



Sustainability at Stanford

2018-19 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

Thank you for your interest in our 2018–19 annual report. Together at Stanford, we continue to tackle new challenges with innovative and practical solutions to model an environmentally sustainable institution to help our campus, local, and global community understand, mitigate, and adapt to the changing climate. While the report provides an overview of significant milestones, highlighted links will connect you to examples of the pervasive commitment to and thriving culture of sustainability at Stanford University.

Today, the university functions as a living laboratory of sustainability. Unique Stanford landmarks like the [Central Energy Facility \(CEF\)](#), the [William and Cloy Codiga Resource Recovery Center \(CR2C\)](#), and the [O'Donohue Family Stanford Educational Farm](#), serve as implementation models and learning centers for thousands of researchers and visitors from all over the world, while also providing educational experiences for our students. We have undertaken ambitious initiatives to advance progress and create a thriving environment. Testament to this vision is our commitment to function on [100% renewable electricity by 2021](#), reducing our campus greenhouse gas emissions by 80%. We are also preparing and aligning this year for a [zero waste Stanford by 2030](#), defined as 90% diversion from the landfill or higher, using the principles of sustainable materials management.

As Stanford works to accelerate progress beyond these goals, it has incorporated sustainability into multiple strategic themes outlined in [the vision for the university's future](#). Stanford's robust and holistic approach to sustainability actively supports its mission to benefit the

region and the world. As an example, the university recently offered a package of [community benefits addressing its long-term](#)

[land use permit](#), including housing and transportation solutions, reflecting the university's values of sustainable development and service to the community.

These and the additional 2018–19 academic year milestones outlined in the report that follow underscore our pledge to meaningful progress and applied innovation. More than 35 academic and operational departments work together to run sustainability, efficiency, and conservation programs that dramatically and collectively reduce Stanford's environmental footprint, while maintaining a #1 spot as a research university among 940 reporting institutions of higher education. This annual report highlights and celebrates our collective work, deep partnerships, and our resilient future.

With gratitude and regards,



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



2018-2019 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 88% across academia, administration, operations, and coordination criteria, Stanford earned the **highest place among research institutions in the United States, among 940+ reporting institutions.**

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



2018-2019 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 \(SDGs\)](#), which countries will aim to advance progress toward. 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 aligns with the various SDG goals.



Bridging Disciplines in Research and Academia

Stanford draws on a breadth and depth of expertise to advance visionary solutions to address climate change and cultivate a robust understanding of the natural world for a sustainable future. From engineering and business, to law, natural sciences, and the arts, leaders in their fields are collaborating to tackle climate impacts from a holistic perspective.

This interdisciplinary approach of the last two decades helps to generate flexible, scalable solutions for maximum impact in our region and world. Across disciplines, Stanford has expanded its support for community engaged teaching on sustainability, enhancing student learning while also directly adding value to regional sustainability programs. In 2018-19, more than 20 community-engaged learning courses connected Stanford students with local organizations to develop innovative solutions.

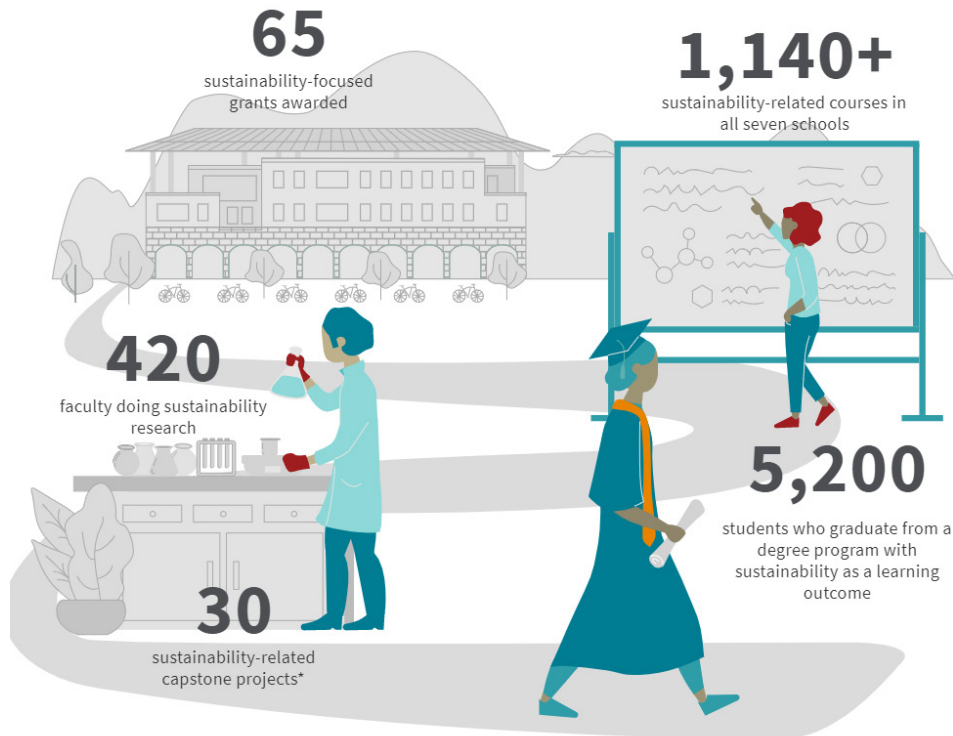
This deep collaboration, in a transformative research and learning environment, influences generations of scientific and policy leaders. The university's commitment to sustainability in the Long Range Plans ensures this collaborative spirit will continue in the decades ahead, as the university empowers ambitious research and partnerships that contribute to a deeper understanding of sustainability.



Bridging Disciplines in Research and Academia

Sustainability is highlighted as a programmatic activity in two strategic themes of the [Long Range Plan: Advancing and Bridging Disciplines](#), and [Building Pathways to Impact](#).

Across all seven schools at Stanford, sustainability-related efforts in 2018-19 included:



* Only capturing capstones offered through the School of Earth, Energy, and Environmental Sciences

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](#)

A Carbon-Free Energy Supply for an Electrified System



The university has taken progressive, cutting-edge steps in managing its energy supply. After implementation of the [SESI program](#) in 2015—which transitioned the campus to an electrically-powered heating and cooling system—the campus is well on its way to accomplish its target to reduce Scope 1 and Scope 2 emissions by 80% in advance of the 2025 deadline. This also falls decades ahead of California’s statewide requirement that electricity be [100% carbon-neutral by 2045](#). To accomplish this, in 2021 a second solar generating station will come online and increase the university’s [renewable electricity portfolio to 100%, up from 69% today](#).

Stanford’s approach to reducing greenhouse gas emissions while meeting the energy supply needs of the campus was first detailed in 2008, through its [Energy and Climate Action Plan](#). The plan has enabled significant results that leave a small percent of Scope 1 and 2 emissions remaining, for which reductions are still under evaluation. Analysis began this year to understand and strategize solutions to eliminate these remaining emissions sources, beginning with an [inventory of Stanford’s building-level natural gas and steam equipment](#).

With a renewable electricity-based energy supply system, Stanford can decarbonize buildings by avoiding natural gas and steam equipment in new buildings, and systematically phasing out this equipment in existing buildings over time as informed by the equipment inventory completed in spring 2019.



A Carbon-Free Energy Supply for an Electrified System

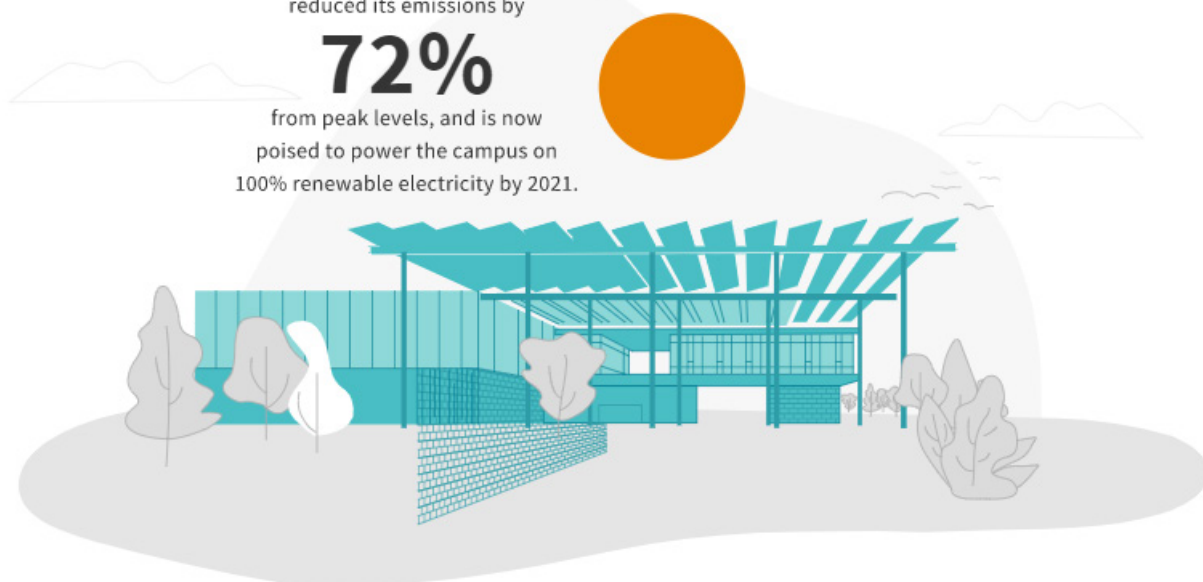
By 2018, Stanford reduced emissions 72% below peak levels, poised to be 80% below peak ahead of target. This emissions reduction is possible due to the campus moving toward 100% renewable electricity by 2021.



By 2018, Stanford reduced its emissions by

72%

from peak levels, and is now poised to power the campus on 100% renewable electricity by 2021.



2018-2019 Highlights

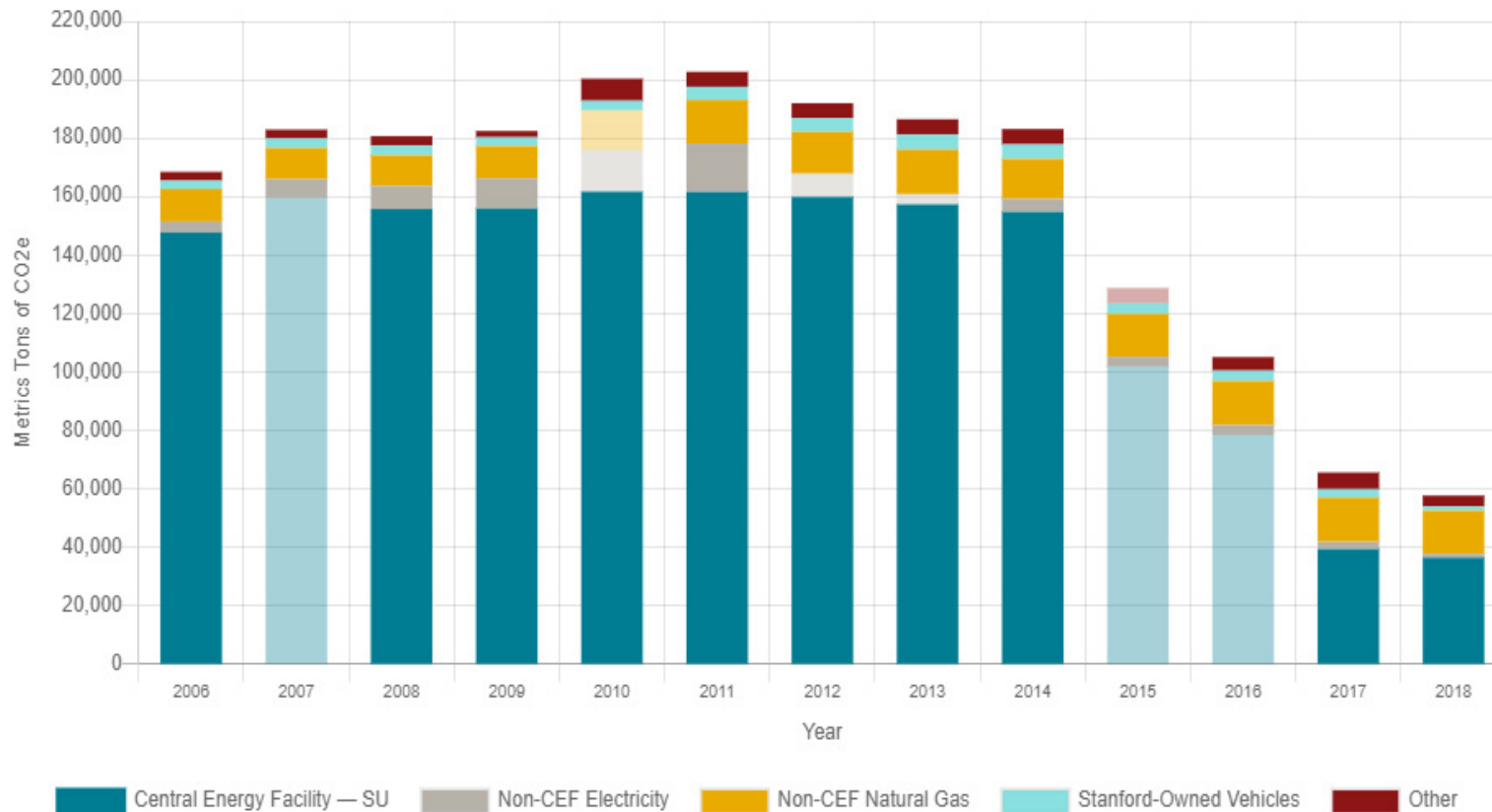
[Stanford University Designated Pac-12 Champion in EPA's Green Power Challenge](#)

[Understanding the Last 10%: A Detailed Inventory of Scope 1 and 2 Emissions](#)

[Local Artist Inspired by SESI](#)

A Carbon-Free Energy Supply for an Electrified System

Publicly Reported Historical GHG Emissions



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



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 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.

Through the work of its water conservation program, the campus has reduced total potable water use by 44% since its start in 2001. While 2018-19 was among the wettest years on record, conservation efforts implemented during the extended four-year drought that ended in 2017 continue to deliver long-term savings. All major campus water customers have achieved [significant reductions in water consumption](#) compared to the pre-drought baseline of 2013. Future water planning efforts continue through the active development of a Sustainable Water Management Plan, for which WRCI completed nearly 20 technical studies related to alternative water supplies, demand projection, and water conservation.



Stewarding Vital Water Resources

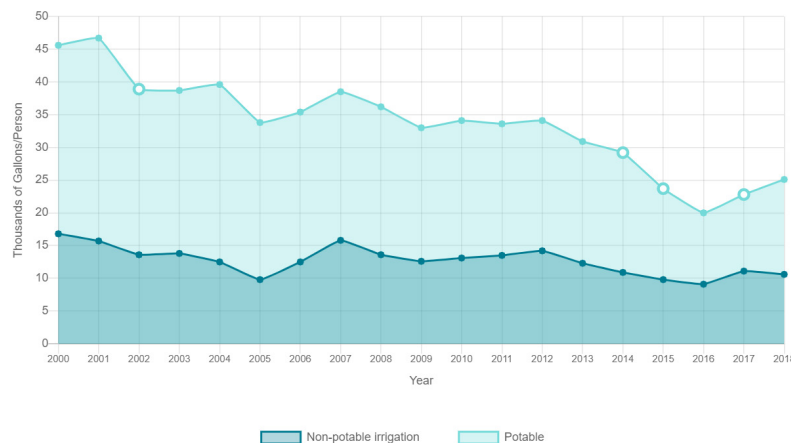
In 2018, potable water use decreased by 3%, and non-potable water use decreased by 1% from the previous year.

Water Consumption Trends

Total



Per Capita



2018-2019 Highlights

[Stanford Celebrates Earth Day with Educational and Service Activities](#)

[Stanford Removes Lagunita Diversion Dam](#)

[“NO-DES” No-Waste Water System Flushing Process Pilot Offers Big Savings](#)

[Breakthrough Year for Codiga Resource Recovery Center \(CR2C\)](#)

Sustainable Materials Management and Zero Waste

Managing the campus' resources to encourage reuse, waste reduction, diversion, and environmentally conscious purchasing remain crucial to Stanford maintaining its role as a leader in sustainability. Stanford is actively progressing on its path toward zero waste to meet the 90% diversion or higher target established through the Long Range Planning Process.

While future planning is wrapping up, current efforts to minimize campus waste have had substantial impact. Through expansive reuse, recycling, and composting programs, the university has significantly reduced the total amount of material Stanford sends to landfill: 8,509 tons in 2018, for a diversion rate of 64%, compared to a peak of 14,000 tons sent to landfill in 1998.

For the Zero Waste Plan and Feasibility Study, Stanford worked to identify source-reduction efforts and efficiency opportunities throughout its system. In developing the plan and feasibility study, the university has undertaken a comprehensive analysis of its waste composition today, and potentially viable solutions that focus on waste reduction and reuse, driving toward a closed-loop system. It highlights responsible purchasing, extensive reuse, easy recycling, expanded composting, and minimal landfill as critical components for increased diversion and efficiency at Stanford.

Because responsible purchasing is so interwoven with waste minimization and efficient resource management, a partnership with Procurement Services has already led to an updated [Responsible Purchasing Guidelines](#) as a resource for the campus community. Additional solutions under consideration include expanded common area waste stations, efficiencies in custodial services, and combined paper/plastics, metal, and glass (or single-stream) recycling. Some of these strategies are already successfully being utilized at the Redwood City campus.

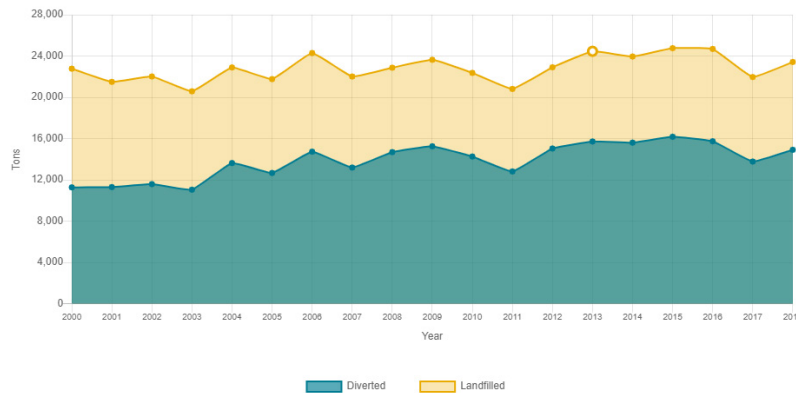


Sustainable Materials Management and Zero Waste

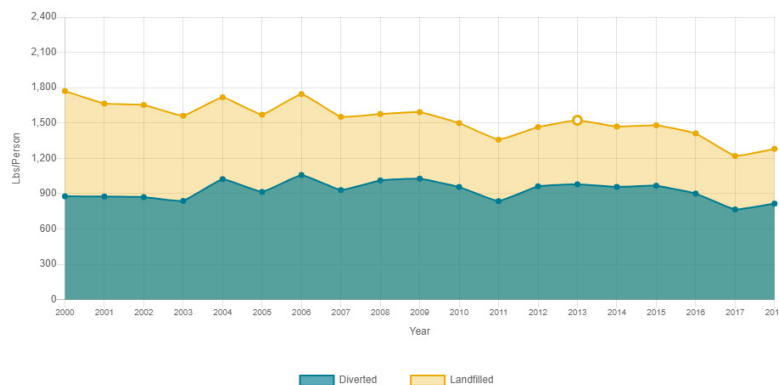
In 2018, Stanford recovered 1,253 more tons of waste compared to 2017, with notable diversion increases in construction and demolition waste, furniture, and cardboard.

Waste Consumption Trends

Total



Per Capita



2018-2019 Highlights

[New Programs Underway in Redwood City](#)

[Waste Characterization Study Provides Detailed Insight into Landfill Composition](#)

[Stanford Remains Committed to Zero Waste](#)

Expansive Evaluation, Conservation, and Engagement Programs

Sustainability is a thread that weaves through all aspects of life on campus, and the solutions implemented help Stanford to lead by example and highlight conservation tactics that advance progress. The Sustainability and SEM Business Services group (SSBS) serves as the central aggregator of campus sustainability programs for both infrastructure and behavior, which combine to reduce the university's environmental footprint in a systematic way. From supporting student projects and a robust internship program, to stewarding Stanford's role as a leader among peer institutions, SSBS provides [comprehensive and dynamic program opportunities](#) that nourish a culture of sustainability across campus. Founded in 2008, SSBS continually assesses opportunities for improvement. This year, office staff participated in the [sustainability design team](#) as a part of the committee working to shape the future of sustainability through the [Long Range Planning process](#).

This focus on planning and governance allows for holistic analysis of campus performance and detailed planning for improvements. In 2018-19, the office undertook planning support for two key sustainability targets: [becoming 80% carbon free by 2025](#) and [zero waste \(defined as 90% diversion or higher\) by 2030](#). In addition to these campus-wide plans, SSBS also undertook strategic evaluation of its [business systems group](#), which manages thousands of utility data points

to monitor and analyze consumption and trends for maximum efficiency. The program offers unparalleled transparency into [campus performance](#) via 135 building dashboards and 25+ systems dashboards.



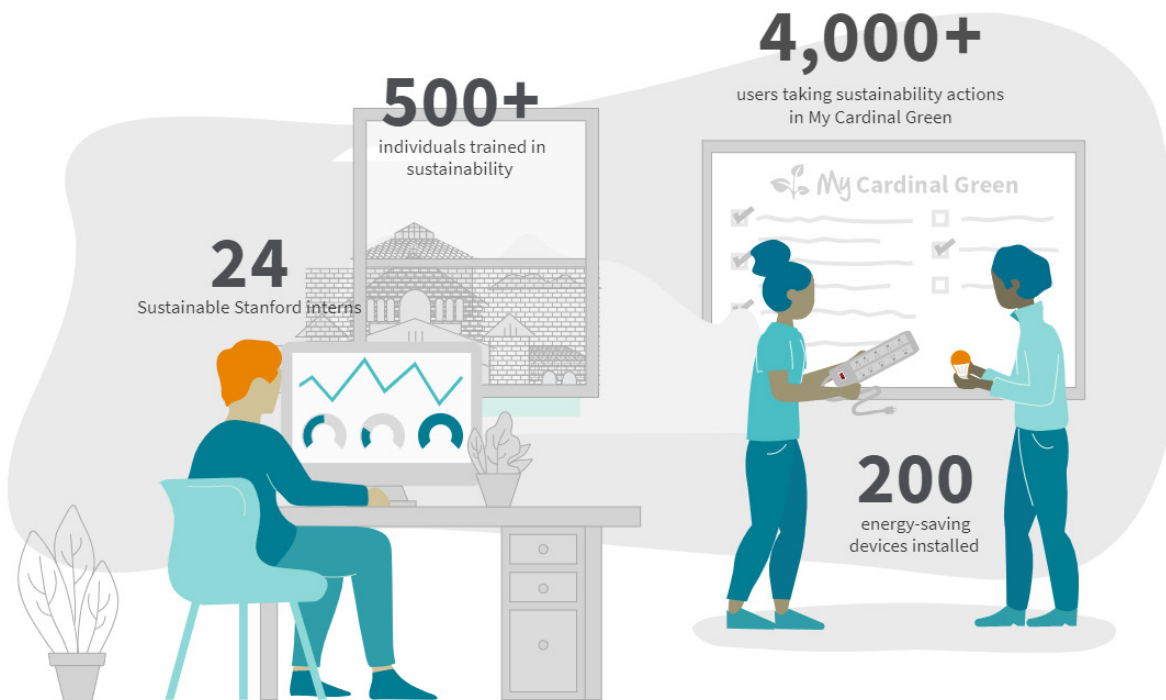
While individual departments manage specific infrastructure programs, since 2017 the [My Cardinal Green program](#) has provided a streamlined pathway for over 4,000 members of the campus community to engage with and practice sustainable behaviors. The program provides personalized conservation suggestions for students, staff, and faculty, with actions included from more than 10 campus partner groups, including targeted opportunities for [labs](#), [offices](#), [IT infrastructure](#), [events](#), and [custom student projects](#).



Expansive Evaluation, Conservation, and Engagement Programs

My Cardinal Green has reached 4,000 participants. Through SSBS' comprehensive conservation programs, savings in 2018-19 total nearly \$950,000, on par with small building retrofit projects.

Streamlining and Digitizing Sustainability



2018-2019 Highlights

[Spring Lab Share Supports Reuse, Saves Over \\$140,000](#)

[My Cardinal Green Boosts Sustainability](#)

[Sustainable Purchasing Tools](#)

[Senate Faculty Hears Update on Sustainability](#)

Pioneering Energy Management Solutions

Reducing energy use in existing buildings is one of the primary pillars of Stanford's Energy and Climate Plan, and a cornerstone of its leadership as a sustainable campus. Meeting the energy needs of an enterprise research organization requires a comprehensive, innovative approach to do so in a sustainable way. 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. FEM coordinates with stakeholders across campus strategically to advance programs and initiatives that realize high-performance outcomes.

While the Stanford Energy System Innovations (SESI) project enabled significant reductions, demand-side management—through programs like the [Whole Building Energy Retrofit Program \(WBERP\)](#) and [Energy Retrofit Program \(ERP\)](#)—accounts for nearly 10% of the savings, for a cumulative savings of over \$14.5 million since the baseline year. Another critical program that drives conservation is the [Integrated Controls and Analytics Program \(iCAP\)](#). The program streamlines diverse energy monitoring and controls platforms into a single enterprise system, allowing facilities teams to more adeptly

manage utility consumption. Through iCAP, flexible, customized applications help to maximize savings with greater accessibility and performance insights. iCAP has also helped Stanford grow as a leader within the “Smart Campus” space. The program has ensured that Stanford's operational efforts complement the highly regarded academic research programs exploring the Internet of Things and Artificial Intelligence. iCAP team leaders collaborate with the most innovative commercial property owners from around the world to identify, test, and vet new building automation technologies that will make our facilities more productive for occupants and more efficient to operate.



Pioneering Energy Management Solutions

In 2018-19, an iCAP retro-commissioning project at Knight Management Center using advanced analytics to optimize performance is on track to save over \$75,000 per year in energy costs. As of 2018, Stanford has reduced energy intensity on campus 26% from a 2000 baseline.



2018-2019 Highlights

[ERP Lighting Project at Green Library Results in Significant Energy Savings](#)

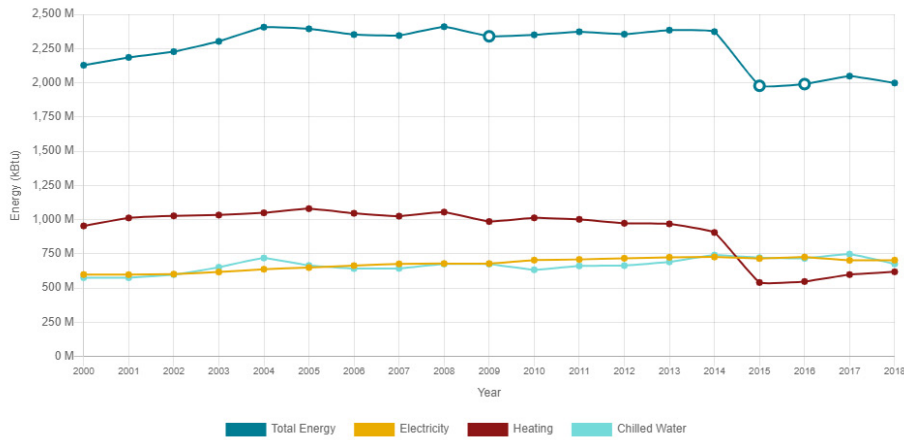
[Sustainable IT Initiatives Result in Energy and Cost Savings](#)

[New Smart Thermostats at Munger Offer Reduced Energy Based on Occupancy](#)

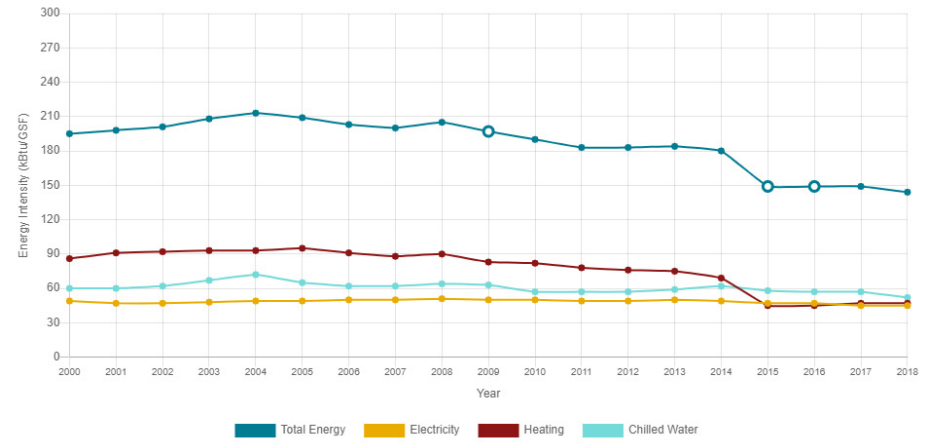
Pioneering Energy Management Solutions

Energy Demand Charts

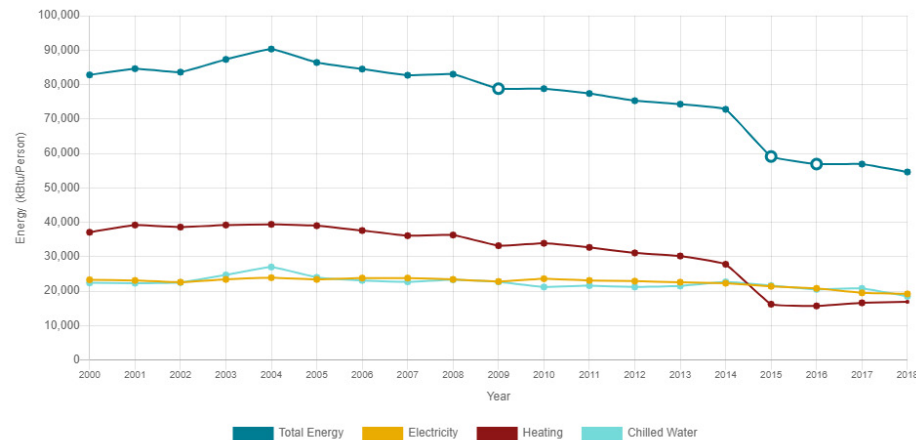
Total



Energy Intensity



Per Capita





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, 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. Across its eateries and cafes, R&DE dramatically expanded its food recovery and donation programs this year. Working with the Silicon Valley Food Rescue, the organization implemented an "A La Carte" food rescue program, which donates excess food from dining halls, cafes, and concessions to local organizations. Coupled with source reduction strategies that weigh excesses from meals to inform proper ordering, R&DE is finding new and innovative ways to reduce food waste.

This systematic analysis to identify opportunities for efficiencies is a focus across R&DE operations. An advanced analytics program has provided a new level

of insight into building operations related to energy, water, and waste.

This year R&DE has experimented with a number of new technologies, including smart thermostats, sensors that track air quality and thermal comfort, and they even worked with students to develop their own sensors that monitor waste production and service. Additionally, a comprehensive survey was undertaken of more than 1,000 graduate students to get an in-depth look at how they manage their waste, how much they are willing to sort, and how frequently and how far they are willing to travel to dispose of it.



Living and Dining Sustainably

Over 75 students worked with R&DE in 2018-19 to perform research, test new ideas, educate their peers, and implement sustainability projects in their living and eating spaces.



2018-2019 Highlights

[Residential and Dining Enterprises \(R&DE\) Receives Broad Sustainability Recognition](#)

[Student Interns Develop Innovative Waste Technology](#)

[Give & Go Offers New Life for Over 64 Tons of Unwanted Items](#)

[A La Carte Food Rescue Program Helps Reduce Community Hunger](#)



Living and Dining Sustainably

2018-19 Culture of Excellence



60+

local farms supply food for R&DE

160

community garden plots

12

organic teaching gardens on campus

50,000+

pounds of Deliciously Imperfect organic and local produce purchased



99%

chemical free cleaning standards in 41 residences, avoiding over 3,000 gallons of chemicals per year

64

tons of material and food was donated to those in need during student move out

6,100

cubic yard reduction in landfill capacity due to increased recycling and composting behavior

Enhancing Building Design and Construction

The built environment at Stanford is critical in supporting the academic mission, providing collaborative 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.

One of the most expansive projects in the university's history has been construction of a new satellite campus in Redwood City, which opened in March 2019. The 35-acre site includes four new buildings that house more than 2,500 staff, as well as a recreation center, café, parking garage, and childcare center. A “mini-Central Energy Facility” powers the facilities using heat recovery for heating and cooling purposes, and incorporates the latest in sustainable design. Low-flow fixtures, LED lights with sensor technology, automated mechanical shades to conserve energy, and recycled water for irrigation are just some of the components that contribute to this [state-of-the-art campus](#).



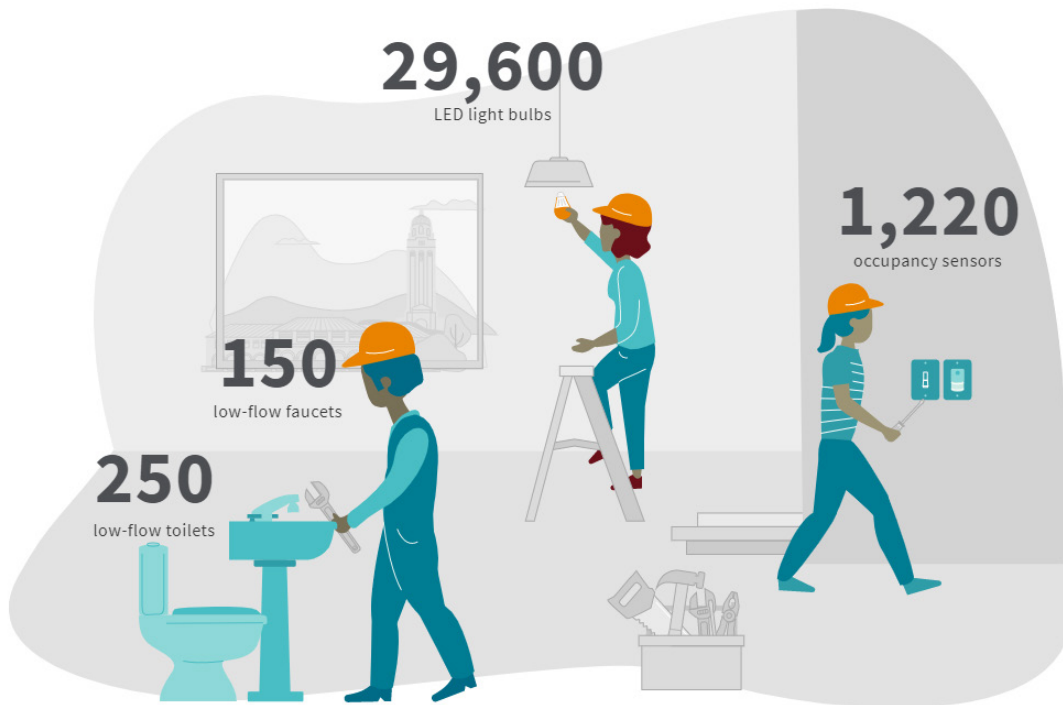
For all projects coming online, operations teams collaborate with the building design team to understand energy consumption and energy targets for all buildings, working closely together to ensure buildings perform as designed. Because of the coordinated approach toward achieving sustainability targets,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



Enhancing Building Design and Construction

In 2018-19, eight [new buildings and a renovated outdoor amphitheater](#) came online and met Stanford's whole building, energy performance targets.

Sustainable Features of New Construction in 2019 Include:



2018-2019 Highlights

[Stanford Redwood City Recognized for Best Practices in Sustainable Design](#)

[Escondido Village Graduate Residences Incorporate Heat Recovery and Green Cleaning Program](#)

[Frost Amphitheater Renovation Enhances Sustainability](#)

Expanded 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, and plans to continue to meet, this standard as proposed under its [General Use Permit](#).

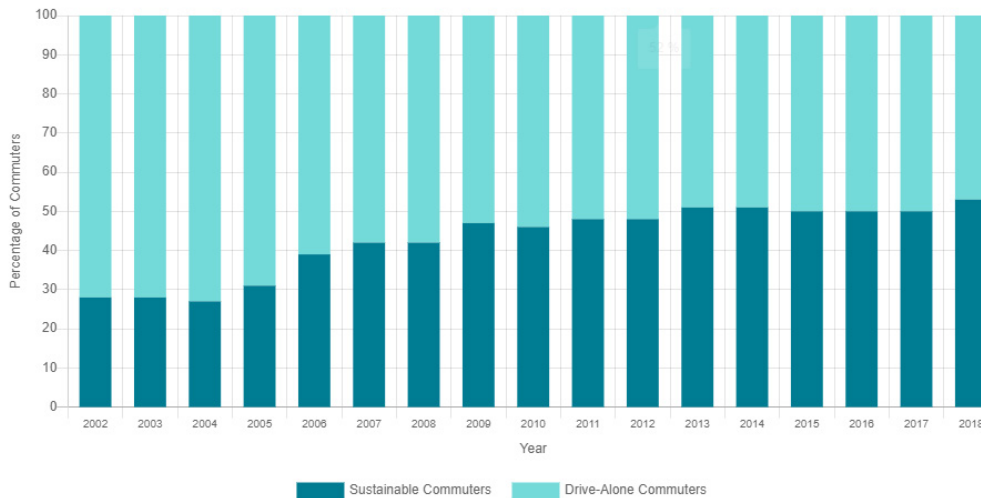
The [Transportation Demand Management \(TDM\)](#) program develops innovative approaches for getting students, faculty, and staff to campus by means other than single-occupancy vehicles. Spearheaded by Stanford Transportation, the TDM program aims to reduce university-related traffic impacts, emissions,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



Expanded Sustainable Transportation Options

In 2018, 58% of campus commuters (employees and commuting students) utilized sustainable transportation options on a regular basis.

Employee Drive-Along Rate



2018-2019 Highlights

[Stanford Greens Its Fleet Operations, Reduces Emissions](#)

[More Than 3,500 Commuters Participate in Bike to Work Day](#)

[Stanford Transportation Offers Weekly Prize Drawings for Carpooling](#)

Expanded Sustainable Transportation Options

Reduced Environmental Impact from 2018-19 Transportation

