

Waste Management and Reduction Plan
PROJECT PROPOSAL

Client: Aquarium of the Pacific

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Table of Contents

1. Introduction	3
2. Background	3
2.1 – Relevant Legislation, Enforcement & Compliance	3
2.2 – Strategies and Methods for Moving Towards Zero Waste Events	5
2.3 – Scope 3 Emissions	6
3. Research Questions	7
4. Methods	8
5. Deliverables	8
6. Timeline	9
7. Management Plan	9
8. Works Cited	11

1. Introduction

Global waste generation is expected to increase from 2.01 billion tons per year to 3.40 billion tons per year by 2050 (The World Bank). Despite accounting for only 4% of the global population, the United States disproportionately produces ~34% of global waste (The World Bank). This waste primarily goes to landfill, the space for which is finite. By 2035 many landfills in the US will be completely full and there is a concern that there may be no safe place for the nation's excess waste (Fast haul).

In addition to representing a finite resource, landfills also represent environmental and human health hazards. Research shows that close proximity to landfills is hazardous to human health. For example, plastic can leach phthalates and BPA into soil and groundwater, which are known endocrine disruptors that cause reproductive and developmental harm (Knoblauch). Landfills also contribute to global warming because these are primarily composed of organic waste. The decomposition of this organic waste produces methane, which has 25X the warming potential as CO₂. Globally, landfills accounted for 15% of all methane emissions in 2019 (EPA).

Waste thus is a local problem because of the scarcity of landfills and a global problem because of methane emissions from landfills. Every nation, city, household and institution has a role to play in waste reduction. This project aims to help the Aquarium of the Pacific in its waste reduction efforts as well as its overall environmental impact from scope 3 emissions. In particular, our team is focused on finding ways to create zero waste events. This will require reducing the overall volume of waste, diverting waste from landfills, donating usable food, and incorporating best industry practices. Additionally, we will assess scope 3 emissions associated with operations and develop a tool for analysis of scope 3 emissions. Although Aquaria and Zoos typically support conservation and environmental stewardship, these institutions generate significant waste and greenhouse gases. Our aspiration is that this project will make AoP a national leader in sustainability, and serve as an example for other aquaria and zoos, assisting them in their own environmental efforts.

2. Background

2.1 – Relevant Legislation, Enforcement & Compliance

Food donations will be an essential part of event waste reduction. This section outlines current organic waste reduction laws that may apply to the Aquarium of the Pacific.

Assembly Bill 1826: Commercial Organic Waste Recycling Law

This was the first and less stringent of the organic waste reduction bills that California introduced. It aims to reduce the total waste sent to landfills in California through diverting organic waste by composting. It requires all California businesses and multi-family complexes to separate organic waste as well as subscribe to an organics collection service, recycle organic waste onsite, self-haul organic waste for recycling, or sell or donate organic waste. Its goals are to achieve 50% waste diversion by 2020 and 75% organics diversion by 2025.

- Requirements:
 - Businesses must recycle their organic waste—food scraps, green waste, yard trimmings, non-hazardous, non-treated wood waste, food-soiled paper, and cardboard.

- Local California jurisdictions to implement an organic waste recycling program if there is not one already in place.
- Enforcement:
 - Local jurisdictions to implement a recycling program to divert organic waste from businesses.
- Applicability:
 - Businesses and multifamily complexes that generate 2 or more cubic tons of solid waste, recycling, and organic waste total per week.
- Effective:
 - April 2016

Senate Bill 1383: Short-Lived Climate Pollutant Reduction Law

This was the second and more aggressive of the organic waste reduction bills that California introduced. This bill specifically aims to reduce the emissions of short-lived climate pollutants (SLCP) from organic waste in landfills. It requires all California residences and businesses to separate organic waste from solid waste and recyclables and participate in an organic collection program. It's goals are to reduce organic waste disposal 50% by 2020 and 75% by 2025 and rescue at least 20% of currently disposed surplus food by 2025.

- Requirements:
 1. Need to separate and recover the maximum amount of edible food that would otherwise be disposed (landfill or compost)
 - a. Carried out by staff or by a food recovery organization or service
 2. Need a contract with each food recovery organization that picks up edible food
 3. Must track and maintain records of food recovered each month
 - a. Type, frequency and pounds of food
- Enforcement:
 - CalRecycle is the state agency responsible for creating the regulatory standards.
 - Local jurisdictions may impose penalties for noncompliance.
- Applicability:
 - All businesses, schools, multi-family complexes, and single-family home residents.
- Effective:
 - January 1, 2022
 - Tier One
 - CalRecycle's regulations for organics reduction and food recovery, as well as state penalties for noncompliance.
 - January 1, 2024
 - Tier Two must comply with edible food recovery requirements
 - Local education agencies (with an onsite food facility)
 - Large venues & events

What are the implications of the enforcement policies?

Neither SB 1383 or AB 1862 has specific enforcement requirements or plans as enforcement is delegated to local jurisdictions and CalRecycle will evaluate the jurisdiction's actions. The overall lack of enforcement forces the laws to depend on the good will of businesses and people. This lack of accountability may have negative implications for the success of the new waste reduction legislation. The essentially nonexistent enforcement applies to Long Beach as well.

How can the cost of compliance be managed?

- Bundling
 - Jurisdictions that mandate organic waste collection may bundle collection rates of solid waste, recycling, and organic waste collection. This bundling would be based on the solid waste service level, thus reducing costs.
 - Businesses can reduce waste costs by reducing solid waste and increasing diversion of recyclables and yard waste. (CalRecycle, 2020)
- Partnering with local organizations to divert organic waste
 - Louis-Zenak (2020) suggested that for restaurants, a collaborative edible food recovery program can reduce the cost of complying with AB 1826, as well as additional costs to safely recover edible food from the waste stream.
- Example program
 - Bailey et al.'s (2021) program, Rubbish, aims to collect food waste from small food retailers to produce renewable energy and compost. These byproducts will lower the program's operational costs, and these savings can be passed on to participating small businesses.

2.2 – Strategies and Methods for Moving Towards Zero Waste Events

Waste reduction requires meticulous planning, but even small changes can have significant impacts. This section provides background for zero waste events by looking at other institutions—outlining key steps for waste reduction, suggestions for sustainable swaps, and key insights of waste audit methodology.

Key steps for waste reduction

- Major components of waste reduction
 - Source reduction
 - Recycling
 - Composting
 - Liquid diversion
- Introduce resource recovery stations
 1. Reusables
 2. Liquids
 3. Recyclables
 4. Compostables/Organics
 5. Landfill
- Major phases and steps towards Zero Waste Events
 - Pre-event
 - Minimize waste upstream
 - Plan for waste downstream
 - Determine the size of your event beforehand, predict the amount of waste produced based on the size, and plan accordingly
 - Ensure all vendors have reusable, certified compostable, or recyclable (recyclable material means #1-5) service ware. Determine whether you'd like to provide the service ware or if the vendors will be required to provide their own.
 - Accurately predict the attendee count based on past event data to prevent waste from printed documents or food.
 - During event

- Set up
- Monitor sorting stations
- Tear down
- Post-event
 - Sorting, clean up and haul resources to end sites
 - Gain feedback and evaluate
 - Publicize event successes
 - Weighing after the event to determine if diversion goals were reached
 - Issue a “waste report” for each event, so that over time these reports can be used to improve the outcome

Sustainable Swaps

- Identify single-use materials that need to be replaced with sustainable alternatives
 - Shopping bags, beverage bottles, take-away food packaging, beverage cups, tableware, etc
- Serving ware alternatives to disposables can be reusable or compostable
 - Compostable: Made of biodegradable material (such as sugar cane bagasse, corn, and wheat straw)
 - Most cannot be composted in the Aquarium’s composter
 - Onyx Company has a wide range of certified compostable serviceware
 - Reusable: could purchase reusable silverware for more formal events where food is served like a restaurant
 - Higher up-front cost, but pays itself off after a few events
 - Many get thrown away or lost at events

Waste Auditing

Waste audits will provide insight to the types of waste produced, the amount of waste produced, and any improperly disposed of waste. We will perform waste stream analysis to calculate waste diversion rates and target large sources of waste to improve waste reduction and landfill diversion at the Aquarium.

- Key insights for waste audit methodology:
 - A standardized methodology with a reporting structure allows for accurate comparison in future waste audits
 - Auditing methodology must maintain the integrity of the sample size and ensure waste streams are not mixed

2.3 – Scope 3 Emissions

Introduction

Scope 3 emissions are typically the most significant source of emissions and are notoriously difficult to reduce. This section outlines scope 3 emissions and our plans to address them.

- “The result of activities that are not controlled by the reporting organization, but that the organization indirectly impacts in its value chain” (EPA, 2022).
- Scope 3 emissions include the Scope 1 and Scope 2 emissions of all organizations along the reporting organization’s value chain.
- Include activities that are not included within the definition of Scope 1 or Scope 2 for the reporting organization.

The EPA splits Scope 3 emissions into 15 distinct categories, outlined in the table below. The EPA has released guidance regarding the calculation of each of these categories, which will be utilized as a reference during the calculation of Scope 3 emissions from the Aquarium of the Pacific.

Performing a facility-wide emissions audit for an organization of this scale can take many years. As such, our team will focus primarily on categories 6 and 7 for the full facility. Our team will, however, perform an all-encompassing Scope 3 emissions audit for events held at the aquarium. This audit will be followed by the development of software which will allow event planners to quickly calculate Scope 3 emissions and account for these emissions in their decision-making.

Scope 3 Category	Category Description	Relevant to the Aquarium of the Pacific?
1	Purchased goods and services	Y
2	Emissions from capital goods	Y
3	Emissions from fuel and energy	Y
4	Upstream transportation and distribution	Y
5	Waste generated in operations	Y
6	Business commuting	Y
7	Employee commuting	Y
8	Upstream leased assets	N/A
9	Downstream transportation and distribution	N/A
10	Processing of sold products	Y
11	Use of sold products	N
12	End of life treatment of sold products	Y, specifically food waste
13	Downstream leased assets	Y (offsite warehouse)
14	Franchises	N
15	Investments	N/A

3. Research Questions

Special Events

1. What types of waste are produced by events? Categorize and identify the streams of waste.
2. What are ways to improve Aquarium waste management, how can we achieve zero

landfillable waste, and how can waste be reduced by implementing sustainable swaps while improving the bottom line?

3. What is the best way to streamline waste reduction strategies for future events, including accounting for leftover food donations?

Scope 3 Emissions

1. How can the aquarium accurately quantify their commuting (employee, business, and potentially visitor) and event emissions?
2. How can the aquarium easily collect data for the above categories of Scope 3 emissions, in order to continue auditing these sources and managing for reduced emissions?
3. How can the aquarium effectively reduce emissions from these categories?

4. Methods

Special Events

We will conduct personal interviews to identify event planning industry best practices. The individuals we will interview include UCLA personnel, Aquarium of the Pacific event planning personnel, other aquaria, government officials, individuals in the food industry, and sustainable event planning professionals.

We will also conduct waste audits of special events. These waste audits serve to identify streams of waste and leftover food, as well as to analyze human behavior surrounding waste disposal. We will perform waste stream analysis by sampling and measuring directly from bins, as well as recording event material inputs (total food, plates, napkins, etc.) and event outputs to accurately calculate food consumed and waste produced. We will compare waste audits of old waste systems to new waste systems to calculate efficacy and cost savings of new bins on site. In addition, event audits will include observation of event guest and employee behavior in waste disposal.

Scope 3 Emissions

EPA guidance states that Scope 3 emissions can be quantified using either primary data specific to an organization, or by using secondary data such as industry averages and proxies. The EPA regularly updates a large quantity of default emissions factors to be used in organizational greenhouse gas calculations and reporting. Organizations which perform a Scope 3 emissions audit will often release their calculation methodology to the public, meaning these can be used as a secondary reference in order to fill any gaps in knowledge from the EPA's guidance. Any calculation method used that goes beyond the EPA's guidance should only come from credible environmental agencies, and must be communicated effectively when utilized. A margin of error should be employed following a Scope 3 emissions audit in order to prevent greenwashing. Such margins of error generally range between 10-30 percent, and are up to the discretion of the reporting organization. This margin must be effectively communicated to the public as a means of building trust.

5. Deliverables

1. Audit the waste produced by special events of varying sizes to identify categories of waste and areas for improvement.
2. Provide the Aquarium with solutions to landfill waste production.
3. Develop best practices for leftover food donations in accordance with new legislation and identify donation locations

4. Create a guide for sustainable event planning for the Aquarium to use in the future
5. Calculate the Aquarium's Scope 3 emissions and develop a tool for future calculations.
6. Produce an executive report and presentation with social, environmental, and cost-based justifications for each potential change.
7. Compile our research into a paper to submit for publication.

6. Timeline

Task	Who's doing it?	Deadline
Brochure	Adrianna	1/11
Team management worksheet	Haley & Cora	1/18/22
Create team email	Communications Lead	1/21
Proposal presentation	Abby	1/24
Incorporate feedback edits on literature review	Brooke + Everyone?	1/30/22
Proposal, including a literature review	Brooke	1/31
Website	Haley + Tyler	2/1
Upload team introduction and bios to the IoES website	Haley +Abby (if you need me to help)	2/1/22
Social media post- Introduction	Adrianna + Cora	2/5/22
Peer evaluations for winter quarter	Everyone	3/7
Presentation on data collection methods and preliminary findings	Abby	3/10/22
Social media update- methods and data collection	Jasleen	3/15/22
Results write up	Brooke	5/15/22
Social media post- results	Skyler	5/17/22
Draft report (and external peer review)	everyone	5/19
Presentation- Intro, methods, results, conclusions	Adrianna + Cora	5/20/22
Perform Scope 3 Emissions Audit	Kevin + Tyler	2/20/22
Create software for Scope 3 emission calculations	Kevin + Tyler	5/25
Create infographics/templates	Skyler & Adrianna	5/27/22
Completed final report	everyone	5/29/22
Completed executive report	everyone	5/31/22
Pitch to Executive team	everyone	6/3/22
Presentation of the final report	everyone	6/6
Peer evaluations for spring quarter	Everyone	6/5
Final report, including an executive summary 3	everyone	Finals Week
TikToks/social media	Cora Skyler & Jasleen	March-May
App		6/5

7. Management Plan

Meeting Format

Our team will hold weekly 2-hr team meetings as well as 2-hr meetings with our advisor. Meetings will be led by the member(s) responsible for a particular task(s) being addressed, and notes will be taken by anyone that's designated. The meetings will also be recorded via Zoom so that if any team member cannot attend, they can still access the information covered.

Team Roles

Our team has assigned the following roles to each member. These roles may be adjusted depending on how each member and the team as a whole is doing.

Haley and Adrianna are our Project Managers. Their responsibilities include generating an action list and keeping the team focused during meetings, planning and scheduling the project, guiding the direction of each project component, and keeping our information organized. Brooke is our Editor. While anyone may be involved in the writing, she is primarily responsible for it along with making final adjustments to written documents, presentations, and creating a cohesive voice. Cora, Adrianna and Abby are our Graphic Designers. They are responsible for designing brochures, infographics, powerpoint presentations, and social media posts. Cora and Skyler are our Web Content Managers, who are in charge of graphics and content for our website. Abby, Tyler, and Brooke are our Team Communications Managers. They are responsible for our team communications (group emails, text messages, and reminders about tasks) and external communications (such as with our client). Jasleen and Cora are our Events/Field Data Managers. They will organize how we approach field research and events. Tyler and Kevin are our Data Analysts. They are responsible for researching relevant literature and performing quantitative analyses of our data. Haley is our Zoom manager. Abby is our Travel Coordinator, who will oversee our transportation and reimbursement.

Documenting, cataloging, and archiving information

All of our files will be stored on a shared Google Drive and organized into respective folders. Important files that need to be shared with our faculty advisor and client will be uploaded to our team's Basecamp. Events are posted on our team's calendar, and deadlines are listed on a spreadsheet and Basecamp. Communications within the team are being done through a text group chat, with smaller group chats for specific tasks. Communication with our faculty advisor and clients will be done over email and Basecamp.

Expectations for Team Conduct and Work

Our team prioritizes communication, good work ethic, dedication, and camaraderie towards all members of the group. Our team also expects that each person will complete professional quality work in a timely manner. If these criteria are not being met, the team will hold that person accountable through 1-on-1 conversations to see how the rest of the team can best support the individual.

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