REPURPOSE WITH A PURPOSE™

OPERATIONAL RESEARCH PROJECT REPORT

Culinary Institute of America

MCURC THE MENUS OF CHANGE UNIVERSITY RESEARCH COLLABORATIVE

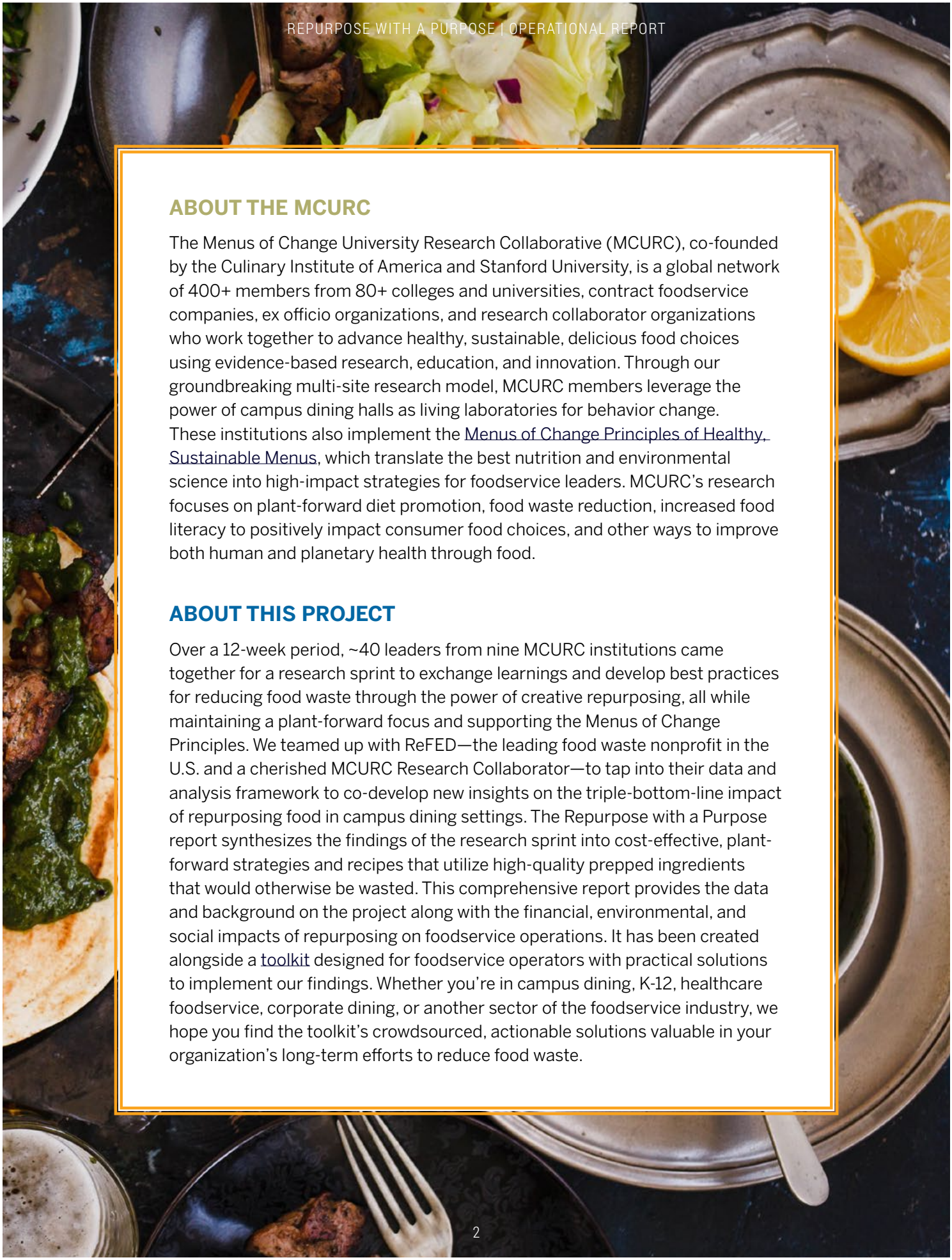
Residential & Dining Enterprises STANFORD UNIVERSITY *Creating a Culture of Excellence*

Stanford MEDICINE | Stanford Prevention Research Center

MENUS OF CHANGE
UNIVERSITY RESEARCH COLLABORATIVE

in collaboration with

ReFED



ABOUT THE MCURC

The Menus of Change University Research Collaborative (MCURC), co-founded by the Culinary Institute of America and Stanford University, is a global network of 400+ members from 80+ colleges and universities, contract foodservice companies, ex officio organizations, and research collaborator organizations who work together to advance healthy, sustainable, delicious food choices using evidence-based research, education, and innovation. Through our groundbreaking multi-site research model, MCURC members leverage the power of campus dining halls as living laboratories for behavior change. These institutions also implement the Menus of Change Principles of Healthy, Sustainable Menus, which translate the best nutrition and environmental science into high-impact strategies for foodservice leaders. MCURC's research focuses on plant-forward diet promotion, food waste reduction, increased food literacy to positively impact consumer food choices, and other ways to improve both human and planetary health through food.

ABOUT THIS PROJECT

Over a 12-week period, ~40 leaders from nine MCURC institutions came together for a research sprint to exchange learnings and develop best practices for reducing food waste through the power of creative repurposing, all while maintaining a plant-forward focus and supporting the Menus of Change Principles. We teamed up with ReFED—the leading food waste nonprofit in the U.S. and a cherished MCURC Research Collaborator—to tap into their data and analysis framework to co-develop new insights on the triple-bottom-line impact of repurposing food in campus dining settings. The Repurpose with a Purpose report synthesizes the findings of the research sprint into cost-effective, plant-forward strategies and recipes that utilize high-quality prepped ingredients that would otherwise be wasted. This comprehensive report provides the data and background on the project along with the financial, environmental, and social impacts of repurposing on foodservice operations. It has been created alongside a toolkit designed for foodservice operators with practical solutions to implement our findings. Whether you're in campus dining, K-12, healthcare foodservice, corporate dining, or another sector of the foodservice industry, we hope you find the toolkit's crowdsourced, actionable solutions valuable in your organization's long-term efforts to reduce food waste.

[Repurposing] The process of reusing overproduced or leftover food items to create new, innovative dishes. This practice reduces waste, maximizes resource efficiency, and can greatly enhance the sustainability and cost-effectiveness of food operations.

INTRODUCTION

REFLECTIONS FROM MCURC AND REFED LEADERS

If there's one thing we know about chefs, it's that they're a creative breed. In addition, delighting diners is the fuel that fills their tanks—bringing a smile to the face of the person on the other end of what they've created. At university campuses across the world, fiscal responsibility and sustainability metrics are similarly paramount. So, there are few topics that can compete with food waste reduction when it comes to making a positive impact at the intersection of food with the triple bottom line of people, planet, and profit.

The U.S. Environmental Protection Agency (EPA)'s Wasted Food Scale underscores that the most important step an organization can take to reduce food waste is to prevent it in the first place. ("Produce, buy, and serve only what is needed.") Many foodservice operations are using sophisticated forecasting techniques and careful measurement of their food purchases to do just that. But nothing gets culinarians' innovation wheels spinning like upcycling—opportunities to turn perfectly good food that would otherwise go to waste into novel, craveworthy dishes their diners will love. It's heartening to see just how many chefs are doubling down on efforts to repurpose edible surplus food in tandem with their other food waste reduction efforts, as repurposing/upcycling ranks just one rung below prevention in terms of its high impact (alongside food donation, which is of critical importance to ensuring food security for all). This potential impact is especially motivating because, according to ReFED's Insights Engine, overproduction represents 23% of the total food waste problem in the foodservice sector, and repurposing is a key solution.

In just one month of this project, we collectively saved close to $20,000 in food costs, 21,000 gallons of water, 545,000 tons of carbon emissions, and...We also improved our staff morale!

And the co-benefits don't stop there, as we found in this project that repurposing food can even boost organizational culture and the morale of students.

Through actionable strategies and rich, cutting-edge insights, this report and accompanying operational toolkit, "Repurpose with a Purpose," illustrate how to marry creative expression with data analysis to achieve measurable food waste reductions in foodservice operations at scale. Because after all, like so much that we love about making delicious food, reducing the waste of it is both art and science.

SOPHIE EGAN, MPH, Co-Director, MCURC, and Director of the R&DE Stanford Food Institute and Sustainable Food Systems

DANA GUNDERS, MS, President, ReFED

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SARA BURNETT, MBA, Executive Director, ReFED

REFLECTIONS FROM OUR REPURPOSE PROJECT CULINARY LEADERS

In the fast-paced, dynamic environment of university dining, we as chefs often face the challenge of balancing creativity, efficiency, and cost management. This report reflects the groundbreaking findings of a project that was led by chefs, for chefs, and highlights the powerful role of chefs as change-makers in advancing healthy, sustainable, delicious food choices for all. The report delves into the value of repurposing surplus food and production trimmings from our perspective as chefs, sharing case studies and operational rationale on how creative utilization benefits both the bottom line and sustainability goals.

At the heart of our approach is the decision to focus on recipes. Menus are thoughtfully designed as balanced collections of recipes, and by incorporating repurposed ingredients, we not only reduce food waste but also generate cost savings. The more repurposed recipes we feature, the greater the impact on food waste reduction and production efficiency.

While a new recipe may involve additional ingredient costs, the savings from reduced food disposal costs and reduced inventory waste frequently outweigh any additional recipe expenses. Furthermore, a repurposing approach supports customer satisfaction by enhancing menu variety through featured 'limited time' specials of repurposed ingredients, which allows us to keep our menus nimble while preventing over-purchasing. Repurposing can also be more efficient in terms of labor, as the time saved in production can offset some of the added ingredient costs.

In our day-to-day roles as culinarians, we intimately understand the operational challenges chefs face. In busy dining operations, unexpected obstacles often dictate decision-making. As we show in this report, leading a culture of repurposing provides chefs a chance to pivot and react to issues such as labor shortages or excess prepped ingredients that need to be used promptly, which can have numerous benefits to the operation and the team. Decisions on repurposing are ultimately shaped by what is readily available and how it fits into the menu structure, and as such, you will see variation in the quantifiable cost and environmental savings among the recipes shared in the report.

Ultimately, repurposing is more than just a method of managing excess food—it is a strategic approach that allows chefs to maintain menu flexibility, enhance efficiency, and deliver high-quality meals while driving long-term financial and operational benefits for dining services. Perhaps most importantly, repurposing has the power to motivate and empower chefs to use their creativity for good. We hope you enjoy this in-depth look at how repurposing is applied in practice and why it is essential for sustainable foodservice.

MATTHEW WARD
Executive Chef of Residential Dining
University of North Texas, Co-Chair,
MCURC Executive Chef Committee

ANDREW MAYNE
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and Plant-Forward Experiences,
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UNDERSTANDING FOOD WASTE

THE SCOPE OF THE PROBLEM – THE ENVIRONMENTAL, SOCIAL, AND ECONOMIC IMPACTS OF FOOD WASTE

Food waste is a global issue that has various economic, social, and environmental consequences. Nearly one-third of all food produced each year is wasted or lost[1], while at the same time over 800 million people find themselves with not enough food to eat[2]. This food that is not consumed results in annual economic losses totalling nearly $940 billion[1]. Food waste not only contributes to economic losses, but also contributes to significant greenhouse gas emissions (GHGs), including methane and carbon, which have long-lasting environmental side effects. Discarded excess foods total nearly 3.3 billion tons of emitted carbon[3]. Food waste emissions result in 8% of annual greenhouse gas emissions across the globe, which contribute to climate change and its associated problems[2]. Not only does food waste contribute to GHGs, but it also consumes about one-fourth of the Earth's freshwater supply[10]. Food waste has a detrimental impact on the environment and resource usage, as food that is wasted still uses labor, resources, and energy to bring it to kitchens or consumers[5]. With rising temperatures and water shortages, it is also likely that food prices will rise, which will have an impact on the cost of foods served to consumers in foodservice settings[2].

While food waste is a serious global problem with economic, social, and environmental impacts, and it also has uniquely detrimental impacts on foodservice operations. Specifically looking at the foodservice sectors, in 2022, the amount of food wasted resulted in $138 billion in losses[5]. These sectors generated 13 million tons of excess food, 80.6% of which ended up as waste in a landfill[4]. In the United States alone, this food waste is equivalent to 21.4 billion meals' worth of food that is wasted, which totals about 0.5% of U.S. gross domestic product[5,21].

The environmental impact of all this wasted food is profound. Nationally, the surplus food generated by foodservice operations released 70.7 million metric tons of carbon dioxide equivalent (CO_2e), which equates to driving 17 million gasoline-powered vehicles for one year[5,20]. Additionally, it wasted 5.95 trillion gallons of water, which is enough to supply water to over 50 million households for an entire year[22].

Many foodservice organizations are often unaware of how much money they spend on wasted food, as these costs are often buried in operational budgets or simply accepted as being a part of the food business. In other cases, the operational resources needed to reduce food waste are not seen as worth the investment[1]. However, there can be many economic benefits to reducing food waste in foodservice operations.

For every $1 invested in reducing food waste, $14 can be saved in operating costs.[6]

In addition to saving operating costs, reducing food waste can also result in more efficient uses of natural resources, such as water and energy[7].

Many consumers are recognizing the impact that their food choices have on the environment and climate change. As a result, many consumers are demanding more sustainable food choices when they eat away from home; if foodservice businesses fail to address these consumer demands, they may begin to lose out on business[9]. Many consumers are making sustainability a priority in their diet choices, so it is essential to develop kitchen staff that also make sustainability a priority in the kitchen, and this can only be achieved by providing them the necessary tools, training, and incentives[9].

In many foodservice operations, the staff want to engage in practices to help prevent food waste, but find that they need more training and guidance from their leadership on this topic[1]. Fortunately, training staff on how to prevent food waste can also lead to increased profits.

Businesses can earn 24% more in profits when they spend at least $1500 on training for each employee.[8]

Reducing food waste is crucial to promoting sustainability efforts globally to help meet the United Nations Sustainable Development Goals (SDGs)[11]. While there are some very serious issues caused by the vast amount of food waste, there are innumerable ways to minimize these impacts. Foodservice leaders can reduce food waste by targeting, measuring, and acting on food waste to help meet the SDGs and meet site-specific operational goals[1].

CHEFS AS CHANGE MAKERS IN FOOD WASTE REDUCTION

The best way to mitigate the negative impacts of food waste is to reduce and even prevent it from occurring in the first place (see the EPA Wasted Food Scale at the bottom of the page). Food waste can be reduced in foodservice settings by engaging staff, which can also result in better profit margins[2]. Chefs have a critical role to play in reducing food waste as changemakers in their kitchens and operations.

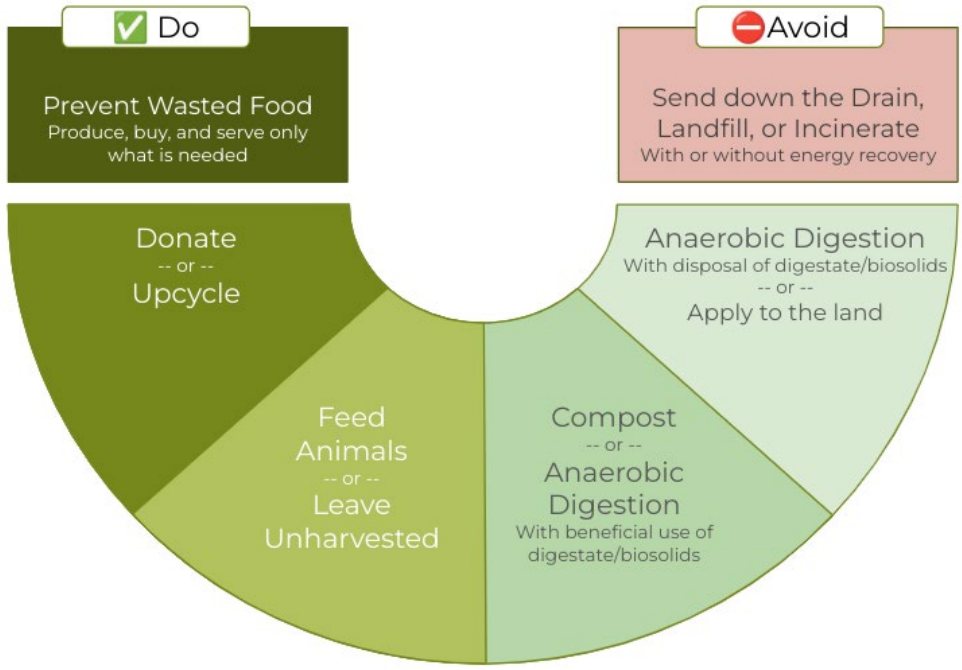
How chefs are key stakeholders in the MCURC (and in a sustainable food future)

Chefs play an important role within the MCURC as key stakeholders who greatly contribute to the overall goal of moving people towards healthier, more sustainable food choices that still deliver on delicious flavor[12]. More broadly, chefs are widely recognized as integral changemakers in the foodservice industry's food waste reduction efforts[13]. Chefs also bring a high level of creativity to develop new, delicious, and sustainable dishes in the kitchen, which gives them the opportunity to address various social, political, and environmental issues through the innovation and expression in their food[14].

Other ways that chefs support sustainable food system transformation include designing new menus that highlight delicious and sustainable items, getting involved in and leading national public campaigns surrounding food and sustainability, and engaging in peer-group education[15], such as the MCURC Executive Chefs Committee, where chefs are able to collaborate and share innovative ideas from their institutions with others across the country and around the world.

Ways chefs can act to reduce food waste

Chefs influence the diet quality of their consumers and the operational sustainability of their kitchen[16]. Chefs can make this positive impact by prioritizing and engaging in practices recommended in the EPA's Wasted Food Scale, such as preventing food waste, upcycling or donating food, and using uneaten food as animal feed or compost[17].



Graph 1: EPA's Wasted Food Scale [17]

Chefs have the opportunity to act as food system changemakers and prioritize food waste prevention through the practices recommended in the EPA's Wasted Food Scale.

STRATEGIES FOR REDUCING FOOD WASTE

PREVENTION	**Inventory Management** Inventory management system for real-time insights, First In First Out Strategy, optimizing par levels, shelf life monitoring. **Menu Planning** Seasonal and local menu items, cross-utilization of ingredients, flexible menu options, customer feedback and data analysis. **Portion Optimization** Standardized recipe and portions, precise tools for foodservice workers, portion variety through different plate sizes, pre-plating, smaller serving utensils. **Repurposing** Creative repurposing of ingredients, transforming food scraps and leftovers into new menu items, utilization of typically wasted edible parts, integration into soups, stocks, and sauces, and many other dishes. See the "Repurpose with a Purpose Operational Toolkit" for step-by-step guidance on repurposing techniques and best practices.
RECOVERY	**Donation Guidelines** Bill Emerson Act/Good Samaritan Food Donation Act, liability protection, USDA Guidelines. Check state level regulations, as local guidelines can impact various aspects of the donation process, such as food safety standards, labeling requirements, tax incentives, or existing food donation programs. **Partnering with Local Organizations** These can include national non-profits such as Feeding America, Food Recovery Network, or Meals on Wheels. Key elements to keep in mind are training staff, logistical considerations (storage, capacity, transport), and how best to coordinate with partner organizations.
RECYCLING	**Finding the Facility** Partner with your waste management team to find a waste management facility that can help with composting or producing biogas. These companies can work with local farmers or the food and beverage industry in your area. **Anaerobic Digestion** Food waste can be transformed into biogas using biodigesters, and contribute to methane reduction and the production of renewable energy. **Composting** Food waste can contribute to soil health if transformed into compost. Work with your local hauler to ensure that you are meeting all the requirements for proper sorting. Train staff and students, organize visits to the processing facility, and/or invite the hauler to your site for staff training. Some farms that do on-site composting programs are happy to take your coffee grounds or clean scraps.

REPURPOSING AS A SOLUTION

KEY BENEFITS OF REPURPOSING

The practice of repurposing overproduced food—a creative transformation of food scraps and leftovers into new, appealing dishes, utilizing typically wasted edible parts—presents a unique opportunity for university dining departments to not only reduce waste but also to tap into staff creativity and make a positive environmental impact. This section explores the key benefits of repurposing, offering practical insights and evidence-based strategies to maximize its potential.

- **Cost Savings:** Repurposing surplus food can lead to significant cost reductions. By transforming overproduced items into new dishes or products, dining services can minimize purchasing expenses and decrease disposal costs.

"As prices rise, using more of what we purchase not only adds value by lowering costs but also reduces waste; this positive correlation between price fluctuations and value savings is clear. The objective is to sustain labor levels by repurposing existing products instead of buying new ones."
—Vanderbilt University's Dining Team Representative

This gives us chefs the opportunity to be inventive, transforming repurposed food into delicious dishes that customers will love."
—Vanderbilt University's Dining Team Representative

- **Environmental Impact:** Reducing food waste through repurposing is a critical step toward sustainability. It helps conserve resources, lower greenhouse gas emissions, and lessen the ecological footprint of food production and consumption.
- **Employee Engagement:** Leveraging chefs' creativity in repurposing efforts not only enhances job satisfaction but also fosters a culture of innovation and responsibility. Encouraging culinary staff to explore new recipes and presentation methods can lead to a more motivated and engaged workforce, while simultaneously addressing food waste challenges.

By prioritizing repurposing strategies, university dining departments can achieve financial savings, environmental benefits, and a more vibrant and creative culinary team.

IMPLEMENTING A REPURPOSING PROGRAM

Repurposing requires a mindset change at several levels of operations. (For more on this, see our "Repurpose with a Purpose Operational Toolkit.") From menu strategy and production planning to daily operations and process evaluation, small adjustments can lead to significant improvements.

The report is organized into categorized guidelines described in the following table. Each of these categories offer relevant case studies used by MCURC members participating in the research sprint.

Getting Started	Menu Planning Strategies Case Studies #1-4	Production Strategies Case Studies#5-6
• Conduct an initial assessment of current food waste • Identify high-cost, high-waste food items • Establish a baseline for food purchases and waste	• Leverage your menu management system • Simplify your menu • Replace a ready-made purchased product with a repurposed recipe • Swap a recurring or existing item for a repurposed version	• Leverage a commissary or central production model • Challenge your production team, while enhancing morale
Daily Operations Strategies Case Studies #7-8	**Service Strategies Case Studies #9-12**	**Evaluation**
• Keep dish components separate • Make space for specials	• Repurpose in catering • Separate served components too • Cut smaller pieces • Try self-served vs. staff-served	• Continuously evaluate high-cost, high-waste food items • Monitor diner satisfaction • Evaluate staff engagement and morale

Table 1: *Repurpose with a Purpose Roadmap*

You will find more details in the "Repurpose with a Purpose Operational Toolkit" on how to implement the roadmap.

CASE STUDIES & SUCCESSES

MCURC RESEARCH SPRINT

The Repurpose with a Purpose project engaged ~40 individuals from nine universities and several partner organizations, and reflects the results of a chef-led research sprint and combined ten-month operational research initiative that engaged MCURC's operational members in co-creating resources to encourage a culture of repurposing overproduced food. The research project, led by MCURC's Executive Chairs Chef Matthew Ward (UNT) and R&DE Stanford Dining, Hospitality, and Auxiliaries Chef Leaders, involved a series of phases from initial design and socialization, through collective ideation and site-level activation, to data analysis and insight generation. The design included drafting survey and recipe criteria, data collection at participating sites, and analyzing both quantitative metrics and qualitative impacts to showcase the economic, social, and environmental benefits of creative culinary utilization in reducing food waste. (Details on the protocol are available in the Appendix). Site-level stakeholders participated in live interviews to collect qualitative data on the economic, social, and environmental impact of creative food product utilization on college and university dining operations.

KEY TAKEAWAYS

Create a Culture of Repurposing

Repurposing food effectively requires mindfulness and proper training. It demands a higher level of knowledge to generate creative ideas and consistent effort to integrate small changes into daily practice. Over time, this can lead to significant impacts. Building this culture also boosts team morale, as staff become more aware of their contributions and understand the importance of these practices in daily operations. The process involves chefs taking the initiative to ensure repurposed dishes are both delicious and sustainable, which might not be the norm for most cooks.

Foster a Supportive Environment

Fostering a supportive environment is essential for encouraging a culture of repurposing. Embracing creativity within a supportive framework allows staff to think critically and feel represented in the dishes they prepare. This supportive environment enhances their engagement and sense of ownership in sustainability initiatives. Additionally, positive framing and staff buy-in are crucial for promoting innovative and sustainable concepts, as staff who are enthusiastic about the food they serve help foster a positive dining experience.

Operationalize It

Successfully operationalizing repurposing involves a combination of staff awareness and training, meticulous planning for food safety, and allocating time for creative ideation and execution. Utilizing existing equipment effectively is also key. Scaling up repurposing efforts can lead to noticeable cost savings and waste reduction. In-house production of ingredients like stocks from food scraps can significantly lower inventory and food costs while reducing waste, demonstrating the value of making more from scratch.

Scale It

With rising food costs, repurposing becomes increasingly valuable. Utilizing more of the purchased product not only adds value as costs decrease but also minimizes waste. Implementing repurposing at scale initially requires investments in training and labor, but these costs should normalize over time. The positive correlation between price fluctuations and food cost savings highlights the financial benefits of repurposing, making it a crucial strategy for long-term sustainability.

Keep Pushing the Envelope on Creative Resource Use

Innovative techniques such as pickling, dehydrating, fat packing, freezing, infusing, and fermentation are beneficial for effective repurposing. Some institutions creatively use imperfect or "wonky" vegetables, repurposing them without unnecessary peeling. By making their own plant-based items in-house, they keep costs down while providing quality, allergen-free options. Continuously pushing the boundaries of creative resource use is crucial for maintaining the momentum of repurposing initiatives and achieving sustainability goals.

Celebrate it!

Share your collective success as a culinary team with your diners, community members, and internal leadership. Creating a culture of transparency, impact, and collective work towards greater sustainability goals can help you gain more support and momentum.

COST SAVINGS, CARBON FOOTPRINT, AND WATER SAVINGS

The impacts realized over the treatment periods (repurposed vs. displayed) are summarized in this table:

IMPACTS REALIZED OVER 1-MONTH* TREATMENT PERIOD (REPURPOSING VS. DISPLACED)			
	Total Cost Savings ($)	Total GHG Emissions Reduction (MT CO2e)	Total Water Savings (gallons)
	$19,448.83	0.54 (equivalent to 1,381 miles driven by a gas-powered car)	20,871.72
Boston University	$3,844.62	0.09	135.84
Rutgers University	$14,241.35	0.04	224.43
San Jose State University	-$26.60*	0.04	372.85
Stanford University	$21.63	0.20	17,045.71
University of Bristol	$29.19	0.02	811.54
University of North Texas	$6.24	0.02	104.54
University of Reading	$295.13	0.05	1,173.36
Vanderbilt University	$1,037.28	0.10	1,003.46

Note: The negative numbers shown compare the cost of the repurposed recipes to the cost of recipes they hypothetically replaced (displaced recipes), excluding any savings from reduced procurement needs. The greater cost implied is hypothetical and based on a comparison of the two recipes used in the research sprint. The cost savings realized here are from repurposing ingredients as compared to using "from scratch" ingredients.

**Please see the Research Sprint design in the Appendix*

DESIGN AND FRAMEWORK OF CASE STUDIES: EXPLORING REPURPOSING STRATEGIES AT MCURC INSTITUTIONS

The following set of case studies showcases cost-effective repurposing strategies employed at the nine participating MCURC institutions that are scalable and replicable at foodservice institutions broadly. Each case study offers insights gained during the chef-led research sprint and operational stakeholder interviews, and include both qualitative and quantitative benefits for each repurposing strategy to emphasize the power of repurposing.

MENU PLANNING STRATEGIES CASE STUDIES #1-4	1. Leverage your menu management system 2. Simplify your menu 3. Replace a ready-made purchased product with a repurposed recipe 4. Swap a recurring or existing item for a repurposed version
PRODUCTION STRATEGIES CASE STUDIES #5-6	5. Leverage a commissary or central production model 6. Challenge your production team, while enhancing morale
DAILY OPERATIONS STRATEGIES CASE STUDIES #7-8	7. Keep dish components separate 8. Make space for specials
SERVICE STRATEGIES CASE STUDIES #9-12	9. Repurpose in catering 10. Separate served components too 11. Cut smaller pieces 12. Try self-served vs. staff-served

The recipe criteria for the research sprint included several key components aimed at ensuring the recipes were both plant-forward and effective in utilizing high-quality prepped ingredients that would otherwise be wasted. These criteria were:

- **Repurposed Ingredient Content:** Each recipe needed to contain at least 51% (by weight) of ingredients that would otherwise be wasted in food production.
- **Plant-Forward Focus:** Recipes needed to have a ratio of 70% or more plant-based ingredients to 30% or less animal protein.
- **Feasibility and Reproducibility:** Recipes needed to be manageable and reproducible within the operational context of the dining facilities, ensuring that they could be consistently produced with available resources.

These criteria were designed to promote the creation of innovative, sustainable recipes that could be adopted widely across foodservice operations to reduce food waste and improve the triple bottom line of economic, social, and environmental impact.

Each case study contains a table summarizing the impact of the repurposed recipe.

Cost per recipe and **cost per serving** are detailed for the displaced recipe (the recipe that would have otherwise been prepared) and compared with the repurposed recipe, as well as with a scratch-made version of the repurposed recipe.

HOW TO READ THE COST TABLES

Each table compares:

- Cost impact created by making the "repurposed" recipe (made with repurposed ingredients) compared to the **same recipe "from scratch"** (made with newly purchased ingredients)
- Cost impact created by making the "repurposed" recipe (made with repurposed ingredients) compared to a **hypothetical "displaced" recipe** (one that might have been made in place of the repurposed recipe)

The cost impact is calculated both **per serving** and over the **month-long treatment period**, using the "scaled servings," which represents the number of servings of the recipe served over that month, based on the volume of the food item that was available to be repurposed by the kitchen team.

Displaced recipes provided by each participating site did not take into account the relative cost of the "from scratch" recipe, so in some cases you will see a hypothetical negative cost impact when the repurposed recipe is compared to the displaced recipe; this does not factor in cost savings realized over time from reduced procurement needs if the repurposed recipe were made over a longer period of time. In the example table below, you will see the greater cost savings from the 'repurposed' recipe as compared to the 'from scratch' recipe:

REPURPOSE WITH A PURPOSE EXAMPLE TABLE

Recipe	Category	Scaled servings	Cost per recipe	Cost per serving	Cost savings per serving repurposed vs. from scratch	Cost savings over treatment period repurposed vs. from scratch	Cost savings per serving repurposed vs. displaced	Cost savings over treatment period repurposed vs. displaced
Risotto Arancini	Repurposed	80	$3.03	$0.04	$0.23	$18.17	$0.15	$12.32
	From Scratch		$21.20	$0.27				
Pesto Whipped Potatoes	Displaced		$15.35	$0.19				

MENU PLANNING STRATEGIES

CASE STUDY #1 // UNIVERSITY OF NORTH TEXAS

LEVERAGE YOUR MENU MANAGEMENT SYSTEM

The menu management system can play a crucial role in supporting these repurposing operations. By providing accurate forecasting and inventory management, the system ensures that overproduction is minimized and that surplus ingredients are efficiently utilized. These systems allow chefs to search for recipes based on available ingredients, making it easier to incorporate repurposed items into the menu. Additionally, **the menu management system tracks the take rate (percentage of a prepared dish that diners select) and leftover food, enabling continuous adjustment and optimization of food production to further reduce waste.** Through this systematic approach, the menu management system enhances the effectiveness of sustainability efforts and promotes a zero-waste food goal.

Matthew Ward, Executive Chef at the University of North Texas, addresses daily overproduction across their operation through smart use of their menu management system, which enables effective redirection of available ingredients into the Mean Greens Cafe, a dedicated outlet for repurposing within their operation. Repurposing efforts extend to their beverage program, where leftover fruit and salad bar items are utilized.

At this all-vegan location, grains, beans, and greens are frequently repurposed and utilized to produce a patty of the day for their popular made-to-order panini station, designed for flexible product usage within a set format. Other items are also used on the "Small Plate of the Day" station, where small bites and appetizers are featured. The staff are well-versed in utilizing available ingredients as part of their sustainability initiatives, making it straightforward to develop new recipes and integrate them into the menu. Employee engagement in these efforts is robust, as the concept is already familiar and embraced by the team.

The University of North Texas chef team developed two recipes to utilize overproduced barley and arborio rice for the research sprint (see **Mean Greens Barley Risotto** and **Risotto Arancini** in the recipe collection). While these repurposed recipes could displace a number of dishes on their menu, two specific recipes were provided for comparative analysis:

DISPLACING PESTO WHIPPED POTATOES WITH RISOTTO ARANCINI

Recipe	Category	Scaled servings	Cost per recipe	Cost per serving	Cost savings per serving repurposed vs. from scratch	Cost savings over treatment period repurposed vs. from scratch	Cost savings per serving repurposed vs. displaced	Cost savings over treatment period repurposed vs. displaced
Risotto Arancini	Repurposed	80	$3.03	$0.04	$0.23	$18.17	$0.15	$12.32
	From Scratch		$21.20	$0.27				
Pesto Whipped Potatoes	Displaced		$15.35	$0.19				

DISPLACING RED PEPPER & PESTO NORTHERN BEANS WITH MEAN GREENS BARLEY RISOTTO

Cooked barley is the most costly ingredient in the Mean Green Barley Risotto recipe, representing more than half of the costs. As compared to the displaced recipe provided, the barley risotto did not translate into actual savings from a menu management perspective, but it allowed UNT to save a valuable ingredient from being thrown away, thereby reducing ongoing procurement needs.

Recipe	Category	Scaled servings	Cost per recipe	Cost per serving	Cost savings per serving repurposed vs. from scratch	Cost savings over treatment period repurposed vs. from scratch	Cost savings per serving repurposed vs. displaced	Cost savings over treatment period repurposed vs. displaced
Mean Green Barley Risotto	Repurposed	33	$9.88	$0.30	$0.40	$13.21	-$0.18	-$6.08
	From Scratch		$23.09	$0.69				
Red Pepper & Pesto Northern Beans	Displaced		$3.80	$0.11				

**Note: The negative numbers shown compare the cost of the repurposed recipes to the cost of recipes they hypothetically replaced (displaced recipes), excluding any savings from reduced procurement needs. The greater cost implied is hypothetical and based on a comparison of the two recipes used in the research sprint. The cost savings realized here are from repurposing ingredients as compared to using 'from scratch' ingredients.*

CASE STUDY #2 // RUTGERS UNIVERSITY

SIMPLIFY YOUR MENU

Creative repurposing can significantly save prep time in the kitchen, particularly through simplified menus. At Rutgers University's Harvest dining hall, the team has designed the operation for sustainability, efficiency, and health, making it the most popular dining outlet on campus. The **menu structure is intentionally simple, and vegetarian or vegan options are offered by default,** with adaptable components that facilitate repurposing by the kitchen team. This streamlined menu approach not only supports sustainability initiatives but also fosters a culture of creativity and resourcefulness among staff. The team works in an environment where everyone is encouraged to think about how ingredients can be repurposed within the simple framework of the menu, resulting in flavorful and easy-to-produce dishes that effectively reduce waste while being well-received by diners.

An exemplary practice at Harvest is the incorporation of repurposed ingredients into the daily menu, maximizing utilization and maintaining the lowest food costs among the college's dining operations. For instance, leftover bread ends from baguettes are transformed into **French Toast Bites**, baked in muffin tins, and featured as the "sweet" item for breakfast. This approach highlights how a flexible menu framework allows for seamless integration of repurposed items.

By focusing on composed salads and sandwiches, the team ensures that prepped food items do not go to waste, as compared to items on a food bar that cannot be reused. This strategic menu simplification not only minimizes waste but also optimizes food cost savings. As the team notes, "**By simplifying our menu, we were able to make it so that everything is being utilized.**" The efficient use of ingredients underscores the significant impact of a well-designed, sustainable menu on overall dining operations.

The success of Harvest's approach is evident in its operational metrics. Compared to another Rutgers cafe, Harvest achieved approximately 97,000 transactions from January to October, while the other cafe had 55,000. Notably, Harvest used around 5,000 pounds or less of animal protein, significantly less than the 15,000 pounds used by the other cafe. This difference illustrates the efficiency and sustainability benefits of offering primarily vegetarian or vegan entrees with options to add small portions of animal protein as desired. By dynamically adjusting the menu based on available ingredients, continuously cross-utilizing components, and maintaining a focus on waste reduction, Harvest exemplifies how a simplified menu can lead to substantial environmental and economic benefits while maintaining high levels of diner satisfaction.

For the research sprint, Rutgers' team chose to displace a from-scratch Panzanella recipe with a French Toast Bites made from repurposed bread ends.

Recipe	Category	Scaled servings	Cost per recipe	Cost per serving	Cost savings per serving repurposed vs. from scratch	Cost savings over treatment period repurposed vs. from scratch	Cost savings per serving repurposed vs. displaced	Cost savings over treatment period repurposed vs. displaced
French Toast Bites	Repurposed	1,028	$104.87	$0.10	$0.05	$800.84	$0.87	$14,241.35
	From Scratch		$154.92	$0.15				
Panzanella	Displaced		$994.95	$0.97				

CASE STUDY #3 // BOSTON UNIVERSITY

REPLACE A STANDING MENU ITEM WITH A REPURPOSED RECIPE

At Boston University (BU), the head chef and sustainability manager collaborated to identify straightforward opportunities for repurposing ingredients that would otherwise be wasted. They focused on the beverage station as a starting point, where fresh fruit was being used to flavor waters. By using pineapple cores instead of the entire fruit to flavor water, they were able to enhance the flavor and reduce costs significantly. Additionally, the BU team replaced a vinaigrette on their salad bar with a pineapple vinaigrette made from the repurposed cores.

The initiative demonstrated significant cost savings and efficiency improvements, as this not only extended the life of the pineapple but also showcased how creative repurposing reduces waste.

"We put out three flavored waters every day. We used the pineapple cores as a base every day, so each day we saved approximately half a case of fruit."

—Boston University Dining Services Representative

By simplifying their menu and integrating repurposed items, BU was able to streamline operations and realize labor savings by making the most of one prepped ingredient for multiple purposes. This method not only ensured a higher quality and consistency in their offerings, but also minimized the labor required for preparation.

"With our static stations, it takes less people to prep and serve the station because it's the same for a week so we can do a consistent bulk batch. It gives us a lot more quality and consistency with some labor savings."

—Boston University Dining Services Representative

Recipe	Category	Scaled servings	Cost per recipe	Cost per serving	Cost savings per serving repurposed vs. from scratch	Cost savings over treatment period repurposed vs. from scratch	Cost savings per serving repurposed vs. displaced	Cost savings over treatment period repurposed vs. displaced
Pineapple Vinaigrette	Repurposed	2,304	$131.33	$0.06	$0.02	$697.08	$0.08	$3,514.43
	From Scratch		$170.06	$0.07				
Vinaigrette	Displaced		$326.58	$0.14				
Pineapple Water	Repurposed	352	$0.00	$0.00	$0.04	$330.19	$0.04	$330.19
	From Scratch		$15.01	$0.04				

Overall, BU's efforts in creative repurposing led to reduced food waste, significant cost savings, and more efficient kitchen operations.

CASE STUDY #4 // VANDERBILT UNIVERSITY

SWAP A PURCHASED PRODUCT FOR A REPURPOSED VERSION

At Vanderbilt University, the dining team transformed their approach to cost management and sustainability by developing a versatile repurposed slaw recipe. By swapping out a purchased slaw mix with a version made from broccoli stems, cilantro stems, and carrot shavings, the team not only managed costs effectively but also minimized waste. This recipe innovation replaced a standing menu item, demonstrating how repurposing commonly discarded ingredients can lead to significant benefits to recurring items on the line.

Repurposing also helped Vanderbilt navigate price fluctuations in the food market. **By creatively using broccoli stalks and other scraps, the team extended the value of their ingredients and achieved significant cost savings**. This proactive approach highlights the powerful impact of swapping recurring menu items for repurposed versions, showcasing the dual benefits of sustainability and cost-efficiency. As Vanderbilt continues to expand their repurposing program, they anticipate even greater connections between reduced waste and cost savings, underscoring the effectiveness of innovative culinary practices in transforming dining operations.

Recipe	Category	Scaled servings	Cost per recipe	Cost per serving	Cost savings per serving repurposed vs. from scratch	Cost savings over treatment period repurposed vs. from scratch	Cost savings per serving repurposed vs. displaced	Cost savings over treatment period repurposed vs. displaced
Asian Broccoli Slaw	Repurposed	1,200	$101.79	$0.08	$0.16	$1,538.25	$0.11	$1,037.28
	From Scratch		$294.07	$0.25				
Broccoli Slaw	Displaced		$231.45	$0.19				

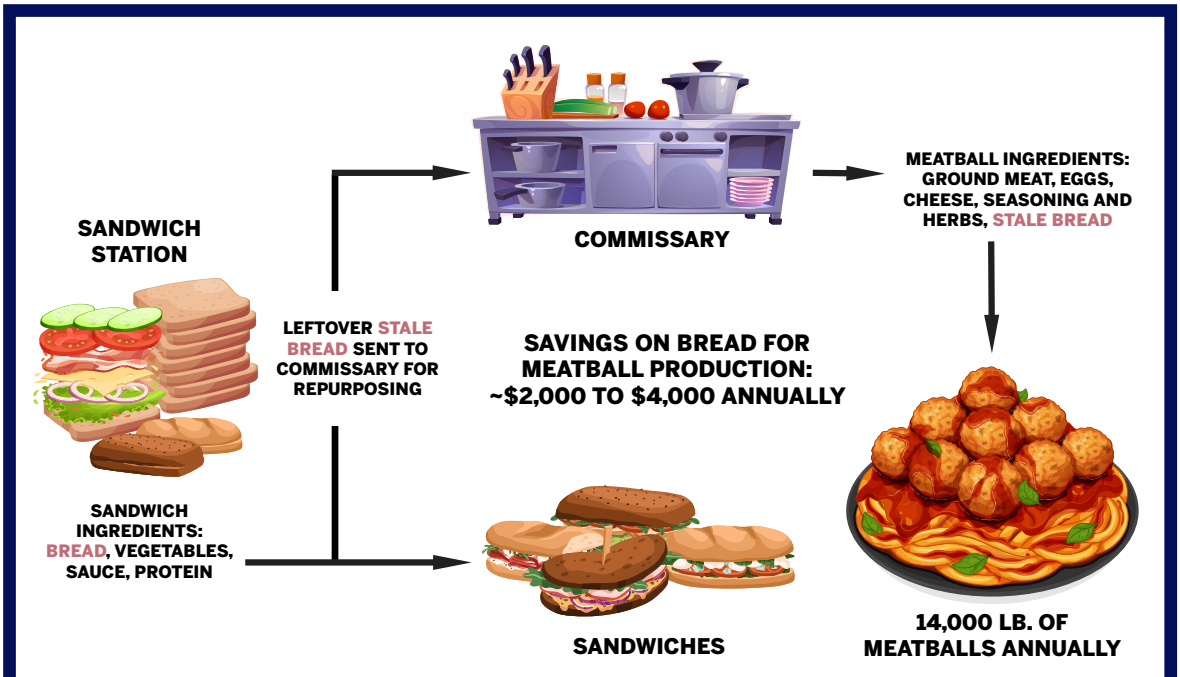
PRODUCTION STRATEGIES

CASE STUDY #5 // UNIVERSITY OF CALIFORNIA, LOS ANGELES

LEVERAGE THE COMMISSARY MODEL

At UCLA, the dining team effectively leverages their commissary kitchen to systematically reduce food waste and manage food and labor costs. The commissary model involves a centralized production facility that services multiple locations, enabling the efficient repurposing of surplus ingredients. By funneling available surplus food into the commissary for repurposing, UCLA achieves significant cost savings and optimizes labor use, maintaining a lean and agile operation even at a large scale.

"We make rules about the components that can be utilized across many salads, for example, so that despite changes in menu details and volume needed for each separate salad, we can use all of the chicken across salad offerings and never have waste from the start. This proactive and organized approach ensures that ingredients are fully utilized, reducing the need for additional purchases, and lowers the carbon footprint of our operations."
– UCLA's Dining Representative



HOW UCLA DINING REPURPOSES BREAD FROM THE SANDWICH STATION TO SAVE THOUSANDS ON A KEY MEATBALL INGREDIENT

CASE STUDY #6 // UNIVERSITY OF READING

CHALLENGE YOUR TEAM, AND ENHANCE MORALE

Repurposing initiatives not only promote sustainability but also significantly boost team morale by challenging the creativity of the kitchen staff. During the month-long research sprint, University of Reading staff engaged in targeted repurposing of trim waste, such as vegetable trimmings, fostering a collaborative environment where team members at various levels contributed innovative ideas and executed new recipes. The challenge of reconfiguring existing recipes using trim without a dedicated development chef provided a significant creativity boost for the team. In fact, **all nine participating sites reported that challenging their teams' creativity led to enhanced team engagement and morale, even for those already accustomed to repurposing**. The modest cost savings from repurposing trim waste were outweighed by the substantial morale benefits. This sentiment was echoed across sites:

"There is a small financial gain overall for repurposing...[but there is] more of a morale gain for repurposing, as it gives chefs a sense of pride in repurposing and reducing waste."
—Alex Sim, Development Chef, University of Bristol Dining Services

The positive impact of engaging kitchen staff in repurposing activities was further emphasized by Chef Daniel Donguines, Executive Chef at R&DE Stanford Dining, Hospitality and Auxiliaries:

"Repurposing transforms routine kitchen tasks into dynamic opportunities for innovation, motivating staff to think creatively and collaboratively. It not only disrupts the monotony of a core rotating menu but also engages the team at a deeper level, sparking continuous discussions on how to maximize every ingredient. This process fosters a culture of ingenuity, where staff feel empowered to contribute new ideas, enhancing both team morale and operational efficiency."
—Daniel Donguines, Executive Chef, R&DE Stanford Dining, Hospitality and Auxiliaries

Similarly, Sarah Kettelhut, Director of Dining Services from the University of North Texas shared an example of a chef using banana peels to create a pulled pork-style dish, illustrating how repurposing can spark creativity and stretch culinary boundaries.

"They're happy to be there and they're excited to do the creative utilization that they're doing...and it's true they're not just coming in, punching in, going to a line, wiping it and changing the parts. They're a part of it."
– Rutgers University Dining Services Representative

Recipe	Category	Scaled servings	Cost per recipe	Cost per serving	Cost savings per serving repurposed vs. from scratch	Cost savings over treatment period repurposed vs. from scratch	Cost savings per serving repurposed vs. displaced	Cost savings over treatment period repurposed vs. displaced
Broccoli Risotto	Repurposed	65	$19.94	$0.31	$1.04	$338.12	$0.75	$245.35
	From Scratch		$87.56	$1.35				
Sweet Pea & Mint Broccoli Risotto	Displaced		$69.01	$1.06				
Spiced BBQ Panko Cauliflower Leaf	Repurposed	40	$15.16	$0.38	$0.37	$29.36	$0.62	$49.78
	From Scratch		$29.84	$0.74				
Battered Banana Blossom	Displaced		$40.05	$1.00				
Cauliflower Bhaji	Repurposed	150	$25.02	$0.17	$0.29	$43.95	$0.02	$3.05
	From Scratch		$68.97	$0.46				
Onion Bhaji	Displaced		$28.07	$0.19				

DAILY OPERATIONAL STRATEGIES

CASE STUDY #7 // R&DE STANFORD DINING, HOSPITALITY AND AUXILIARIES

KEEP RECIPE COMPONENTS SEPARATE

At R&DE Stanford Dining, Hospitality and Auxiliaries, the dining team has adopted a strategic approach to food preparation by keeping recipe components separate, which plays a crucial role in minimizing food waste and enabling the creative repurposing of ingredients. **This production strategy involves holding prepped ingredients ready for à la minute cooking, allowing cooks to mix and finish dishes based on real-time demand**. By monitoring headcounts in the dining halls at 15-minute intervals, the staff can adjust their preparation accordingly, ensuring that only the necessary amount of food is cooked, while any unused components remain fresh and available for future use.

PREPARATION → Separate vegetables, protein, and sauces

MONITORING → Track dining hall headcounts every 15 minutes

ADJUSTMENT → Prepare food based on real-time demand

REPURPOSING → Save and repurpose unused components

TRACKING → Measure waste reduction and cost savings

DATA ANALYSIS → Use technology to optimize procurement

The positive impact of engaging kitchen staff in repurposing activities was further emphasized by Chef Daniel Donguines, Executive Chef at R&DE Stanford Dining, Hospitality and Auxiliaries:

"By keeping recipe components separate, we've built flexibility into our kitchen operations, allowing us to respond dynamically to real-time demand. This approach not only reduces waste but also maximizes the potential for creative repurposing of ingredients. Whether it's vegetables or proteins, we can hold and reuse what isn't needed immediately, ensuring that our ingredients are used efficiently while maintaining the highest culinary standards."

—Executive Chef,
R&DE Stanford Dining, Hospitality and Auxiliaries

This effective preparation strategy was employed by other participating sites as well:

"At UNT we might have all the spinach washed and the onions cut and the bacon ready to go, but we haven't sauteed all the spinach for service so that if it's not utilized, it's still a fresh ingredient that has a longer shelf life and that we can use in other ways."
—Sarah Kettelhut, Director of Dining Services, University of North Texas

The impact of this strategy is evident in the significant reduction of food waste at Stanford. **By using techniques such as à la minute cooking and leveraging food waste monitoring technology, Stanford has achieved purchasing reductions of approximately 200-300 pounds of food daily.** This translates to substantial cost savings and smarter procurement choices, particularly as food costs continue to rise. **On a monthly basis, this equates to a reduction of 6,000-9,000 pounds of food,** demonstrating the effectiveness of keeping components separate as a strategy for limiting waste and enhancing operational efficiency.

Recipe	Category	Scaled servings	Cost per recipe	Cost per serving	Cost savings per serving repurposed vs. from scratch	Cost savings over treatment period repurposed vs. from scratch	Cost savings per serving repurposed vs. displaced	Cost savings over treatment period repurposed vs. displaced
Lugaw	Repurposed	246	$65.37	$0.27	$0.15	$114.30	-$0.09	-$63.42
	From Scratch		$103.47	$0.42				
Egg Drop Soup	Displaced		$44.23	$0.18				
Vegetable Korma with Chicken	Repurposed	219	$135.32	$0.62	$0.45	$97.93	$0.39	$85.05
	From Scratch		$233.25	$1.06				
Chicken Coconut Curry	Displaced		$220.37	$1.00				

Note: The negative numbers shown compare the cost of the repurposed recipes to the cost of recipes they hypothetically replaced (displaced recipes), excluding any savings from reduced procurement needs. The greater cost implied is hypothetical and based on a comparison of the two recipes used in the research sprint. The cost savings realized here are from repurposing ingredients as compared to using 'from scratch' ingredients.

CASE STUDY #8 // UNIVERSITY OF BRISTOL

MAKE SPACE FOR SPECIALS

At University of Bristol, the dining team effectively minimized food waste by making space for specials, a strategy integral to the Repurpose with a Purpose project. Recognizing the challenges of creating repurposed recipes on a large scale with a limited volume of repurposed product available, especially with limited refrigeration or freezer space, the Bristol team leveraged specials to utilize on-hand ingredients creatively. Specials allowed them to run out of an item, making it an efficient way to serve a limited volume of products while reducing pre-consumer (back of house) food waste.

"The flexibility of featuring specials alongside the core menu provided an excellent opportunity to repurpose ingredients that might otherwise be wasted. Broccoli is popular so they try to use most of the stems, but some stems are wasted. They pickle them and use a similar recipe to dill pickles, but it doesn't achieve enough volume to use all the broccoli stems. By incorporating such items into specials, the team could creatively use surplus produce without the pressure of maintaining them as main menu items."
—Alex Sim, Development Chef, University of Bristol Dining Services

Recipe	Category	Scaled servings	Cost per recipe	Cost per serving	Cost savings per serving repurposed vs. from scratch	Cost savings over treatment period repurposed vs. from scratch	Cost savings per serving repurposed vs. displaced	Cost savings over treatment period repurposed vs. displaced
Kale and Pumpkin Seed Pesto	Repurposed	100	$4.25	$0.04	$0.07	$6.84	$0.26	$26.14
	From Scratch		$11.09	$0.11				
Homemade Pesto	Displaced		$30.39	$0.30				
Cauliflower Bhaji	Repurposed	150	$25.02	$0.17	$0.29	$43.95	$0.02	$3.05
	From Scratch		$68.97	$0.46				
Onion Bhaji	Displaced		$28.07	$0.19				

SERVICE STRATEGIES

CASE STUDY #9 // SAN JOSÉ STATE UNIVERSITY AND BOSTON UNIVERSITY

REPURPOSE IN CATERING

At San José State University (SJSU) and Boston University (BU), the dining teams successfully utilized repurposed catering as an innovative strategy to minimize food waste and promote sustainability. Catered events provide an excellent opportunity to creatively repurpose ingredients that have been safely held, offering a fresh outlet for these components rather than purchasing and preparing new items from scratch. This approach not only saves time and money but also allows for positive messaging and storytelling for the attendees.

During the research sprint, SJSU showcased the effectiveness of repurposed catering by featuring specific recipes such as **Pumpkin Chowder**, which displaced their traditional Baked Potato Soup, and **Drunken Noodles with Tofu**, which displaced a Chana Masala. These delicious and sustainable dishes were part of a student-facing event in the community garden. The chefs and sustainability manager communicated their repurposed approach to the menu, receiving enthusiastic support for their environmental efforts.

Recipe	Category	Scaled servings	Cost per recipe	Cost per serving	Cost savings per serving repurposed vs. from scratch	Cost savings over treatment period repurposed vs. from scratch	Cost savings per serving repurposed vs. displaced	Cost savings over treatment period repurposed vs. displaced
Pumpkin Chowder	Repurposed	15	$2.53	$0.17	$0.11	$1.60	$0.29	$4.34
	From Scratch		$4.13	$0.28				
Baked Potato Soup	Displaced		$6.87	$0.46				

While the repurposed drunken noodles recipe was more cost effective than the version made from scratch, the Chana Masala was inherently cheaper to produce per serving, resulting in no cost savings when comparing the two, as indicated by a loss of $0.31 per serving and $30.94 over the treatment period.

Recipe	Category	Scaled servings	Cost per recipe	Cost per serving	Cost savings per serving repurposed vs. from scratch	Cost savings over treatment period repurposed vs. from scratch	Cost savings per serving repurposed vs. displaced	Cost savings over treatment period repurposed vs. displaced
Drunken Noodle with Tofu	Repurposed	100	$81.37	$0.81	$0.07	$6.82	-$0.31	-$30.94
	From Scratch		$88.19	$0.88				
Chana Masala	Displaced		$50.42	$0.50				

**Note: The negative cost impact compares the cost of repurposed recipes to the potential cost of a recipe that might have been made in place of the repurposed dish, excluding any savings from reduced procurement needs. The displaced recipe was inherently cheaper, but the repurposed recipe utilized food that would be otherwise wasted, indicating a maximization of food already procured.*

Similarly, BU's culinary team featured repurposed menus at catered events for senior university administrators and students. They developed over a dozen creative, delicious, and primarily plant-based repurposed recipes using ingredients that would otherwise have been wasted as trim or overproduction. In both cases, guests enjoyed their meals without initially knowing the story behind the recipes. It was only revealed before dessert that all the ingredients had been repurposed and transformed into new menu items. This revelation impressed the administrators and students alike, highlighting the culinary creativity and sustainability impact of the meal. The BU team hosted pop-up events featuring dishes made with repurposed ingredients during Earth Month to educate and delight diners, with much success.

"We catered a lunch for the senior leadership team of Auxiliary Services, a group that wouldn't necessarily be outwardly seeking sustainable or repurposed food. From the start, we didn't promote what it was, and then at the end we explained that everything they ate would otherwise have been destined for the compost bin, and people were really impressed and pleased."
—Boston University Dining Services Representative

Balancing the level of added labor required for repurposed recipes is crucial, as some items might save costs overall, like making bread pudding from leftover breakfast pastries, while others might be so labor-intensive they cost more than non-repurposed menu items. Nonetheless, the successful implementation of repurposed catering at SJSU and BU illustrates the potential for reducing food waste and procurement needs while promoting sustainability through creative culinary practices.

For further ideas, the World Wildlife Fund (WWF) has developed a full report on "Catering for Sustainability"[18].

BUILDING A CULTURE OF SUSTAINABILITY

To foster a culture of creative repurposing in culinary operations, engaging staff is a critical component. Culinary teams often find empowerment and pride in contributing to sustainability efforts, particularly when they are given the autonomy to experiment with repurposing practices. This engagement is not just about reducing waste but also about enhancing teamwork and creativity within the kitchen environment. Engaging diners is equally essential, as initiatives like "Weigh the Waste" events help raise awareness about food waste among students and provide actionable insights that lead to operational changes. Continuous improvement in food waste reduction practices is necessary to maintain momentum and meet the growing demand for sustainability reporting. Finally, training and enablement of staff are crucial to ensure consistency in these practices, leading to cost savings and a more sustainable kitchen culture overall.

ENGAGING STAFF

At UCLA, the dining team effectively leverages their commissary kitchen to systematically reduce food waste and manage food and labor costs. The commissary model involves a centralized production facility that services multiple locations, enabling the efficient repurposing of surplus ingredients. By funneling available surplus food into the commissary for repurposing, UCLA achieves significant cost savings and optimizes labor use, maintaining a lean and agile operation even at a large scale.

"Repurposing empowers our culinary team by giving them the autonomy to innovate and contribute directly to our sustainability goals. It fosters creativity and teamwork, allowing staff to take ownership of the process while feeling that their ideas are valued. This culture of engagement not only reduces waste but also builds a sense of pride and shared purpose within the kitchen."
—Michelle Ihrig, Senior General Manager, Stanford Dining, Hospitality and Auxiliaries

A supportive work environment, coupled with a kitchen culture of repurposing, deepens worker engagement and creates a ripple effect that inspires team members to get involved. However, it's important to keep the concept of repurposing fresh, as staff who frequently engage in it can become bored. Overall, repurposing can be a powerful tool to promote teamwork, creativity, and sustainability within the kitchen.

"We repurpose in practice already, and the cooks already actively give us ideas everyday. When you have this type of culture, they simply come up to you with an idea of how we can utilize something; 'can we make it into a recipe?'"
—UCLA's Executive Chef

ENGAGING DINERS

"Sometimes I urge people to stand by the dish receptacle and watch what people are putting into the dish pit to be thrown away and then kind of reflect back to look at yourself and what you're consuming, to balance our efforts with the students' part of reducing food waste."
—Sarah Kettelhut, Director of Dining Services, University of North Texas

At Boston University, student-led "Weigh the Waste" events are held 20 times each semester across campus. These events provide students in the dining halls with a tangible sense of the food waste generated from their plates. More importantly, the students leading these events have the opportunity to survey their peers to identify which foods are being wasted and why. They also offer simple suggestions on how to minimize food waste, such as encouraging students to review all menu options before selecting their food.

During these events, comprehensive data is captured, including total edible food waste, inedible food waste, napkin waste, and trash. This data allows for comparisons across different times and locations, providing valuable insights. The primary outcomes of these events have been an increased awareness of food waste among students and, more critically, actionable information that has led to operational changes aimed at reducing waste. Since the inception of these events in the 2018/2019 academic year, Boston University has achieved a more than 50% reduction in average edible post-consumer food waste, highlighting the effectiveness of this initiative in promoting sustainability on campus.

CONTINUOUS IMPROVEMENT

Maintaining momentum and continuously improving food waste reduction practices is essential for dining operators. There is growing demand for sustainability reporting and demonstrated impact, and leveraging creativity in the kitchen can serve as a powerful tool to meet this demand, reduce waste, and increase resource efficiency. From small operations to large corporations, organizations are increasingly investing in sustainability because consumers are demanding it.

"Organizations are spending dollars on sustainability; they've heard from the consumer that sustainability is something they want companies to focus on and to make pledges about concrete changes they plan to make by 2030 or 2050. Communicating savings and diverted waste is a component of that."
—Matt Ward, Executive Chef of Residential Dining, University of North Texas

TRAINING AND ENABLEMENT

Training staff is crucial for maintaining and enhancing these practices, as it leads to significant cost savings. The goal is to ensure that labor efforts remain consistent, with staff repurposing products instead of using new ingredients. This approach not only saves costs but also aligns with sustainability goals. Although repurposing may add tasks for the cooks, they are generally eager to take on these responsibilities. Regularly training staff and fostering a culture of creativity and sustainability in the kitchen reduces waste and keeps culinary teams engaged and motivated.

CONCLUSION

The Repurpose with a Purpose project has demonstrated the significant impact that creative repurposing and sustainability initiatives can have on reducing food waste in campus dining operations. Through collaborative efforts, participating institutions have successfully implemented innovative strategies that not only minimize waste but also promote environmental stewardship, cost savings, and team engagement.

The project's success is attributed to the dedication and creativity of chefs, sustainability managers, and other dining staff who have embraced repurposing as a core practice. By transforming surplus ingredients into new, appealing menu items, these teams have showcased the potential of repurposing to enhance both operational efficiency and culinary innovation. Engaging students in sustainability initiatives has further reinforced the importance of mindful consumption and the collective responsibility to reduce food waste across every campus.

Key takeaways from this project include the importance of fostering a culture of repurposing, providing continuous staff training, and creating supportive environments that encourage creative problem-solving. Institutions have seen tangible benefits:

In just one month of this project, we collectively saved close to $20,000 in food costs, 21,000 gallons of water, 545,000 tons of carbon emissions, and...We also improved our staff morale!

Looking forward, the practices and insights gained from the "Repurpose with a Purpose" project provide a scalable model that can be adopted by other institutions and foodservice operations. Continued commitment to sustainability, coupled with innovative approaches to food management, will be essential in driving further progress towards a zero-waste future. As we move ahead, it is crucial to maintain the momentum and expand these efforts to create lasting positive impacts on our environment and communities.

Together, we can transform our collective approach to food waste and contribute to a more sustainable and resource-efficient world!

ACKNOWLEDGEMENTS

The success of the Repurpose with a Purpose project is a testament to the collaborative efforts of dozens of individuals and organizations dedicated to promoting sustainability in campus dining halls. We extend our deepest gratitude to the Menus of Change University Research Collaborative (MCURC) for their invaluable support and guidance throughout this project, including to its founders and Board members Dr. Shirley Everett, Greg Drescher, Dr. Christopher Gardner, and Eric Montell, and to its co-directors, Sophie Egan and Abby Fammartino.

We would like to thank the dozens of chefs, sustainability managers, dining directors, and other staff members from participating institutions. Your creativity, dedication, and hard work in implementing and documenting repurposing practices have been crucial to the success of this research. Your willingness to share your experiences and insights has provided a wealth of knowledge that will benefit others in our industry.

We also deeply appreciate the support and contributions of our Research Collaborator, ReFED. Your resources and expertise in food waste reduction have been instrumental in shaping the project's approach and methodology. Special thanks to:

Participating Institutions:

- Boston University
- Rutgers, the State University of New Jersey - Dining Services
- San Jose State University
- R&DE Stanford Dining, Hospitality, and Auxiliaries (SDHA)
- UCLA
- University of North Texas
- University of Reading
- University of Bristol
- Vanderbilt University

Core Project Team:

- **Project Lead:** Matt Ward, Executive Chef of Residential Dining, University of North Texas
- Abby Fammartino, MCURC Co-director
- Jessica Van Wie, MS, Project Coordinator
- Selena Mao, Research & Insights Manager, ReFED
- Kenjin Chang, Doctoral Researcher, Cornell University
- Mychel Brewster, Executive Chef, R&DE Stanford Dining, Hospitality & Auxiliaries
- Andrew Mayne, Senior Associate Director of Culinary Strategy andPlant-Forward Experiences, R&DE Stanford Dining, Hospitality & Auxiliaries
- Ghislaine Challamel, Senior Advisor, R&DE Stanford Dining, Hospitality & Auxiliaries
- **Culinary Leads:**
- Mario Martinez, San Jose State University
- Alex Sim, University of Bristol
- And Chef Leaders from:
    - Boston University
    - Rutgers University
    - University of Reading
    - Vanderbilt University
    - UCLA

Additional MCURC Member Participants:

- Mojgan Bakhshaniyan, San Jose State University
- Paul Cingolani, (formerly San Jose State University)
- Michelle Ihrig, SDHA
- Sarah Kettelhut, University of North Texas
- Amy Morgan, University of Bristol
- Rob Smith, University of Bristol
- And Additional Participants from:
- Boston University
- Rutgers University
- University of Reading
- Vanderbilt University
- UCLA

Additional Project Advisors:

- Claire Turner, Sustainability Manager, Good Eating Company/Sodexo
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- Moira Zbella, Scope 3 Emissions Program Manager, and Annabelle Bardenheier, Scope 3 Emissions Analyst, Stanford University
- Asch Harwood, VP of Data and Insights, ReFED
- Minerva Ringland, Climate and Insights Manager, ReFED
- Brian Roe, PhD, President of the Agricultural and Applied Economics Association, Ohio State University
- Kathryn Bender, Assistant Professor of Economics, University of Delaware
- Steven Finn, VP Sustainability and Public Affairs, Leanpath
- Joshua Tasoff, Associate Professor, Claremont Graduate University
- Jackie Bertoldo, PhD, Johns Hopkins University

Finally, we thank all the students who participated in our food waste reduction events and other sustainability initiatives. Your engagement and feedback have been invaluable in understanding the impact of these efforts and in driving continuous improvement.

This project would not have been possible without the collective efforts and shared vision of everyone involved.

APPENDIX

Resources, Protocol, and References

RESOURCES FROM OUR RESEARCH COLLABORATORS

- 86 Food Waste Initiative
- Champions 12.3 Business Case for Food Waste: Hotels (Leanpath, WRI)
- Catering for Sustainability: Making the Case for Sustainable Diets in Foodservice. WWF, Sodexo, Food Ethics Council.
- ReFED Stakeholder Guide for Foodservice
- Roadmap to 2030: Reducing U.S. Food Waste by 50% and the ReFED Insights Engine
- The Comprehensive Case for Sustainability

MCURC'S REPURPOSE WITH A PURPOSE PROTOCOL

RESEARCH DESIGN

This project was designed as a research sprint involving MCURC chefs and advisors with support from site-level sustainability managers and dining directors. From October to November 2023, participating MCURC chefs were tasked with developing, refining, and implementing two top utilization recipes in their dining halls. The project was launched during the annual MCURC All-Member Meeting in early October 2023, where the Executive Chefs committee established specific recipe constraints and ingredient categories. These constraints were designed to focus on ingredients that are frequently wasted and more challenging to repurpose, ensuring that the repurposed recipes were plant-forward and comprised of at least 70% plant-based foods.

A standardized recipe template was provided to chefs to complete, encouraging a recipe matrix format to support the cross-utilization of similar ingredients, making the toolkit transferable and easy to implement.

During the one-month time period, chefs tracked various data points, including total product purchased, available product type, total available product to repurpose, product that could not be repurposed, and total product that was successfully repurposed. In addition, they also tracked meals during meal periods where the repurposed recipes were served, along with detailed recipe information such as the name of the recipe, volume of repurposed ingredient used, cost, and the estimated number of servings yielded per day of that recipe. Following the sprint, chefs were also asked to share a displaced recipe - representing the dish that would have been served if the repurposed recipe had not been made.

In November and December, 2023, participating MCURC chefs collaborated with their sustainability managers and/or dining directors to complete a brief survey that included both qualitative and quantitative questions regarding the impact of their utilization techniques.

The study's measurable outcomes and corresponding qualitative and quantitative analysis included:

- Quantifying the effectiveness of in-house repurposing in reducing food waste.
- Measuring the amount of pre-consumer food waste reduced in target categories (overall and per- person equivalent).
- Calculating the displacement cost savings from replacing from-scratch recipes with the same recipes utilizing repurposed ingredients, to show the benefit on overall menu cost.
- Calculating the food cost savings achieved by substituting a standard dish (the displaced recipe) with a repurposed dish that uses food available to be repurposed, to quantify the financial benefit of utilizing ingredients that would otherwise go to waste.
- Assessing the GHG reductions and water savings from in-house repurposing efforts.

DATA COLLECTION METHODS

The initial goal was to direct recipe ideation towards the highest cost, highest environmental impact food items. However, participating chefs had the flexibility to focus on different food categories, including meat, dairy, dry goods, produce, and prepared foods. As a result, the nature and variety of the data collected during the one-month research sprint was highly variable across participating sites, both in terms of the food categories targeted and treatment-period frequency and duration. The volume and frequency of dishes prepared also varied based on operational realities and the availability of product in selected ingredient categories.

Chefs tracked their recipes and repurposed ingredients using a Google Sheet data collection template prepared by the MCURC. They recorded daily measurements of food weighed, repurposed, and recorded by the culinary team. Measured variables were constructed to quantify the amount of food diverted by repurposing for each category, and included total weight purchased, the total weight available to be repurposed, and amount wasted after repurposing target ingredients. This data collection was maintained throughout the intervention period, and all staff involved were trained to measure these variables consistently using the data collection sheet.

Culinary teams provided detailed recipes for both the repurposed and displaced dishes that would have otherwise been prepared. Each recipe included the amount of each ingredient used and the total servings yielded. These details formed the basis for comparison in assessing the economic and environmental impacts of repurposing during the intervention period. Additionally, culinary teams specified the destination pathway for ingredients if they had not been repurposed, which was critical for calculating the downstream GHG reductions associated with avoiding the disposal of these food items.

After the one-month research sprint, chefs, along with their sustainability managers and/or dining directors, participated in a 25-minute survey to share further insights. The project team developed an interview guide prior to these interviews, and each site scheduled a 25-minute interview involving the site-level sustainability manager and/or dining director, chef, MCURC Research Program Manager (Abby Fammartino at the time) and/or Research Assistant (Jessica Van Wie, MS, former MCURC Student Fellow Co-Manager). Questions were sent to the sites beforehand so they could gather any necessary information. Survey data was collected during the call via a Google Form, with a transcript recording generated for later review to ensure thoroughness. This data, along with firsthand experiences gathered from the interviews, was utilized for the qualitative analysis of the research study.

Qualitative

1. Thematic analysis
2. Transcription analysis, pulling quotes for the toolkit by theme and impact area

Qualitative analysis for this study was done through thematic analysis and transcription analysis of the interviews conducted for each participating site. In the thematic analysis, relevant themes that were found across sites were selected including labor implications, cost implications, environmental implications, product, study participation, and student feedback. For the transcription analysis, the interview response form and transcript was reviewed side-by-side for each participating site. Relevant quotes were selected from these interviews and cleaned up. They were then grouped based on relevant themes found throughout all of the interviews. A sentence was added under a theme to capture a sentiment or commonality across the interviews, which further allowed for grouping of the quotes based on theme. This qualitative analysis then led to understanding of the common themes and sentiments found throughout all of the participating sites in this study.

Quantitative

Quantitative analysis was conducted using an aggregated data spreadsheet that combined site-level data from 8 participating institutions into base data variables. This data was compiled into a Google Sheet, and used to calculate the food cost savings, GHG reductions (MT CO2e), and water savings (gallons) realized from repurposing during the intervention period. Where applicable, information from the completed recipe templates provided in count or customary-unit terms were converted to their corresponding weight estimates using the USDA Nutrient Database for Standard Reference.

Calculating Food Cost Savings

The number of servings of the repurposed recipe served during each participating day within the treatment period was deduced by proportionally adjusting the volume of the ingredients available for repurposing to the prescribed portion yields identified in the completed recipe templates. To adjust ingredient quantities to reflect the actual number of servings, a scaling factor was applied. To maintain consistency in the comparison between the repurposed and displaced recipes, it was assumed that the number of servings produced by the repurposed recipe equaled the number of servings that would have been generated by the displaced recipe.

Two comparisons were conducted to assess the cost savings from repurposing ingredients: (1) repurposed recipe versus displaced recipe and (2) repurposed recipe versus scratch-made equivalent. For both comparisons, ingredient quantities were converted to pounds and multiplied by the scaling factor to yield the adjusted amounts [23] . The cost of each ingredient was then calculated by multiplying the converted weight in pounds by the associated wholesale cost per pound, using data sourced from ReFED. The total cost of the repurposed recipe was calculated by summing the costs of all ingredients, excluding the repurposed ingredient, as these ingredients were assumed to have no additional cost. The total cost of the comparison recipes (displaced or scratch-made) was determined by summing the costs of all ingredients.

The costs of salt, pepper, and sugar were not included in the ingredient cost calculations because their cost is minimal and unlikely to significantly impact the overall cost analysis. Additionally, these ingredients are considered standard, ubiquitous ingredients that are typically available in bulk and used across a wide variety of dishes, making their specific cost attribution to any one recipe less meaningful. Similarly, alcohol was excluded from the analysis because it falls outside the scope of the study and is not classified as a food item.

The cost per serving was then calculated by dividing the total cost by the estimated number of servings yielded per day of that recipe. Cost savings per serving were determined by subtracting the repurposed recipe cost per serving from the comparison recipe cost per serving. Finally, the total cost savings over the treatment period were calculated by multiplying the per serving savings by the estimated number of servings per day of that recipe and the number of days the repurposed recipe was served.

Key Formulas

1. **Recipe Scaling Factor:**
   Scaling Factor = Estimated Number of Servings per Day / Original Recipe Servings
2. **Ingredient Weight Conversion (to pounds):**
   Converted Weight (lbs) = Ingredient Quantity (lbs) ×Scaling Factor
3. **Ingredient Cost Estimation:**
   Cost per Ingredient = Converted Weight (lbs)×Cost per Pound
4. **Total Recipe Cost:**
   Total Recipe Cost = ∑(Cost per Ingredient)
5. **Cost per Serving (Repurposed Recipe):**
   Cost per Serving = Total Recipe Cost (excluding food available to be repurposed) / Estimated Number of Servings per Day
6. **Cost per Serving (Displaced or Scratch-Made Recipe):**
   Cost per Serving = Total Recipe Cost / Estimated Number of Servings per Day
7. **Cost Saving per Serving:**
   Per Serving Savings = Cost per Serving (Displaced or Scratch-Made Recipe) –
   Cost per Serving (Repurposed Recipe)
8. **Total Savings Over the Treatment Period:**
   Total Savings = Per Serving Savings × Estimated Number of Servings × Number of Days Served during Intervention Period

GHG Reductions

The GHG emissions reduced from repurposing food was calculated by evaluating both upstream and downstream emissions reductions. Upstream emissions avoided were calculated based on the volume of the displaced food item, using emissions factors developed by Quantis for ReFED's Impact Calculator tool [24]. These upstream factors were mapped to the displaced food item based on the closest available reference item type and by the stage of processing, ensuring a more precise calculation of the emissions associated with each type of food and its respective processing stage. The volume of the displaced food item (in tons) was multiplied by the corresponding upstream emissions factor (mtCO2e/ton) to determine the upstream emissions avoided.

Downstream emissions avoided from repurposing were calculated by multiplying the volume of the repurposed ingredient (in tons) by the downstream emissions factor (mtCO2e/ton), which was assigned based on the destination where the ingredient would have ended up if not repurposed (e.g. landfill or compost), as specified by site-level operators. The total GHG emissions reductions per site were obtained by summing the upstream and downstream emissions avoided. These reductions were then aggregated by site and further aggregated to the university level to determine the overall environmental impact of the repurposing initiative.

Key Formulas

1. **Downstream Emissions Reduction (mtCO2e) =**
   Volume of Repurposed Ingredient (tons) × Downstream Emissions Factor (mtCO2e/ton)
2. **Upstream Emissions Avoided (mtCO2e) =**
   Volume of Displaced Food Item (tons) × Upstream Emissions Factor (mtCO2e/ton)
3. **Total Emissions Avoided (mtCO2e) =**
   Downstream Emissions Reduction (mtCO2e) + Upstream Emissions Avoided (mtCO2e)

Water Savings

Water savings from repurposing food were assessed by estimating the water use avoided through the production of displaced food items. Water use avoided was estimated using ReFED's water footprint factors developed by the Water Footprint Network, which links specific food items to their respective water consumption during production of that item [26]. The volume of the displaced food item (in tons) was multiplied by the corresponding water use factor (gallons/ton) to calculate the water savings from forgoing the displaced food item.

LIMITATIONS

This analysis faced several limitations that could potentially skew the results and impact the overall accuracy of the findings.

During the data collection process, some sites were given the opportunity to clarify and revise their responses following additional prompts. While this allowed for more accurate data from those specific sites, it also introduced the possibility of inconsistencies across the dataset. Not all sites were equally prompted to review or modify their inputs, which could lead to variations in data quality and comparability between sites.

One significant challenge was the inconsistency in how recipes were provided by participating institutions. Ingredient quantities were often given in various units, such as counts, cases, and eaches, rather than in standardized weights. To create a consistent dataset, assumptions had to be made to convert these non-weight measurements into weights, which were then converted to pounds. The inherent variability in the initial reporting of these units, coupled with the assumptions required for conversion, introduces a degree of uncertainty into the final weight calculations. This variability could affect the accuracy of the ingredient volume calculations and, subsequently, the estimates of food cost savings, GHG reductions, and water savings.

Another limitation involves the methodology used to determine wholesale prices. The cost analysis relied on Nielsen POS data, from which ReFED derived retail prices for numerous grocery items [27]. Wholesale prices were then extrapolated by applying a percent margin reduction from these retail prices, using data from the US Census Bureau [28]. This method assumes a consistent markup percentage across different products and market conditions. However, in reality, the margin between retail and wholesale prices can vary significantly depending on factors such as product type, region, and economic conditions. These variations may lead to inaccuracies in the estimated ingredient costs, potentially skewing the overall assessment of food cost savings.

Additionally, the emissions factors used to calculate GHG reductions were developed from Quantis at ReFED's request to represent a national average [25]. The specific process-level data and assumptions underlying these factors are confidential and therefore not available for external verification or scrutiny. While these factors are intended to capture typical emissions across the country, there is a risk of inaccuracy when applying them to operations that significantly deviate from the national average. This variability means that the emissions factors may not fully reflect the specific circumstances of each site. This limitation could affect the accuracy of the GHG reduction estimates and, consequently, the estimated environmental impact of the repurposing initiative.

Furthermore, the economic and environmental co-benefits to repurposing represented in this report are based on hypothetical comparisons made between the repurposed recipes that were implemented during the described treatment period and a series of displaced recipes that were identified by participating institutions post hoc. The modeled changes in environmental impact and incurred financial costs are therefore not representative of differences in practice pre-post, but rather presumed differences based on site representatives' best judgment of what their operations would have done had they not participated in the research sprint.

Despite efforts to standardize and validate the data used in this analysis, these limitations introduce potential sources of error that should be considered when interpreting the results.

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