

# Arizona State University: Plastic Reduction Project



**Team Frizbeez**

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## Meet Team Frizbeez



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Nico McCrossan is an MS student enrolled in the Sustainability Solutions program with a focus on corporate sustainability. Upon graduation he plans to work for an organization to ensure capital is being allocated to sustainable solutions.



Chloe Pyne is an MS student enrolled in the Sustainability Solutions program with a focus on organizational behavior and transformational change. Upon graduation she plans to transform the status quo business model of an organization to embed sustainability.

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## **Executive Summary**

The expertise of Team Frizbeez was sought out by Arizona State University's (ASU) Sustainability and Procurement Programs Manager to critically analyze the university's consumption of single-use plastic, and to provide implementable solutions at strategic intervention points.

Below you will find summaries, synthesized data, timelines, interviews, and workshop plans to help facilitate the changes ASU will need to make to usher in a plastic reduction strategy. The report begins with providing definitions for common terms used when discussing single-use plastic, as requested by our project sponsors. Following the definitions, we discuss a workshop Team Frizbeez coordinated and conducted with the single-use plastic working group. The workshop centered its discussion around Arnim Wiek's Transformational Problem Solving Framework. An initial goal was to break down the silos we noticed between the departments working on this problem. Identifying root drivers of this problem was a critical first step in creating tangible solutions, and bringing more people to the proverbial table to ensure all voices are heard.

Our project sponsor also requested an analysis of a waste characterization study conducted by Cascadia Consulting in 2018. We examined the report's waste numbers and also compared them to different universities to see how they compare to ASU and show the gaps in recycling vs. composting vs. landfill. Next in the report comes a market analysis of alternative eco-vendors and a brief cost breakdown analysis of currently available infrastructure options that could help ASU transition away from single-use plastic. It then transitions to a waste service provider analysis with a summation of the current landscape provided by Josh Ellner of Zero Waste. He proposed possible solutions to address some of the current problems. The transition away from single-use plastics will be a costly endeavor. This cost and the challenges associated with replacing single-use plastic will vary widely from department to department, but it is imperative if ASU wants to maintain its status as a sustainability leader.

In addition to the analysis mentioned above, Team Frizbeez performed a landscape analysis of universities with procurement guidelines utilized to help their sustainability and plastic reduction goals. We researched and engaged with numerous universities that have already begun plastic reduction strategies, from Washington University in St. Louis, which has not had plastic water bottles on its campus since 2009, to the University of California Los Angeles (UCLA), which plans to eliminate all non-essential single-use plastic on their campus by the end of 2023.

The work done over the semester culminates in the final section as a plastic reduction timeline. We adapted the timeline from UCLA and UC Berkeley. We revised the single-use plastic policy timeline at UCLA and UC Berkeley to be more relevant and feasible dates for ASU. This timeline is in written and in table form to show what should be eliminated and when. These are our recommendations, ASU may move the dates around as they see fit, but we recommend that the plastic products mentioned in the timeline should not change.

**Below are some of the key takeaways from all of our research activities:**

Deliverable	Key Takeaways
Workshop	<ul style="list-style-type: none"> <li>● There is no single solution because of the complexity of the system, solutions must be holistic and informed by a broad base of legitimate stakeholders</li> <li>● Solving this problem will require spending money so it is important that it is clear how each component of the solution will be funded</li> <li>● Ownership over the plastic reduction efforts at ASU needs to be held by an individual at the top of the organization's structure, who can make decisions and move things forward</li> </ul>
Waste Characterization	<ul style="list-style-type: none"> <li>● ASU is behind when compared to other universities with similar diversion goals</li> <li>● The quality of ASU's AASHE STARS waste reporting lacks transparency and detail when compared to UC Schools</li> <li>● ASU landfill current diversion efforts relies heavily on recycling</li> </ul>
Waste Audit	<ul style="list-style-type: none"> <li>● In order to improve the actionability of waste audits they should be completed on consistent intervals</li> <li>● Future waste audit studies should provide a deeper dive into the itemized breakdown of each material type</li> </ul>
Market Analysis	<ul style="list-style-type: none"> <li>● The current market is capable of handling ASU's reduction of single-use plastic</li> <li>● Transitioning away from single-use plastics is a costly endeavor, but is an investment in enhancing the long-term resiliency of the university</li> <li>● Further outreach should be conducted to partner with a producer of compostable single-use alternatives</li> </ul>
LCA Comparison	<ul style="list-style-type: none"> <li>● LCA's demonstrate that reusable and compostable products have lower environmental impacts than disposable products</li> <li>● Available composting facilities do not accept PLA plastic, and therefore these products often end up in the landfill</li> </ul>
Infrastructure	<ul style="list-style-type: none"> <li>● Food waste is the largest waste category at ASU, investment in composting infrastructure would help remove this barrier</li> <li>● When looking to make the switch away from single-use plastic the two best alternatives are compostables and reusable products</li> <li>● The cost of composting infrastructure (among many other projects and sustainability related infrastructure) could be subsidized with the implementation of a tuition 'green fee' (as low as \$10)</li> </ul>
Current Waste	<ul style="list-style-type: none"> <li>● Mandate a sustainability training component for Republic Services</li> </ul>

<p>Service Provider</p>	<p>and Olympus staff</p> <ul style="list-style-type: none"> <li>● Return all in-person on campus dining to reusables as soon as possible, based upon current COVID-19 guidelines and mandates</li> <li>● ASU needs to challenge the national contracts to eliminate single-use plastics</li> <li>● Partner with Precious Plastics and Tyler Eglen (tyler.eglen@asu.edu) on plastic waste to be disposed of on campus</li> </ul>
<p>Procurement Guidelines</p>	<ul style="list-style-type: none"> <li>● ASU must create enforceable procurement policies that should replace the existing purchasing guidelines, and include a definition of single-use plastic</li> <li>● Provide resources for ASU faculty and staff to learn more about the sustainable procurement guidelines and how to embed sustainability into any and all purchases made</li> </ul>
<p>Landscape Analysis</p>	<ul style="list-style-type: none"> <li>● Regarding vendors and new RFPs, sustainability should be a central factor. Pepsi’s sustainability initiatives have far surpassed Coca-Cola’s</li> <li>● Large scale investments into composting infrastructure must be considered to reach the 90% diversion goal - e.g., anaerobic or aerobic digesters, mixers, partnership with R. City, etc</li> <li>● Creation of a Tableware Share Program similar to the one Pomona has implemented could drastically reduce waste on campus</li> </ul>
<p>Timeline</p>	<ul style="list-style-type: none"> <li>● Evidence from schools of comparable size and complexity, provide a plausible timeline for reducing ASU’s single-use plastic</li> <li>● Start with low hanging fruit and progressively tackle more “wicked” plastic streams</li> <li>● Existing vendors contracts largely dictate when product changes can be implemented, be ready to push sustainability when these contracts are expiring</li> </ul>

## **Introduction**

Plastic waste has become a wicked problem throughout the world. More plastic has been produced in the last decade than in the last century (Lebreton et al., 2018). Historically, governments are slow to react to even urgent issues due to the bureaucracy surrounding them. For this reason, it is imperative that organizations and college campuses act to mitigate the damage that plastic waste causes.

Team Frizbeez was “hired” to create a plastic reduction strategy for Arizona State University (ASU) in partnership with Danielle Van Vleet from the procurement department. Reducing plastic consumption at ASU is a necessary component of the campus’ sustainability strategy. Our input is needed because [per the project brief] “ASU’s waste diversion goal is 90% by the fiscal year 2025 and will require collaboration across many departments and programs to be successful. In the supply chain, reducing plastic use, especially single-use plastic, is a critical step in reaching 90% waste diversion.”

We chose Dr. Arnim Wiek’s Transformational Problem Solving Framework tool to reframe the plastic problem at ASU as a sustainability problem. Throughout the planning process our team has worked closely with Dr. Katja Brundiers, an expert in collaboration within the sustainability space. Our team put together the Sustainability Problem Map for the plastic problem at ASU. Identifying root drivers of this problem was a critical first step in creating tangible solutions.

ASU has set itself apart and ahead of many other universities by successfully implementing its water fill-up stations. ASU could eliminate plastic water bottles tomorrow, and the infrastructure is already in place for a seamless transition. Shall we say, “low-hanging fruit?”

Plastic waste is a problem recognized by universities, communities, and cities all over the country, and we have conducted interviews, researched, and analyzed data to help ASU on its journey forward to address this pervasive problem. Reducing plastic at ASU will be a long and challenging process because of the many administrative layers of such a large university. The good news is that there is no need to reinvent the wheel - there are many success stories around the United States. Read on to learn more.

## Requested Definitions

<p><b>Single-Use Plastics:</b></p>	<p>At ASU, we define single-use plastics as:</p> <ul style="list-style-type: none"> <li>● Plastics derived from fossil fuel-based chemicals composed of synthetic polymers that are: <ul style="list-style-type: none"> <li>○ Neither intended nor suitable for multiple uses</li> <li>○ Generally recognized by the public as an item to be discarded after one use</li> </ul> </li> </ul>
<p><b>Plastic Alternatives [single-use]:</b></p>	<p>At ASU, we define [single-use] plastic alternatives as an item:</p> <ul style="list-style-type: none"> <li>● Maintaining the same goal/function as plastic*</li> <li>● Neither intended nor suitable for multiple uses</li> <li>● With materials ranging from <ul style="list-style-type: none"> <li>○ organic matter</li> <li>○ synthetically made material derived from a natural source</li> </ul> </li> <li>● Made from non-recyclable material usually intended to be biodegradable**</li> </ul> <p>*with a well intended plastic replacement, end of life disposal is complex and nuanced, making this solution potentially exacerbate the original problem</p> <p>**Not all biodegradable material is compostable, but all compostable material is biodegradable</p>
<p><b>Plastic Reduction:</b></p>	<p>Plan of action that intends to reduce the overall purchase, use, and disposal of plastic at ASU.</p> <p>Efforts of a reduction strategy may include:</p> <ul style="list-style-type: none"> <li>● Analysis of the <ul style="list-style-type: none"> <li>○ Material</li> <li>○ Current alternative market</li> <li>○ Current policy language and agreements with <ul style="list-style-type: none"> <li>■ Vendors</li> <li>■ Waste management services</li> </ul> </li> </ul> </li> <li>● Creating a comprehensive plan that addresses <ul style="list-style-type: none"> <li>○ Sustainability education on all levels of operation</li> <li>○ Necessary changes in behaviors of consumers</li> <li>○ A timeline of plastic phase-out <ul style="list-style-type: none"> <li>■ Alternatives proposed</li> </ul> </li> </ul> </li> <li>● Reevaluation that continually <ul style="list-style-type: none"> <li>○ Adapts to changing conditions</li> <li>○ Improves to meet a demanding market</li> <li>○ Addresses emerging environmental externalities</li> </ul> </li> </ul>



## Workshop

### Workshop Key Takeaways

- There is no simple one step solution because of the complexity of the system. Solutions must be holistic and informed by a broad base of legitimate stakeholders
- Solving this problem will require spending money so it is important that it is clear how each component of the solution will be funded by
- Ownership over the plastic reduction efforts at ASU needs to be held by an individual at the top of the organization structure who can make decisions and move things forward

### Why a Workshop?

Our workshop aimed to yield positive sustainability outcomes as we reframe the plastic problem as a sustainability problem. Many departments are working on plastic reduction at ASU, including Procurement, Zero Waste, University Sustainability Practices, Strategic Partnerships, and Marketing/Communications. These groups are siloed, pulling from different budgets, and have competing agendas with their own goals and metrics for success. Throughout the workshop we intended to bring all of these groups together to discuss their own goals and explore how they connect back to the university's larger visions. In the workshop, we uncovered the barriers each group faces individually and collectively when working together to create effective collaborative plans for the future. The final deliverable from this workshop was a sustainability problem map of the plastic problem at ASU that identifies points of intervention, the technology & infrastructure that facilitate the problem, rules, norms, resources surrounding plastic.

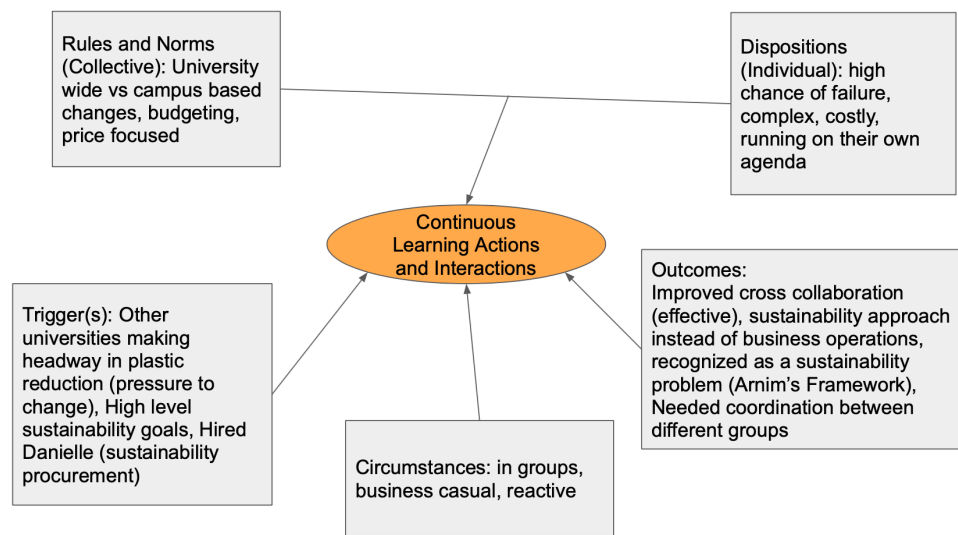


Figure 1 shows a brainstorming map that led to the outcome of a workshop for this group of stakeholders.

### Workshop Survey Questions (Pre)

Which one of ASU's Eight Sustainability Goals does your department most align with?  
 How familiar are you with these Eight Sustainability Goals?  
 How aligned is your department with the Eight Sustainability Goals i.e do you use these to frame day-to-day operations?  
 What do you think the university's biggest barriers to reducing single-use plastics are?  
 In your opinion how could this barrier be resolved?  
 What is the biggest barrier your team faces when working on multi-department projects?  
 In your opinion how could this barrier be resolved?  
 Why do you think it's most important to reduce single-use plastics?  
 What strategy do you most associate with single-use plastic reduction?

Workshop Survey Takeaways

This survey was sent out two weeks prior to the workshop date, the survey was sent to 16 of the Single-Use Plastic Working group members, 13 responded.

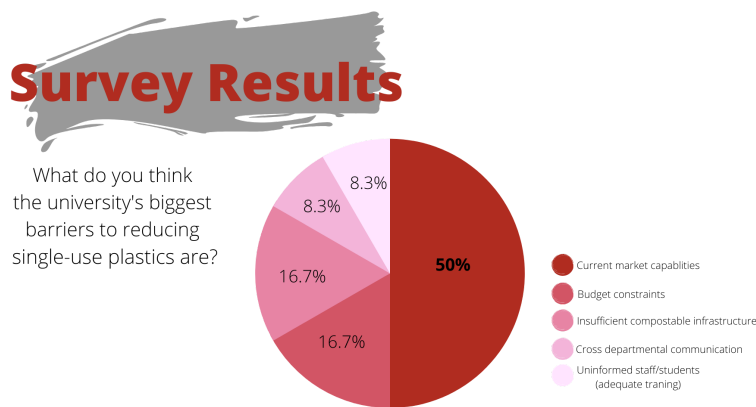


Figure 2 What do you think the university's biggest barriers to reducing single-use plastics are?

Half of the 13 participants said that the university's most significant barrier to reducing single-use plastics is the current market capabilities. However, there are many other universities that have been managing this barrier. Throughout the team's culminating experience, we have been focused on finding tangible solutions through other universities. In our presentation at the workshop a few of the universities we touched on were Marshall University, Pomona College, Vanderbilt University, and the UC Schools. Marshall University is an example of a sustainability champion that shows how much impact one person can have. Pomona College has a reusable tableware share program for all campus events. Vanderbilt University made a stand with Coca-Cola, as they changed to Pepsi for their school's pouring rights and were able to get aluminum bottles for their beverages. The UC Schools are making strides toward plastic reduction from such a large university through extensive work creating a Single-Use Plastic

Policy and an actual Plastic Policy Implementation Guide that addresses all of the issues that would arise against such a policy.

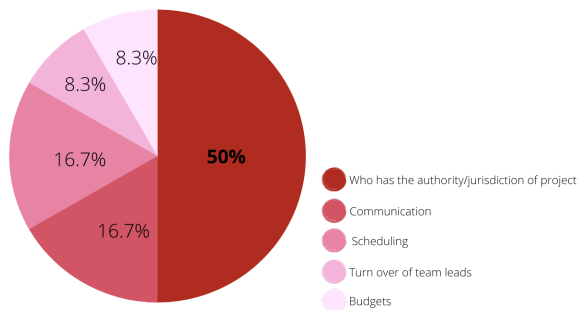


Figure 3 Why do you think it's most important to reduce single-use plastics?

Half of the participants said that the most significant barrier their department faces in working on the reduction of single-use plastic at ASU is the lack of a designated leader who has authority and jurisdiction over the project. This seems to be a common challenge that many large organizations face as projects evolve from a couple of people to several different departmental teams. Many stakeholders internally feel like there needs to be a central manager for this project while the single-use plastic problem is explored here at ASU. Moving forward, this is a crucial recommendation for this group, having sustainability coordinators or analysts to act as communicators between the groups. This individual(s) could also look at proposed solutions and see if they are viable for ASU or not.

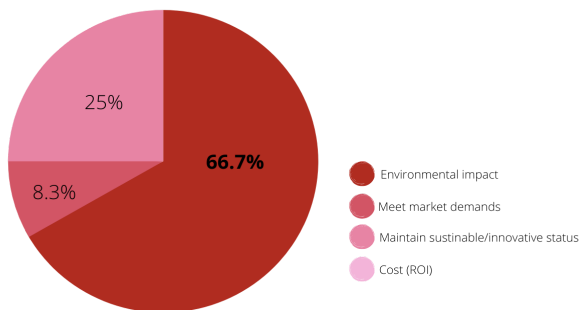


Figure 4 What is the biggest barrier your team faces when working on multi-department projects?

When asked what the participants thought were the most important reasons for reducing single-use plastic at ASU, the majority of the participants said that the environmental impact is the most important reason. There is a shared value amongst the stakeholders, and it acts as a reminder that they are all working on this goal to reduce single-use plastic to protect the environment for future generations.

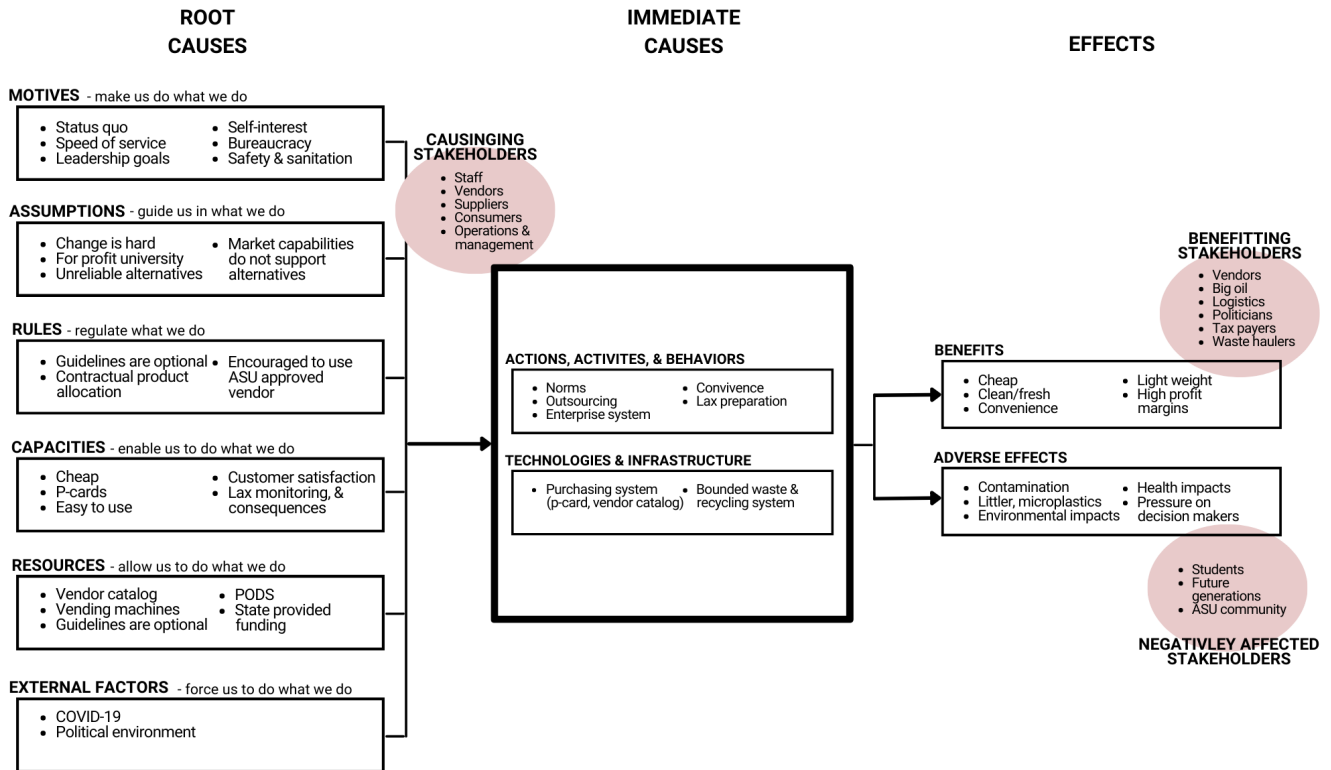
## Breakout Room Discussions

During the workshop, our team broke up all the participants into breakout rooms to maximize the time and information we could get. There were three breakout rooms and they each focused on one part of the sustainability map; root causes, immediate causes, and effects. We asked a series of questions in each room, described below, and used this information to create our final deliverable from the workshop, the sustainability problem map. The breakout room discussion and responses are linked [here](#).

## Final Deliverable [from the workshop]

Workshop attendees highlighted the value of our research into, and engagement with other universities working on plastic reduction strategies. There are a lot of lessons to be learned from what others are doing, but it can be difficult for staff to find the time to keep up with what other universities are doing when they already spread so thinly. An idea that came out of that was to hire student worker analysts to monitor and engage with stakeholders at other institutions to identify and recommend ideas to teams working on plastic reduction at ASU.

After the workshop and the insights were gathered from the breakout rooms, our team put together the information from each room into the Sustainability Problem Solving Framework. This framework puts the plastic problem at ASU into a sustainability problem for the stakeholders in this group to continue to use as a reminder throughout their problem-solving efforts. Our team sent back this map to each stakeholder that participated in the workshop, with no responses to the email we only have to make assumptions on the value that this map brings to the group. The sustainability problem at ASU needs deep sustainability thinking and problem-solving efforts for transformational change to occur. We believe that this map is a preliminary step in this.



Wiek, A. (2015). Solving Sustainability Solutions: Tools for a New Generation of Sustainability Professionals. Arizona State University.

Figure 5 - The final Sustainability Problem Map curated from the workshop participants and Team Frizbee

## Waste Characterization

### Waste Characterization Key Takeaways

- ASU is behind when compared to other universities with similar diversion goals
- The quality of ASU's AASHE STARS waste reporting lacks transparency and detail when compared to UC Schools
- ASU landfill current diversion efforts relies heavily on recycling

We begin this section by using this Sustainability Tracking, Assessment, and Rating System (STARS) set forth by The Association for the Advancement of Sustainability in Higher Education (AASHE). STARS is a self-reporting, transparent framework for institutions to measure their sustainability performance across five primary domains (e.g., academics, engagement, operations, planning and administration, and innovation and leadership). For the sake of this report, we have exclusively looked at institutional waste, a subdomain of operations. For comparison, we selected five University of California (UC) campuses on five dimensions

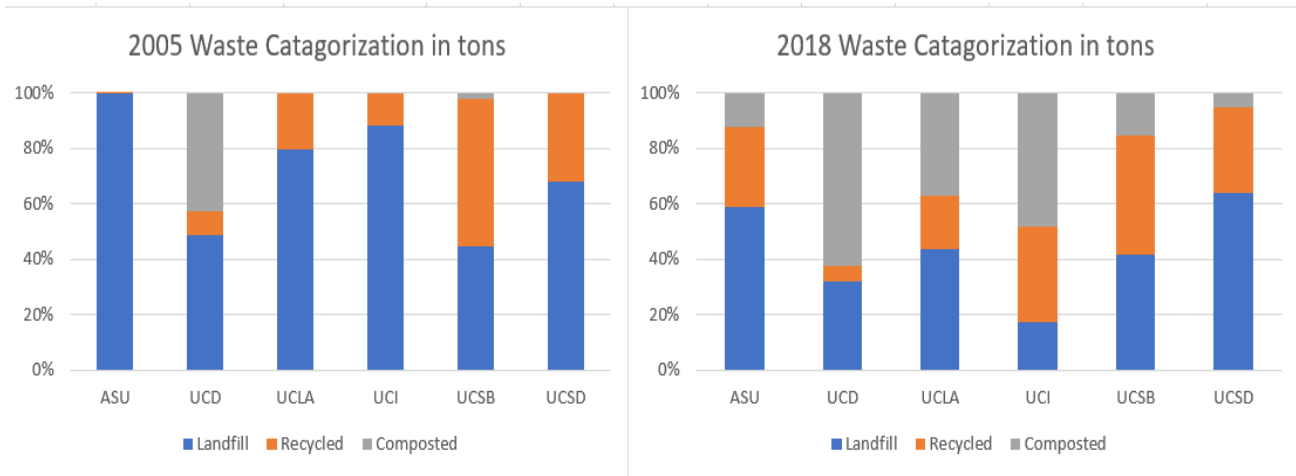
1. Industry leader in sustainable transformations
2. Capita comparable to ASU
3. Similar diversion goal to ASU
4. Baseline reporting year of 2005
5. Report renewal in 2018

University	AASHE Stars Rating	AASHE STARS Score – Waste Minimization and Diversion	Total waste generated per campus user in tons (performance year / baseline year)	Public Diversion Goal	Current Diversion rate
<a href="#">ASU</a>	Platinum	5.30 / 8.00	.13 / .22	90% by 2025	43%
<a href="#">UCI</a>	Platinum	5.43 / 8.00	.24 / .37	90% by 2020	81%
<a href="#">UCD</a>	Gold	5.84 / 8.00	.59 / .69	90% by 2020	70%
<a href="#">UCLA</a>	Gold	4.14 / 8.00	.31 / .44	90% by 2020	65%
<a href="#">UCSB</a>	Gold	5.81 / 8.00	.26 / .58	90% by 2020	69%
<a href="#">UCSD</a>	Gold	5.61 / 8.00	.14 / .48	90% by 2020	43%

Table 1 - Highlights a few key metrics from the AASHE report to conceptualize where ASU is as compared to our other selected universities. All data retrieved from <https://stars.aashe.org/reports-data/>.

Team Frizbeez then graphed data reported by the universities during AASHE STARS renewals to determine total waste generation (and diversion) to find trends in waste characterization over time. Graphs 1 and 2 below show a side-by-side comparison of campuses in the baseline year of 2005 and again in 2018. We noticed a trend in waste composition. The catalyst campuses UCI,

UCLA, and USD reduce landfill and recycling composition while increasing their composting composition. The breakdown of individual UC campuses over time can be found in appendix 1.



Graph 1 and 2. All data retrieved from <https://stars.aashe.org/reports-data/>

## Waste Audit

### Waste Audit Key Takeaways

- In order to improve the actionability of waste audits they should be completed on consistent intervals
- Future waste audit studies should provide a deeper dive into the itemized breakdown of each material type

In 2018, ASU had a Waste Audit completed by Cascadia Consulting Group to obtain detailed data on the quantities and composition of the materials making up their landfill and recycling streams. Team Frizbeez cannot disclose the data found in the Audit Report due to an NDA with ASU. However, we can present our findings of the report. The comprehensive report analyzed the waste streams of four campuses (DPC, Polytechnic, Tempe, and West), focusing on four generator groups – academics, classroom, business, lab, and public (ACBLP); athletics; mixed; and operations. While the study provided relevant insight into what materials are making up ASU’s waste composition, our team, with the help of Josh Ellner from Zero Waste, found the study was missing information critical to changing ASU’s waste composition to meet their waste goals. The recognized gaps in the study are as follows.

1. The delay in receiving the written study – Ellner stated in an interview that by the time the report was received, more than six months after the audit was conducted, the information was already out of date. It was a screenshot of the history of a particular day.
2. The lack of images – a physical visualization of the composition of material types to see which vendors and what products are driving the problem – e.g. the plastic section of the report breaks into subsections of materials – a few are listed below. Zero Waste would have liked to have seen actual pictures of each material type to help recognize the sources of said stream of materials.
  - a. #1 PET Bottles & Containers (Vendor-generated)
  - b. #1 PET Bottles & Containers (Non-vendor)
  - c. #2 HDPE Bottles and Containers
  - d. #3-7 Containers (Vendor-generated)
  - e. #3-7 Containers (Non-vendor)
  - f. Plastic Film (Vendor-generated)
  - g. Plastic film (non-vendor)
  - h. Expanded Polystyrene (EPS)
3. A percentage source breakdown of the top contributors to each of the 44 material types recognized in the study – what are the primary sources to each stream of materials, so we know where to intervene. For example, presenting data like xx% Starbucks cups, xx% Sparky's Den cups, xx% Subway cups, would help create action around changing the characterization of our waste.



## Market Analysis

### Market Analysis Key Takeaways

- The current market is capable of handling ASU's reduction of single-use plastic
- Transitioning away from single-use plastics is a costly endeavor, but is an investment in enhancing the long-term resiliency of the university
- Further outreach should be conducted to partner with a producer of compostable single-use alternatives

While virgin single-use plastic is the cheapest material to produce, consumers pay for the cost via externalities long after its intended use. In an interview, Mark Arnold, the General Manager for Sodexo at Marshall University, stated that transitioning away from single-use plastic increased vendors' costs by 60% – but this does not consider the environmental externalities, the social impact of single-use plastics, or the cost of waste disposal for the institution.

### Single-Use Plastic Alternatives

We have researched the market cost of nine primary single-use items and their alternatives available to ASU's purchasers. Table 2 shows the cost difference between plastic, PLA, and fibrous compostable materials available through Staples. Table 3 compares the cost of fibrous compostable to the cost of PLA compostable available through Staples. The final Table 4 shows the cost difference between Staples and Good Start Packaging, a plastic-free eco-packaging company. Our findings indicate that ASU's current vendors do not offer economical alternatives that support transitioning away from single-use plastics. Further research should be conducted on vendors/manufacturers of compostable alternatives to help the transition away from plastic.

Item	Plastic	PLA	% change in cost from plastic to PLA	Fibrous	% change in cost from plastic to fibrous
12oz cup	\$ 0.10	\$ 0.14	40.0%	\$ 0.12	20.0%
cup lid	\$ 0.06	\$ 0.12	100.0%	\$ 0.10	66.7%
6in plate	\$ 0.05	\$ 0.13	160.0%	\$ 0.07	40.0%
9in plate	\$ 0.09	\$ 0.26	188.9%	\$ 0.12	33.3%
fork	\$ 0.03	\$ 0.09	200.0%	\$ 0.10	233.3%
knife	\$ 0.03	\$ 0.09	200.0%	\$ 0.13	333.3%
spoon	\$ 0.03	\$ 0.06	100.0%	\$ 0.10	233.3%
12oz bowl	\$ 0.09	\$ 0.38	322.2%	\$ 0.10	11.1%

straw	\$ 0.01	\$ 0.05	400.0%	\$ 0.05	400.0%
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Table 2 - Staples items by unit.

Item	PLA	Fibrous	% change in cost from PLA to fibrous
12oz cup	\$ 0.14	\$ 0.12	-14.3%
cup lid	\$ 0.12	\$ 0.10	-16.7%
6in plate	\$ 0.13	\$ 0.07	-46.2%
9in plate	\$ 0.26	\$ 0.12	-53.8%
fork	\$ 0.09	\$ 0.10	11.1%
knife	\$ 0.09	\$ 0.13	44.4%
spoon	\$ 0.06	\$ 0.10	66.7%
12oz bowl	\$ 0.38	\$ 0.10	-73.7%
straw	\$ 0.05	\$ 0.05	-20.0%

Table 3 - Staples items by unit.

Item	Staples PLA	Good Start PLA	% change in PLA cost from Staples to Good Start	Staples Fibrous	Good Start Fibrous	% change in fibrous cost from Staples to Good Start
12oz cup	\$ 0.14	\$ 0.16	14.3%	\$ 0.12	\$ 0.15	25%
cup lid	\$ 0.12	\$ 0.13	8.3%	\$ 0.10	\$ 0.12	20%
6in plate	\$ 0.13	-	-	\$ 0.07	\$ 0.07	0%
9in plate	\$ 0.26	-	-	\$ 0.12	\$ 0.18	50%
fork	\$ 0.09	\$ 0.07	-22.2%	\$ 0.10	\$ 0.07	-30%
knife	\$ 0.09	\$ 0.07	-22.2%	\$ 0.13	\$ 0.09	-30.8%
spoon	\$ 0.06	\$ 0.08	33.3%	\$ 0.10	\$ 0.09	-10%
12oz bowl	\$ 0.38	-	-	\$ 0.10	\$ 0.09	-10%
straw	\$ 0.05	-	-	\$ 0.04	\$.003	-25.0%

Table 4 - Staples compared to Good Start. Blank spaces indicate that the manufacturer does not produce that item.

## Criteria for Comparing the LCAs

### LCA Comparison Key Takeaways

- LCA's demonstrate that reusable and compostable products have lower environmental impacts than disposable products
- Available composting facilities do not accept PLA plastic, and therefore these products often end up in the landfill

Team Frizbeez used the Life Cycle Assessments (LCA) framework to show the value of conventional products. The products we selected are those most commonly used on ASU's campus – tableware (cutlery, napkin, cup, plate, tray mat) and beverage cups.

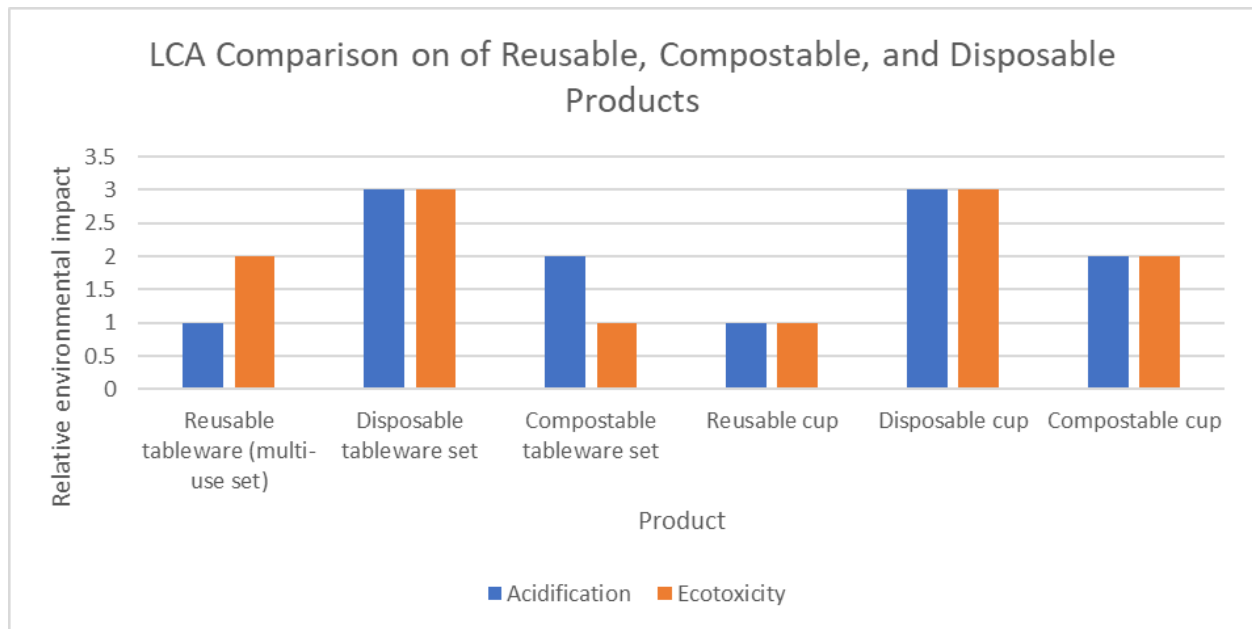
Below, table 5 demonstrates how reusable, compostable, and single-use items compare with one another. We selected two key metrics to measure – acidification and ecotoxicity. These two impact categories show how the product or process impacts the environment. Acidification refers to how much the product is acidifying the soil and water. Ecotoxicity is how much the product's toxins impact the environment. The purpose is to help convince ASU that choosing a reusable option will have a lower environmental impact. For the tableware LCA, the most impactful systems have a percentage closer to 100 and the least impactful system have a percentage closer to 0. For the cups LCA, the result uses the relative contribution percentage, meaning a greater percentage has a lower environmental impact. The two LCAs had different functional units, with the tableware LCA assessing the environmental impact of supplying 1000 meals and the beverage cup LCA looking at “the recipients needed for serving 100-liter beer or soft drinks on a small-scale indoor (2000-5000 visitors) and a large-scale outdoor event (>30 000 visitors)” (Sarlee, 2006).

Table 5 also shows that while compostable PLA is a better alternative than disposable plastic products, they are not the best alternative due to the challenges with composting it. Its higher environmental impact is compared to compostable products made from other materials like paper. PLA bottles have higher GHG emissions than PET bottles when recycled. While it is unclear whether PLA decomposes in landfills, it is clear that most PLA products end up in landfills (Clean Water Fund, 2017). An LCA comparing PLA compostable plates and reusable ceramic plates found that the ceramic plates had a lower environmental impact after only 50 uses (Clean Water Fund, 2017). PLA is commonly used as a greener alternative to PET plastics since it is made from plant materials instead of petroleum, but the challenges with composting prevent it from being the environmentally better choice. In the United States, most compost facilities do not accept PLA, because of this it often ends up in landfills similar to regular plastic (Clean Water Fund, 2017). However, compostable tableware from other materials, such as paper, is less than half the global warming impact of single-use tableware (Gold, 2020). Since an LCA on compostable tableware that was made from materials other than PLA was not found, this

qualitative analysis is provided as evidence to avoid using PLA materials as a “greener alternative.”

Product	Product materials	Acidification	Ecotoxicity
<a href="#">Reusable tableware (multi-use set)</a>	Polylactic acid (PLA) - Polybutylene succinate (PBS), and paper	About 45%	About 30%
<a href="#">Disposable tableware set</a>	Polystyrene (PS), and paper	About 99%	About 95%
<a href="#">Compostable tableware set</a>	Polylactic acid (PLA), Polybutylene succinate (PBS), and paper	About 75%	About 25%
<a href="#">Reusable cup</a>	Polycarbonate	About 0	About 0
<a href="#">Disposable cup</a>	Polypropylene	About -15%	About -20%
<a href="#">Compostable cup</a>	Poly lactide (PLA)	About 0	About -5%

Table 5. Comparing the LCAs of reusable tableware, disposable tableware, compostable tableware, reusable cup, disposable cup, and a compostable cup.



Graph 5. An LCA comparison of the relative environmental impacts of the six different analyzed products.

To show the negative environmental impacts of the products, the products in our two categories (tableware and beverage cup) were ranked for both impact categories, with the product having the highest environmental impact receiving a value of three and a product with the lowest environmental impact receiving a value of one. The disposable option has the highest environmental impact for both types of products.

## Infrastructure

### Infrastructure Key Takeaways

- Food waste is the largest waste category at ASU, investment in composting infrastructure would help remove this barrier
- When looking to make the switch away from single-use plastic the two best alternatives are compostables and reusable products
- The cost of composting infrastructure (among many other projects and sustainability related infrastructure) could be subsidized with the implementation of a tuition ‘green fee’ (as low as \$10)

When transitioning away from single-use plastic, compostables and reusables are the two best current alternatives. Team Frizbeez looked into each alternative, the associated cost, and the financial benefits of reducing single-use plastics. Both alternatives have cost benefits, reduce single-use plastic over time, have net positive environmental impacts, and support ASU’s waste aversion and diversion goals. We recognize the high cost associated with transitioning to compostable infrastructure. However, our research has found that implementing a \$10 ‘green fee’ (per student, per semester) into tuition costs could help cover the initial cost in just a few years.

### Composting

We begin by looking into two manufacturers of composting infrastructure used by universities that have already made the transition to compostables (UC and Marshall University) to see the approximate cost of implementation for a university the size of ASU. With the expertise of Glenn McConkey, President of Xact Systems, Team Frizbeez was able to use a variety of industry standards/averages to calculate the ROI of each system if we were to sell our final product. The data below recognizes the distance between ASU campuses and is based on the Tempe campus being the epicenter of a 15 miles radius to include the organic waste produced by the closest satellite campuses.

Company	Model	Infrastructure cost	Number of units required to meet demand	Annual energy cost	Annual yd <sup>3</sup> production	Number of years producing until profitable
Green Mountain Technologies (GMT)	Earth Flow Heavy Duty	\$2,560,000	16	\$1,721,109	26,280 yd <sup>3</sup>	18
Xact Systems	1060 Bioreactor	\$2,610,000	6	\$239,042	53,485 yd <sup>3</sup>	5

*Table 6. Average values used for amount of student waste per day (.75lbs); energy cost of \$.15 per kilowatt; sale price of final product per yd<sup>3</sup> (\$25).*

We recognized a few vital characteristics that can make or break an alternative when considering composting infrastructure. First and foremost is the amount of time organic material must remain in the digesting vessels. The GMT system needs material to stay in the vessel three times as long (14-21 days) as the Xact systems (5 days), requiring 266% more infrastructure and a 720% increase in energy cost. Another consideration is how ready is the material to sell once out of the system. The GMT system recommends allowing 1-3 months to cure the final organic material before selling (this may vary due to ASU being located in an arid desert region). At the same time, the XACT Systems is ready to sell once removed from the vessel. It is noteworthy to mention that the Xact System recommends using a bulking agent (landscape waste) throughout the process. Using a bulking agent in the GMT system may significantly reduce material time in vessel and curing. Lastly, the land area required for GMT would be considerably more significant due to the number of systems needed and the land required to cure the material before selling. Team Frizbeez only looked into two infrastructure systems. More research should be conducted on available alternatives to decide what's best for ASU.

### Reusables

When considering a transition to reusable items, it is not as simple as implementing an entirely new system as it is with composting. We must consider the compatibility of ASU's current infrastructure with that of the requirements of a reusable system. A few questions to consider are

1. Does ASU have the facility space to store reusables (plates, cups, utensils)?
2. Do ASU's facilities have the capacity to introduce dishwashers? How would this look in dining facilities vs. Memorial Union vs. faculty/student lounges?
3. What inputs are required for operating the system (labor, water, energy)?
4. What material of reusables would be best (ceramic, glass, stainless steel). Consider the lifetime of the materials, the environmental impacts of production, weight, and size.

Below is a chart (Table7) provided by Upstream, a company dedicated to practical solutions that help organizations shift from single-use to reuse. The chart looks into various alternative materials' economic, social, and environmental impacts. We want to acknowledge that the reusable section of the chart does not consider the impacts of disposal.

## Reusable: The Clear Choice

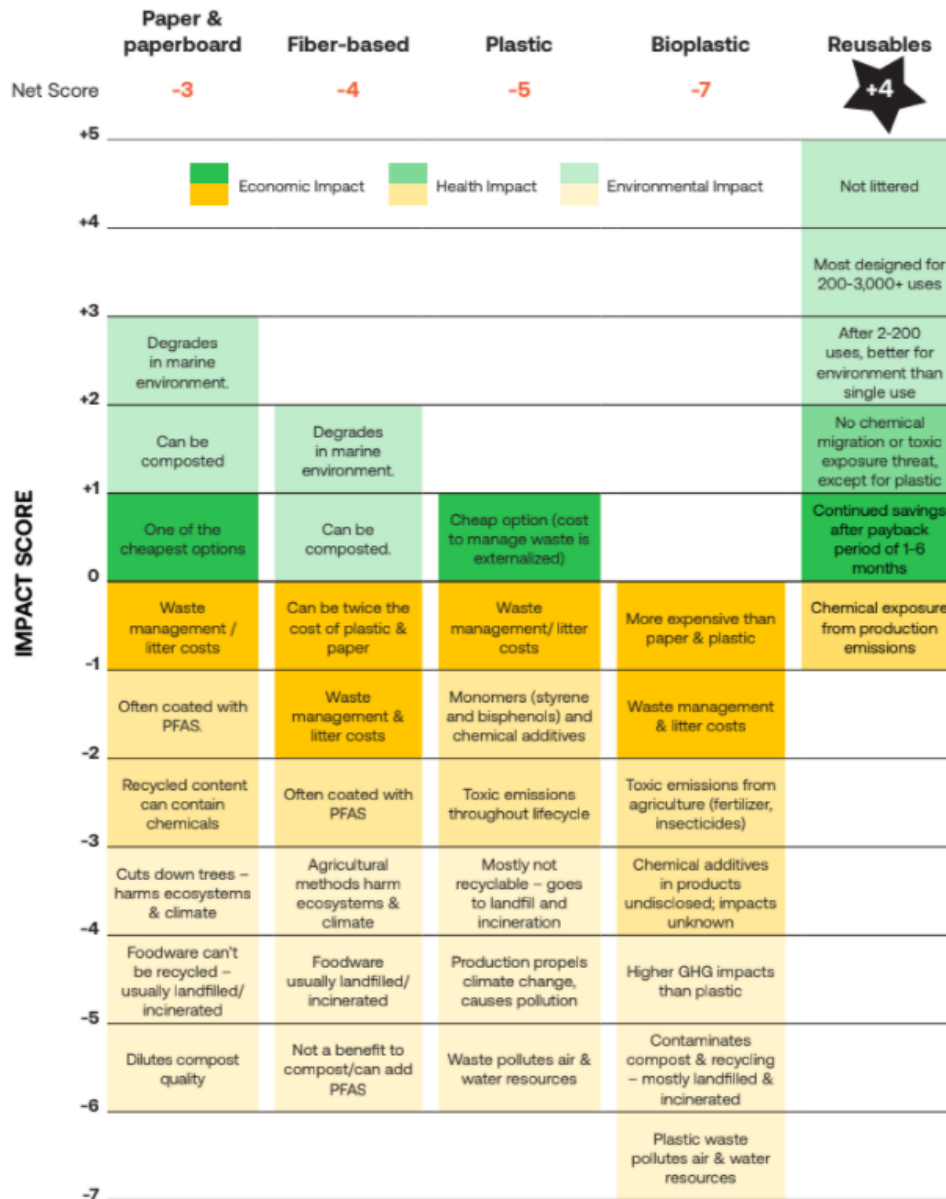


Table 7. The clear choice graph taken from Upstream highlights the comprehensive impact of materials. <https://drive.google.com/file/d/1nB4VhY409e7z6SKtcTNYMaGgrONX2-4w/view?usp=sharing>

Considering this study's limited time and resources, Team Frizbeez could not provide an exact projected cost of implementation and maintenance. However, available research shows there is value in investing in further research to see if reusables are feasible for ASU.

## Current Waste Service Provider Analysis

### Current Waste Service Provider Key Takeaways

- Mandate a sustainability training component for Republic Services and Olympus staff
- Return all in-person on campus dining to reusables as soon as possible, based upon current COVID-19 guidelines and mandates.
- ASU needs to challenge the national contracts to eliminate single-use plastics.
- Partner with Precious Plastics and Tyler Eglen (tyler.eglen@asu.edu) on plastic waste to be disposed of on campus.

*These excerpts below were taken from a conversation with Josh Ellner from Zero Waste which explains the jumping around nature of the content. So pardon the brevity/informality of some of the paragraphs.*

Arizona State University's primary hauler is Republic Services. They collect waste from centralized locations on campus. They also haul the bulk of compostable materials, but Zero Waste handles all solid waste. ASU's primary janitorial service on campus is Olympus. There is a severe lack of education and emphasis on the importance of waste separation, leading to high cross-contamination levels. Outdoor bins are the most contaminated, while indoor bins and indoor office buildings are the least contaminated. In buildings on campus, to avoid contamination, trash and recycling are supposed to be picked up on different days, but this is not always the case. To help prevent contamination, having required training for employees on separation, recycling, and composting would be highly beneficial. For students, waste-related marketing and outreach campaigns could be run through Educational Outreach and Student Services ([EOSS](#)) or our recommended class (Zero Waste Lab - see below). Students could be asked/required to watch training on waste or can volunteer as "Garbage Police" at the beginning of the semester to monitor trash bins. Without students, faculty, and staff changing their behavior around waste, real change at ASU will be extremely difficult to make. Concerning waste on campus, establishing a processing facility before the waste is taken to the landfill could help with contamination, along with smaller, more frequent waste audits.

Regarding the solid waste on campus, Zero Waste could use more staff to carry out operations because ASU depends on downstream sorting, which creates too many moving parts. To assist in sorting, research, and more regular waste audits, a Zero Waste Lab class could be developed to get students involved with solving the plastic waste problem on campus. The partnership that ASU already has with the Post Landfill Action Network ([PLAN](#)) should be better utilized. They could help to connect Procurement or Zero Waste with students interested in waste audits, or already doing them on campus. Smaller-scale waste audits on a more regular timeline could be more beneficial as they deliver smaller snapshots of what waste looks like on campus.

If individual departments make decisions, more communication between Procurement, Zero Waste, and USP is critical to ensure mutually beneficial solutions and decisions. This



communication is vital so that Zero Waste would know what Procurement was purchasing to better plan for the processing of it. As far as purchases go, a more stringent vetting process for vendors and their products is essential.

## Proposed Zero Waste Lab

To be offered in spring and fall semesters (SOS498/598) Zero Waste Lab would address the problem of not having enough people on the ground to manage waste, waste audits, and contamination. It could also be a source for new information and research around the current technologies surrounding waste and waste infrastructure.

Class Description: The waste problem is not going anywhere anytime soon. Problematic waste streams must be identified and actionable solutions must be put in place. This class will be a mix of analysis, applied skills, waste management education, and research. It will prepare students for careers in the circular economy in positions at universities, governments, and high profile companies.

- The class would be looking for a faculty member that is tied to zero waste or a teaching team that combines skills and expertise from different units. A list of potential faculty could be:
  - [Albert](#) Brown: Teaches a class on Sustainable Waste Management in the ERM Department.
  - [Erin](#) Redman: Values and norms on sustainable waste. More on the social side of reducing waste. If Ms. Redman is chosen, her contribution would need to be made remotely because she lives outside of Arizona.
  - [Kiril](#) Hirstovski: Technical side of reducing waste. He comes from an engineering background.
  - [Peter](#) Fox: Biological side of waste and its impact on the environment.
- Another option could have a graduate student or some sort of TA teach the topic
- The class would:
  - Conduct monthly waste audits
  - Design scoreboards for evaluating different waste streams/strategies
  - Conduct analysis and propose recommendations
  - Look at case studies of other institutions that have reduced waste
  - Contract analysis and have guest lecturers
  - Marketing/communications strategies for Zero Waste initiatives
  - Help support ongoing Zero Waste initiatives
  - Municipal waste management analysis
  - The dangers of convenience culture
  - Waste stream mapping
  - Field trips to recycling and landfills
- Since ASU plans to instill new general education requirements ([See minute 37](#)), this could guide new requirements and class content.
- [Zero Waste Research Center](#) run through the Student Environmental Resource Center (SERC)
- [UC Berkeley Zero Waste Class](#) and [Syllabus](#)

## Procurement Guidelines

### Procurement Guidelines Key Takeaways

- ASU must create enforceable procurement policies that should replace the existing purchasing guidelines, and include a definition of single-use plastic
- Provide resources for ASU faculty and staff to learn more about the sustainable procurement guidelines and how to embed sustainability into any and all purchases made

Team Frizbeez began by assessing what ASU is already doing in sustainable procurement, quickly learning about the university's existing sustainable purchasing guidelines. However, we also learned those guidelines are not embedded into the procurement strategy of the university. A 2019 study done by an assistant professor and PhD student at the Center for Organizational Research and Design, revealed that only 10% of respondents were extremely familiar with ASU's procurement guidelines (Stritch and Chen, 2019). The respondents of this survey included individuals whose roles involved purchasing. Additionally, 92% of these respondents stated that online training and quick guides/brochures would be helpful for learning more about the guidelines (Stritch and Chen, 2019.). This study highlighted the lack of knowledge surrounding the university's procurement guidelines, and a desire to learn more about it.

To guide our strategy, Team Frizbeez researched other universities and organizations sustainable procurement guidelines, policies and strategies to better inform and provide ASU a place for partnerships, collaboration, and learning from peers. Team Frisbeez chose the University of Colorado, California State University, Cornell, McGill University, Humboldt State University, University of California system, and Colorado State University because they all have sustainable procurement guidelines and offer possibilities for improving ASU's current guidelines. Table 8 below provides an overview of universities and organizations procurement guidelines coupled with recommendations for how ASU can improve its own guidelines – including language that is directly from each organization's procurement guidelines, with examples of policy language around single-use plastic. From these examples, it is clear that the wording in guidelines and policies are critical and can dictate whether or not single-use plastics are prohibited.

Another critical insight is the lack of education and training for buyers and employees at many universities, procurement guidelines need to include information on the training required for purchasers. ASU needs sustainable procurement guidelines that prioritize education, provide specific definitions of key concepts, and focus more on sustainable procurement information. An example of the importance of the educational component, was highlighted by Humboldt State University which utilized student groups to increase education and outreach on the issue of reducing single-use plastic bottles. Team Frizbeez recommends to continue to leverage internal and external partnerships and collaborations as one of the 8 critical recommendations.

ASU has sustainable purchasing guidelines that only mention plastic once, and it does not explicitly mention single-use plastics. These guidelines state, “Products containing microbeads or other microplastics shall not be purchased or used” and do not refer to any other types of plastic (ASU Procurement, 2021). ASU’s guidelines state that products that do not comply with the policy would face financial consequences. However, it does not say that they would be outright prohibited, which is what would be required to reduce single-use plastics on campus (ASU Procurement, 2021).

Since the procurement policy exists within ASU’s Procurement Department, they should be the ones enforcing it. This is a big ask, and the procurement department would need help from other departments or at the minimum a direct determination of who is in charge of enforcement. The guidelines also use language such as “preference shall be given to,” which alludes to the fact that it is more of a suggestion than a requirement (ASU Procurement, 2021). A binding policy, not just vague guidelines, is required for meaningful change to occur. An example of a more enforceable language that could be included would be “the university requires all purchased products to meet the requirements as stated below” and “the university requires all suppliers to adhere to the guidelines as set forth in this document.” By changing the verbiage in the document to be more binding, the university can illustrate its commitment to reducing single-use plastics, and ensure that the policy is taken seriously. The university also has a purchasing toolkit for sustainable promotion materials, which states plastic 11 times, and guides ASU staff on how they could reduce plastic through their actions (ASU Staff Council, n.d.). While the toolkit helps address the educational component necessary to reduce single-use plastics, it is not binding and merely provides suggestions. Additionally, this toolkit is not easily accessible, and one needs to know exactly what to look for in order to find it.

ASU’s standard terms and conditions state that the “Supplier will make commercially reasonable efforts to use Small Business (SB) and Small Diverse Business (SDB)” however the conditions do not refer to sourcing from sustainable businesses that do not use single-use plastics or use very little of it (ASU, 2022). An example could look like “Employees will be required to source from suppliers that do not use single-use plastics or use very little of it.” By taking a more rigid stance, the university could reduce the amount of single-use plastics coming into the university. The procurement department has stated that it has plans to update the guidelines and make it more well-known, and the team would like to reiterate the importance of this action. For the moment, the procurement department could link the current purchasing guidelines in the purchasing and policy section on the webpage "[What is ASU is Doing](#)". Information on it could also be included in the SEEDS of Sustainability training, and be provided in an expanded outreach and training campaign for everyone who is involved in purchasing at the university.

University	Single-Use Plastic Information	Text from other Organization	Recommendations for ASU and Draft Text
<a href="#">University of Colorado</a>  Public (33,000)	No mention of it in SPG	<p>“Require that all equipment purchased, when practicable, be compatible with products and services that provide source reduction benefits” (University of Colorado Boulder, n.d.).</p>	<p>ASU needs to differentiate between "requesting or recommending" and "requiring" suppliers, and provide clearer verbiage.</p> <p><b>Draft text:</b> “Employees must exercise due diligence while seeking alternatives for single-use plastic items prior to making a purchase, and select alternatives which are respective of the university's recycling and composting facility capabilities” (Policy to Restrict the Procurement and Use of Single-Use Plastic, 2019).</p>
<a href="#">California State University</a>  Public (485,000 across all universities)	Plastic is mentioned several times.	<p>“Campuses shall establish purchasing practices that assure, to the maximum extent economically feasible, the purchase of single-use plastics including plastic straws, plastic water bottles, and plastic bags are eliminated. Purchase preference shall be given to reusable products, followed by locally compostable and/or recyclable products. Procurement, auxiliaries, and all relevant stakeholders will work with campus sustainability staff to assess and select the most sustainable alternatives” (California State University, 2018).</p>	<p>ASU should define what single-use plastic is to be eliminated.</p> <p><b>Draft text:</b> “No restaurant, including fast food restaurants, beverage providers, or vendors shall use, provide, distribute, or sell plastic straws, plastic water bottles, and plastic bags, or plastic cutlery” (Harris, 2020).</p> <p>“No person shall distribute plastic straws, plastic water bottles, and plastic bags, or plastic cutlery at any ASU facility or sponsored event“ (Harris, 2020).</p>
<a href="#">Cornell</a> Private (21,	No mention of plastic	“Cornell University will identify and promote	ASU should have a greater focus on procurement and vendor

000)		<p>environmentally responsible procurement by featuring sustainable products and services, practices, processes, and procedures” (Cornell University, 2020).</p> <p>“The vendor selection process at Cornell University must identify the best, most qualified and/or suitable vendor to meet the needs of the university, while complying with all applicable laws and regulations” (Cornell University, 2020).</p>	<p>single-use plastic, as it relates to how employees and departments can select suppliers who have a smaller amount of single-use plastic in their products.</p> <p><b>Draft text:</b> “ASU will work with suppliers to ensure that all products supplied to ASU adhere to this policy and encourage suppliers to adopt the same plastic free standards within their organization and supply chains” (SKY Ocean Rescue, 2018).</p>
<p><a href="#">McGill University</a> Public (40,000), Canadian</p>	<p>No mention of plastic</p>	<p>“McGill recognizes that its demand for goods and services can generate social, economic and environmental impacts, both locally and abroad. That is why the University is committed to Sustainable Procurement, and life cycle thinking. McGill University values its suppliers’ genuine efforts to reduce the negative environmental or social impacts of their operations, their products, services, and those of their supply chain, in light of their full lifecycle” (McGill, 2016).</p>	<p>ASU should highlight the consequences of plastic use and the benefits it would bring for the university/environment to help get buy-in from stakeholders.</p> <p><b>Draft text:</b> “ASU is committed to the responsible purchase of all our products. This includes all products from suppliers that provide materials used internally in our operations, and all items that are used to engage the public in marketing type activities. It also includes items provided by suppliers for events and catering on and off site. It is the responsibility of all ASU staff who procure (or instruct procurement of) goods and services, to ensure that any physical products purchased directly or through third parties on our behalf, meet the requirements of this policy” (WWF, 2018).</p>

<p><a href="#">Humboldt State University</a></p> <p>Public (8,116)</p>	<p>Phased out the sale of plastic water bottles</p>	<p>“During the first year of the phase-out, there will be increased education and outreach by groups like Take Back the Tap and the Waste Reduction and Resource Awareness Program” (Humboldt State University, 2011).</p>	<p>ASU should have an internal purchasing educational program that coincides with their single-use plastic reduction goals.</p> <p><b>Draft text:</b> “ASU will work with student groups such as Greenlight Solutions, Changemaker Central, Net Impact, and PLAN to provide educational training and tools to staff, students and faculty to increase policy awareness.”</p>
<p><a href="#">University of California</a></p> <p>Public (more than 280,000 across all universities)</p>	<p>Mentions plastic in various forms, but no mention of single-use plastics</p>	<p>“Locations will consider eliminating single-use plastic beverage bottles when contracting with suppliers, or upon contract renewal and/or extension if current contract terms prohibit (e.g., vending machines, departmental purchases, etc.)”</p> <p>“The ban on expanded plastic foam materials in packaging applies to all packaging brought onto UC campuses via the purchase of goods for the University. The only exception to this ban is for the purchase of products utilized in laboratory or medical settings” (University of California, 2021).</p>	<p>ASU needs to have a specific single-use plastic policy.</p> <p><b>Draft text:</b> “ASU departments will eliminate single-use plastic products when contracting with suppliers and during supplier contract renewal.”</p> <p>“The Single-Use Plastic Policy commits Arizona State University to remove and reduce single-use plastics from ASU operations and services by reducing the number of plastics that are purchased, sold, and distributed by ASU” (UCLA, 2020 and Dorset Council, 2021).</p>
<p><a href="#">Patagonia Paper Procurement Guidelines</a></p>	<p>A specific policy surrounding paper, same principle could be applied for plastic</p>	<p>“When it comes to producing paper and other forest products, we are acutely aware of how irresponsible forestry practices are systematically destroying the Earth’s biodiversity. We use paper in many of our business processes—printing at our corporate offices, producing catalogs for customers,</p>	<p>ASU needs to have specific policies and procedures in place when it comes to plastic if it is serious about a transition away from SUP. A separate document inspired by Patagonia could be one route.</p> <p><b>Draft text:</b> When products need to be purchased for ASU (any sector of the operations) the materials being used need to be</p>

		<p>putting hang tags on our products and shipping goods in boxes across the globe (Patagonia, 2018)</p>	<p>critically analyzed before purchase. At the large scale that ASU makes purchases we are aware of the environmental impact that follows. We assume all responsibility for the effects on the surrounding community and environment, and will ensure that our purchases impacts are minimized to the fullest extent.</p>
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*Table 8. Comparison of the procurement guidelines of several organizations and universities, possible recommendations for ASU.*



## Landscape Analysis of Other Universities Plastic Reduction Strategies

### Landscape Analysis Key Takeaways

- Regarding vendors and new RFPs, sustainability should be a central factor. Pepsi's sustainability initiatives have far surpassed Coca-Cola's.
- Large scale investments into composting infrastructure must be considered to reach the 90% diversion goal - e.g., anaerobic or aerobic digesters, mixers, partnership with R. City, etc.
- Creation of a Tableware Share Program similar to the one Pomona has implemented could drastically reduce waste on campus

One crucial facet of sustainability strategy is showing evidence or finding places where what you are trying to do is already being done. For this portion of the project, we set up interviews with universities across the United States that already had plastic reductions strategies and are working to eliminate single-use plastic from their campuses. In our research, UCLA is the most progressive university in terms of plastic reduction in the country with hopes of eliminating all non-essential single-use plastic from their campus by late 2023! So it can be done.

Before we get into the details of the different university plastic reduction strategies, we wanted to introduce an opportunity for a plastic reduction partnership. The **National Wildlife Federation** and the **Campus Race to Zero Waste Program** recently announced a new certification program for colleges and universities taking action to reduce the purchase and use of plastics on campus. This would be an excellent opportunity for ASU to maintain its "cool school" status because no other Arizona school has signed on yet. To be a part of the program, a university must:

- Commit to a three-year evaluation cycle and will submit results in the Plastic Reduction Partner [workbook](#) for either Bronze, Silver, or Green Certification
- Be associated with AASHE STARS processes and if in the program, ASU would be eligible for innovation credits and points
- Campuses will be asked to re-apply for certification every three years to remain current

### University Reduction Summaries

[Link](#): Reduction Strategy Summaries in Spreadsheet Form.

[Link](#): Reduction Strategy Summaries in Bulleted/Outline Form.



The first school we met with was UC San Diego. We met with their Senior Buyer/Dining Commodity Manager, Maggie Grey. Some key takeaways from this meeting were that she warned us of Coca-Cola's greenwashing attempts on their campus. And, when talking about

diversion, you may as well shoot for 100% because even if you do not hit it, you will already be in the 90% range.



The second school we met with was Washington University in St. Louis. We met with their Assistant Director - Office of Sustainability, Cassie Hage. Some key takeaways from this meeting were that their university had not had plastic water bottles on campus since 2009! They have to have consistent check-ins with vendors because plastic seems always to make its way back onto campus. Student-led activism is a crucial aspect of achieving a plastic reduction strategy. The school does utilize a reusable program for take-out containers but struggles with getting the containers returned.



The third school we met with was UC Irvine. We met with Lily Zaprianoff from their procurement department, Carrie Metzgar a sustainability and planning analyst, and Anne Krieghoff one of the Facilities Managers. UC Irvine has no formalized sustainability offices but has key colleagues focused on sustainability that work together from different units, organizations, and departments to maintain collaboration and connections. UC Irvine finished second behind ASU in the "cool school" rankings. One of the critical successes that UC Irvine has had in sustainability work is having people like Carrie in sustainability and planning roles to ensure projects are seen through to the end. They began with plastic bags and straws, or "low-hanging fruit." They have established rigorous onboarding processes and purposeful language for all vendors. Vendors are also highly encouraged to go through EcoVadis certification and are expedited through the onboarding process if they are certified. They embed sustainability in their training and education - words and specific contract language can make or break goals. One of their main messages was that any significant change should never occur in the middle of a semester. Act instead of react.



The fourth school we met with, and what became a game-changer, in our project research was UCLA. In our initial meeting, we met with Bonny Bentzen, the Deputy Chief Sustainability Officer, and had many email correspondences with their Zero Waste Manager, Kikei Wong. UCLA is the most progressive of the UC schools and is also creating a methodology that could be successfully integrated into other universities. In addition to their published process, they also have a very stringent single-use plastic [policy](#) and even a single-use plastic anonymous reporting

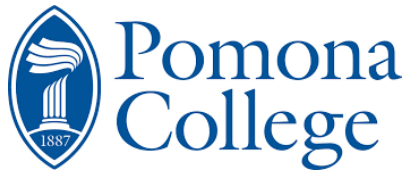
[form](#). UCLA has added hundreds of compost bins to their campus, even including paper towels in their bathroom. The first phase of the policy is scheduled to begin in July of this year when UCLA plans to officially phase out plastic utensils, cup lids, bowls, plastic bags, and similar “food accessory” items. They plan to be plastic-free by the end of 2023. UCLA has so much to offer. It would be good to spend time with all of their [material online](#).



The fifth school we interviewed was Marshall University in West Virginia. We interviewed their Sustainability Manager, Amy Parsons. Amy is a sustainability champion. She does it all on campus, from lobbying the state legislature to legalize industrial composting infrastructure to creating a complete composting program at the university. She negotiated with all of the vendors on campus to change to compostable to-go containers and is in the process of writing a sustainable purchasing policy. Marshall is lucky enough to have a sustainability liaison in every department on campus to ensure policies and procedures are being implemented, and things are going smoothly. Amy is a great connection and is always more than willing to help.



The sixth school we interviewed was UC Berkeley. We had a conversation with two students, Grace Martin and Kathryn Wilson, working on their Plastic Policy Roadmap and their Zero Waste Lab on campus. We also met with Lin King, Berkeley's Zero Waste Manager, Campus Operations. Similar to ASU, they developed a single-use plastic working group but included staff, faculty, and students to be a part of the group. The campus is committed to eliminating all non-essential single-use plastic by 2030 at the latest. They have a major focus on student-led initiatives, which is where our idea for the Zero Waste Class came from. It is modeled after some of the concepts from their Zero Waste Lab. Their [plastic policy](#) is currently in progress, and it is apparent that they are following in the footsteps of UCLA. They also have a policy [target document](#). In addition to their working group and Zero Waste Lab, they have a Zero Waste Coalition consisting of undergraduates and graduate students. As Josh Ellner mentioned, having a plastic recovery facility on campus would help prevent contamination, and UC Berkeley agrees and has a facility for that purpose. The on-campus facility allows for internal audits to be done regularly, and helps to track hard to recycle items and the downstream characterization of materials.



The seventh school we would like to bring attention to is one we did not meet with directly. Alexis Reyes is an Assistant Director of Sustainability Integration Officer at Pomona College. Pomona has a program that we think should be implemented at ASU as soon as possible. They have a successful [Checkout Program](#) for on campus events when Foodservice Ware is needed. It is a tableware share program. The "greenware" is available to checkout for all campus events, both large and small. Checkout is free if returned the following day. Otherwise, there is a fee. The "greenware" can be returned dirty. "Greenware event kits provide reusable plates, bowls, cups, and cutlery, along with a compost bucket. Cookware kits have common cooking items, such as pots, pans, bowls, and measuring cups. Both kits are custom-sized and checked out to students, staff, and faculty for campus events."

Link to buy from [Amazon](#).



**VANDERBILT**  
UNIVERSITY

The eighth and final university we interviewed was Vanderbilt. A stakeholder as we conducted interviews mentioned Vanderbilt because they had successfully transitioned from plastic bottles to aluminum. This was the first university we had come across that had seen that amount of success in its transition away from single-use plastic. We talked directly with their Sustainability Outreach Program Manager/Sustainability and Environmental Management Office Facilities, Chelsea Hamilton. We were also in contact with Suzanne Herron, Vanderbilt's Sustainability Coordinator, Campus Dining: Business Affairs, via email. Chelsea was nice enough to send us a [picture](#) of a convenience store fridge with all aluminum in it! We had never seen that before. Vanderbilt has a significant advantage in its plastic reduction strategy because its dining is done internally, and they do not work through Aramark or Sodexo. They initiated a zero waste campaign and a working group composed of faculty, staff, and students. They have multiple working groups on campus, but Zero Waste is by far the most popular. Vanderbilt was contracted with Coca-Cola. They informed Coke of their transition away from single-use plastic and wanting everything in aluminum. Coke was not meeting their demands, so they put out a new RFP, and Pepsi, a company with much stronger sustainability commitments, stepped up and completed the switch to aluminum. Their dining halls use real plates or compostable, and they have a partnership with a local industrial composting company. Dish rooms are standard for all new buildings, and old buildings are being renovated to make room for them. We wanted to highlight that Vanderbilt had very similar diversion goals to ASU so a partnership would be beneficial.

### Vanderbilt's Sustainability Goals

- Goal 1: Achieve Zero waste (90 percent diversion from landfill) by 2030
- Goal 2: Achieve 30% waste generation reduction from 2017 levels by 2030
  - Supporting Actions:
    - End institutional single-use plastic purchases by 2025, except in laboratories\*; and
    - Expand food waste collection to include all dining areas and residential halls by 2025.

[Link](#): Reduction Strategy Summaries in Spreadsheet Form.

[Link](#): Reduction Strategy Summaries in Bulleted/Outline Form.

- Great Resource to search for Case Studies and to see what other Universities are doing:  
[Plan's Program Case Library](#)

## Timeline Recommendations

### Timeline Key Takeaways

- Evidence from schools of comparable size and complexity, provide a plausible timeline for reducing ASU's single-use plastic
- Start with low hanging fruit and progressively tackle more “wicked” plastic streams
- Existing vendors contracts largely dictate when product changes can be implemented, be ready to push sustainability when these contracts are expiring

This timeline was adapted from UCLA and Cal Berkeley's Single-Use Policy documents. These universities are laying the groundwork for others to follow and provide excellent case studies and insight into the feasibility of eliminating plastic from a university campus. This timeline is to help serve as a guide for eliminating non-essential single-use plastic on campus. The size and complexity of ASU poses barriers to transition away from plastic. However, looking to other comparable universities regarding these two factors makes the recommended solutions much more tangible.

- **By August 15th, 2023**
  - Eliminate plastic straws from all campuses (*Low Cost*)
  - Eliminate plastic bags from all campuses (*Low Cost*)
  - Block the purchase of K-cups from department's budgets and p-card transactions (*Low Cost*)
  - Eliminate the sale and free distribution of single-use plastic water and beverage bottles and non-recyclable water containers and provide reusable alternatives during all indoor events with fewer than 100 attendees. This includes, but is not limited to, internal and external catering and distribution related to meetings, events, or other commercial or non-commercial activities (*Medium Cost*)
  - Creation of Anonymous [Single-Use Plastics Reporting Form](#) (*Zero Cost*)
- **By January 15th, 2024**
  - Replace disposable single-use plastics for all campus Foodservice Facilities, meetings, events, and catering events with reusables or locally compostable alternatives (*High Cost*)
  - Replace disposable single-use plastics for to-go facilities with reusable or locally compostable alternatives (*High Cost*)
- **By August 15th, 2024**
  - Eliminate the sale and free distribution of single-use plastic water and beverage bottles and non-recyclable water containers and provide reusable alternatives during all indoor events with greater than 100 attendees. This includes, but is not limited to, internal and external catering and distribution related to meetings, events, or other commercial or non-commercial activities (*Medium Cost*)
- **By January 15th, 2025**

- Replace single-use plastic foodware items with reusable or locally compostable alternatives for all dine-in and any remaining to-go facilities with indoor and/or outdoor associated seating (*High Cost*)
- **By August 15th, 2025**
  - Eliminate the sale and free distribution of single-use plastic water and beverage bottles and non-recyclable water containers and provide reusable alternatives at retail stores and all vending machines on university property. ASU will prioritize the installation of hydration stations to support this transition (*Medium Cost*)
- **By December 15th, 2025**
  - Review all above reductions and eliminate any remaining identified streams (*Low Cost*)
- **By August 15th, 2026**
  - Continued review of all above reductions and eliminate any remaining identified streams (*Medium Cost*)
    - Focus on elimination of Science/Research/Laboratory/Medical Plastic Use

If under contract:

- If there is a product from a vendor under a contract that is found to be using a non-essential single-use plastic item, an exemption could be given for the contract duration.
- Upon termination of the contract, the single-use plastic item will be discontinued, and a replacement that is deemed acceptable by the sustainable procurement head and the zero waste team will replace it.
- The new product will be either locally compostable or reusable.

Definitions for Timeline:

- *Foodservice facilities* mean restaurants, cafes, or similar places where food or drink is prepared, packaged, served, or sold for consumption on premises or elsewhere (not intended to include individual apartment kitchens).
- *To-go facilities* means foodservice facilities, including retail stores, which offer food that is primarily taken to-go and consumed off the premises.

<b>Policy Goal</b>	<b>UC Sustainable Practices Policy</b>	<b>UCLA Single-Use Plastics Policy</b>	<b>ASU's Projected Single-Use Plastics Policy</b>
Eliminate plastic bags, straws, and k-cups	1/1/2021	1/1/2021	8/15/2023
Replace plastic foodware accessory items	7/1/2021	1/1/2021	1/15/2024
Replace plastic foodware items at to-go facilities	7/1/2022	1/1/2021	1/15/2024
Eliminate plastic water and beverage bottles from events with fewer than 100 attendees	1/1/2023	1/1/2021	8/15/2023
Eliminate plastic beverage bottles at all food service facilities	1/1/2023	10/1/2021	8/15/2024
Provide reusable foodware items for all dine-in and to-go facilities	7/1/2022	10/1/2021	1/15/2025
Eliminate plastic water and beverage bottles from all retail stores and vending machines	1/1/23	9/1/23	8/15/2025
Replace prepared, packaged foods with locally compostable or recyclable packaging options	As soon as possible	As soon as possible	As soon as possible

*Table 9 - Compares the overall timeline of plastic reduction for the entire UC System to UCLA and ASU*

### **California State University - [Plastic Elimination Strategy](#)**

23 Campuses - 500,000 students - 150,000 employees

<b>Item</b>	<b>Must Phase Out by</b>
Plastic Straws and Carryout Bags	2019
Styrofoam Food Service Items	January 2021
Single-Use Plastic Water Bottles	Before January 2023

*Table 10 - Timeline of plastic reduction of the entire California State University System.*



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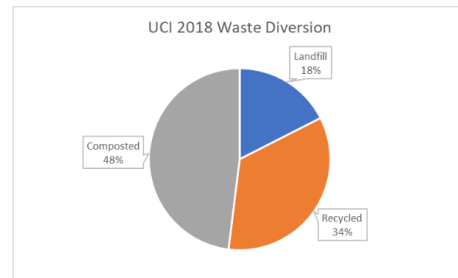
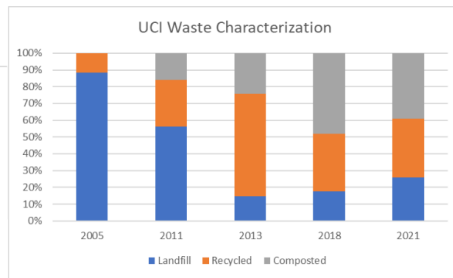
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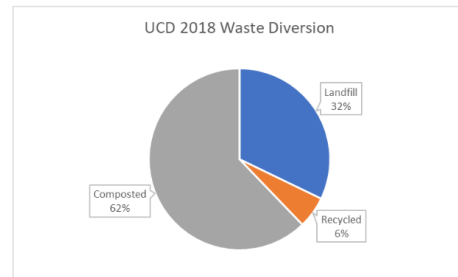
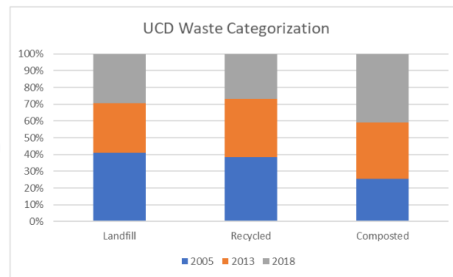
### Appendix 1-

These charts take data each university reports to AASHE to visualize the transition of their waste composition over time to their diversion and diversion goals. We found that becoming too reliant on recycling creates a feedback loop that entrenches single-use into the system making it more challenging to introduce a new waste management system, such as composting. The earlier a university begins its transition, the more significant difference it can make over time with emerging alternatives.

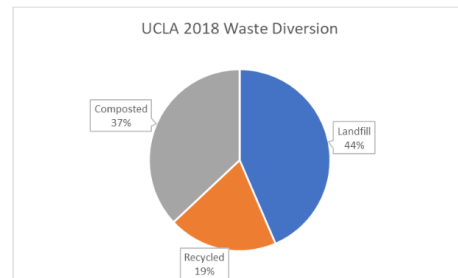
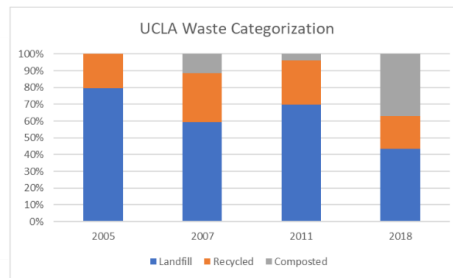
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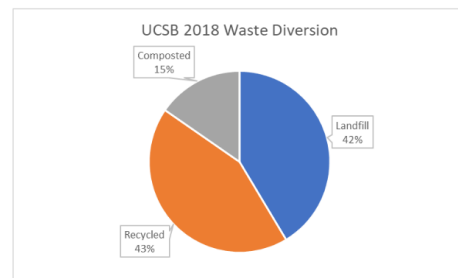
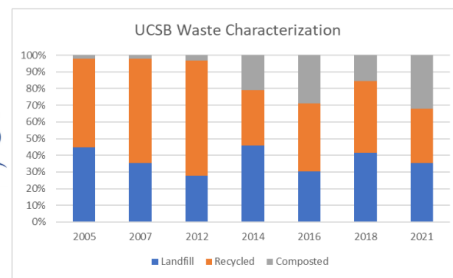
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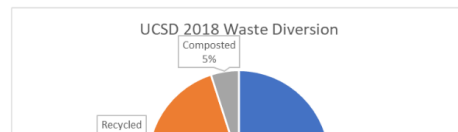
**UCLA**



**UCSB**



**UCSD**



## **Appendix 2-**

We felt this was a great flow chart taken from UCLA's Plastic Policy Implementation Guide ([link](#)). This could be utilized as ASU renews contracts or as a strategy when plastic shows up when it had previously been eliminated.

# Comply with UCLA Single-Use Plastics Policy

Use this flow chart to determine next steps if you have received products that contain single-use plastics and do not comply with the Policy.

