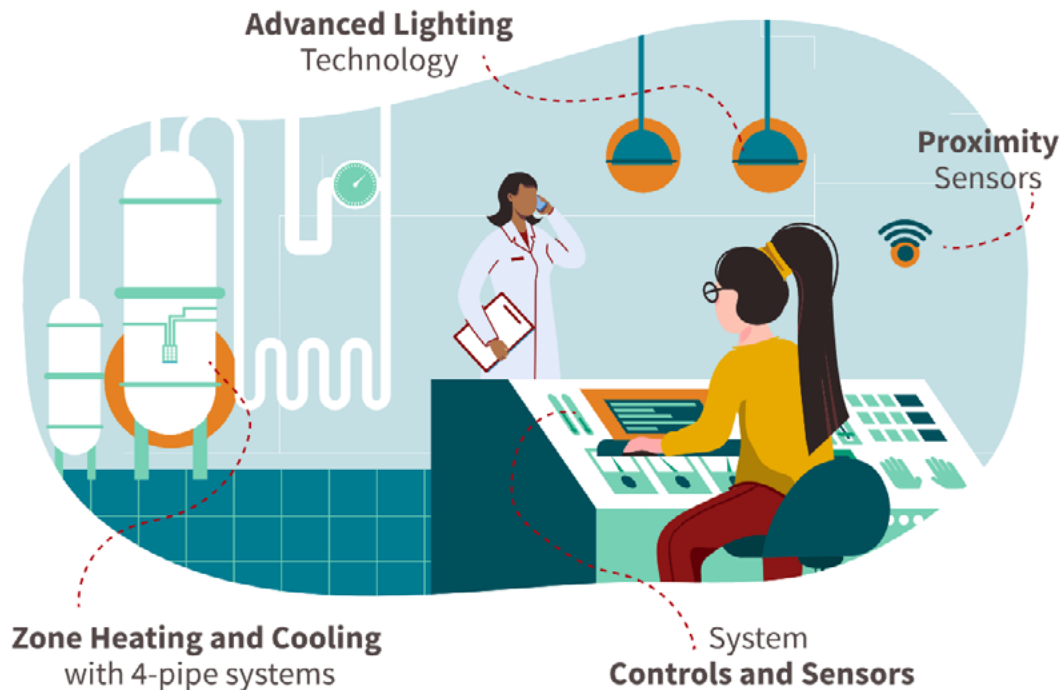
Operations teams collaborate with the building design team to understand energy consumption and energy targets for all buildings, working closely together to ensure buildings perform as designed. Because of the coordinated approach toward achieving sustainability targets, Stanford buildings operate at a [LEED gold standard](#).



Building Design and Construction

In 2019-20, in the face of COVID, construction continued on the new Escondido Village residences, which feature a number of sustainability components and constitute the largest residential project in the Bay Area

Strategies that Contribute to Efficiency in New Construction:



2019-2020 Highlights

[Escondido Village Opens with Sustainability in Mind](#)

[Team Science Complex Fosters Collaboration](#)

[BioMedical Innovations Building Reflects Best Practices for Lab Design](#)

Sustainable Transportation Options

Stanford is committed to achieving the “No Net New Commute Trips” standard, which is defined by the Stanford Community Plan as no additional trips above a measured baseline during peak commute hours in the campus commute direction. Stanford has met, and plans to continue to meet, this standard, as required under its [General Use Permit](#).

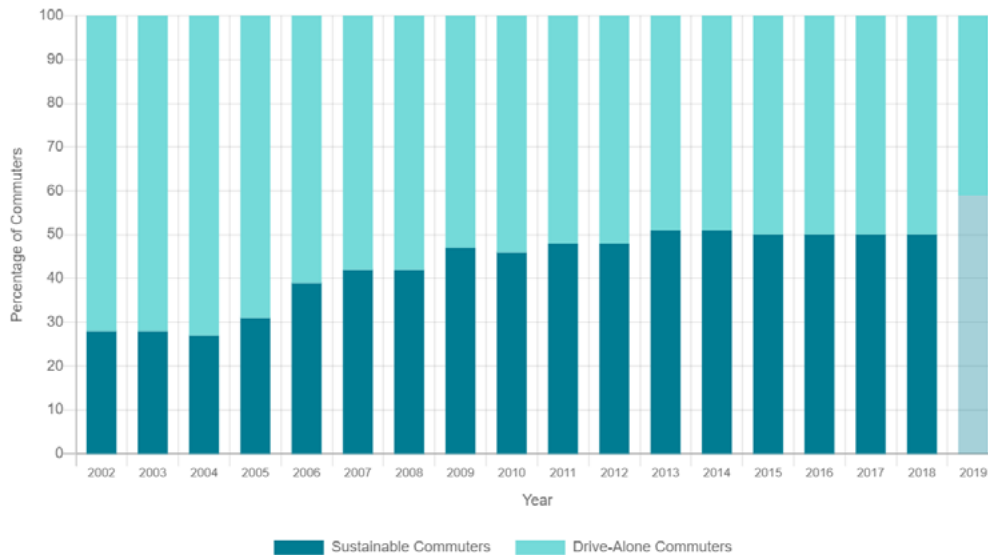
The [Transportation Demand Management \(TDM\)](#) program develops innovative approaches for getting students, faculty, and staff to campus by means other than single-occupancy vehicles. Spearheaded by Stanford Transportation, the TDM program aims to reduce university-related traffic impacts, emissions, and parking demand while the campus continues to grow.



Sustainable Transportation Options

In 2019, some 59% of campus commuters (employees and commuting students) utilized sustainable transportation options on a regular basis.

Sustainable Commute Rate



2019-2020 Highlights

[Stanford Transportation's Hat Trick: Platinum Level Bicycle Friendly University for a Third Time](#)

[Sustainable Transportation Encouraged at New Redwood City](#)

[Stanford's Commute Club Members Enjoy Treats](#)

Expanded Sustainable Transportation Options

2019-20 Sustainable Transportation Achievements

