

# R&DE Stanford Dining Food Waste Prevention Playbook: Operationalizing Best Practices

## The Big Picture: Our Strategic Roadmap for Minimizing Food Waste

### COMMIT.

It all starts with dedication at the leadership level. In 2019, Eric Montell, Executive Director of R&DE Stanford Dining, created a Food Waste Reduction Task Force. It includes key expertise from across the department: culinary, sustainability, food choice architecture, management, and research. Their objective was to develop a Food Waste Reduction Strategy and action plan for the years to come. In April 2021, incorporating the recommendations of our partners and our task force--and as part of our overall sustainable food program, One Plate, One Planet (see sidebar on p.8) and our adoption of the Menus of Change Principles of Healthy, Sustainable Menus--we built upon our long-standing initiatives reducing food waste by committing to further reduce Stanford Dining's food waste by 25% by the end of 2022.

### COLLECT AND ANALYZE DATA.

Having both sufficient quantity and quality of food waste data enables us to make better decisions. After all, you can only manage what you measure.

### CULTIVATE A CULTURE OF FOOD WASTE PREVENTION.

We hold a robust suite of annual trainings for our entire staff: from the climate impacts and the “why” behind food waste prevention, to the inspiring potential of creative culinary upcycling, to the use of technological tools such as Leanpath for tracking waste over time. We acknowledge and identify success cases and innovative leaders within our organization, and share and replicate best practices within our units. This approach produces the greatest effect in terms of cultivating the organization's culture of food waste prevention.

Food Waste Reduction Task Force leaders share high-level reviews of the progress made during Community Roundtable discussions, to celebrate and learn from the impact we are having across the units.

This culture applies to our students as well, who help us see through collaborative research that, although signage has not significantly changed food waste-related behavior, having signage in the dining halls is an important signal to everyone in our community that minimizing food waste is an essential element of Stanford Dining's culture. For this reason, signage remains a key part of our overall strategy.



## OPERATIONALIZE BEST PRACTICES.

We both learn from and contribute to the growing knowledge on effective food waste reduction strategies, through academic and operational research studies. These allow us to identify and test the best ways to prevent food waste at the source and reduce it throughout the entire value chain. This strategy has a particular focus on what's called "food choice architecture"--how we design dining hall environments to make it easier for students to take only the amount they need and want to eat, and to make it more difficult to generate waste. One example is trayless dining, a widely used best practice throughout many college dining programs in the nation, for its proven ability to reduce food and water waste. (Trays are available to students upon request.) Check out our [Food Choice Architecture Playbook](#) to read the full set of strategies for making healthy, sustainable choices the easy choices. Ultimately, we translate food waste-related research into programs; pilot and test them to ensure their feasibility and impact; then replicate, standardize, and continuously improve them at scale across our entire dining ecosystem.

### **Be sure to read our [Food Choice Architecture Playbook](#).**

This is our compilation of data-driven strategies for designing dining hall environments to optimize health and sustainability, with an emphasis on reducing food waste and advancing plant-forward menus.

## ENGAGE STUDENTS.

These efforts include: real-world opportunities for students to collaborate on research and education; participation in food waste audits; volunteer positions with our partner organization, the student-led group Stanford Food Recovery, to support food donations to food-insecure individuals and families in the Bay Area; and clear, compelling signage when they enter the dining halls and when scraping their plates into the compost bin.

Our food waste prevention strategies and target address both pre- and post-consumer food waste reduction. (See sidebar.) That said, our food waste audits in the dining halls have indicated that the greatest source of food waste is pre-consumer (operational), and the majority of pre-consumer waste (80-90%) is due to overproduction. So, in terms of dedicating resources most effectively for impact, pre-consumer waste is the greatest opportunity we have.

For this reason, **this playbook focuses particularly on operationalizing best practices.** You will see, however, that **the focus on operational strategies is deeply interconnected with all the other elements of our overall strategic roadmap, and that we work simultaneously to reduce both pre- and post-consumer food waste.**

### **What's the difference between "pre-consumer" and "post-consumer" food waste?**

As defined by LeanPath:

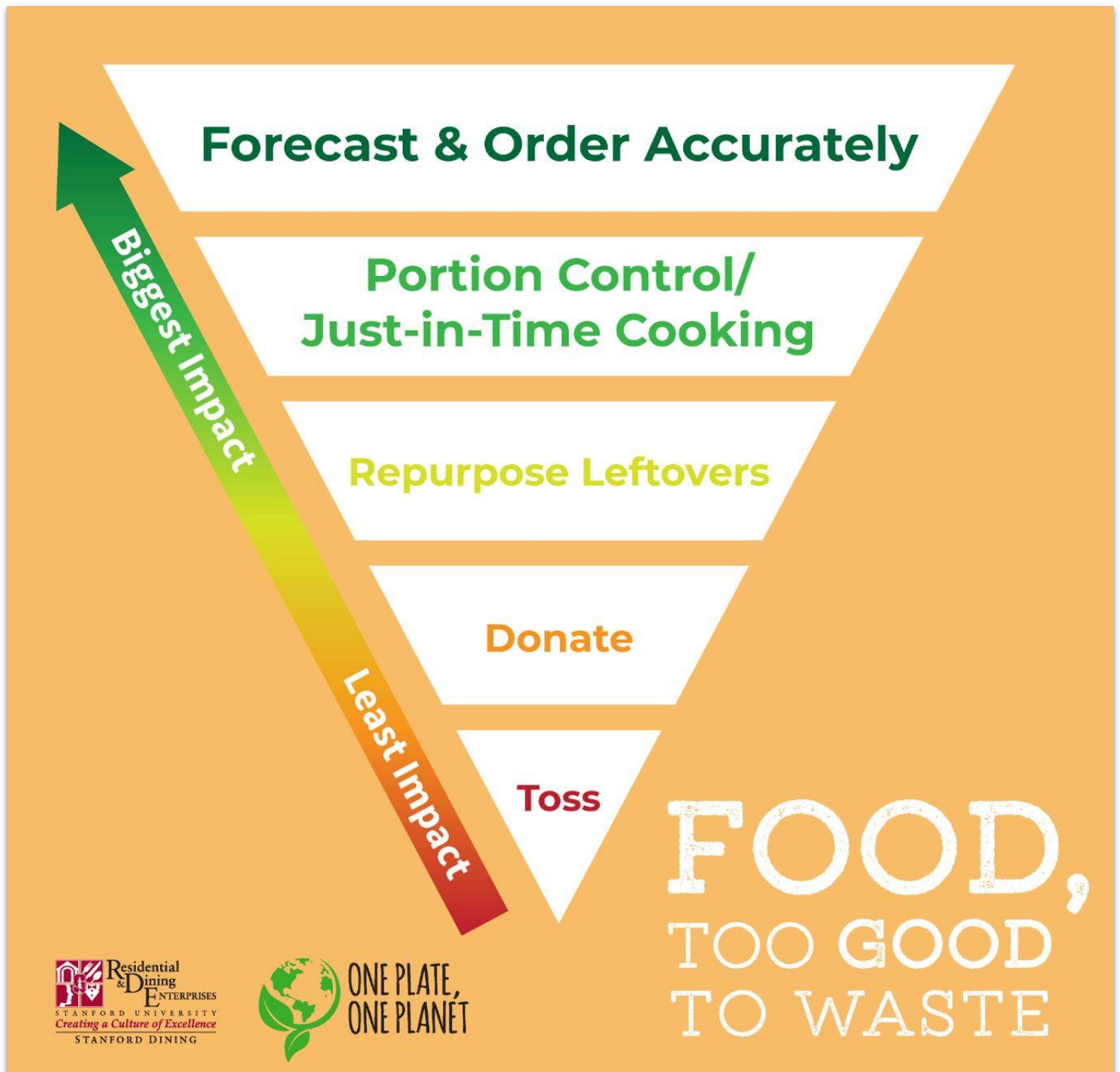
**"Pre-Consumer Food Waste** is food waste discarded by staff within the control of the foodservice operator. This includes all waste in the back of the house including overproduction, trim waste, expiration, spoilage, overcooked items, contaminated items, and dropped items. It also includes all waste in the front of the house that has remained under the control and custody of the food-service operator, including items on cafeteria stations such as salad bars, steam wells, self-serve deli stations, misordered product (e.g. erroneous grill orders never served), and expired grab & go items..If an item has been sold or served to a customer and is then discarded it is no longer pre-consumer waste."

**"Post-Consumer Food Waste** is food waste discarded by customers/guests/students/patients/visitors after the food has been sold or served. This waste is sometimes referred to as "plate waste" or "table scraps" and the decision to discard it (or leave the food on the plate) is made by the consumer rather than the foodservice operator."

# Operationalizing Best Practices: Strategies for Success

How will we reach our target? Through the core set of data-driven, interconnected strategies described in this document.

Inspired by the clear framework for focus that the U.S. Environmental Protection Agency (EPA)'s Food Recovery Hierarchy offers, we have developed our own hierarchy of opportunities for impact. We group our strategies into the following categories, and **prioritize our efforts toward the interventions that have the biggest impact.**



# Forecast & Order Accurately

The top of the pyramid is all about reducing food waste at the source

## SYSTEMS INNOVATION WITHIN OUR OPERATIONS

Source reduction--lowering the total amount of surplus food generated in the first place--is by far the most preferred pathway for impact. It is our biggest area of opportunity. To reduce food waste at the source, we focus on utilizing food waste data in order to forecast and order accurately.

### **Enhance food waste data.**

- *Systematize Production Worksheets.* Capturing data on how much food was produced, repurposed, donated, and thrown away after each meal period provides valuable data on patterns in our food waste generation. This data directly informs our forecasting and ordering.
- *Optimize Leanpath.* Leanpath is a technology platform--a combined hardware and software system--used to measure and track food waste over time. It can inform decisions to support our food waste reduction goals. This cutting-edge tool is used by thousands of kitchens around the world, including Google, Sodexo, and many other university dining programs. The company is a Certified B Corp and was developed by a Stanford alum. We began using Leanpath in 2016 and have relaunched with a 2.0 program, robust training for our entire staff, and a new, streamlined set of Standard Operating Systems (SOPs) that are tailored to the unique opportunities and constraints of our dining environment.

Our Food Waste Reduction Task Force works with Leanpath to simplify and optimize the user experience for our culinary teams. This collaboration improves the quality and sustains the use of the system as an integrated part of our daily operations.

Each dining hall has a Leanpath Champion and Co-Champion, who ensure the quality of our data collection and regularly exchange success stories, lessons learned, and strategies for navigating challenges with the system.

At the department level, two Super Champions develop SOPs and adapt kitchen spaces to promote Leanpath usage. They work closely with dining hall Champion and Co-Champion teams.

Through Leanpath, we capture the financial impact of reducing food waste, to help drive economic motivation for this tool and ensure our fiscal responsibility--less food waste means less wasted time, energy, and resources as well.



“We’re chefs. By our very nature, we hate to waste food. Our food waste prevention strategies are really exciting to me personally because I grew up with parents who experienced food scarcity when they were young, even living through war times, and explained the value of not wasting food.”

Christina Betondo, Associate Director of Culinary Excellence, Co-Chair of the R&DE Stanford Dining Food Waste Reduction Task Force, Leanpath Super Champion



■ *Leverage data from Central Production Kitchen (CPK) requisitions.*

Our commissary, CPK, is where the bulk of our purchasing, menu design, and core menu production occur. It's the optimal vehicle for driving progress in our food waste reduction. Specifically, we:

- Measure changes over time of central purchases of high-greenhouse gas (GHG) emissions ingredients and products. This is important because **not all food waste has equal environmental impact**. For the sake of reducing food-related GHG emissions, the most important type of food not to waste is red meat (especially beef). So, we look particularly closely at ensuring that our protein orders are as precise as possible, so that the waste of those orders is as close to zero as possible. We do so by working with all of our executive chefs to continuously review their requisitions and adjust according to Leanpath data and operational fluctuations.
- Capture this food waste reduction, and continuously recalibrate orders and production practices based on fluctuations in needs (i.e., differences between product types, special events and numbers of guests in our dining halls; historical consumption patterns based on time of year, weather, season, exam schedules, holidays, etc.). As one example, after seeing that gallon-size bags for salad dressings (which are made-in house and distributed to all of the units) were too large, checking product use at the dining halls led to the conclusion that half-gallon bags would be better. Making this simple swap--from gallon-size bags to half-gallon--significantly reduced the amount of wasted salad dressing. As a best practice at the CPK, items are bagged in the amount they are most used, to avoid creating more plastic waste than is necessary, and to balance the dual imperatives of minimizing both packaging use and food waste.



■ *As needed, conduct food waste audits in each dining hall; leverage audit data.*

- Measure both pre- and post-consumer waste.
- Compare Leanpath records with measured food waste to ensure compliance and accuracy. These audits allow us to identify barriers and specific circumstances that prevent the use of Leanpath and to assess the quality of Leanpath data.
- In collaboration with its waste hauler, Stanford adopted the software program Zabble, which provides information each time a dumpster is serviced on its volume (fullness) and level of contamination (contents disposed of in the wrong waste stream, for example food in the landfill bin that should have been in the organics/compost bin).
- R&DE also partners with its hauler and students to provide periodic audits of Stanford Dining's landfill profile.

## Food Waste: A Prime Opportunity for Climate Action

Climate change can be overwhelming. It can make each of us feel helpless, even paralyzed about how to act. Engaging our entire staff, as well as our students, on reducing food waste is a powerful example of a concrete step that we each can take, every single day, to make a difference in the university's total carbon footprint. This "multisolving" is a perfect example of what the University's Scope 3 Emissions Program calls the "3 Es: Economy, Emissions, Experience." Lowering food waste saves money, lowers emissions, and improves diner experience (because we all feel better when less food gets wasted).

Importantly, our One Plate, One Planet program reflects R&DE's core values, and as such, so too do our food waste reduction strategies, including values such as: "Build a Sustainable Future," "Be Results Oriented," "Be Fiscally Responsible," "Lead by Example," "Communicate in an Open and Honest Manner," "Value Teamwork," "Be Innovative"--to name just a few.

Within our pillar of "climate-smart dining," reducing food waste is one of our top "GHG hotspots"--an area that's associated with high greenhouse gas emissions, but that we have the opportunity to directly impact through strategic operational shifts.. Other elements of our emissions are further away from our direct sphere of influence--still important to work on, but not as readily actionable.

Why so much focus on reducing food waste? Project Drawdown ranks reducing food waste the **#1 solution for reversing global warming**. Food waste accounts for about 8% of total global GHG emissions. This is both concerning and encouraging--an inviting opportunity for impact. With our membership in Drawdown Labs, we have built on our long-standing initiatives reducing food waste by **committing to further reduce Stanford Dining's food waste by 25% by the end of 2022**. Our partnership in Drawdown Labs will help us learn and shape not only long-term food waste targets but broader food-related climate targets over the months to come.





# Portion Control/Just-in-Time Preparation

## Leveraging expertise on food choice architecture and behavioral research

No one wants to waste food. So why does it occur? That's the thrust of a large body of academic research that we learn from and also contribute to, especially through our participation in the Menus of Change University Research Collaborative (MCURC) and our leadership of the Stanford Food Institute..

### **PORTION SIZE STRATEGIES.**

In addition to focusing on source reduction to minimize pre-consumer food waste, we also aim to create a dining environment that encourages students to take appropriate portions in order to reduce the amount of food that goes uneaten on their plate (post-consumer food waste). The holistic approach to designing health and sustainability into our operations is detailed in our Food Choice Architecture Playbook, which outlines the numerous nudge strategies we've implemented across Stanford Dining. For example, research indicates that going trayless, using smaller plates, and serving moderate portions can reduce the amount of food taken by students in all-you-care-to-eat environments such as dining halls. Students are encouraged to put only what they think they can eat on their plate. They can always return to the serving line for seconds. The result is a lower chance of excess food that goes uneaten. It also encourages more mindful eating by giving students the opportunity to check in with their internal satiety cues before getting more to eat.



### **JUST-IN-TIME PREPARATION.**

We want to serve food that is fresh, prepared as close to when students are going to eat it as possible. Just-in-time preparation helps ensure that we make the amount of food that is needed to feed students as they arrive and gives us the option to flex production up or down depending on how busy the dining halls are. This strategy has the dual benefit of providing students with the freshest food possible while minimizing overproduction and wasted food on the serving line.

### **BE STRATEGIC WITH SHOULDER PERIODS.**

In between meals and during low-traffic times, we can reduce food waste by being intentional with how we present food. We develop and refine processes for consolidating food and redesigning food displays to use smaller platters during shoulder periods and low-traffic times, while ensuring enticing variety and an abundance of choice for our diners.

## ENGAGING STUDENTS IN RESEARCH THAT USES DINING HALLS AS LIVING LABORATORIES.

As co-founders of the MCURC, and as Stanford is one of the world's leading research institutions, research is in R&DE Stanford Dining's DNA. Over the years, we have engaged students in behavioral research within the dining halls. For example, we participated in a multi-site study--"Food Choice and Waste in University Dining Commons – A Menu of Change University Research Collaborative Study"--that was published in the journal *Foods*. It uncovered two strategies with big potential for reducing food waste: 1) boosting confidence in choosing a dish by increasing familiarity, since foods that were dubbed more familiar were also wasted less, and 2) reducing portion size for new dishes, as more food was wasted when someone else served a novel dish.



### Background: Our Sustainability Vision

R&DE Stanford Dining's award-winning Sustainable Food Program, One Plate, One Planet, collaborates on many aspects of complex global food systems—from equitable supply chains, climate-smart dining, and regenerative agriculture, to reducing food waste and shifting diets towards plant-forward options.

One Plate, One Planet represents these six pillars:

- climate-smart dining, especially food waste reduction and advancing plant-forward diets;
- racial equity and supporting Black businesses;
- curbing deforestation through supply chain pressure;
- thriving oceans;
- catalyzing a circular economy of food;
- and embracing systems thinking.

We believe that with each plate we serve, and each meal our students eat, we have the opportunity to create a better future for this planet together.

R&DE Stanford Dining demonstrates that sustainable, ethical, and healthy food systems can be deployed at scale, while simultaneously inspiring the next generation to improve how Earth's precious resources are managed.



Sophie Egan, MPH, R&DE Stanford Dining's Senior Advisor for Sustainable Food Systems



## Case Study: Dining Halls as Living Laboratories

The food choice and waste study published in *Foods* was the fourth multi-site research study led by the MCURC to be published in a major academic peer-reviewed journal. It highlights the importance of cross-campus research, which can improve dining hall operations at Stanford, across MCURC campuses, and beyond. The purpose of the study was to investigate the relationships of food type and personal factors with food choice, consumption, and waste behaviors of college students at all-you-care-to-eat dining facilities. The amount of food taken and wasted was indirectly measured in units relative to the plate size, using before and after photos taken by the diners themselves. Stanford was one of five colleges and universities that participated, along with UC Berkeley, UC Davis, UC Santa Barbara, and Lebanon Valley College.

Just as no chef wants to cook food that doesn't get eaten, no diner wants to waste food. It doesn't make anyone feel good. But why does it happen? Based on their analysis of the data, the researchers arrived at several key hypotheses about what's driving food waste in these contexts. These findings have led us to develop several culinary strategies to reduce food waste at the point of choice:

**Hypothesis 1. Waste is caused by uncertainty.** Participants wasted less when they had eaten the item before. They wasted less when they were more confident that they would like the item.

**Action We Are Taking:** Boost diner confidence when selecting a dish. Inspired by the MCURC study, we incorporate strategies to boost diners' confidence when making food choices, which, in turn, can reduce food waste.

For example, we invite students to try a food multiple times, in multiple recipes, as well as sampling, in order to increase familiarity with different foods being served. Though COVID has put this on hold, we see tremendous potential with this approach.

In the future, we intend to utilize our Tasting Table to provide tastings of new foods that are more likely to be wasted. In the meantime, we are encouraged by the potential of two other similar strategies. With our labeling program, we provide information on ingredients, as well as dish descriptions on point-of-service labels, to help students decide which foods they'd prefer to eat. (Reading this information helps reduce uncertainty.)



**Hypothesis 2. Waste is caused by differences in perceived/actual hunger.** “Not hungry” was the second most popular reason for leaving food on the plate but choosing based on hunger was not related to leaving food on the plate.

**Action We Are Taking:** Strategic portion design. We have long employed strategies on balanced portion size, but we see further opportunities to utilize strategic portion design. Participants in the study wasted less when someone else selected the portion for them. Through strategic portion design, we can make it easier for students to try new foods and gain the variety they’re seeking, without leading to overeating or wasting food.

**Hypothesis 3. Waste is caused by variety seeking.** More items offered in a dining facility led to more items being taken. More being taken led to more being wasted.

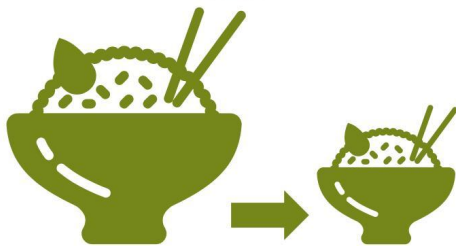
**Action We Are Taking:** We have seen in our own environment that the more different types of produce we offer, the more waste occurs. We have therefore consolidated our menu to see if less variety-seeking translates to less food waste, while keeping student satisfaction high.

Overall, this field of research is still quite young, and we look forward to collaborating with MCURC peers on further behavioral research on topics such as these, using our dining halls as living laboratories for behavior change related to reducing food waste.



## Boost Confidence in Food Choices

### Reduce Food Waste



#### Reduce Portion Size

To make it easier to try a new food.



#### Try Multiple Times in Multiple Recipes

To increase familiarity with the food.

# Repurpose Leftovers

Leveraging the culinary creativity and operational expertise of our staff

## EMPOWER CHEFS TO INTERCEPT AND DIVERT FOOD WASTE.

**Repurpose with Purpose:** We develop and refine processes for our staff to repurpose food (when it's safe to do so)--especially through menu elements that are student favorites (think: leftover chicken breasts turned into chicken nachos), chef specials, and the Performance Bar--by consulting with an executive chef before disposing of food. We also build a culture of creative culinary innovation driven by such techniques as upcycling leftover food into new dishes, all while adhering to our rigorous food safety standards.

**Close the Loop of Communication:** The Central Production Kitchen (CPK) has close communication with our executive chefs, sous chefs, and kitchen leads to understand the continuous usage and trends for the product made by CPK. As we understand the importance of utilizing excess goods, we focus on the root of production. If we can reduce production efficiently to reduce excess, we can reduce the cost of goods by purchasing smaller quantities of ingredients and at the same time decrease the labor to process it.

## Donate

Distribute leftover food to feed hungry individuals and families in our community

## WORK WITH STUDENT GROUPS TO DONATE LEFTOVER FOOD FROM THE DINING HALLS.

They work with Bay Area food recovery organizations and our passionate culinary team to coordinate food donations to those in need. We currently collaborate with the student-led organization, Stanford Food Recovery, for dining hall pickups, which they distribute locally in partnership with the nonprofit Loaves and Fishes.

## DESIGNATE FOOD WASTE CHAMPIONS AT ALL SPECIAL EVENTS.

For every special event we host, we assign a chef to oversee ordering, train chefs on processes and metrics for food waste reduction, understanding what data will be captured, and being the liaison for food donations.



"Ultimately, our mission is creating a culture committed to food waste reduction. In addition, we intend to channel learnings from the strategies employed in our existing dining halls into the design of a future dining hall, which we envision as the first truly zero-food waste dining hall."

Bob McClenaghan, Associate Director for Residential Dining Operations, Co-Chair of the R&DE Stanford Dining Food Waste Reduction Task Force, Leanpath Super Champion



# Toss

The lowest rung on the hierarchy is tossing remaining food; fortunately, much of what's tossed is actually not wasted, because of higher-impact strategies like upcycling and feeding animals

## **DIVERT ORGANICS TO FEED ANIMALS.**

100% of the organics that make it into the dining hall organics/compost dumpster are so nutrient-dense, they get converted into pig and dog feed by our waste hauler in Santa Clara. Diverting food scraps for animal feed is a much-preferred outcome to sending all organics to compost--according to the EPA's Food Recovery Hierarchy--as it extends the life of those food scraps, ensures their inherent nutritional value gets put to good use, and saves natural resources and land that would otherwise be used to grow food to feed these animals.

## **CONVERT WASTE OIL TO BIODIESEL.**

Industrial uses, such as converting food scraps and waste oils into fuel and energy sources, also confer better environmental impacts than wasting them. Through a partnership with SeQuential, 100% of our used cooking oil from the dining halls — roughly 6,400 gallons a year — is converted to biodiesel.

## **SUPPORT STANFORD'S ZERO-WASTE CAMPUS INITIATIVE THROUGH OUR ROBUST COMPOST PROGRAM.**

Stanford University is committed to reaching a diversion rate from the landfill of 90% by 2030. The current diversion rate is 65%. In the future, we're excited about how this aspect of our operations can help support another One Plate, One Planet pillar, which is to help catalyze a circular economy of food. We embrace the principles of a circular economy, which are: design out waste and pollution; keep products and materials in use; and regenerate natural systems. We aim to design operations and physical spaces and purchase products with these principles in mind. In the meantime, by composting, we ensure that nearly all our remaining organics contribute to the creation of nutrient-rich soils.

## **SEND REMAINDER TO COMPOST.**

While Stanford Dining's food waste is sent from dining halls to animal feed, the remainder of Stanford's food waste that isn't captured in a dining hall (i.e., in a dorm, an apartment, anywhere else on campus other) is sent to the Newby Island Resource Recovery Facility in San Jose, where it is composted. Our agreement allows us to send 100% of material collected, meaning no organic material collected needs to be landfilled.

Do you have a question about our  
*Food Waste Prevention Playbook?*

Reach out to Sophie Egan, MPH, our Senior Advisor for Sustainable Food Systems, [smegan@stanford.edu](mailto:smegan@stanford.edu), and our Food Waste Reduction Task Force Co-Chairs, Christina Betondo and Bob McClenaghan: [cbetondo@stanford.edu](mailto:cbetondo@stanford.edu) and [robertms@stanford.edu](mailto:robertms@stanford.edu).