FINAL

2019 Integrated Solid Waste Management Plan Update

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City and County of Honolulu

JACOBS®

Executive Summary

The City and County of Honolulu (City) recognizes the value of a comprehensive waste reduction, recycling, composting, and disposal program for the island of Oahu. To determine the most effective combined strategy for managing solid waste while protecting human health and the environment and to meet state and local requirements, the City has developed, and periodically updates, an integrated solid waste management plan (Plan). The City has taken leadership on sustainability, climate change, and resilience through commitments to the Paris Climate Agreement and the Aloha+ Challenge, which presents Hawaii's statewide sustainability goals aligned with the 17 United Nations Sustainable Development Goals. The City is measuring progress towards these sustainability and climate targets, including the Aloha+ Challenge 70 percent waste reduction goal by 2030, through an open-data transparency portal on the Aloha+ Dashboard.

Chapter 342G of the Hawaii Revised Statutes (HRS) requires each county develop a Plan and revise it once every 10 years, provided that an interim status report is submitted 5 years after every revised Plan submission. Further, Section 9-1.13 of the Revised Ordinances of Honolulu (ROH) requires that Plans and interim status reports that meet the requirements of the HRS and consider alternative technologies be submitted to the City Council as well.

Introduction

Over the past 30-plus years, the City has made significant enhancements to its solid waste management system, including the following:

- Implementation of a series of initiatives to reduce, reuse, and recycle waste, including residential curbside collection of green waste and mixed recyclables
- Conversion from an all-manual residential curbside collection system to a nearly ninety percent automated cart system
- Construction of two major waste transfer stations and six convenience centers
- Establishment of the Honolulu Program of Waste Energy Recovery (H-POWER) waste-to-energy facility, which over the past 28 years has converted over 17 million tons of refuse to 8.5 million megawatt hours of electricity, saved the importation of over 17 million barrels of oil, and significantly reduced the volume of waste disposed of at landfills

This Plan details the City's primary solid waste management objectives for designing and managing an integrated system to maximize source reduction and minimize the generation of waste, maximize the recovery of solid waste generated, and ultimately minimize the amount of waste that requires landfill disposal. In addition, it describes the existing conditions and strategies for improving individual elements of the City's solid waste management system. Finally, the Plan contains a section outlining the revenues and expenses required to manage the system and an implementation strategy, that identifies ongoing and planned initiatives for the 10-year period leading up to the next iteration of the Plan (fiscal year [FY] 2019 through FY 2028).

Key Components of the Existing System

During the Plan's development, the following components of the City's solid waste system were determined to be critical to continued successful management:

- Source Reduction: Identified as the highest priority among the solid waste management practices and processing methods for the state, the City's source reduction efforts currently focus on providing public education to increase awareness of existing source reduction resources and encourage residents and businesses to prevent waste at the source. Source reduction and reuse are also identified as key solid waste reduction metrics for meeting the Aloha+ Challenge waste targets, a set of interconnected sustainability goals and statewide commitment endorsed by the Governor of the

State of Hawaii and Mayor of Honolulu, together with the other county mayors, the State Legislature, and public and private sector partners.

- Public Education: The City's public education efforts focus on awareness of existing programs, resources, tools, and regulatory mechanisms that promote waste management, source reduction, and recycling practices on the island. The success of public education efforts is dependent on the effectiveness of the communications describing waste management and recycling activities and the willingness of the community to implement them. The City's public education programs are designed to reach all sectors of the community, including residents, businesses, and schoolchildren, through a variety of avenues such as the City's website (opala.org), printed materials, media, school curricula, special events, and a dedicated technical assistance phone line (808-768-3200).
- Ongoing Advances in Beneficial Reuse of Materials: The City released requests for proposal (RFPs) to solicit proposals for the beneficial reuse of several materials, including glass, auto shredder residue (ASR), and ash, in early to mid-2018. Both of those RFPs will be reissued in early 2019 in an attempt to solicit a greater number of eligible offers. An additional RFP for recycling and processing of white goods is planned for rerelease in early 2019. Currently, there are limited to no recycling options available for these materials on the island. The purpose of the RFPs is to gather information on and ultimately implement new management techniques so that these materials can be beneficially reused, which will promote access to markets and local reuse of materials. If beneficial reuse technologies could be implemented for any of these materials, the City would be successful in supporting new markets as well as diverting waste from the Waimanalo Gulch Sanitary Landfill (WGSL).
- Recycling Markets: The City's recycling and waste diversion programs are affected by fluctuations in the global recycling industry. In July 2017, China notified the World Trade Organization of its plans to ban import of 24 solid waste materials by the end of 2017, with the banned materials including certain plastics, unsorted paper, and textiles. In addition, new regulations would establish low contaminant limits for material acceptance. China's initiative has had an immediate effect on existing markets for recyclables, causing recyclers to seek new markets and evaluate methods to achieve lower contaminant levels. Given the volatility in the recyclable commodities market and the impacts of processing and shipping recyclables to overseas markets, the City is considering options to manage materials in the most economically and environmentally sustainable way possible.
- Energy Recovery: The City-owned H-POWER facility uses both refuse-derived fuel (RDF) and mass burn combustion technologies to process combustible solid waste materials into energy. Municipal solid waste (MSW), including bulky waste, sewage sludge, certain types of tires and medical waste, and other special wastes are accepted at H-POWER. Up to 90 percent of the volume of the MSW received at H-POWER is diverted from WGSL and converted into renewable electric energy. H-POWER can provide up to 10 percent of Oahu's electricity. H-POWER also extracts ferrous and non-ferrous metals from the waste and ash for delivery to recycling facilities for further processing. The ash and residue generated from H-POWER are delivered separately to WGSL. In FY 2017, the residue and ash produced as a result of WTE processes totaled approximately 185,000 tons. This is equivalent to a 70 percent reduction of waste by weight that would otherwise have been landfilled.
- MSW Landfill: The City-owned WGSL is the primary permitted MSW landfill on Oahu and has been in operation since September 1989. In FY 2017, WGSL received approximately 49,000 tons of MSW, 30,000 tons of special handle waste, 142,000 tons of ash, and 43,000 tons of process residue from H-POWER. It should be noted that the FY 2017 volume of MSW is atypically high because of several major, planned refurbishment projects at H-POWER that caused MSW that would normally have been processed at H-POWER to be diverted to WGSL. WGSL received an average of 337 tons per day of MSW and H-POWER residue, and 390 tons per day of ash in FY 2017.
- Financial Stability: The City has a stable financial system that includes adequate funding of the Solid Waste Fund primarily from disposal fees, electrical revenue, and a subsidy from the City's General Fund. In forming the overall budget for the City, the Administration must balance solid waste program needs against the other priorities of City government; however, the City has always provided adequate funding to deliver the existing services detailed in this Plan. The City's ability to implement new initiatives to improve solid waste management, depending on the program, hinges on the receipt of additional funding.

The Future of Solid Waste Management

The City has identified the following key findings and action items to further improve Oahu's solid waste management system:

- Source Reduction: The City recognizes that a successful source reduction program will require ongoing collaboration with stakeholders throughout Oahu, including the state and federal governments, business and industry, research and education, non-governmental organizations, policy makers, and residents. Many source reduction initiatives require further evaluation of economic, social, and environmental factors to determine feasibility, as well as support from stakeholders outside the City to achieve implementation. The City is committed to stepping up source reduction efforts and continuing the discussion begun with stakeholders through the development of this Plan by establishing a Source Reduction Working Group (SRWG), which will meet quarterly (or as often as determined by the SRWG itself) and focus on developing quantifiable targets for source reduction, identifying metrics and milestones to track progress, and evaluating the feasibility and practicality of potential source reduction initiatives. In this ISWMP, the City has established the following goals:
  - Reduce per-capita waste generation 25 percent by 2030, from 6.5 pounds per day to 4.9 pounds per day.
  - Reduce carbon emissions from the waste stream by substantially reducing or eliminating carbon-based single-use plastics and polystyrene from the waste stream going to H-POWER and landfill by 2030.
- Recycling and Bioconversion: The City is proposing a series of new recycling initiatives that include issuing RFPs for recycling or beneficial reuse of glass deposit beverage containers and non-deposit glass, recycling of white goods, and recycling or beneficial reuse of ash, as well as implementing residential user fees as a possible mechanism to encourage waste prevention. In this ISWMP, the City has established the following goal:
  - Increase landfill diversion to a diversion rate of 95 percent by 2030 and eliminate the need for an everyday landfill.
- Public Education: The City plans to make changes on several fronts to increase public education and awareness, including investigating the feasibility of designating a Public Education Coordinator position to serve as a centralized hub for all Refuse Division education initiatives. The City will update its website, opala.org, to make information on waste prevention and reuse even more accessible. The City will also look for opportunities to explore new partnerships (similar to the ones currently done with businesses showing waste prevention methods in action) and interact directly with the public to increase awareness and provide support for commercial and residential source reduction efforts as opportunities arise and as appropriate. In addition, the City plans to develop a Public Education Plan to evaluate its education and outreach efforts and set measurable goals for the future. The goal of the plan is to assess the effectiveness of programs, identify opportunities to improve public awareness/compliance, and develop steps to improve implementation in order to increase public awareness.
- Environmental and Economic Benefits of WTE: Oahu's physically remote location as an island makes it relatively difficult to recycle most materials locally, with products being shipped great distances to overseas markets. Recently, China's National Sword policy has made it difficult if not impossible for products sorted from residential curbside collection systems to meet these new material quality standards. The result is uncertainty about where recyclables will be accepted in the future and at what cost. In response, the City plans to evaluate the environmental and economic implications of sending certain recyclables to H-POWER rather than sending them to overseas markets. For example, as an alternative to sending them overseas, some curbside recyclables like mixed paper and plastics could be combusted at H-POWER to produce electricity to replace that which is currently generated elsewhere, mainly through the combustion of fossil fuels. The results from this analysis will inform and guide the City on factors needing consideration when making decisions on how it manages its solid waste to optimize existing programs, inform future H-POWER initiatives, and pursue changes to policies and, if needed, local and state laws.

- Energy Recovery: The H-POWER facility converts up to 90 percent by volume of the MSW generated on Oahu into energy. This facility currently has a WTE processing capacity of up to 900,000 tons of waste per year. While the projected H-POWER receipts are not expected to exceed the combined design capacity of the RDF and mass-burn boilers within the next 10 years, the City will continue to monitor receipts into the facility to ensure adequate capacity is available.
- MSW Landfill: As forecasted in the 2017 *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu* report prepared for the City, solid waste generation is expected to increase over the next 10 years; however, H-POWER is expected to process the majority of MSW on the island so that much of the waste disposed of at WGSL will be limited to ash, residue, and special handle wastes. WGSL receipts are not expected to exceed the permitted capacities within the next 10 years. The City has plans to rebalance the MSW and ash portions of the landfill, which is estimated to extend the life of WGSL to 2038 according to the analysis performed as part of the 2017 Assessment. It should be noted that the life of the landfill can be extended if the City succeeds in diverting more materials from WGSL (e.g., if RFPs are successful). The process to rebalance cell configuration is currently ongoing and will require approval by the State.

  If the 2038 end-of-life date continues to hold, site selection for a future MSW landfill should begin in year 2028, 10 years before WGSL is anticipated to reach capacity. Between 2028 and 2037, the City should reanalyze the sites ranked in previous landfill siting reports and investigate potential new landfill sites; conduct the site selection; undertake land acquisition (e.g., negotiation, condemnation, or purchase); obtain environmental permits, land use permits, and operating permits; and conduct site planning, design, engineering, and construction.
- Financial Stability: If user fees for residential refuse collection service are implemented in the future, it is expected that the General Fund subsidy to the Solid Waste Fund can be lessened and those funds may be used for other City priorities.

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Acronyms and Abbreviations

%	percent
AC	Advisory Committee
ACM	asbestos-containing material
AD	anaerobic digestion
ADF	Advance Disposal Fee
ASR	auto-shredder residue
BSR	Business for Social Responsibility
BYOB	bring your own bag
C&D	construction and demolition
Cascadia	Cascadia Consulting Group
CESQG	conditionally exempt small quantity generator
CFR	*Code of Federal Regulations*
City	City and County of Honolulu
CIP	Capital Improvements Plan
CPI	Consumer Price Index
CRT	cathode ray tube
CY	calendar year
DBC	deposit beverage container
DBEDT	Department of Business, Economic Development, and Tourism
DDT	dichlorodiphenyltrichloroethane
Division	Refuse Division
DIY	do-it-yourself
DOH	Department of Health
DOT	Department of Transportation
DPP	Department of Planning and Permitting
e-waste	electronic waste
EPA	United States Environmental Protection Agency
EPR	extended producer responsibility
FICA	Federal Insurance Contributions Act
FOG	fats, oil, and grease
FY	fiscal year
GIS	geographic information system
H-POWER	Honolulu Program of Waste Energy Recovery
HAR	Hawaii Administrative Rules
HB	House Bill
HDPE	high density polyethylene

HECO	Hawaiian Electric Company
HER	Hawaiian Earth Recycling
HHW	household hazardous waste
HI	Hawaii
HI-5	Hawaii deposit program
HNL	Honolulu
HRS	Hawaii Revised Statutes
HTY	Honolulu Theatre for Youth
IEMN	International E-Waste Management Network
ISWMP	Integrated Solid Waste Management Plan
LCD	liquid crystal display
LF	landfill
MACLSS	Mayor's Advisory Committee on Landfill Site Selection
MMBtu	million British thermal unit
MRF	materials recovery facility
MSW	municipal solid waste
NA	not accepted
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resource Defense Council
OCC	other corrugated cardboard
PAYT	pay-as-you-throw
PCS	petroleum-contaminated soils
PET	polyethylene terephthalate
Plan	Integrated Solid Waste Management Plan
RCRA	Resource Conservation and Recovery Act
RDF	refuse-derived fuel
RFP	request for proposal
ROH	Revised Ordinances of Honolulu
RPS	Renewable Portfolio Standard
RRR	Reduce Reuse Recyclers Hawaii LLC
State	State of Hawaii [government]
SRWG	Source Reduction Working Group
SWAC	Solid Waste Advisory Committee
SWMP	Storm Water Management Plan
TDF	tire-derived fuel
TTI	Texas Transportation Institute
Unitek	Unitek Solvent Services
USDA	United States Department of Agriculture

WARM	[U.S. EPA] Waste Reduction Model
WGSL	Waimanalo Gulch Sanitary Landfill
WMH	Waste Management of Hawaii Inc.
WSDOT	Washington Department of Transportation
WTE	waste-to-energy
WWTP	wastewater treatment plant

1. Overview of Existing Solid Waste Management System

The City and County of Honolulu (City) recognizes the value of a comprehensive waste prevention, recycling, composting, and disposal program. To determine the most effective combined strategy for managing solid waste while protecting human health and the environment, the City has developed, and periodically updates, an integrated solid waste management plan (Plan). The first step in updating the Plan is to gather information on the existing solid waste management system.

1.1 Goals and Objectives

The goal of this section is to provide an overview of the City's existing solid waste management system. The main components of the current solid waste management system include the following:

- Solid waste collection
- Convenience centers
- Transfer stations
- Energy recovery (Honolulu Program Of Waste Energy Recovery [H-POWER])
- Landfilling
- Recycling and bioconversion (green waste)
- Source reduction
- Special waste management
- Household hazardous waste (HHW) and electronic waste (e-waste) management
- Public education

1.2 Background

Chapter 342G of the Hawaii Revised Statutes (HRS) requires each county to develop a Plan and revise the Plan once every 10 years, provided that an interim status report is submitted 5 years after every revised Plan submission. Further, Section 9-1.3 of the Revised Ordinances of Honolulu (ROH) requires that Plans and interim status reports that meet the requirements of the HRS and consider alternative technologies be submitted to the City Council as well.

Over the past 25 plus years, the City has progressed its management of solid waste from an all-manual residential curbside collection system to a nearly ninety percent automated system, constructed two major waste transfer stations and six convenience centers, and established the H-POWER waste-to-energy (WTE) facility, which over the past 28 years has converted over 17 million tons of refuse to 8.5 million megawatt hours of electricity, saved the importation of over 17 million barrels of imported oil, and significantly reduced the volume of waste disposed of at landfills.

This Plan details the City's primary solid waste management objectives set forth in previous plans to design and manage an integrated system to maximize the recovery of solid waste and minimize the amount of waste that requires landfill disposal. It is intended to support the City's goals on sustainability, climate change, and resilience, including the Paris Climate Agreement and the Aloha+ Challenge 70 percent waste reduction goal that aligns with the 17 United Nations Sustainable Development Goals. The City is tracking data-driven progress towards these goals on the Aloha+ Challenge Dashboard.

The Plan begins with an overview of Honolulu's existing solid waste management system (Section 1) and a look at the current and projected waste stream (Section 2). Sections 3 through 10 discuss individual elements of the City's solid waste management system, including the details of the current system and future options. The revenues and expenses required to manage the system are addressed in Section 11. Section 12 contains an implementation strategy, which identifies ongoing and planned initiatives for the 10-year period leading up to the next iteration of the Plan (fiscal year [FY] 2019 through FY 2028).

Each of these components, as well as the City's current and future demographics, is described in more detail below and in the dedicated sections that follow.

1.3 Demographics

The population of Oahu is unique because in addition to a resident population of over 976,000 in 2015, Oahu accommodated 4.8 million visitors.[1] When evaluating waste management options, it is important to consider the de facto population, which is defined by the State of Hawaii (State) Department of Business, Economic Development, and Tourism (DBEDT) as "the number of persons physically present in an area, regardless of military status or usual place of residence; it includes visitors present but excludes residents temporarily absent."

Table 1-1 shows the projected Honolulu County resident population and the projected de facto population (which includes the effect of visitors) every 5 years from 2015 through 2040. The de facto population is an average of 4.5 percent higher than the resident population over that period, suggesting that visitors will continue to comprise a measurable portion of the population that generates waste. Note also that the projected average annual growth rate is relatively small at 0.4 percent, which has implications for future growth in waste generation.

Table 1-1. Honolulu County Resident and De Facto Population

Year	Resident Population[a]	De Facto Population[b]
2015	976,200	1,033,251
2020	1,003,700	1,051,585
2025	1,029,400	1,071,733
2030	1,052,100	1,094,827
2035	1,071,200	1,114,250
2040	1,086,700	1,130,040
Annual Growth Rate	0.4%	0.4%

Notes:

[a]DBEDT. 2012. "Population and Economic Projections for the State of Hawaii to 2040." http://dbedt.hawaii.gov/economic/economic-forecast/2040-long-range-forecast/.

[b]City and County of Honolulu, Department of Environmental Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu.* November. http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.

% = percent

Figure 1-1 shows the development plan areas that the Honolulu Department of Planning and Permitting (DPP) uses when it collects and analyzes demographic data.[2] The DPP projects change in each of the development plan areas; the projections shown in Table 1-2 indicate that, during the planning period, the resident population is expected to continue to be concentrated on the southern half of the island, with the highest growth rate expected in Ewa.

Although the DPP does not provide the de facto population by development plan area, it does project growth in visitor accommodation units. The projections suggest that visitor accommodations will continue to be concentrated in the Primary Urban Center, in addition to significant resident population growth in Ewa.[3] The Ewa plan area is therefore likely to experience stronger growth in waste and recyclable quantities than other parts of the island.

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[1] DBEDT. 2012. "Population and Economic Projections for the State of Hawaii to 2040." http://dbedt.hawaii.gov/economic/economic-forecast/2040-long-range-forecast/.

[2] City and County of Honolulu, DPP. 2017. *Development Plan Areas*. http://www.honoluludpp.org/Portals/0/pdfs/planning/demographics2/Maps/DPA-DPSAmap.pdf. http://www.honoluludpp.org/Planning/ResearchStatistics.aspx.

[3] City and County of Honolulu, DPP. 2016. *Annual Report on the Status of Land Use on Oahu, Fiscal Year 2014.* http://www.honoluludpp.org/Portals/0/pdfs/planning/dpar2/DPAR2014.pdf.

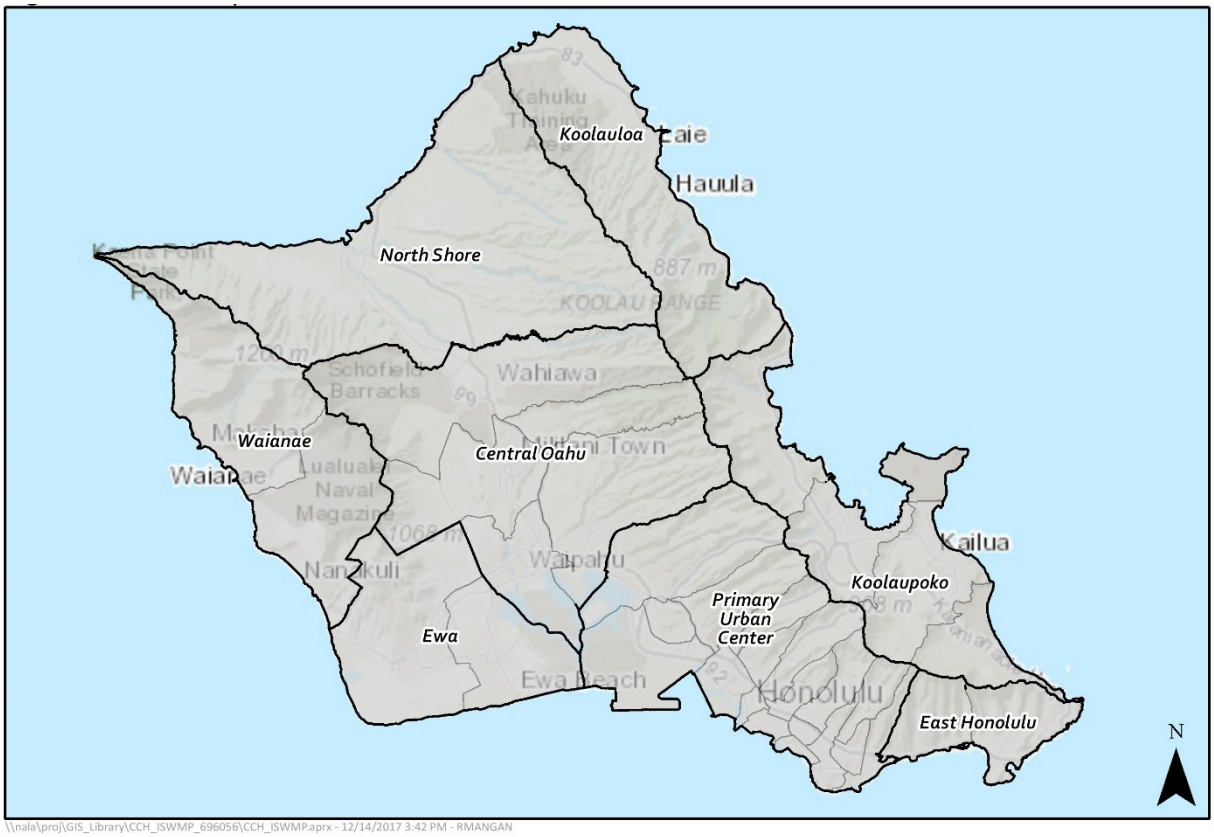

Figure 1-1. Development Plan Areas with Subareas

Table 1-2 shows projected jobs on Oahu every 10 years from 2010 through 2040. In 2010, nearly three-quarters of the jobs were located in the Primary Urban Center. Most of the remainder of the commercial activity and job growth is in Ewa, Central Oahu, and Koolaupoko. The number of jobs on Oahu is projected to increase by more than 20 percent during the planning period, at annual growth rates of less than 1 percent. Projections are that most new jobs will continue to be located in the Primary Urban Center, with the largest rate of job growth projected in Ewa. Coupled with the projected growth in population in the Ewa plan area, this suggests the City should plan on increased future waste generation being strongest in this area of the County.

Table 1-2. Oahu Jobs by Development Plan Area

Development Plan Area	2010	2020	2030	2040
Primary Urban Center	437,011	458,299	473,329	493,054
Ewa	28,294	44,567	46,028	73,607
Central Oahu	56,174	64,965	67,095	78,524
East Honolulu	10,252	10,357	10,696	10,406
Koolaupoko	46,181	47,271	48,822	47,578
Koolau Loa	7,316	8,287	8,558	9,144
North Shore	5,888	6,055	6,254	6,059
Waianae	9,098	9,364	9,671	9,382
Total:	**600,214**	**649,165**	**670,453**	**727,754**
Annual Growth Rate		0.5%	0.3%	0.8%

Source: City and County of Honolulu, DPP. 2016. *Annual Report on the Status of Land Use on Oahu, Fiscal Year 2014.* http://www.honoluludpp.org/Portals/0/pdfs/planning/dpar2/DPAR2014.pdf.

1.4 Solid Waste Collection

1.4.1 Residential Curbside Collection

The Refuse Division of the Department of Environmental Services of the City (Division) provides municipal solid waste (MSW) collection to about 200,000 accounts, which includes most single-family residences and a limited number of multi-family properties, non-residential customers, and City agencies on the island of Oahu.

The Division collects residential waste curbside, two times each week. Most routes are collected using automated vehicles with one equipment operator per vehicle. Households in automated collection areas receive three carts for sorting waste: gray for refuse, green for green waste, and blue for mixed recyclables. One day each week is designated for refuse pickup and one for recycling, which alternates weekly between green waste and mixed recyclables.

In 2019, the City plans to reduce blue cart collection to approximately once-per-month (one collection every 4 weeks). This reduction in collection frequency is proposed as a result of a 2017 City survey where a blue cart set-out rate of 55 to 60 percent was observed, with many carts less than half full. The intent is to improve efficiency by encouraging residents to make better use of carts and optimizing the collection schedule by reallocating resources to tasks that demand more attention, such as bulky item collection and gray and green cart service.[4]

In addition, the City is transitioning all previous 64-gallon blue carts to 96-gallon carts. The 64-gallon carts were issued to households in automated collection areas at the start of the City's automated collection program in 2010. The 96-gallon blue carts are issued when residents request new or replacement carts.[5]

In areas where access with an automated truck is limited, such as one-way streets, narrow streets, and streets where there is limited turnaround area, manual service using three-person crews (one crew leader/driver and two collectors) is provided. Approximately 20,000 households are located in manual collection areas and receive refuse collection twice a week.[6] Residents in these areas do not receive carts for recyclables or green waste. Options to expand the curbside recycling program to include households in manual collection areas are currently being investigated.

Bulky items are collected in a method similar to manual service by the Division on a monthly basis and are either recycled or delivered to H-POWER. No direct user fee is currently charged to residential generators for any of the collection services. The City is investigating implementation of an appointment-based system for bulky item collection. A pilot project using an online appointment setup was launched in June 2019 for residents in metro Honolulu.[7] The City will consider the results of the pilot study when determining whether to implement appointment-based bulky item collection island-wide.

The geographic area served by the Division covers approximately 600 square miles. To more efficiently provide service, the Division has seven collection districts located throughout the island, each with its own collection yard where trucks begin and end routes each day. Having multiple collection yards helps reduce the amount of time collection trucks spend off-route, going to and from the collection yard and delivery locations (e.g., transfer stations and H-POWER) and maximizes the time spent collecting materials from customers. Figure 1-2 provides a map of the island showing the boundaries of the collection districts and the locations of the yards serving them.

[4] Information provided by Refuse Division staff. January 31, 2018.

[5] CH2M. 2017. *Meeting Summary for Advisory Committee Meeting 02 – January 9, 2018*. Final.

[6] City and County of Honolulu, Department of Environmental Services. 2018. "3-Cart Refuse / Recycling Collection." Accessed January 25, 2018. http://www.opala.org/solid_waste/curbside.htm.

[7] City and County of Honolulu, Department of Environmental Services. 2019. "Honolulu Bulky Item Collection Pilot." Accessed October 28, 2019. http://www.opala.org/solid_waste/Honolulu_Bulky_Pilot.htm.

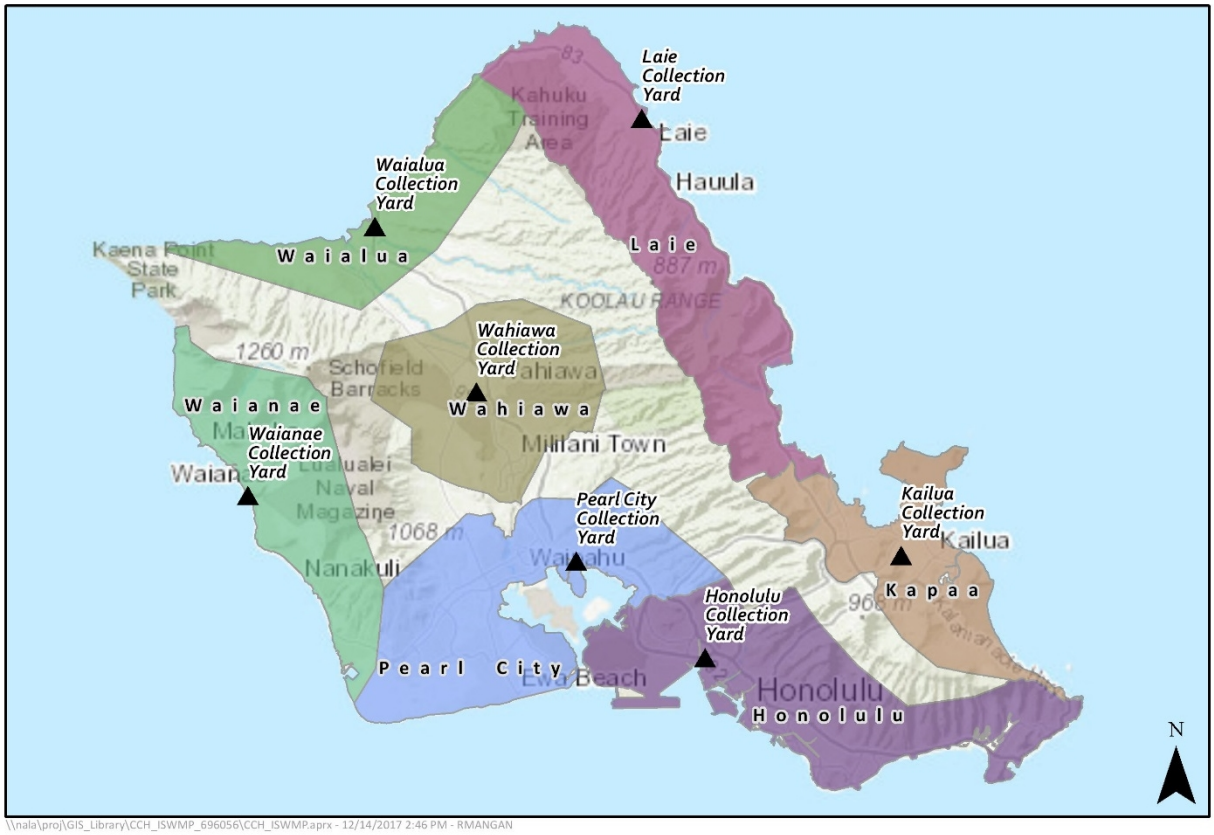

Figure 1-2. Division Collection Districts

The Honolulu District is served primarily by the Honolulu Collection Yard and has the largest population, with a high density of homes and some neighborhoods with older, narrow streets and dense commercial development. This district also includes some residences and many businesses and visitor accommodations served by private haulers, including the Waikiki tourist area, the major business area downtown, and the densely populated multifamily area of Makiki. These developments, along with military bases, are not typically served by the Division because of ordinance restrictions (e.g., businesses are required to provide their own refuse collection service and are required to adhere to truck access and turnaround requirements in ordinance).

The Pearl City District, served primarily by the Pearl City Collection Yard, continues to be one of the fastest growing areas on the island, as described earlier (although the boundaries of the development plan areas do not correspond exactly to the boundaries of the collection districts, there is significant overlap). H-POWER is located in this district, so waste collected here is delivered directly to this facility rather than to a transfer station.

The Kapaa District is on the southeastern side of the island and is served primarily by the Kailua Collection Yard. This area receives more precipitation than the districts on the western side of the island, resulting in generation of more green waste.

The Wahiawa District is in the center of the island and includes Mililani and other residential areas where moderate growth is anticipated. This area is primarily served by the Wahiawa Collection Yard.

The Waianae District is on the western side of the island, where it is relatively dry. As a result, there is less green waste generated than elsewhere. This district is primarily served by the Waianae Collection Yard.

The Waialua District is on the northwestern side of the island and is primarily served by the Waialua Collection Yard.

The Laie District, on the northeastern part of the island, is less densely populated and is primarily served by the Laie Collection Yard.

Table 1-3 summarizes the average number of daily routes operated, by yard. Some of the average daily routes are fractional because the same number of routes is not always operated daily. Based on this data, approximately 67 automated cart routes and 45 manual collection routes are operated by the Division every Monday through Saturday. A limited number of front loader routes are operated out of Honolulu (2), Pearl City (2), and Kailua (1) collection yards daily.

Table 1-3. Collection Routes by Yard

Yard	Average Daily Collection Routes	
	Automated	Manual
Honolulu	20	22
Kapaa	10	5
Laie	2	2.5
Pearl City	21	7
Wahiawa	6.5	2.5
Waialua	2	2.5
Waianae	5	3
Total:	**66.5**	**44.5**

Source: City and County of Honolulu. 2016. *2017 Staffing Needs Assessment Nov2016.xls*.

1.4.2 Commercial Solid Waste Collection

Except for a limited number of businesses served by the City, commercial MSW is collected by private haulers who compete to haul waste from these generators, which include commercial and industrial facilities, multi-unit residential properties, and military bases. Waste received from multi-unit residential properties and apartments is considered commercial waste if collected by a private hauler. In past years, multi-unit residential properties and apartment complexes were eligible to receive City front-loader collection service if their development met certain physical requirements. These requirements were given to the developers during the planning stages of their development, giving developers the option to either meet the requirements or opt for private collection of their trash. Currently, the City is not accepting new front-loader-service customers but continues to serve existing customers.[8]

Most private haulers deliver their waste directly to the City disposal facilities at H-POWER (for MSW or bulky items) or WGSL (for special wastes not suitable for H-POWER). A small number of commercial loads are delivered to City transfer stations.

Honolulu Disposal Service, Inc. and West Oahu Aggregate Company, Inc., currently the two largest private MSW haulers, operate their own transfer stations, which are capable of processing the trash they collect each day. Honolulu Disposal Service, Inc., operating under Honolulu Recovery Systems, Inc., also uses a materials recovery facility (MRF) that sorts co-mingled recyclables and rubbish.

Commercial construction and demolition (C&D) debris is not accepted at either H-POWER or WGSL, but can be taken to the privately-owned C&D landfill operated by PVT Land Company, Ltd. in Nanakuli. In addition to C&D landfill operations, PVT Landfill operates a recycling and materials recovery center. Residents serviced by the Refuse Division are allowed to place limited quantities (up to 1 cubic yard) of

[8] Information provided by Refuse Division staff. November 7, 2017.

C&D debris at the curbside for collection in the City's monthly bulky item collection service. Recovered materials are sold for recycling and other reuse purposes, reducing the amount of material interred at the landfill.[9]

1.5 Source Reduction and Reuse

Source reduction is any action that causes a net reduction in the generation of solid waste before the waste (or recyclables) is collected, and reuse refers to repairing or finding an alternate use for materials that would otherwise be disposed of. The City's existing source reduction and reuse efforts focus on providing public education and awareness of existing programs, resources, tools, and regulatory mechanisms that promote source reduction and reuse and encourage residents and businesses to prevent waste at the source and reuse materials. Existing programs include the following:

- **Opala.org Website**—The City's website provides information on a series of waste prevention topics, including waste reduction approaches specific to the type of generator or material.
- **Promotion of Reuse Organizations**—Many businesses and organizations on Oahu are involved in source reduction activities by providing opportunities for residents to reuse a variety of items and materials rather than buying new products. The City supports reuse organizations by promoting their services on the opala.org website and by hosting facility tours.
- **Preventing and Diverting Wasted Food**— The City promotes and offers a variety of guidance programs and resources aimed at source reduction, feeding hungry people, and feeding animals. In addition, City ordinance requires recycling of some types of commercial food waste, creating a financial incentive to reduce food waste generation.
- **Grasscycling**—Grasscycling is the practice of leaving grass clippings on the lawn after mowing. The City grasscycles at all City parks and recreation facilities. The opala.org website also promotes grasscycling by educating readers on the benefits, such as the return of nutrients to the soil and reduction in the amount of waste disposed of.
- **Business Waste Prevention Guide**—The *Waste Prevention Guide*[10] for businesses, available on the opala.org website, provides information about producing less waste and dealing with excess waste. Businesses can produce a large amount of waste in daily operations, which may provide an opportunity for cost savings through waste reduction.
- **Plastic Bag Ban**—Effective July 1, 2015, businesses are prohibited from providing plastic checkout bags and non-recyclable paper bags to their customers at the point of sale for the purpose of transporting groceries or other merchandise, with some exceptions.[11] Effective July 1, 2018, businesses must charge a minimum of 15 cents per reusable bag, compostable plastic bag, or recyclable paper bag provided at the point of sale for the purpose of transporting groceries or other merchandise. Further, effective January 1, 2020, plastic film bags with a thickness of 10 mils or less will no longer be considered reusable bags and compostable plastic bags will no longer be considered acceptable bags.
- **Measuring Reduction**—The City surveys businesses engaged in reuse and recycling activities annually to determine the types and quantities of materials that are being recycled or reused. Based on the data obtained from the surveys, as well as H-POWER and WGSL receipts, the City is able to determine the progress that has been made in diverting waste and where more effort is needed.

[9] City and County of Honolulu, Department of Environmental Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu*. November. http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.

[10] City and County of Honolulu, Department of Environmental Services. 2018. "Business Recycling." Accessed January 18. http://www.opala.org/solid_waste/business_recycling.htm.

[11] ROH Chapter 9, Article 9.

1.6 Recycling and Bioconversion

1.6.1 Recycling

The City has implemented the following notable recycling programs, which have contributed to an increase in the amount of recyclables recovered from residential, commercial, and industrial sources:

- The curbside mixed recycling collection program, serving approximately 160,000 households
- The curbside green waste collection program, serving approximately 160,000 households
- The curbside island-wide bulky item collection program
- Recycling of targeted materials required by law for most businesses and government agencies (e.g., glass recycling for bars and restaurants, paper recycling for office buildings, and food-waste recycling for hotels, grocery stores, food manufacturers and processors, food courts, and hospitals).

These collection programs are described further in the following sections. Section 4, Recycling, contains additional details on the quantities of recyclables recovered.

1.6.1.1 Recycling Collection Programs

In 2010, the City completed island-wide implementation of the curbside recycling program for single-family households in automated collection areas. Each household receives three carts for sorting waste: gray for refuse, green for green waste, and blue for mixed recyclables. Green waste includes grass, tree and hedge trimmings, garden fruits and vegetables, and Christmas trees. Mixed recyclables include newspaper, corrugated cardboard, white and colored office paper, paper bags, glass bottles and jars, all metal food and beverage cans, and plastic containers with #1 and #2 plastic codes.

Currently, curbside recycling collection occurs once per week, alternating weekly between green waste and mixed recyclables. As noted in Section 1.4, the City plans to reduce blue cart collection to approximately once-per-month (one collection every 4 weeks) in 2019. [12] Options to expand the curbside recycling program to include households in manual collection areas are currently being investigated.

In addition to the curbside recycling collection program, residents can bring household-generated green waste, appliances, batteries, compressed gas cylinders, and tires to the convenience centers and transfer stations for recycling as described in Section 1.4.2 and Section 1.5. White goods are collected for recycling along with other bulky items in a method similar to manual service by the Division on a monthly basis. [13]

The majority of multi-unit residential properties (e.g., town houses, apartment buildings, and residential high-rises) on the island are serviced by private waste haulers. These haulers offer a variety of recycling services and container options for their multi-unit customers. The City provides a list of companies that offer recycling collection to multi-unit properties on the island on its website. [14] Residents in multi-unit residential properties that do not have recyclables collected by a private hauler may self-haul recyclables to recycling drop-off centers. [15]

1.6.1.2 Advance Disposal Fee on Glass

For many years, the City has administered a non-deposit (non-HI-5) glass recycling program with funding and authorization from the State Advance Disposal Fee (ADF) program. An ADF of 1.5 cents per non-deposit glass container is collected from glass bottle and jar importers by the State and is made available

[12] City and County of Honolulu, Department of Environmental Services. 2017. "3-Cart Refuse / Recycling Collection". http://www.opala.org/solid_waste/curbside.htm.

[13] City and County of Honolulu, Department of Environmental Services. 2017. "Curbside Collection/Schedules." http://www.opala.org/solid_waste/collection_schedule_search.html.

[14] City and County of Honolulu, Department of Environmental Services. 2017. "Collectors." Accessed December 14, 2017. http://www.opala.org/solid_waste/archive/Collectors.html.

[15] See list of drop-off centers at http://www.opala.org/solid_waste/community_recycling_centers.html.

(based on per capita rates) to the counties to operate non-deposit glass recycling or reuse programs. This 1.5-cent ADF has not been increased since it was written into state law in 1994, and is insufficient to cover recycling costs. In April 2014, the City notified licensed glass recyclers of a reduction in the recycling incentive payment for non-deposit glass because of the limited funding received from the State to operate this program. Following this notification, licensed glass recyclers informed the City that they would no longer accept non-deposit glass from the public for recycling as of June 2014. As a result, the City suspended ROH Section 9-3.1 as applicable to non-deposit glass (the ordinance is still in effect for HI-5 deposit glass).[16]

Currently, there are no public recycling options for non-deposit glass.[17] However, non-deposit glass is still collected in the blue cart recycling program and in two licensed glass recyclers' commercial accounts.

1.6.1.3 Deposit Beverage Container Program (HI-5)

Hawaii's beverage container deposit program, known as the HI-5 program, has been in place since 2005. A 5-cent deposit per beverage container is charged for the purchase of select glass, bi-metal, aluminum, and plastic containers statewide. To help support the costs of recycling and State program administration, a 1- to 1.5-cent non-refundable container fee is also assessed.[18] Beverages included under the law are soft drinks, beer, juices, water, teas, coffees, and sports drinks contained in deposit beverage containers (DBCs). Excluded beverages include wine, milk, and hard liquor. DBCs may be redeemed for the 5-cent deposit by either individual container count, up to 200 containers, or by weight whereby a State Department of Health (DOH) -mandated segregated weight conversion is used. Certified redemption centers are reimbursed by the DOH for any 5-cent deposits refunded. They also receive a handling fee, currently set at 4 cents per container for glass and 2 cents per container for aluminum, bi-metal, and plastic.[19]

Currently, approximately 30 redemption centers are privately operated throughout the island. Redemption centers operate on different schedules, with some offering very limited days and hours of operation, and many accept other recyclables in addition to DBCs.[20] All redeemed DBCs are transported to a recycling facility for processing and marketing.

The City offers schools, non-profit organizations, and condominiums the use of 96-gallon recycling carts to enhance their recycling efforts and raise extra money. Each recipient is responsible for arranging pickup or transport of the recyclables and receives the 5 cents for each DBC.[21]

1.6.1.4 Commercial Recycling

The recycling of targeted materials is required by law for most businesses and government agencies on Oahu. Mandatory recycling laws affect restaurants, bars, hotels, office buildings, shopping centers, retail and grocery stores, hospitals, food courts, food manufactures and processors, golf courses, parks, tree trimmers (as yard waste), auto shops, and appliance dealers.[22]

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[16] City and County of Honolulu, Department of Environmental Services. 2017. *Report on the Enforcement of Mandatory Business Recycling Ordinances*. June. http://www.opala.org/solid_waste/pdfs/2017%20Report%20on%20Mandatory%20Business%20Recycling.pdf.

[17] Ibid.

[18] The fee is currently 1 cent, which is in effect when the redemption rate is below 70 percent: the fee is 1.5 cents when the redemption rate is above 70 percent.

[19] State of Hawaii, Department of Health, Solid and Hazardous Waste Branch. 2008. *Public Notice: Hawaii Deposit Beverage Container Law, Handling Fee Adjustment for Glass Deposit Containers.* http://health.hawaii.gov/hi5/files/2013/05/HandlingFeeSep081.pdf.

[20] City and County of Honolulu, Department of Environmental Services. 2018. "HI-5 Plus – One-Stop Recycling Centers." Accessed January 10, 2018. http://www.opala.org/solid_waste/HI5_plus.html; See a list of redemption center locations and hours of operation at http://health.hawaii.gov/hi5/redemption-centers/.

[21] City and County of Honolulu, Department of Environmental Services. 2017. "Reduce Litter - Increase Recycling." http://www.opala.org/solid_waste/Beverage_Container.html.

[22] City and County of Honolulu, Department of Environmental Services. 2017. "Mandatory Recycling." http://www.opala.org/solid_waste/archive/Mandatory_Recycling_Laws.html.

Most large businesses on Oahu are affected by the City's recycling ordinances. The requirements identify the types of businesses that are required to implement a recycling system and which materials are targeted. Table 1-4 summarizes the laws impacting the commercial sector.

Table 1-4. Commercial Recycling Ordinances

Material	Generator Type	Ordinance Requirement	Ordinance Number
Cooking oil waste, FOG waste (animal/ vegetable fat, oil and grease and other waste that is retained in or removed from a commercial pretreatment device)	Commercial	Banned at all disposal facilities	9-1.7
Cardboard, green waste	Commercial	Restricts landfill disposal	9-1.7
Newspaper, cardboard, office paper, aluminum, glass, plastics	City agencies	Recycling required	9-1.11
Glass	Bars and restaurants	Recycling required	9-3.1
Office Paper, newspaper, cardboard	Office buildings with 20,000 square feet or more of office space	Recycling required	9-3.1
Food waste	Hotels, restaurants, grocery stores, food courts, food manufacturers/processors, hospitals meeting specific size criteria	Recycling required	9-3.5

Some of the mandatory recycling ordinances are enforced at the point of generation. The City mails compliance forms and conducts annual site inspections of businesses that are required to recycle. If, during a site inspection or as indicated on a compliance form, the business is not in compliance with the mandatory recycling ordinance(s), a City Recycling Specialist will work with management to improve or correct the system, as appropriate. Disposal bans and restrictions on high-volume recyclables, including green waste, cardboard, tires, auto batteries, white goods and scrap metals, are enforced at the point of disposal. Inspectors monitor trucks unloading at WGSL, H-POWER, and transfer stations and visually determine if a truckload is over the limit on restricted material or contains any amount of banned material. The offending vehicle or hauler can be denied access to City disposal facilities, with the penalty and duration determined by the Division Chief.[23]

As required, City offices recycle white and colored office paper, newspaper, cardboard, and beverage containers (aluminum, glass, and plastic) at approximately 20 City buildings. The City collects paper in dumpsters for pickup, and a contractor collects, processes, and markets the material. In September 2015, the segregated paper collection system was changed to a mixed paper system, allowing white and colored paper, cardboard and newspaper to be collected together. Recovery rates increased by more than 15 percent under the new system.[24]

The City also promotes commercial recycling through the Peer Consultants program, created by the City and the business community to enhance the recycling resources available to businesses to help them divert more material from WGSL. Peer consultants from the business community are available free of charge to advise companies interested in starting recycling programs or purchasing recycled-content products.[25]

[23] City and County of Honolulu, Department of Environmental Services. 2017. *Report on the Enforcement of Mandatory Business Recycling Ordinances*. June. http://www.opala.org/solid_waste/pdfs/2017%20Report%20on%20Mandatory%20Business%20Recycling.pdf.

[24] City and County of Honolulu, Department of Environmental Services. 2016. *Report on City Agency Mandatory Recycling*. June. http://www.opala.org/solid_waste/pdfs/2016%20Report%20on%20Mandatory%20City%20Agency%20Recycling.pdf.

[25] City and County of Honolulu, Department of Environmental Services. 2017. "Peer Consultants." http://www.opala.org/solid_waste/Partnership_for_the_Environment.html.

1.6.1.5 Other Mixed-material Recycling Activities

- **State Public Schools**—All Oahu public schools have recycling collection programs funded by the State through the Department of Education's refuse collection contract. Collection is provided by private haulers.
- **Backhauling**—Large retailers backhaul corrugated cardboard, pallets and some other materials by shipping these materials back to the mainland in otherwise empty shipping containers.
- **H-POWER**—Both ferrous and non-ferrous metals are extracted and recycled from the solid waste processed at H-POWER.
- **Schnitzer Steel Hawaii (Schnitzer)**—This company is the oldest and largest metals recycling company in the islands, exporting both ferrous and non-ferrous scrap metal. All types of metal, including junked cars and white goods, are accepted and processed for recycling at Schnitzer.
- **Unitek Solvent Services (Unitek)**—Unitek recycles a significant portion of the island's used tires. The tire treads are shredded and burned as fuel to generate electricity at AES Hawaii.
- **PVT Land Company**—The largest recycler on Oahu, PVT Land Company conducts material recovery and recycling in addition to its C&D landfill operations.

1.6.2 Bioconversion

1.6.2.1 Green Waste

Green waste is one of the few materials that is currently collected, processed, and recycled on Oahu. Green waste is also one of the largest components of the waste stream, so diversion can have an impact on landfill life and recycling goals.

The City provides automated curbside collection of green waste every other week to over 160,000 households on the island. Residents may also drop off green waste at convenience centers, Kapaa Transfer Station, or the Hawaiian Earth Recycling (HER) Wahiawa location. Residents can drop off up to two loads of green waste per day for free.

HER composts residential and commercial green waste at its main facility in Wahiawa. In addition to accepting residential green waste, HER accepts green waste from commercial and government agencies for a fee. Mulch is available to the public for free and compost can be purchased directly from HER or at local garden shops.

Generators of green waste are also encouraged to consider small-scale do-it-yourself mulching and composting, and residents are encouraged to leave grass clippings on the lawn after mowing to return the nutrients to the soil.[26] During development of this Plan, the City reinstated the free composting workshops previously offered to educate residents about backyard composting and grasscycling. Two workshops were offered in 2018 and four workshops will be offered in 2019.

A landfill ban for all green waste went into effect in January 2003, although the City has been restricting most green waste at disposal facilities since the mid-1990s.

1.6.2.2 Food Waste and Biosolids

Food waste has been recycled on Oahu for decades. In 1997, the City passed a mandatory recycling ordinance (ROH Section 9-3.1) for large commercial food waste generators such as restaurants, grocery stores, food courts, hotels, hospitals and manufacturers. Some leftover quality food is delivered to food banks and similar establishments, but most food waste is delivered to or collected by hog farmers. Certain types of food waste can be co-composted with green waste.

[26] The City discourages residents from raking grass clippings into the street, as this can block storm sewers.

Some biosolids (sewage sludge from wastewater treatment plants) are also processed and reused on Oahu. Currently, the City contracts with Synagro to generate fertilizer pellets from biosolids generated at the Sand Island Wastewater Treatment Plant (WWTP). H-POWER also accepts biosolids. Sludge from military WWTPs is composted at the Navy Biosolids Treatment Facility in Kalaeloa, Oahu (former Barbers Point).

1.7 Special Waste Management

HRS Section 342G-1 defines "special waste" as any solid waste that, because of its source or physical, chemical or biological characteristics, requires special consideration for its proper processing or disposal or both. This term includes, but is not limited to, the following:

- Asbestos
- Used oil
- Petroleum-contaminated soil (PCS)
- Lead acid batteries
- Municipal waste combustion ash
- Sewage sludge that is not hazardous waste
- Agricultural and farm generated wastes that are normally placed in landfills
- Medical wastes
- Tires
- White goods
- Derelict vehicles

Asbestos and PCS are accepted at the PVT Landfill. Residential-derived used motor oil can be disposed of with MSW if prepared per the City's guidelines. Lead acid batteries are collected by retailers or at the City's convenience centers and transfer stations. Ash and residue from H-POWER are taken to WGSL for disposal. Sewage sludge is taken to H-POWER for combustion or processed for reuse by Synagro.

Most agricultural waste on Oahu is processed through bioconversion or other means at the site on which it is generated, although some animal carcasses are accepted at WGSL for disposal. Certain autoclaved medical wastes (excluding treated sharps) are accepted at H-POWER, while treated sharps can be disposed of at WGSL. Residential-derived tires collected at the City's convenience centers and transfer stations and tires collected by community cleanup groups are taken to H-POWER for energy recovery.[27] All other scrap tires are required to be properly disposed of and recycled in accordance with state regulations.

Residential-derived white goods are collected at the curb on a monthly basis or self-hauled to convenience centers and taken to a white goods processor. Commercial entities are directed to deliver white goods directly to a recycler. Derelict vehicles on City-owned streets can be reported by residents and are removed, then auctioned off or recycled if unclaimed.

Section 5 describes requirements and existing programs on Oahu to handle special wastes, as well as options for future management.

1.8 Household Hazardous Waste and Electronic Waste

HHW refers to wastes resulting from products purchased by the general public for household use which, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may pose a substantial known or potential hazard to human health or the environment when improperly treated, disposed of, or otherwise managed.[28] HHW materials include automotive products, cleaners, pesticides,

[27] In 2014, the City received a variance from the DOH that allows H-POWER to accept and process tires collected by the Refuse Division (at convenience centers, transfer stations, or through bulky item pickup).

[28] HRS Section 342G-1

herbicides, paints, and solvents. The City provides guidance for waste prevention and safe disposal of HHW on its website.[29]

Many types of HHW can be safely disposed of in the City's existing refuse and sewage systems according to the City's recommended methods. Materials that present serious health and safety hazards, including pesticides and highly flammable substances like gasoline and kerosene, require special handling. Residents can call the City and make an appointment to drop off hazardous wastes requiring special handling at a drop-off event; events are scheduled approximately every 2 months. Section 6 describes existing programs and future options for management of HHW in greater detail.

Used electronics or e-waste includes discarded computers, cell phones, televisions and other electronic products. The City enacted a disposal ban on electronics for commercial or government generators in 2006. Home electronics are exempted from the ban and can be disposed of with regular household refuse or bulky collection, but the City encourages the use of e-waste recycling options. The Hawaii Electronic Waste and Television Recycling and Recovery Law was adopted in 2008 and requires electronics manufacturers to provide recycling programs for televisions, computers, computer printers, computer monitors, and portable computers. The City provides a list of e-waste recycling and reuse options on its website.[30] Additional detail regarding existing programs and future options for handling e-waste is provided in Section 6.

1.9 Public Education

The City maintains an active and innovative solid waste management Education and Awareness program. The cornerstone of this program is the City's website, opala.org. Other programs and educational materials used by the City include the following:

- *WasteLine*, a blog and electronic newsletter
- Opalavision videos, available on opala.org
- Flyers, handouts, and other educational materials
- Tour de Trash events
- Educational presentations at schools, including partnership with Honolulu Theatre for Youth
- Partnership for the Environment, a coalition of businesses working with the City to reduce waste
- Print advertisements, direct mailers, and press releases
- Environmental Concern Line
- Public surveys
- Special events and public education campaigns
- Enforcement mechanisms, such as cart inspections
- Refuse and Recycling Services phone line, through which the City provides technical assistance
- Social media, including a department Facebook page and Twitter account and division Facebook page

These programs are described in more detail in Section 7.

1.10 Facilities

1.10.1 Convenience Centers

The Division operates six convenience centers located throughout the island, shown on Figure 1-3. Residents may use any of the convenience center locations for free; however, no more than two loads per resident per day are allowed.[31] Commercial or business refuse (e.g., from tree trimmers, roofers, or

[29] http://www.opala.org/solid_waste/Household_Hazardous_Waste.html.

[30] http://www.opala.org/solid_waste/eWaste.html

[31] City and County of Honolulu, Department of Environmental Services. 2017. "Drop-Off Convenience Centers for Refuse and Recycling." http://www.opala.org/solid_waste/Drop_off_Centers_for_Refuse.html.

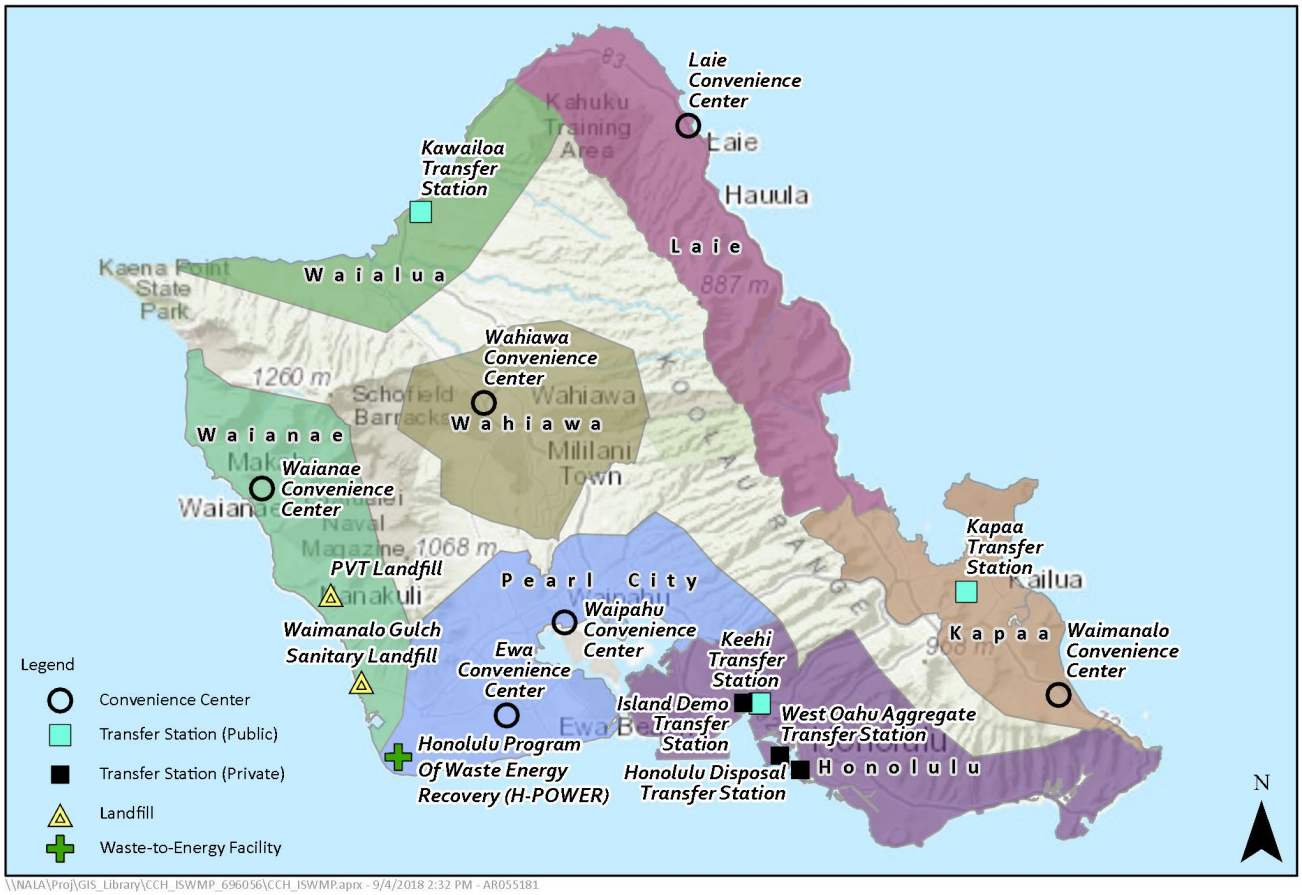

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Figure 1-3. Convenience Centers and Transfer Stations

small stores) is strictly prohibited at convenience center locations, as is disposal by commercial and private haulers.

Residential household waste accepted at convenience centers includes residential refuse, green waste, auto batteries, tires, compressed gas cylinders such as propane tanks and fire extinguishers, and appliances. Accepted refuse is separated as follows and delivered to the appropriate disposal or recycling location:

- MSW is delivered to H-POWER.
- Green waste is delivered to HER for composting.
- Large appliances, tires, auto batteries, propane tanks, fire extinguishers and other materials are set aside for separate collection and delivery to recycling facilities.

All convenience centers are open daily from 7 a.m. to 6 p.m. and accept the listed materials, except for Wahiawa. Wahiawa no longer accepts green waste because the HER green waste facility is nearby; residents can deliver green waste directly to HER.

1.10.2 Transfer Stations

The Division operates transfer stations in Honolulu (Keehi), Kailua (Kapaa), and Haleiwa (Kawailoa), as shown on Figure 1-3. These three transfer stations serve to consolidate waste from MSW collection trucks into large transfer trailers for more efficient and economical transport to H-POWER. Residents may dispose of their MSW and certain other waste materials at the transfer stations for free. The tipping fee for

businesses and commercial users at the transfer stations is $110.60 per ton plus a 12 percent recycling surcharge and a 35-cent-per-ton state surcharge.[32]

The Keehi Transfer Station is located at 606 Middle Street in Honolulu, between Nimitz Highway and the H-1 Freeway. It is operated by 24 employees, including supervisors, equipment operators, truck drivers, scale attendants, ramp attendants, and laborers. The transfer station operates from 4 a.m. to 7 p.m., Monday through Saturday. [33]

The primary customer during the morning is the City's Honolulu Refuse Collection Yard. Because of the congested traffic from the large trucks in the morning hours, residential self-haul customers are only allowed to deliver waste from 12 p.m. to 6 p.m. The Keehi Transfer Station has fewer residential customers than Kapaa because of the reduced hours and limited scope of materials accepted. Keehi Transfer Station accepts combustible MSW and used auto batteries only.[34]

The Kapaa Transfer Station is located at 100 Kapaa Quarry Access Road. The transfer station is operated by 34 employees, including supervisors, equipment operators, truck drivers, scale attendants, ramp attendants, and laborers. This facility operates 7 days a week from 6 a.m. to 6:30 p.m., and is open to residential self-haul customers from 10 a.m. to 6 p.m. Monday through Friday and 7 a.m. to 6 p.m. Saturday and Sunday.[35] Similar to Keehi Transfer Station, the primary customers are the City's Kailua Refuse Collection Yard in the morning and residents later in the day. Of the City's transfer stations, Kapaa Transfer Station accepts the most material types, including MSW, green waste, scrap metal, white goods, tires, batteries, propane tanks, and fire extinguishers.

The Kawailoa Transfer Station is located at 62-180 Kawailoa Drive, next to the closed Kawailoa Landfill. The facility is operated by 6 employees, including the lead operator, 2 equipment operators, and 3 truck drivers. The primary customers are the City's Laie and Waialua Refuse Collection Yards and residential self-haulers. Green waste is not accepted for recycling at Kawailoa Transfer Station, and these loads are directed to the nearby green waste composting facility. However, if incidental green waste is delivered to Kawailoa, it is hauled to H-POWER with the normal trash. The facility operates 7 days a week from 7 a.m. to 6 p.m.

In addition to the three City transfer stations, there are three private transfer stations on Oahu: the Honolulu Disposal Service, Inc. transfer station, the West Oahu Aggregate transfer station, and the Island Demo transfer station. The Honolulu Disposal Service, Inc. transfer station accepts MSW from the company's own trucks. The West Oahu Aggregate and Island Demo facilities accept C&D debris from commercial contractors and the company's own trucks, sort materials for recycling, and transfer the non-recyclable portion to disposal facilities.

1.10.3 H-POWER

The City-owned H-POWER facility is the only WTE facility on Oahu. H-POWER has been in commercial operation since 1990 and is managed through a full-service vendor contract with Covanta.[36] The majority of residential and commercial MSW collected on the island for disposal, as well as some WWTP biosolids, are delivered here.

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[32] City and County of Honolulu, Department of Environmental Services. 2004. *Refuse Collection and Disposal Rate Schedule*. July 30. http://www.opala.org/pdfs/solid_waste/rates04.pdf.

[33] Information provided by Refuse Division staff. June 1, 2018.

[34] City and County of Honolulu, Department of Environmental Services. 2017. "Drop-Off Convenience Centers for Refuse and Recycling." http://www.opala.org/solid_waste/Drop_off_Centers_for_Refuse.html.

[35] City and County of Honolulu. 2016. *2017 Staffing Needs Assessment Nov2016.xls*. November; City and County of Honolulu, Department of Environmental Services. 2017. "Drop-Off Convenience Centers for Refuse and Recycling." http://www.opala.org/solid_waste/Drop_off_Centers_for_Refuse.html.

[36] City and County of Honolulu, Department of Environmental Services. 2013. *2013 Interim Status Report on the Integrated Solid Waste Management Plan (2008)*.

H-POWER is located on a 28-acre City-owned site in Campbell Industrial Park, Kapolei. Waste deliveries are accepted from 5:30 a.m. to 6:30 p.m. on weekdays and 6:30 a.m. to 4 p.m. on weekends.[37] In addition to MSW, H-POWER accepts dewatered sewage sludge, used automobile tires collected by the Refuse Division and community clean-up events, bulky waste, and other special wastes.

The facility uses the following two combustion processes to process combustible solid waste materials into energy:

1) Refuse-derived fuel (RDF) combustion, which requires MSW to be processed into RDF that is used as fuel to generate electricity. H-POWER operates two 854-ton-per-day RDF boilers with two waste processing lines.
2) Mass burn combustion, which allows MSW to be burned to generate electricity with minimal pre-processing. The 900-ton-per-day mass burn boiler was added in 2012.[38]

Historically, up to 90 percent of the volume of the MSW received at H-POWER has been diverted from WGSL and converted into renewable electric energy. H-POWER also extracts ferrous and non-ferrous metals from the waste or ash using magnets and an eddy current separator. Recovered metals are sent to recycling facilities for further processing. The ash and residue from H-POWER are delivered separately to WGSL.[39]

The City has a waste supply commitment with the facility operator to deliver 800,000 tons of solid waste per year to H-POWER.[40] The City also has a power purchase agreement with Hawaiian Electric Company (HECO) to purchase the electricity generated at H-POWER.

The current tipping fee paid by the private haulers and other commercial vehicles at H-POWER is $81.00 per ton plus a 12 percent City recycling surcharge and a 35-cent-per-ton state surcharge.[41] The current tipping fee paid by City agencies is $62.00 per ton for MSW and $77.50 per ton for sewage sludge with surcharges.

1.10.4 Landfills

WGSL is the primary permitted MSW landfill on Oahu. It is owned by the City and has been in operation since September 1989. Operations at WGSL are under contract to Waste Management of Hawaii Inc. (WMH), except for the vehicle scales, which are operated by the City.

WGSL is located at 92-460 Farrington Highway in Kapolei on the western side of Oahu in Waimanalo Gulch, Kahe Valley. The WGSL property encompasses over 200 acres, with the majority of the property permitted for landfilling and support operations. The landfill is open 7 days a week from 7 a.m. to 4:30 p.m.

Both commercial haulers and residents can drop waste off at WGSL, but the City has set policies to accept only limited types of materials. Materials accepted include ash, special handle wastes, and small amounts of dirt, rock, sand, gravel, and concrete (small amounts of inert C&D debris are accepted from residents only; commercial C&D debris must be hauled to private facilities). Special-handle wastes include, but are not limited to, certain sludges, dead animals and offal, and auto shredder residue (ASR).[42] Because of either permit restrictions, City policy, or state or federal law, WGSL does not accept hazardous waste, combustible waste (most MSW, only accepted during H-POWER diversions), asbestos-containing materials (ACM), bulky items (only accepted during H-POWER diversions), tires, batteries,

[37] Information provided by Refuse Division staff. June 1, 2018; Information provided by Covanta staff. June 15, 2018.

[38] Covanta. 2017. “Covanta Honolulu.” https://www.covanta.com/Our-Facilities/Covanta-Honolulu.

[39] R.M. Towill Corporation and SMS Research Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O‘ahu*. November. http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.

[40] Information provided by Refuse Division staff. November 9, 2017.

[41] City and County of Honolulu, Department of Environmental Services. 2004. *Refuse Collection and Disposal Rate Schedule*. July 30. http://www.opala.org/pdfs/solid_waste/rates04.pdf.

[42] Waste Management of Hawaii, Inc. 2017. *2017 Annual Operating Report, Waimanalo Gulch Sanitary Landfill*. Final. July 27.

appliances, or scrap metals.[43] Residents are directed to take unacceptable materials to convenience centers and transfer stations, while commercial haulers must make their own arrangements for proper disposal. These policies and laws help to divert most materials from WGSL to H-POWER so that little more than ash and residue (byproducts of H-POWER) are disposed of at WGSL. The City's intent is to preclude items from being disposed of at the landfill unless there are no other alternatives.

The City has a waste supply commitment with the facility operator to deliver 250,000 tons of solid waste per year to WGSL.[44] The tipping fee at WGSL for regular waste is the same as H-POWER.[45]

The PVT Landfill is a privately owned and operated permitted C&D debris landfill located in Waianae. In addition to C&D landfill operations, the PVT Landfill also conducts recycling and materials recovery operations. Recovered materials are sold for recycling and other reuse purposes, reducing the amount of material ultimately disposed of in the landfill.[46] The military also operates a smaller-sized landfill at Kaneohe Marine Corps Base Hawaii.

1.11 Processing and Markets

The mixed recyclables recovered in the City's curbside collection program are taken to Reduce Reuse Recyclers Hawaii LLC (RRR). RRR processes the City's material, and materials from other accounts, and markets the material to overseas end users. There are a number of other companies that process and market recyclables. One of them, Honolulu Disposal Service, Inc., operates a recycling business under the name Honolulu Recovery Systems and processes and markets cardboard, newspaper, aluminum, plastic and glass collected through private accounts. Another, Island Recycling, handles and markets scrap metal, scrap steel, DBCs, paper, cardboard, plastics, and tires collected through their accounts, one of which is for the City's office paper recycling.

Recyclers process and sell recycled materials to end users in the mainland United States or in Asia, usually through brokers. Typically, materials are baled or otherwise reduced in volume before being shipped to market. In some limited cases, end products are processed and used in final products locally. Some of these Oahu recyclers also accept materials generated on other Hawaiian Islands.

There are unique challenges to marketing recyclables from a physically remote island, which are highlighted in Section 9. However, the City has undertaken the following initiatives to develop and promote end uses for materials on the island:

- The City adopted regulations allowing the use of crushed glass in road construction in 1993.
- The City buys recycled-content paper to support the recycled paper market.
- The City continues to explore other types of products made from recycled material - such as recycled plastic lumber - that could be used in place of products currently being purchased.
- The City has also showcased recycled-content products at the Honolulu Zoo.

Markets exist locally for materials that are generated in high volumes, have relatively low value, and for which large and costly production facilities are unnecessary. These materials include organics (e.g., untreated wood, green waste, and food waste) and many construction and demolition materials such as concrete, asphalt concrete, and brick. Some locally developed products include used oil boxes, Menehune Magic soil amendment, Synagro pellets, biodiesel, and refurbished mattresses.

[43] City and County of Honolulu, Department of Environmental Services. 2018. "Drop-Off Convenience Centers for Refuse and Recycling." Accessed May 15, 2018. http://www.opala.org/solid_waste/Drop_off_Centers_for_Refuse.html#waimglch.

[44] CH2M. 2017. *Meeting Summary for Advisory Committee Meeting 02 – January 9, 2018*. Final.

[45] City and County of Honolulu, Department of Environmental Services. 2004. *Refuse Collection and Disposal Rate Schedule*. July 30. http://www.opala.org/pdfs/solid_waste/rates04.pdf.

[46] City and County of Honolulu, Department of Environmental Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu*. November. http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.

2. Solid Waste Generation

2.1 Introduction

This section of the Plan describes the waste stream that is currently generated in the City and projects the quantity of waste anticipated during the planning period from July 1, 2017, through June 30, 2028. The development of future waste management options will depend, in part, on the estimated quantity and composition of the waste stream to be managed.

2.2 Goals and Objectives

The City's solid waste management program includes programs to reduce the overall level of waste generated on-island over time and efficiently and effectively collect, recycle, reuse, and dispose of solid waste generated by the citizens and visitors to the island. To develop targeted programs and achieve an overall reduction in waste generated, it is important to know the composition of waste delivered to each facility and the composition generated by each generator type. This section describes the waste stream that is currently generated in the City.

2.3 Background

To ensure that solid waste programs account for the various waste streams generated by its customers, HRS requires that each county develop and maintain a solid waste management plan that includes a waste generation component.

Per HRS Title 19, Sections 342G-25(b)(1) and 342G-26(a), the county solid waste management plan must include a waste stream assessment that describes the historical and projected waste generated by the system, as well as the composition of the waste stream. The component should identify and assess the following:

- The origin, composition, and weight or volume (or both) of solid waste generated within the county during the year in which the plan is being developed, or during the subsequent years when a revised plan is being developed
- Data that are reasonably representative of, and that reflect information that considers seasonal and year-round patterns in waste generation
- A quantitative estimate of the amount of each type of solid waste that was reduced through recycling and bioconversion during the previous planning period
- Estimated reductions that have resulted from source reduction efforts, to the extent that the reductions can be quantified

This section addresses these HRS requirements.

2.4 Population Projections

The size of the population has a direct influence on the amount of waste generated in a geographic area: The greater the population, the greater the generated solid waste. Other factors such as commercial and economic growth are also likely to have an impact on waste generation in the City. Table 2-1 shows the projected de facto population for the planning period from July 1, 2017, through June 30, 2028, based on DBEDT projections.

According to the DBEDT Population and Economic Projections for the State of Hawaii to 2040, de facto population is defined as "the number of people physically present in an area, regardless of military status or usual place of residence. It includes visitors, such as tourists, but excludes residents temporarily absent, both calculated as an average daily census." Because of the large number of visitors to the City and their impact on the waste generated, it is important to include them when determining population and

amounts of waste generated. These projections reflect that the de facto population will increase 4.5 percent between July 1, 2017, and June 30, 2028.

Table 2-1. De Facto Population for the City and County of Honolulu

Year	De Facto Population
2000	926,192
2005	959,340
2010	988,106
2015	1,033,251
2016	1,033,421
2017	1,038,641
2020	1,051,585
2025	1,071,733
2030	1,094,827
2035	1,114,250
2040	1,130,040

Note:

MSW de facto forecast begins in 2016.

Sources:

R.M. Towill Corporation and SMS Research Services. 2017. *Assessment of Municipal Solid Waste Handing Requirements for the Island of O'ahu*. Prepared for the City and County of Honolulu Department of Environmental Services, Recycling and Landfill Diversion.

DBEDT. 2012. "Population and Economic Projections for the State of Hawaii to 2040." http://dbedt.hawaii.gov/economic/economic-forecast/2040-long-range-forecast/.

2.5 Current Generation, Recycling, and Disposal

The total amount of waste generated by residents and visitors in the City was determined by combining the tons delivered to H-POWER for energy recovery, the tons delivered to WGSL for disposal, and the tons recycled (including reuse and bioconversion). The total amount generated in 2017 was approximately 1.2 million tons (Table 2-2).

Table 2-2. Waste Generation, 2017

Management	Tons
H-POWER	695,414
Waimanalo Gulch Sanitary Landfill[a]	109,696
Recycled[b]	434,934
Total:	**1,240,044**

Notes:

[a] Excludes approximately 170,000 tons of ash and residue from H-Power.

[b] Recycled material excludes about 763,000 tons of construction and demolition debris.

Table 4-1 in Section 4 provides a detailed breakdown of the recycling data by material.

2.6 Projections of Waste Generation (From 2017 study)

Table 2-3 presents the projected tonnage for MSW and recycling through the study period. The assumptions underlying these forecasts for solid waste generation are that the de facto population growth rates will remain relatively stable over the long run and that recycling will continue to grow slowly through 2040.

It should be noted that generated waste is based on forecasts of de facto population and a constant rate of waste generation (generation/de facto population). To the extent the City and Oahu residents and businesses are successful in adopting strategies to reduce and prevent waste from being generated, the tons of waste generated and disposed of will be less than is shown in Table 2-3. Those strategies should also consider the increases in packaging waste that have occurred in recent years and could continue into the future because of the increase in online shopping. Specific waste reduction initiatives and their ability to lower MSW generation will be explored during the deliberations of the proposed source reduction working group (see Section 3).

Note also the decline in waste generation that occurred from 2005 to 2010. This occurred despite a small increase in de facto population and is mainly the result of the severe economic slowdown that occurred during that time period. The forecasts shown in Table 2-3 assume relatively steady growth in de facto population; actual generation will be influenced by changes in economic growth on Oahu.

Table 2-3. Projected MSW and Recycled Material

Year	Total MSW Generated (tons)	Recycled Material (tons)	Total MSW Received (tons)
2005	1,358,983	417,669	941,314
2010	1,208,542	448,639	759,903
2015	1,261,555	478,934	782,621
2016	1,261,729	488,394	773,335
2017	1,240,044	434,934	805,110
2020	1,288,340	504,591	783,749
2025	1,315,924	521,508	794,417
2030	1,339,175	535,864	803,311
2035	1,359,331	548,380	810,951
2040	1,377,157	559,503	817,654

Note:

Data excludes C&D disposal and about 763,000 tons of C&D recycling done mainly at private facilities.

Source: R.M. Towill Corporation and SMS Research Services. 2017. *Assessment of Municipal Solid Waste Handing Requirements for the Island of O'ahu*. Prepared for the City and County of Honolulu Department of Environmental Services, Recycling and Landfill Diversion.

2.7 Waste Composition

To determine the best approaches to managing waste, it is important to understand the source and the type of waste to be managed. The City retained Cascadia Consulting Group (Cascadia) to conduct an updated waste composition study to obtain information for use in developing the various sections of this Plan. The 2017 Waste Composition Study provided an estimate of the composition and quantities of solid waste material handled by the Refuse Division of the City and County of Honolulu destined for disposal at H-POWER or the WGSL. To develop targeted programs, it is important to know the composition of waste delivered to each facility and the composition generated by each generator type. The 2017 Waste Composition Study was conducted to provide this information. A summary of the methodology and results of the study are provided in the following sections.

Before starting fieldwork, Cascadia developed a sampling plan that defined the material stream included in the study and the areas from which the field crew would collect samples. Cascadia coordinated with City and disposal facility staff, identified waste haulers and disposal sites from which to select samples, collected samples, and hand-sorted and weighed all samples. Cascadia field staff reviewed all field forms daily to identify any unusual or missing entries and resolved them immediately. After collecting the raw data in the field, staff entered all data twice and rectified any discrepancies between the two entries. Cascadia then calculated composition estimates. Cascadia used these data to estimate the composite annual tonnage of waste disposed of for overall, residential and commercial categories.

2.7.1 Methodology

Cascadia characterized a total of 312 samples. Table 2-4 presents the number of samples taken from each customer class. The samples were taken in July and August 2017, and additional bulky samples were characterized in September and October 2017. These time frames were chosen to avoid gathering data that could be affected by atypical spikes caused by holiday trash. The field team hand-sorted all samples except for bulky residential loads, commercial self-haul loads, and residential self-haul loads from convenience centers. These loads were visually characterized instead of hand-sorted.

Table 2-4. Waste Composition Sample Distribution by Generator Type

Customer Class	Number of Samples
Residential	224
Residential Self Haul	20
Commercial	40
Commercial Self Haul	28
Total:	**312**

Source: Cascadia. 2018. *2017 Waste Composition Study*. June.

The Cascadia team combined the composition data (percentages by weight) from these sorts with annual quantity (tonnage) data provided by the City to generate the estimates presented in this section. Table 2-5 summarizes residential and commercial waste tonnages reported during the study period from September 2016 through August 2017.

Table 2-5. Waste Composition Study Solid Waste Totals

Sector	Waste Tonnages
Residential	
City-collected	266,528
Self-haul	62,397
Residential Total:	**328,924**
Commercial	
Privately collected	400,154
Self-haul	65,290
Commercial Total:	**465,444**
Total:	**794,368**

Note:

Data from September 2016-August 2017.

Source: Cascadia. 2018. *2017 Waste Composition Study*. June.

2.7.2 Composition

The composition profiles developed based on field activities performed by Cascadia were integrated with annual weight data to obtain estimated annual tonnages for each material category. Table 2-6 presents characterization data for solid waste composition type by residential and commercial customers. It also provides a weighted aggregate result for the combined waste stream of the City.

Table 2-6. Waste Composition Summary

Material	Residential		Commercial		Total	
	Tons	% of Total	Tons	% of Total	Tons	% of Total
Paper	63,641	19%	115,365	25%	179,006	23%
Plastics	36,562	11%	41,794	9%	78,356	10%
Metal	17,658	5%	19,159	4%	36,817	5%
Organics	139,136	42%	144,744	31%	283,880	36%
Glass	4,531	1%	7,532	2%	12,063	2%
Inerts and C&D Materials	41,849	13%	73,858	16%	115,707	15%
Household Hazardous Waste	2,504	1%	2,377	1%	4,881	1%
Other Materials	23,043	7%	60,614	13%	83,657	11%
Total:	**328,924**	**100%**	**465,443**	**100%**	**794,367**	**100%**

Note:
Data from September 2016-August 2017.
Source: Cascadia. 2018. *2017 Waste Composition Study*. June.

It is important to note that the annual estimates represent the amount of material for each waste composition type. These compositions do not include the ash or residue material that is produced because of waste processing and combustion at H-POWER. Based upon the data provided for H-POWER, approximately 136,000 tons of ash and 34,000 tons of residue were disposed of at the WGSL during calendar year (CY) 2017.

2.7.3 Generator Type

Table 2-7 shows the amount of waste delivered to H-POWER and the WGSL categorized by waste generator type based on the annual weight data provided by the Refuse Division for calendar year 2017. Approximately 86 percent, or approximately 695,000 tons, is received at H-POWER. Residential waste from City and County Refuse Division trucks and transfer stations accounted for 280,000 tons. Commercial haulers delivered nearly 376,000 tons to H-POWER.

MSW from City refuse trucks, special handle waste, and self-haul residential waste accounted for nearly 110,000 tons of waste at the WGSL. Including H-POWER residue and ash, a total of about 280,000 tons was disposed of at the WGSL.

2.7.4 Total Composition of Waste Generated

Table 2-8 presents the waste composition for H-POWER, the WGSL, and recycled material. The composition of recycled and reused material is shown in more detail in Table 4-1 in Section 4. Organics make up the largest single component of the total waste stream, with about 438,000 tons being generated in 2017. Paper is second, with approximately 249,000 tons, while metals accounted for about 171,000 tons of total waste. Approximately 34,000 tons of H-POWER residue (e.g., dirt, pebbles, gravel, broken glass, grass, leaves, and dust) was transferred from the H-POWER facility to the WGSL. Approximately 136,000 tons of ash was also sent to the WGSL from H-POWER. In total, about 435,000 tons of material was recycled or reused in 2017 (excluding about 763,000 tons of construction and demolition waste recycled at private facilities).

Table 2-7. Annual Waste by Generator Type, 2017

	CY 2017 Tons
H-POWER	
City Refuse Division Trucks	119,486
City Other Agencies and City Sewage Sludge	15,808
Transfer Stations	161,364
Convenience Center	17,070
Eleemosynary	6,005
Commercial	375,681
H-POWER Total:	**695,414**
WGSL	
MSW from Refuse Division and Other Agencies[a]	75,172
Special Handle Waste	34,231
Local Resident Self-haul[b]	294
WGSL Total:[c]	**109,696**
Total Tons Received at H-POWER and WGSL:	**805,110**

Notes:

[a] Higher than normal because of planned maintenance conducted at H-POWER in 2017

[b] Converted to tons at 0.25 ton per vehicle

[c] Excludes 136,403 tons of ash and 33,521 tons of residue from H-POWER.

Source: City and County of Honolulu Refuse Division, Master Tonnage data.

Table 2-8. Total Waste Composition (2017)

Material	H-POWER	WGSL	Recycled	Total
Reuse	0	0	32,816	32,816
Paper	165,263	17,934	65,820	249,017
Plastics	71,486	7,758	5,889	85,133
Metal	33,374	3,803	133,904	171,081
Organics	257,653	28,663	151,815	438,131
Glass	11,114	1,206	14,713	27,033
Inerts and C&D Materials	106,754	11,585	1	118,339
Household Hazardous Waste	4,004	879	0	4,883
Other Materials	45,767	37,870	29,977	113,614
Subtotal:	**695,414[b]**	**109,697**	**434,934**	**1,240,045**
Residue from H-POWER	0	33,521	0	33,521
Ash from H-POWER	0	136,403	0	136,403
Total:	**695,414**	**279,621**	**434,934**	**1,409,969**

Notes:

[a] Excludes C&D disposal and about 763,000 tons of C&D recycling done mainly at private facilities.

[b] Inbound tons inclusive of 33,521 tons of residue sent to the WGSL and not combusted.

2.8 Waste Composition Trend

Table 2-9 compares the results from the waste composition studies conducted in 2006 and 2017. It should be noted that the 2006 study took place before the City had implemented curbside recycling (2010). It should also be noted that the 2006 study used a somewhat different sampling methodology than the 2017 study, so caution should be used when comparing the results of the two studies.

From 2006 to 2017, the overall waste composition experienced reductions in the paper (-7.5 percent), plastics (-2.3 percent), and glass (-0.2 percent) categories. Green waste (-3.3 percent) also experienced a reduction in its share of total waste composition. While sampling differences make exact comparison difficult, it is likely that much of this difference can be attributed to the success of the City's curbside recycling and green waste programs.

Table 2-9. Waste Composition Comparison, 2006 to 2017

Material	2006		2017		Increase/ Decrease in Composition	% Change in Tonnage from 2006-2017
	Tons	%	Tons	%		
Paper	284,082	30.2%	180,645	22.7%	-7.5%	-36%
Plastics	113,821	12.1%	78,137	9.8%	-2.3%	-31%
Metal	45,448	4.8%	36,662	4.6%	-0.2%	-19%
Glass	16,089	1.7%	12,147	1.5%	-0.2%	-25%
Inorganics/C&D	29,370	3.1%	30,293	3.8%	0.7%	3%
Other Waste	93,486	9.9%	82,930	10.4%	0.5%	-11%
Treated/Untreated Wood	35,089	3.7%	86,398	10.9%	7.1%	146%
Organics	231,334	24.6%	233,052	29.3%	4.7%	1%
Green Waste	89,226	9.5%	49,282	6.2%	-3.3%	-45%
HHW	2,243	0.2%	4,822	0.6%	0.4%	115%
Totals:	**940,188**		**794,368**			**-16%**

Notes:

Tonnage statistics for 2006 reflects FY 2006 data.

Tonnage statistics for 2017 reflect September 2016 through August 2017 data.

Total tonnage decreased approximately 16 percent, from approximately 940,000 tons in 2006 to 794,000 tons in 2017. The high tonnage reflected in the 2006 study was a result of the high economic growth Oahu was experiencing at the time just before the recession that began in 2008. Some material types (e.g., Organics) appear to be a larger part of the waste stream in 2017 (29.3 percent) than they were in 2006 (24.6 percent), but Organics tonnage only increased by less than 1 percent (approximately 1,700 tons). The large growth in the treated/untreated wood category is largely attributed to an increase in wood pallets noted in the 2017 study. Pallets were banned from disposal at H-POWER and the WGSL during 2006, but untreated pallets are now accepted at H-POWER after construction of the mass burn third boiler; treated pallets are still banned. As noted, the differences in sampling methodologies may explain some of the differences between the two studies.

3. Source Reduction and Reuse

Source reduction and reuse are at the top of the U.S. Environmental Protection Agency (EPA) Waste Hierarchy and are the preferred methods of waste management.[47] The primary goal of source reduction (commonly described as waste prevention) is to achieve a net reduction in the generation of solid waste before the waste (or recyclables) is collected.

Reuse is defined as the recovery or reapplication of a package, used product, or material in a manner that retains its original form or identity.[48] By reusing a product, you are preventing waste; because of this, reuse is often categorized as a type of source reduction. However, because of the unique attributes of reuse, it is important to consider it separately.

Examples of source reduction and reuse include, but are not limited to, the following:

- Implementing policy that eliminates disposable materials and encourages reusable products and materials
- Reducing packaging
- Implementing policy that encourages manufacturers to design products to be readily reused, repaired, reconditioned, or recycled (i.e., extended producer responsibility [EPR])
- Reducing the amount of yard waste generated, through onsite or backyard management practices
- Reducing the amount of food waste generated, through donation and other prevention techniques
- Establishing user fees for waste collection and disposal with incentives to reduce waste generated
- Reusing or donating materials such as furniture, clothes, toys, paper, cardboard, glass, metal, plastic, and other materials
- Implementing policy that discourages or prohibits disposal of certain items and ultimately results in more reuse

3.1 Goals and Objectives

As a key component of solid waste management, source reduction needs to be a focus of the City's solid waste management strategy. Successful source reduction programs can help alleviate the need for additional waste collection and processing capacity as Oahu's population grows, allowing the City to potentially avoid costly infrastructure improvements. The City's goals for source reduction are to support policies that achieve source reduction, enhance education around source reduction, and take steps to maximize waste diversion.

The City has shown its commitment to source reduction by promoting educational campaigns and non-profits, and through the implementation of source reduction programs and new policy. To move beyond its past commitments to source reduction, the City has established the following source reduction and landfill diversion goals:

- Reduce per-capita waste generation 25 percent by 2030, from 6.5 pounds per day to 4.9 pounds per day.
- Reduce carbon emissions from the waste stream by reducing or eliminating carbon-based single-use plastics and polystyrene from the waste stream. Specifically, the City has established a goal of reducing plastic waste going to H-POWER and landfill by 1 percentage point (from 10 percent to 9 percent) by 2030.

[47] EPA. 2018. https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy.
[48] State of Hawaii. 2018. "Reuse." Accessed September 5, 2018. https://dashboard.hawaii.gov/en/stat/goals/5xhf-begg/7rpz-qst3/eawq-rkvv.

The City also adopts, in Section 4, a measurable goal for landfill diversion.

These goals were developed after evaluating the potential for strategies outlined in this ISWMP to result in source reduction. The following are the foremost of the source reduction initiatives that the City plans to implement during the life of this ISWMP to reach these goals:

- Establish a Source Reduction Working Group (SRWG) to openly collaborate with other government entities, businesses, community groups, and other stakeholders to determine the best approaches and provide recommendations to further reduce waste generation
- Institute residential user fees based on the amount of service received
- Promote home green waste and food waste composting by reintroducing home composting workshops and increasing their frequency
- Increase food waste reduction education initiatives, including partnership with the National Resource Defense Council (NRDC)

The SRWG can further assess the City's quantifiable targets for source reduction and identify metrics and milestones to track progress and evaluate the feasibility and practicality of potential source reduction initiatives. Recommendations from the SRWG will be given weight and preference when working to meet source reduction goals. The following types of waste together compose 59.1 percent (by weight) of the waste stream accepted at H-POWER and WGSL based on the results of the waste composition study conducted by Cascadia. These are the most quantifiably significant parts of the waste stream, would have the greatest impact on waste generation if reduced, and could serve as a starting focus for the SRWG:

- Paper (uncoated corrugated cardboard, newspaper, paper bags, white and colored ledger paper, mixed recyclable paper, compostable paper, and other paper): 22.7 percent
- Food waste (vegetative and non-vegetative): 20.1 percent
- Green waste: 6 percent
- Wood (untreated wood, treated wood, and pallets): 5.9 percent
- Other plastic film/wrap (film packaging and products, shrink wrap, bubble wrap, garbage bags, produce bags, and re-sealable bags), 4.4 percent

In addition to quantity, the SRWG will need to examine other attributes of each waste type (such as sustainability, emissions, and other metrics) to evaluate the impact, feasibility, and practicality of potential source reduction initiatives. Although these waste types are currently sent to H-POWER to generate electricity, reducing their presence in the waste stream furthers the City's source reduction and landfill diversion goals. The City will also continue its current practices and encourage improvement in source reduction through education and support of relevant new programs and policy.

3.2 Background

3.2.1 Legislative

In HRS Section 342G-1, "Source Reduction" is defined as follows:

> *"Source reduction means the design, manufacture, and use of materials to:*
>
> *(1) Minimize the quantity or toxicity, or both, of the waste produced; and*
>
> *(2) Reduce the creation of waste either by redesigning products or by otherwise changing societal patterns of consumption, use, or waste generation. "*

Furthermore, HRS Chapter 342G goes on to state, “each county shall consider the following solid waste management practices and processing methods in their order of priority:

1) Source reduction;
2) Recycling and bioconversion, including composting; and
3) Landfilling and incineration.”

As shown, source reduction is the highest priority.

Source reduction and reuse are also identified as key strategies for meeting the Aloha+ Challenge waste goal. The Aloha+ Challenge is a statewide commitment endorsed by the Mayor of Honolulu with the Governor of the State of Hawaii, other county mayors, and the State Legislature to achieve six interconnected sustainability goals for 2030. This includes a goal to reduce the solid waste stream before disposal by 70 percent, through source reduction, recycling, bioconversion, and landfill diversion methods.[49] The State and all four counties measure progress against goals on the Aloha+ Challenge Dashboard (https://dashboard.hawaii.gov/aloha-challenge). Progress towards the 70 percent reduction goal and quantities of material reused each year are tracked. Currently, source reduction quantities are not measured because of the many local and national data gaps in collection, monitoring, and evaluation in this area, but until such time that improved source reduction data are available, the Dashboard will track source reduction targets, metrics, and data informed by this Plan.[50]

This section focuses on the solid waste management techniques of source reduction and reuse; subsequent chapters will cover other processing methods.

3.2.2 Current Waste Diversion

Although source reduction activities can be difficult to track because they cannot be measured directly at the source, two common ways of measuring source reduction are MSW generated per capita and reuse. Communities can monitor the amount of waste generated per capita and can compare that to other years to see if this metric is increasing or decreasing. The amount of MSW per capita has increased slightly, from 1.176 tons per person in 2013 to 1.178 tons per person in 2017.[51] Communities can also monitor the amount of materials reused. Reusing items or fixing broken items are considered source reduction activities because they prevent the creation of waste at the source and delay or avoid an item's entry into the waste collection and disposal system. Although it can be difficult to identify all source reduction activities, data collected by the City indicate approximately 32,800 tons of material were reused on Oahu in 2017.[52] The ratio of reused materials to total MSW has risen from 1.5 to 2.7 percent between 2013 and 2017.[53] Other forms of source reduction are harder to quantify; however, various businesses, residents, and the City are making efforts to reduce waste at the source, as described further in Section 3.3.

3.3 Existing Programs

Reusing products and materials is part of Hawaii’s island heritage (e.g., homemade toys, lauhala hats, dustpans made from old tin containers, and clothes and accessories created from rice bags), and contributes to reducing the amount of materials requiring disposal. The City’s source reduction and reuse efforts focus on providing public education and awareness of existing programs, resources, and tools and

[49] State of Hawaii. 2018. “The Aloha+ Challenge Dashboard.” Accessed September 5, 2018. https://dashboard.hawaii.gov/aloha-challenge.

[50] State of Hawaii. 2018. “Reuse.” Accessed September 5, 2018. https://dashboard.hawaii.gov/en/stat/goals/5xhf-begg/7rpz-qst3/eawq-rkvv; State of Hawaii. 2018. “Source Reduction.” Accessed September 5, 2018. https://dashboard.hawaii.gov/en/stat/goals/5xhf-begg/7rpz-qst3/te7z-9zrq.

[51] Calculated as total MSW generated divided by de facto population. Source of MSW generated: City and County of Honolulu, Department of Environmental Services. 2018. “Recycling and Landfill Diversion” Accessed September 4, 2018. http://www.opala.org/solid_waste/archive/facts2.html. Source of de facto population: City and County of Honolulu, Department of Environmental Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O‘ahu.* November. http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.

[52] City and County of Honolulu, Department of Environmental Services. 2018. “Recycling and Landfill Diversion.” Accessed September 4, 2018. http://www.opala.org/solid_waste/archive/facts2.html.

[53] City and County of Honolulu, Department of Environmental Services. 2018. “Recycling and Landfill Diversion.” Accessed September 4, 2018. http://www.opala.org/solid_waste/archive/facts2.html.

regulatory mechanisms that promote source reduction and encourage residents and businesses to prevent waste at the source. These approaches are similar to the type of programs offered in many communities around the country.

The success of source reduction initiatives is dependent on the effectiveness of the City's efforts to educate the public and advocate for policy change, as well as the willingness of the community and policymakers to implement them.

Additional discussion regarding each of the existing City programs is presented below.

3.3.1 Website

The City operates a website (opala.org) that offers alternatives for source reduction through waste prevention and reuse. This website provides information to residents on a series of waste prevention topics, including the following:[54]

- Reducing packaging waste
- Reducing general waste
- Reducing office waste

The website also describes approaches to reduce waste specific to each of the following types of generators, methods, or materials:

- Maintenance and housekeeping
- Retail
- Manufacturing
- Hotel
- Restaurant/food service
- Waste prevention worksheet
- Computer equipment
- Reuse organizations
- HHW

3.3.2 Promotion of Reuse Organizations

Many businesses and organizations on Oahu are involved in source reduction activities by providing opportunities for residents to reuse a variety of items and materials rather than buying new products. Some provide pickup service; others ask that items be delivered to their location or collection box sites.

A donation of goods to a qualified non-profit organization with 501(c)(3) status may provide a tax deduction for the donor. The City supports reuse organizations by promoting the following services on its website:

- **Drop-off Locations**—These locations accept used items such as clothing, small appliances, bedding, small furnishings (end tables, chairs, and lamps), toys, and kitchen and household goods. Residents can contact these organizations to drop off their reusable items.
- **Computer Equipment Donations**—These organizations refurbish computer equipment and donate them to children and families in need. Many schools also accept donated computer equipment.
- **Pickup Services**—These organizations will pick up used items from your home. Items must be in good working condition and may include, but are not limited to, clothing, small appliances, bedding, small furnishings (end tables, chairs, and lamps), toys, and kitchen and household goods. Residents should call the phone numbers listed on the website to schedule a pickup day for their reusable items.

[54] City and County of Honolulu, Department of Environmental Services. 2018. "Reduce and Reuse." Accessed January 18, 2018. http://www.opala.org/solid_waste/archive/Reuse.html.

- **Thrift Stores**—Numerous non-profit organizations around Oahu are involved in reuse operations in the form of thrift stores. These organizations accept items such as clothing, small appliances, bedding, small furnishings, toys, kitchen and household goods. Some provide pickup service and others ask that items be delivered to their location or collection box sites. A list of these organizations, including contact information and type of goods accepted, is on the City's website.[55]
- **Aloha Shares Network**—This statewide reuse network provides a link between donors and non-profits that accept and distribute those donations. The group accepts surplus materials from businesses and residents and distributes them to non-profits and schools.
- **Nanakuli Housing Corporation**—The Base Yard at Sand Island receives construction materials donated by contractors, homeowners, and businesses, and distributes these to families needing materials to repair their homes. Diverting these materials from disposal reduces the amount of materials going to landfills while giving a tax donation opportunity to donors. Families with very limited income, including the elderly and disabled, are their focus.
- **Re-Use Hawaii**—Re-Use Hawaii is a non-profit organization that salvages building materials through the systematic disassembly of buildings and offers the used building materials to the community at affordable rates.
- **ReStore**—ReStore supports Habitat for Humanity via proceeds from the sale of new and gently used building materials, appliances, and furniture at substantially lower prices.
- **Honolulu Freecycle™**—This is an internet listing service, part of a global Freecycle Network, that helps find new homes for reusable items by connecting available items with people who can use them. All items posted are available at no cost.
- **Aloha Harvest**—This non-profit organization takes quality, donated food and delivers it to social service agencies feeding the hungry in Hawaii, free of charge.
- **HNL Tool Library**—The HNL Tool Library allows members to share and borrow tools for a small membership fee, and also offers workshops to members and non-members.
- **Used Bookstores**—These bookstores buy and resell used books, offering an option for reuse.
- **Pacific Biodiesel**—Pacific Biodiesel converts used cooking oil and beef tallow into renewable fuel.

3.3.3 Preventing and Diverting Wasted Food

Current estimates find that wasted food represents 23 percent of global agriculture, and that Americans throw away approximately one quarter of all the food and beverages that they purchase. The total food waste in Hawaii is estimated to be valued at over $1 billion per year, which, in 2010, was equivalent to 1.52 times the total production of agriculture in Hawaii.[56]

Meanwhile, millions of Americans face some level of food insecurity. The United States Department of Agriculture (USDA) reported that, in 2017, 15 million households were food insecure sometime during that year. This means that those households were not able to provide adequate food for the family members living there. [57]

These and similar statistics inspired the first United States national food waste goal. In September 2015, the USDA and EPA set a goal to reduce national food waste by 50 percent by 2030.[58]

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[55] City and County of Honolulu, Department of Environmental Services. 2018. "Reduce and Reuse." Accessed January 18, 2018. http://www.opala.org/solid_waste/archive/Reuse.html.

[56] City and County of Honolulu, Department of Environmental Services. 2018. "Food Waste Prevention." Accessed January 18, 2018. http://www.opala.org/solid_waste/food_waste_prevention.html.

[57] USDA. 2018. "Key Statistics & Graphics." Accessed September 6, 2018. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-graphics.aspx.

[58] EPA. 2018. "United States 2030 Food Loss and Waste Reduction Goal." Accessed January 18, 2018. https://www.epa.gov/sustainable-management-food/united-states-2030-food-loss-and-waste-reduction-goal.

For decades, the City has been a leader in the diversion of food waste. Since 1997, the City has had an ordinance (ROH Section 9-3.5) that requires recycling of food waste by hotels, restaurants, grocery stores, food courts, food manufacturers and processors, and hospitals that meet specific, ordinance-defined size criteria. Section 4 provides further discussion of this ordinance. Although on the surface this may sound like a type of regulatory mechanism that encourages recycling rather than source reduction, it also has an indirect impact on the latter. By requiring certain businesses to recycle their food waste (and pay for that service), those businesses have a financial incentive to find ways to generate less food waste.

In addition, the City promotes and offers a variety of guidance programs aimed at source reduction, ranging from tours at local establishments that are practicing food waste prevention to fielding questions from interested parties and providing technical assistance to affected businesses. Through a network of local food banks, food pantries, and pig farmers, hungry people and animals are able to use food that would otherwise have become waste.[59]

The City website promotes source reduction of food waste by sharing information and resources that promote source reduction, feeding hungry people, and feeding animals. All of these methods help reduce the amount of wasted food that is generated:

- **Source Reduction** – The City's *Food: Too Good to Waste* guide, developed based on material published by EPA,[60]contains recipes from local food establishments and tips that promote efficient food use to help prevent food waste.[61] The guide discusses topics such as smart shopping (e.g., making a shopping list, planning multiple meals using shared ingredients, and shopping your fridge first), smart storage and preparation (e.g., identifying the best storage methods and refrigerator organization to keep foods fresher longer), smart eating (e.g., using an "eat me first" sign or repurposing leftovers), and donating excess food.
- **Feed Hungry People** –Getting unwanted food to hungry people is another way to reduce the amount of food waste that is generated. The Bill Emerson Good Samaritan Food Donation Act (Good Samaritan Act) is a federal law that provides consistent country-wide protection to food donors that "donate in good faith to a non-profit organization."[62] Surplus food can be taken to one of the many local food banks and food pantries in the area. Some establishments, like Aloha Harvest Food Rescue, will pick up perishable food. Others such as Hawaii Foodbank welcome drop-off donations.
- **Feed Animals** – Certain types of food scraps and spent brewery grain can be used for animal feed (e.g., are accepted at some pig or hog farms and cattle operations).
- Additional details, examples, and resources for each of these methods can be found on the City and EPA websites.[63]

3.3.4 Backyard Composting

Backyard composting is a practice that homeowners can use to create nutrient-rich compost from food scraps generated within their home. Information about backyard composting, including what it is and how to get started, can be found on the City's website. In addition, the City's Recycling Office will provide technical guidance to people, including personal training for school students, that call with questions.

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[59] City and County of Honolulu, Department of Environmental Services. 2018. "Food Waste Recycling." Accessed January 18, 2018. http://www.opala.org/solid_waste/food_waste_recycling.html.

[60] EPA. 2016. "Food: Too Good to Waste Implementation Guide and Toolkit." Accessed September 17, 2018. https://www.epa.gov/sustainable-management-food/food-too-good-waste-implementation-guide-and-toolkit

[61] City and County of Honolulu, Department of Environmental Services. 2018. "Food: Too Good to Waste." Accessed January 18, 2018. http://www.opala.org/solid_waste/pdfs/Food_Too_Good_to_Waste.pdf.

[62] EPA. 2018. "Links and Resources About Food Recovery in Honolulu." Accessed February 18, 2018. https://www.epa.gov/sustainable-management-food/links-and-resources-about-food-recovery-honolulu#donations.

[63] City and County of Honolulu, Department of Environmental Services. 2018. "Food Waste Prevention." Accessed January 18, 2018. http://www.opala.org/solid_waste/food_waste_prevention.html; EPA. 2018. "United States 2030 Food Loss and Waste Reduction Goal." Accessed January 18, 2018. https://www.epa.gov/sustainable-management-food/united-states-2030-food-loss-and-waste-reduction-goal.

During development of this Plan, the City reinstated the free composting workshops previously offered, with two workshops offered in 2018 and four workshops to be offered in 2019.

3.3.5 Grasscycling

Grasscycling is the practice of leaving grass clippings on the lawn after mowing. Grasscycling reduces the time spent on lawn work by eliminating raking, and saves money by reducing the amount of trash bagged and disposed of. The City grasscycles at all City parks and recreation facilities. The opala.org website also promotes grasscycling, educating readers on such benefits of grasscycling as the return of nutrients to the soil and reducing the amount of waste. The City will also provide technical guidance on this subject area for people who call with questions.

3.3.6 Business Waste Prevention Guide

The City *Waste Prevention Guide*[64] for businesses is available on the opala.org website. It provides information to businesses about producing less waste, dealing with excess waste, and understanding the various ordinances and bans that the City enforces related to waste. In addition, the City will provide technical guidance on this subject area for people that call with questions. Businesses that produce a large amount of waste may be able to reduce costs by reducing the amount of waste they generate.

The information provided helps businesses save money in both purchasing practices and disposal costs by using less or reusing leftover items. The website provides links to other websites that explain how to reduce waste and educate employees to reduce waste to save resources and funds. The *Waste Prevention Guide* suggests businesses establish a baseline of waste generated to monitor the results of the waste reduction methods implemented.

The City also showcases companies that have established successful programs to recycle and reduce their operations' waste. Managers of these companies have offered their time as peer consultants to share their experiences and strategies with other companies, and their programs provide working models for the business community. Profiles of some of the successful programs are posted at opala.org.

3.3.7 Plastic Bag Ban

Effective July 1, 2015, an ordinance has been put in place to regulate the use of plastic bags on Oahu. Businesses are prohibited from providing plastic checkout bags and non-recyclable paper bags to their customers at the point of sale for the purpose of transporting groceries or other merchandise.[65] The ordinance allows for the use and provision of (1) reusable bags, compostable plastic bags, or recyclable paper bags for the purpose of transporting groceries or other merchandise or (2) non-recyclable paper bags to protect or transport prepared foods, beverages, or bakery goods.[66]

The following changes to this ordinance have either recently been implemented or are upcoming, as detailed:[67]

- July 1, 2018
  - Businesses may provide, at the point of sale, reusable bags, compostable plastic bags, or recyclable paper bags for the purpose of transporting groceries or other merchandise provided that they charge the customer a minimum of 15 cents per bag.
  - “Plastic Film Bag” will replace “Plastic Checkout Bag.” “Plastic Film Bag” means a bag made out of thin flexible sheets of plastic with a thickness of 10 mils or less.

[64] City and County of Honolulu, Department of Environmental Services. 2018. “Business Recycling.” Accessed January 18, 2018. http://www.opala.org/solid_waste/business_recycling.htm.

[65] ROH Chapter 9, Article 9.

[66] City and County of Honolulu, Department of Environmental Services. 2018. “Plastic Bag Ban.” Accessed January 18, 2018. http://www.opala.org/solid_waste/archive/plastic_bag_ban.html.

[67] Ibid.

- January 1, 2020
  - Compostable plastic bags shall no longer be provided.
  - Plastic film bags with a thickness of 10 mils or less shall no longer be considered “Reusable Bags.”

3.3.8 Measuring Reduction

The City annually surveys businesses to determine the types and quantities of materials that are being recycled or reused. Over 50 businesses responded to the 2017 web-based survey. In addition, the City maintains data regarding the amount of waste delivered to the H-POWER facility and disposed of at WGSL. Based on the data obtained from these sources, the City can determine the progress that has been made in diverting waste and where more effort is needed. Data collected from these surveys is posted and available at opala.org.

3.4 Strategies for Additional Source Reduction

As discussed in Section 3.3, the City is currently promoting source reduction through a variety of existing programs. The City will continue to promote these programs and activities. Existing programs are not discussed further as far as strategies for increasing source reduction, unless there is a specific change recommended for that existing program.

3.4.1 Source Reduction Working Group (SRWG)

The City recognizes that a successful source reduction program will require ongoing research and collaboration with stakeholders throughout Oahu, including the state and federal governments, business and industry, research and education, non-governmental organizations, policy makers, and individual citizens. Many source reduction initiatives require further evaluation of economic, social, and environmental factors to determine feasibility, as well as support from stakeholders outside the City to achieve implementation. The City is committed to stepping up source reduction efforts and continuing the discussion begun with stakeholders through the development of this Plan by establishing an SRWG.

The SRWG will meet quarterly (or as often as determined by the SRWG itself) and focus on developing quantifiable targets for source reduction, identifying metrics and milestones to track progress, and evaluating the feasibility and practicality of potential source reduction initiatives. One role of the SRWG could be to first conduct a profile of the waste stream to identify the carbon-based sources with the largest contributions to greenhouse gas emissions and then prioritize strategies to eliminate carbon from the City’s waste stream to comply with Mayor’s Directive on Climate Change and align with the City’s commitment to the Paris Climate Agreement. Recommendations from the SRWG will be delivered to the appropriate parties, including the Mayor, City Council, the Director of the Department of Environmental Services, and the Office of Climate Change, Sustainability, and Resiliency. Additional information regarding the SRWG is provided in Appendix A.

3.4.2 Education

Promoting public education and awareness is key to successful source reduction, and ensuring adequate funding for educational programs is equally important. Inadequate funding limits the number and types of programs that can be provided as well as their effectiveness.

The City plans to make changes on several fronts to increase public education and awareness, including investigating the feasibility of designating a Public Education Coordinator position to serve as a centralized hub for all Refuse Division education initiatives. The City will update its website, opala.org, to make information on waste prevention and reuse even more accessible. The City will also look for opportunities to explore new partnerships (similar to the ones currently done with businesses showing waste prevention methods in action) and interact directly with the public to increase awareness and provide support for commercial and residential source reduction efforts as opportunities arise and as appropriate. Additional information regarding public education is presented in Section 7, Public Education.

3.4.3 Residential User Fees

Residential user fees are an alternative or a supplement to using property taxes to finance the collection and disposal of MSW and recycling; under such a system, customers are billed directly for their collection services. User fee systems can be structured in many ways: one method used by many locales in the United States is to charge residents based on the quantity of garbage they place at the curb, commonly referred to as a pay-as-you-throw (PAYT) system.[68] These systems can provide a financial incentive to reduce waste, but are more complex and costly to implement than paying for services through property taxes.

There are a variety of ways that user fees can be structured, varying in complexity and ability to influence source reduction. Table 3-1 categorizes different types of user fees and provides a description and the advantages and disadvantages of each system.

Table 3-1. Types of User Fees

Type	Description	Advantages	Disadvantages
Set Fee Regardless of Carts	Charge all households a set fee regardless of the number of carts they have.	Easier to implement and bill because there would not need to be a full accounting of the number of carts at each home and all households would be billed the same amount.	No financial incentive for residents to change behavior with regards to the amount of trash being generated; therefore, no impact on source reduction.
Base Fee for Three Carts	Charge all residents a set base fee for the standard three carts (gray cart for trash, green cart for green waste, and blue cart for mixed recyclables), with residents requesting or needing additional carts paying a fee for each added cart.	Provides a modest financial incentive for residents to stay within the base fee, therefore, having a moderate effect on source reduction.	More difficult to implement as the City would need to have a full accounting of all carts at each household and charges would vary, depending on the number of carts at each household.
Cart-size Fee	Charge residents a fee based on the size of the cart at each household. For instance, residents could request 64-gallon carts versus the current 96-gallon carts, and be charged accordingly.	Provides a strong financial incentive for source reduction by selecting smaller can sizes and reducing the garbage set out for collection.	More difficult to implement; requires purchase of smaller carts, cart inventory tracking, and more sophisticated billing and accounting systems.
Weight-based Fee	Charge residents a fee based on the weight of material in a cart.	Provides greatest financial incentive to generate as little waste as possible, therefore having the greatest impact on source reduction.	Requires substantial fleet and billing system modifications and will add to collection costs because of the added time required to record cart weights at each stop and the fitting of scales to trucks.

The City provides residential collection of garbage, recyclables, and green waste and several other solid waste services to residents free of charge. Such other services include bulky item collection; drop-off opportunities for select materials at convenience centers, transfer stations, and the WGSL; and HHW collection events. Charging for these refuse-related services would provide a direct disincentive for generating waste by making the cost of waste management more visible. User fees also increase equity among users by ensuring that all waste generators pay the cost of managing the waste they generate. Another benefit of implementing user fees would be decreasing the subsidy from the General Fund that is currently required to pay a substantial amount of the cost of managing the City's solid waste system, thus increasing the system's financial self-sufficiency. Finally, implementing user fees might eventually allow the Refuse Division to be operated as an enterprise fund, which many cities use to improve the alignment of revenues and expenses for utility services. Although the City has no current plans to operate the Refuse Division as an enterprise fund, implementing user fees may help facilitate such a move in the future. City legislation and appropriate tracking and billing systems would be required to implement a user

[68] EPA. 2018. "Pay-As-You-Throw." Accessed January 18, 2018. https://archive.epa.gov/wastes/conserve/tools/payt/web/html/index.html.

fee system. While such legislation has been proposed in the past, no City user fee legislation has ever been passed and established.

Although charging for residential refuse collection service can provide varying degrees of incentive for source reduction (as shown in Table 3-1), communities that have implemented fees often report that some residents take illegal approaches to reducing the level of service that they must pay for, such as illegal dumping or putting residential waste in commercial dumpsters. Most communities report that these behaviors can be managed effectively with an active education and enforcement program. Section 7, Public Education, provides more information.

Because most homes on Oahu are serviced by the City's automated collection three-cart system (gray cart for trash, green cart for green waste, and blue cart for mixed recyclables), if the City decides to implement a residential refuse collection user fee, the City would need to determine the best method of charging within the three-cart system. Any such system should be accompanied by a targeted and focused public education effort before implementation, to highlight the program's benefits and increase public acceptance. In addition, the public education effort could seek to capitalize on the momentum generated by the ISWMP process; City staff could meet with City Council members to provide them with information and gain support for user fee implementation.

3.4.4 Government Procurement Policies

The City could serve as a model by increasing the emphasis on source reduction and reuse in its procurement policies. All City offices could expand the use of bulk purchasing, material reuse, and other waste prevention measures by allowing for a price preference or other incentive for City Departments to select products that accomplish these objectives. The State Procurement Code (HRS Section 103D-1050) also provides for preferences for use of recycled products.

3.4.5 Offer Home Composting Workshops

As described in Section 3.3.5, the City currently posts information about backyard composting on its website and provides technical guidance on composting to interested residents. In the past, the City has partnered with HER to offer free composting workshops.[69] During development of this Plan, the City reinstated the free composting workshops previously offered, with two workshops offered in 2018 and four workshops to be offered in 2019.

3.4.6 Grasscycling

Increased activity in grasscycling could complement curbside collection.

3.4.7 Preventing and Diverting Wasted Food

Since the roll-out of the United States national goal to reduce wasted food by 50 percent by 2030, many regions through the country have a renewed or new focus on this issue. As a result, new innovations (e.g., apps and online sharing networks such as ChowMatch, MealConnect, and Spoiler Alert connect donors that have surplus food with sources in need)[70] and strategies (e.g., USDA compiling tips for reducing food waste at school)[71] are being tested and implemented. In the City, a partnership with the NRDC has been newly established to display food waste reduction advertisements in public venues. The City will continue to monitor progress in this arena to find additional strategies that may be appropriate for implementation on Oahu.

[69] R.W. Beck. 2008. *Integrated Solid Waste Management Plan Update*. October.

[70] EPA. 2018. "Sustainable Materials Management (SMM) Web Academy Webinar: Technology Innovation - Reducing Food Going to Waste." Accessed January 18, 2018. https://www.epa.gov/smm/sustainable-materials-management-smm-web-academy-webinar-technology-innovation-reducing-food.

[71] USDA. 2016. *What You Can Do to Help Prevent Wasted Food*. July. https://fns-prod.azureedge.net/sites/default/files/tn/USDAHelppreventwastedfood.pdf.

3.4.8 Advocate for Extended Producer Responsibility

EPR, also referred to as manufacturer responsibility, is a tool that is being used in places such as Oakland, California[72] to further source reduction efforts. Eco-cycle describes EPR as "A strategy that places a shared responsibility for end-of-life management of consumer products on the manufacturers of the products, while encouraging product design that minimizes negative impacts on human health and the environment at every stage of the product's lifecycle.[73] It is challenging for a municipality to drive EPR, as these topics are typically influenced at the state and federal levels. However, the City will address this topic with the SRWG to determine how best to advocate for EPR. Such measures could provide incentives for manufacturers to design products to be readily reused, repaired, reconditioned, or recycled. Local retailers could assist in collecting and returning selected products to manufacturers.

3.4.9 Plastic Bag Ban

Like Honolulu, other cities throughout North America (e.g. Portland, Oregon, and San Francisco, California) have implemented similar bans on plastic bags. The City will compare the existing City ordinance to similar bans around the country and recommend changes to the ordinance to improve its composition and optimize its effectiveness.

3.5 Action Item Summary

Significantly reducing the amount of waste that is produced requires focused effort from the City, as well as ongoing collaboration with and support from stakeholders outside the City. The City is committed to establishing an SRWG to develop source reduction targets, identify metrics and milestones to track progress, and evaluate potential source reduction initiatives.

Source reduction efforts by the SRWG are further detailed in Appendix A. As an example of source reduction, the amount of packaging used in consumer products can be reduced by reengineering packaging, enhancing packaging durability to allow for reuse, or both. It is also important to change consumer habits that lead to actions that prevent waste or that encourage the reuse of materials and products. This can be done through education and economic incentives. Because the City has limited ability to influence the design of consumer products and packaging, the City will work with the SRWG to determine how best to advocate for EPR. The City will also continue to encourage residents and businesses to reduce the amount of solid waste they produce through education. The City will also continue to pursue instituting a refuse user fee system where residents are charged for the refuse they set out for collection or drop off for disposal.

The action items that the City has already implemented or plans to implement to encourage residents and businesses to reduce the amount of waste they produce are summarized in Table 3-2.

Table 3-2. Source Reduction Action Item Summary

Material Type	Action Item	Initiative Status	Implementation Dates
General Household Products and Materials	Establish an SRWG to spearhead evaluation of potential source reduction initiatives on Oahu	Planned	FY19-FY20
	Continue to promote source reduction and reuse through the City's website, opala.org, and other educational avenues	Ongoing/Planned	FY19-FY28
	Make changes to increase public education and awareness (update opala.org to make information on waste prevention and reuse even more accessible)	Ongoing/Planned	FY19-FY20

[72] Oakland City Council. Resolution No. 80390. Accessed January 18, 2018. http://clerkwebsvr1.oaklandnet.com/attachments/15713.pdf.

[73] Eco-cycle. "Zero Waste – Producer Responsibility." Accessed January 18, 2018. http://www.ecocycle.org/zerowaste/overview/producer-responsibility.

Table 3-2. Source Reduction Action Item Summary

Material Type	Action Item	Initiative Status	Implementation Dates
	Look for opportunities to explore new partnerships with businesses showing waste prevention methods in action	Planned	FY19-FY21
	Interact directly with the public to increase awareness and provide support for commercial and residential source-reduction efforts as opportunities arise and as appropriate	Ongoing	FY19-FY28
	Continue to provide technical assistance regarding implementation of source reduction activities to residents and businesses on request	Ongoing	FY19-FY28
	Continue to emphasize source reduction and reuse in the City's procurement policies	Ongoing	FY19-FY28
	Advocate for EPR for product waste as opportunities arise	Ongoing/Planned	FY19-FY28
	Continue to encourage consumers to choose reusable bags rather than plastic bags	Ongoing	FY19-FY20
	Continue to conduct annual surveys on business recycling and reuse activities	Ongoing	FY19-FY28
	Implement residential user fees as a possible mechanism to encourage waste prevention	Planned	FY20-FY28
	Compare the existing City ordinance regarding plastic bags to other similar bans around the country; consider recommending changes to the law to optimize its effectiveness	Planned	FY21-FY28
Green Waste	Establish an SRWG to spearhead evaluation of potential source reduction initiatives on Oahu	Planned	FY19-FY20
	Continue to encourage grasscycling and other yard waste minimization techniques through opala.org and other avenues	Ongoing	FY19-FY28
	Continue to provide technical guidance regarding grasscycling and other yard waste minimization techniques to residents and businesses on request	Ongoing	FY19-FY28
	Continue to conduct annual surveys on business recycling and reuse activities for green waste	Ongoing	FY19-FY28
	Offer home composting workshops	Ongoing/Planned	FY19-FY28
Food Waste	Establish an SRWG to spearhead evaluation of potential source reduction initiatives on Oahu	Planned	FY19-FY20
	Investigate the potential for different ways to process or collect food waste	Planned	FY19-FY20
	Continue to encourage residents to become aware of the amount of food wasted and to practice food waste prevention techniques	Ongoing	FY19-FY28
	Continue to provide technical assistance regarding implementation of food waste prevention practices to residents and businesses on request	Ongoing	FY19-FY28
	Continue to enforce food waste recycling ordinances for businesses (See Section 4 for more information.)	Ongoing	FY19-FY28
	Continue to conduct annual surveys on business recycling and reuse activities for food waste	Ongoing	FY19-FY28
	Monitor progress with respect to food waste to see if additional strategies are appropriate for implementation on Oahu; revise outreach as necessary	Planned	FY19-FY20

4. Recycling and Bioconversion

The primary goal of recycling and bioconversion is to achieve additional value from materials that have already been used. Recycling is more than collecting used bottles at the curb: It is a process that can generate a variety of benefits, such as financial savings and gains, environmental sustainability, and social returns.[74]

According to the EPA, recycling provides the following advantages:[75]

- Reduces the amount of waste sent to landfills and incinerators
- Conserves natural resources such as timber, water and minerals
- Increases economic security by tapping a domestic source of materials
- Saves energy (required by mining, harvesting, and processing of virgin materials for new products)
- Supports American manufacturing and conserves valuable resources
- Helps create jobs in the recycling and manufacturing industries in the United States

Increasing the amount of materials reused through recycling and bioconversion helps to divert waste from landfills and WTE, and preserves capacity at H-POWER.

4.1 Goals and Objectives

The City continues to show its commitment to recycling and bioconversion through the following:

- Implementation of recycling programs and policies (disposal bans and ordinances)
- Public education of recycling procedures and practices
- Continuous improvement in recycling technologies
- Collaboration with the State on initiatives
- Support and development of cost-effective infrastructure and programs for on-island processing and recycling (e.g., green waste, glass, H-POWER ash and residue, and similar) to reduce the City's exposure to the volatility of the global commodities market

Due in part to these efforts, the amount of materials recycled has increased. The recycling rate (the ratio of recycled materials to total MSW) in the City and County of Honolulu has risen 16 percentage points (from 41 to 57 percent) between 2012 and 2017.[76] The City is committed to recycling materials and reducing contamination to the greatest extent possible, in a fiscally responsible manner, and has established the following recycling and waste diversion goals:

- Increase the recycling rate in the City and County of Honolulu by 10 percentage points by 2030

- Increase landfill diversion to a diversion rate of 95 percent by 2030 and eliminate the need for an everyday landfill

[74] EPA. 2018. "Vocabulary Catalog." Accessed on January 25, 2018. https://ofmpub.epa.gov/sor_internet/registry/termreg/searchandretrieve/glossariesandkeywordlists/search.do;jsessionid=njEv_cAJAoRr1TAkV52dTqB9FIlkrXFfV76z2BLwLE2TS3GwzY7Z!-2031908280?details=&vocabName=State%2FLocal%20Climate%20and%20Energy&filterTerm=recycling&checkedAcronym=false&checkedTerm=false&hasDefinitions=false&filterTerm=recycling&filterMatchCriteria=Contains.

[75] EPA. 2018. "Recycling Basics." Accessed on February 1, 2018. https://www.epa.gov/recycle/recycling-basics.

[76] City and County of Honolulu, Department of Environmental Services. 2018. "Recycling and Landfill Diversion." Accessed August 21, 2018. http://www.opala.org/solid_waste/archive/facts2.html#msw. Note that this ratio does not include WTE processes.

This goal was developed after evaluating the potential for strategies outlined in this ISWMP to result in landfill diversion.

4.2 Background

4.2.1 Legislative

According to HRS Section 342G-1, recycling and bioconversion are defined as follows:

> *"Recycling" means the collection, separation, recovery, and sale or reuse of secondary resources that would otherwise be disposed of as municipal solid waste, and is an integral part of a manufacturing process aimed at producing a marketable product made of postconsumer material.*
>
> *"Bioconversion" means the processing of the organic fraction of the waste stream through biological or chemical means to perform composting or generate products including, but not limited to, fertilizers, feeds, methane, alcohols, tars, and other products. This term includes, but is not limited to, biogasification, acid hydrolysis, pyrolysis, and fermentation. This term does not include any form of incineration or methane gas extraction from a municipal waste landfill.*

HRS Chapter 342G goes on to state, "each county shall consider the following solid waste management practices and processing methods in their order of priority:

1) Source reduction;
2) Recycling and bioconversion, including composting; and
3) Landfilling and incineration."

To encourage progress towards following these priorities for solid waste management, state statutes established the following goals to reduce the solid waste stream prior to disposal through source reduction, recycling, and bioconversion (HRS Section 342G-3):

- 25 percent reduction by January 1, 1995
- 50 percent reduction by January 1, 2000

In October 1989, the City established an ordinance (ROH Section 9-1.1) setting a recycling, reuse, composting, and diversion goal of 90 percent by 2015:[77] As discussed in Section 3.1, the Aloha+ Challenge includes a 2030 goal to reduce the solid waste stream before disposal by 70 percent.

The State defines "diversion" as a combination of reuse and recycling activities that does not include in its definition landfilling, incineration or combustion, or WTE processes.[78] The goals set forth in HRS Section 342G-3 do not consider waste processed at the H-POWER WTE facility to be diverted waste. Corresponding to the State's qualification of diversion, as of 2017 the City diverted, through recycling and reuse, over 50 percent of the waste that would otherwise have been landfilled.[79]

It should be noted that other sections of the HRS define MSW as a renewable energy source and electricity generated by WTE facilities as renewable energy.[80] More than 25 U.S. states have similar definitions. Furthermore, the EPA State and Local Climate and Energy Program Glossary of Terms

[77] City and County of Honolulu, Office of the City Auditor. 2017. *Audit of the City's Recycling Program*. Report No. 17-06. October.

[78] DOH, Office of Solid Waste Management. 2015. *Report to the Twenty-Eighth Legislature State of Hawaii 2016*. December. https://health.hawaii.gov/shwb/files/2013/06/2016_OSWM_Annual_Report.pdf,

[79] City and County of Honolulu, Department of Environmental Services. 2018. "Recycling and Landfill Diversion." Accessed January 10, 2018. http://www.opala.org/solid_waste/archive/facts2.html.

[80] DBEDT, Hawaii State Energy Office. 2018. "Overview." Accessed February 1, 2018. http://energy.hawaii.gov/renewable-energy/overview; HRS Section 196-11, see definition for Renewable Energy; HRS Section 269-91, see definitions for Renewable Electrical Energy and Renewable Energy.

defines recycling as "turn[ing] materials that would otherwise become waste into valuable resources."[81] As such, WTE can be considered a form of recycling similar to waste that is converted into material products by other recyclers. From this perspective, incorporating WTE processing efforts at H-POWER results in a landfill waste diversion rate of over 82 percent in 2017.[82] The City is committed to continuing to work toward meeting the established solid waste stream reduction goals.

At the local level, the ROH include a number of ordinances (many specifically defined in Chapter 9) mandating recycling and waste diversion practices for commercial generators, businesses, and City agencies. Sections 4.3 and 4.4 of this Plan discuss specific ordinances.

The City's recycling and waste diversion programs are affected by fluctuations in the global recycling industry. For example, in July 2017, China notified the World Trade Organization of its plans to ban import of 24 solid waste materials by the end of 2017. The banned materials include certain plastics, unsorted paper, and textiles.[83] In addition, new regulations would establish low contaminant limits for material acceptance.[84] China's initiative has had an immediate effect on existing markets for recyclables, causing recyclers to seek new markets and evaluate methods to achieve lower contaminant levels.[85]

Given the volatility in the recyclable commodities market and the economic and environmental impact of processing and shipping recyclables to overseas markets, it is important for the City to continue to advocate for reuse, source reduction, EPR, and cost-effective on-island processing and recycling. In parallel, the City plans to pursue changes to laws that would give it the flexibility to send certain recyclables to H-POWER, where they will be processed into renewable energy for Oahu when markets are down.[86] This flexibility would give the City the ability to manage materials in the most economically and environmentally sustainable way possible.[87]

4.2.2 Current Markets for Recyclables

The Office of the City Auditor published an audit of the City's recycling program in October 2017, offering an analysis of commodity markets, the City's initiatives and current practices, projections, and costs compared to revenue. The report concluded that the market for selling and buying recycled materials has declined. Subsequently, revenues generated from "the sale of solid waste are insufficient to offset the costs of processing the collected recycled waste."[88] In response to this, the City is evaluating ways to optimize its programs and best allocate funds in pursuit of its goal to continue diverting waste from the landfill. Specifically, the City plans to work towards flexibility in sending recyclables to H-POWER; to continue contracting and procurement in a way such that periodic adjustments to service fees can be negotiated, waste guarantees are avoided (when possible), and reductions in payments can be made in the event of unprocessed waste; and to continue education and support of policies to encourage source reduction and reduce the amount of waste that needs to be managed.[89]

Recyclers on Oahu process and sell recycled materials to end users in the continental U.S. or Asia, usually through brokers. Typically, materials are baled or otherwise reduced in volume before being

[81] EPA. 2018. "Vocabulary Catalog." Accessed on January 25, 2018. https://ofmpub.epa.gov/sor_internet/registry/termreg/searchandretrieve/glossariesandkeywordlists/search.do?details=&vocabName=State%2FLocal%20Climate%20and%20Energy.

[82] City and County of Honolulu, Department of Environmental Services. 2018. "Recycling and Landfill Diversion." Accessed August 21, 2018. http://www.opala.org/solid_waste/archive/facts2.html.

[83] World Trade Organization. 2017. Notification, G/TBT/N/CHN/1211, 17-3880. July 18.

[84] Resource Recycling. 2017. "Roundup of the latest developments on China's ban." September 6. https://resource-recycling.com/recycling/2017/09/06/roundup-latest-developments-chinas-ban/.

[85] Resource Recycling. 2017. "How WM and other exporters are reacting to China's ban." July 25. https://resource-recycling.com/recycling/2017/07/25/wm-exporters-reacting-chinas-ban/.

[86] Information provided by Refuse Division staff. December 21, 2017.

[87] Ibid. January 31, 2018.

[88] City and County of Honolulu, Office of the City Auditor. 2017. *Audit of the City's Recycling Program*. Report No. 17-06. October.

[89] Ibid.

shipped to market. In some limited cases, end products are processed and used in final products locally. Some of these Oahu recyclers also accept materials generated on other Hawaiian Islands.

Because of the state's physical remoteness, there are unique challenges to marketing recyclables; Section 9 highlights some of these. However, the City has undertaken several initiatives to develop and promote end uses for materials on the island such as buying recycled-content paper to support the recycled paper market and showcasing recycled-content products at the Honolulu Zoo.[90]

Markets exist locally for materials that are generated in high volumes, have relatively low value, and for which large and costly production facilities are unnecessary. These materials include organics (e.g., untreated wood, green waste, and food waste) and aggregate (e.g., concrete, asphalt concrete, brick, and aggregate). Some locally developed products include used oil boxes, Menehune Magic soil amendment, Synagro pellets, biodiesel, and refurbished mattresses.

4.2.3 Current Waste Diversion

The City has implemented recycling programs that have contributed to an increase in the amount of recyclables recovered from residential, commercial, and industrial sources. In 1988, Oahu recycled approximately 74,000 tons of material, compared to approximately 1,198,000 tons (including general material recycling, C&D debris recycling, and some reuse) in 2017.[91]

Table 4-1 shows that three types of material (C&D debris, green waste, and metal [particularly ferrous metal]) comprised most of all material recycled. Paper, glass, plastic, tires, auto batteries, electronic scrap, wood waste and pallets, and food waste were also recycled.

Table 4-1. Total Tons Recycled, Calendar Year 2017

Material Type	Quantity (Tons)
Paper	
Corrugated Cardboard	43,119
Newspaper	12,501
Office Paper	9,337
Other Paper	863
Paper Total:	**65,820**
Metals	
Ferrous (includes autos)	111,495
Non-Ferrous (includes aluminum)	22,409
Metals Total:	**133,904**
Glass	14,713
Plastic	5,889
Tires	6,477
Auto Batteries	6,859
Electronic Scrap	1,997
Green Waste (yard trimmings)	108,710
Wood Waste/Pallets	14,643
C&D (rock, concrete, asphalt)	763,279
Food Waste	43,105
Other Reuse (Goodwill, Salvation Army)	32,816
Total:	**1,198,213**

Source: http://www.opala.org/solid_waste/archive/facts2.html

[90] City and County of Honolulu, Department of Environmental Services. 2018. "How the City Manages Our Waste." Accessed January 18, 2018. http://www.opala.org/solid_waste/archive/How_our_City_manages_our_waste.html.

[91] City and County of Honolulu, Department of Environmental Services. 2017. "Recycling and Landfill Diversion." Accessed December 14, 2017. http://www.opala.org/solid_waste/archive/facts2.html.

4.3 Existing Programs

The City's recycling efforts focus on providing convenient programs and services to encourage recycling, public education and awareness of such programs, resources, and tools or regulatory mechanisms that promote waste diversion from the landfill. These approaches are similar to the type of programs offered in many communities across the country.

The following sections provide an overview of the City's existing recycling programs and related regulations.

4.3.1 Community Recycling (White Bin) Program

The City began the community recycling bin program in 1990 with 20 locations on school campuses where residents could recycle newspaper, cardboard, office paper, glass, aluminum and plastic containers. The program was well used, and by 2005, the City expanded the program to approximately 75 locations. However, over time the program experienced diminishing returns, with the costs of running the program outweighing the volume of materials collected. This was largely a result of the implementation of the curbside recycling program in 2010, as the City observed a 70 percent drop in materials collected. As a result, in 2012, the City turned ownership of many of the bins and continuation of the program over to the private sector. Despite new ownership of the program, the Community Recycling (White Bin) Program was ultimately discontinued.[92] Although the program has been discontinued, all Oahu public schools do have their own recycling collection programs per the Department of Education's contract for refuse collection. Bins are currently serviced by a contractor.

4.3.2 HI-5 Program

Hawaii's beverage container deposit program, known as the HI-5 program, has been in place since 2005. The DOH Solid and Hazardous Waste Branch oversees this program, which aims to divert targeted containers to recycling.

A 5-cent deposit per beverage container is charged for the purchase of select glass, bi-metal, aluminum, and plastic containers statewide. To help support the costs of recycling and state program administration, a 1- to 1.5-cent non-refundable container fee is also assessed.[93] Beverages included under the law are soft drinks, beer, juices, water, teas, coffees, and sports drinks contained in DBCs. Excluded beverages include wine, milk, and hard liquor. DBCs may be redeemed for the 5-cent deposit by either individual container count, up to 200 containers, or by weight, whereby a DOH-mandated segregated weight conversion is used. Certified Redemption Centers are reimbursed by the DOH for any 5-cent deposits refunded. They also receive a handling fee, currently set at 4 cents per container for glass and 2 cents per container for aluminum, bi-metal, and plastic.[94]

Approximately 30 redemption centers are privately operated throughout the island. Redemption centers operate on different schedules, with some offering very limited days and hours of operation, and many redemption centers accept other recyclables in addition to DBCs.[95] The City currently hosts privately owned mobile redemption centers on three City properties. Redemptions center operators pay the City a monthly rental fee that allows them to establish and operate the center on City property. The Division will continue to attempt to identify City-owned parcels that are able to host redemption centers.[96]

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[92] Information provided by Refuse Division staff. January 31, 2018.

[93] The fee is currently 1 cent, which is in effect when the redemption rate is below 70 percent; the fee is 1.5 cents when the redemption rate is above 70 percent.

[94] DOH, Solid and Hazardous Waste Branch. 2008. *Public Notice: Hawaii Deposit Beverage Container Law, Handling Fee Adjustment for Glass Deposit Containers*. http://health.hawaii.gov/hi5/files/2013/05/HandlingFeeSep081.pdf.

[95] City and County of Honolulu, Department of Environmental Services. 2018. "HI-5 Plus – One-Stop Recycling Centers." Accessed January 10, 2018. http://www.opala.org/solid_waste/HI5_plus.html; See a list of redemption center locations and hours of operation at http://health.hawaii.gov/hi5/redemption-centers/.

[96] Information provided by Refuse Division staff. January 31, 2018.

All redeemed DBCs are currently transported to a recycling facility for processing and marketing.

4.3.3 Public Recycling Receptacles

The City provides recycling receptacles in public locations to encourage recycling and increase the recovery of recyclables. It is estimated that 375 HI-5 recycling receptacles are available in various locations, including administration buildings, parks, golf courses, malls, Waikiki, the Blaisdell Center, Honolulu Hale, Fasi Municipal Building, Kapolei Hale, and the Honolulu Zoo. In addition, two City-operated facilities have blue carts where DBCs and other recyclables normally collected in City's curbside recycling program can be deposited for recycling: Waialua Refuse Collection Yard and Kawailoa Transfer Station.

To facilitate recycling at events held in areas without HI-5-specific separation receptacles, the City offers ClearStream containers for loan to event organizers. ClearStream containers are portable receptacles consisting of a foldable steel frame and conforming lids for "Plastic Only," "Aluminum Only," and "Aluminum and Plastic." Assembly of the containers are completed with compatibly sized plastic bags, which can be purchased by the event organizer at local stores. The City only loans out ClearStream containers; event organizers are responsible for collection, recycling, and redemption of DBCs.[97]

The City also encourages the community to implement Do-It-Yourself (DIY) self-service recycling baskets, which can be affixed to public trash receptacles so the public can deposit or withdraw DBCs at will and at any time. The idea for these DIY recycling baskets was developed by a grass roots collective, and the City promotes this initiative by providing materials, signage ("Take, Leave, Whatevas"), and workshop sessions to enable the public to spread recycling awareness. The DIY baskets have proven to be a simple, inexpensive, and effective means of increasing recyclables collection.[98]

4.3.4 Residential Recycling

4.3.4.1 Automated Curbside Recycling

In 2010, the City completed island-wide implementation of the curbside recycling program for approximately 160,000 single-family households in automated collection areas. Each household received three carts for sorting waste: gray for refuse, blue for mixed recyclables, and green for green waste. Mixed recyclables include newspaper, corrugated cardboard, white and colored office paper, paper bags, glass bottles and jars, all metal food and beverage cans, and plastic containers with #1 and #2 plastic codes. Green waste includes grass, tree and hedge trimmings, garden fruits and vegetables, and Christmas trees. Previously, green waste was collected curbside in bags or bundles. Materials from the carts are delivered to processors that are contracted by the City.[99]

Curbside recycling using the three-cart system currently occurs once per week, alternating weekly between green waste and mixed recyclables.[100] In 2018, the City plans to reduce blue cart collection to approximately once-per-month (one collection every 4 weeks). This reduction in collection frequency is proposed as a result of a 2018 City survey where a blue cart set-out rate of 55 to 60 percent was observed, with many carts less than half full. The intent is to improve efficiency by encouraging residents to make better use of carts and to optimize the collection schedule by reallocating resources to tasks that demand more attention, such as bulky item collection and gray and green cart service.[101] As part of plans

[97] City and County of Honolulu, Department of Environmental Services. 2018. "Bagged Collection Systems." Accessed January 18, 2018. http://www.opala.org/solid_waste/bag_collection_systems.htm.

[98] City and County of Honolulu, Department of Environmental Services. 2013. *2013 Interim Status Report on the Integrated Solid Waste Management Plan (2008)*. December 16.

[99] Information provided by Refuse Division staff. January 29, 2018.

[100] City and County of Honolulu, Department of Environmental Services. 2017. "3-Cart Refuse / Recycling Collection." Accessed December 14, 2017. http://www.opala.org/solid_waste/curbside.htm.

[101] Information provided by Refuse Division staff. January 31, 2018.

and evaluations such as these, the City continues to review collection contracts and modify them accordingly for flexibility and efficiency.

In addition, the City is transitioning all previous 64-gallon blue carts to 96-gallon carts. The 96-gallon blue carts are issued when residents request new or replacement carts.[102]

Although curbside recycling has increased recovery of materials, collection crews and recyclers must contend with contamination in blue and green carts. To address contamination and educate residents, the City performs early morning inspections of carts and issues reminders or error notices if they find contamination.[103] City refuse and recycling truck operators also report addresses that are not recycling correctly.[104] These enforcement efforts have resulted in a low blue cart contamination rate of 9.52 percent by weight during 2016.[105] In the future, if current cart removal enforcement efforts decrease in effectiveness, the City may consider implementing fines for cart contamination.

4.3.4.2 Manual Collection Areas

In areas where access with an automated truck is limited, including one-way streets, narrow streets, and streets where there is limited turnaround area, manual service is provided. Approximately 20,000 households are located in manual collection areas and receive refuse collection twice a week.[106] Residents in these areas do not receive carts for recyclables or green waste and are encouraged to self-haul these materials to redemption centers, convenience centers, transfer stations, Waialua Collection Yard, or directly to HER, the City's contracted green waste recycler. Residents can place their self-hauled materials in the carts available at Kawailoa Transfer Station and Waialua Collection Yard; these carts are serviced by automated trucks in the same manner as residential curbside collection. Options to expand the curbside recycling program to include households in manual collection areas are currently being investigated.

4.3.4.3 Multi-unit and Family Recycling

The majority of multi-unit residential properties (e.g., town houses, apartment buildings, and residential high-rises) on the island are serviced by private waste haulers. These haulers offer a variety of recycling services and container options for their customers. The City provides a list of companies that offer recycling collection to multi-unit properties on the island on its website.[107] The limited number of multi-unit residential properties serviced by the City's front-end-loader service are not provided with separate collection for mixed recyclables. However, the City will provide up to $2,000 in program start-up reimbursement costs for multi-unit properties looking to establish a recycling program. Covered materials include aluminum cans, corrugated cardboard, glass bottles, green waste, newspaper, office paper, and plastic bottles. The homeowner's association would be responsible for arranging the collection of the materials with a private recycler.[108] Start-up reimbursement details including the Startup Cost Reimbursement Request Form and contact phone number for the City's Recycling Office are available on opala.org.[109]

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[102] CH2M. 2017. *Meeting Summary for Advisory Committee Meeting 02 – January 9, 2018*. Final.

[103] City and County of Honolulu, Department of Environmental Services. 2018. "Curbside Recycling – From Curbside to Processing." Accessed January 17, 2018. http://www.opala.org/solid_waste/curbside_inspect_and_process.htm.

[104] Information provided by Refuse Division staff. January 29, 2018.

[105] Ibid. February 1, 2018.

[106] City and County of Honolulu, Department of Environmental Services. 2018. "3-Cart Refuse / Recycling Collection." Accessed January 25, 2018. http://www.opala.org/solid_waste/curbside.htm.

[107] City and County of Honolulu, Department of Environmental Services. 2017. "Collectors." Accessed December 14, 2017. http://www.opala.org/solid_waste/archive/Collectors.html.

[108] Information provided by Refuse Division staff. February 1, 2018.

[109] City and County of Honolulu, Department of Environmental Services. 2019. "Condo and Apartment Recycling." Accessed October 28, 2019. https://www.opala.org/solid_waste/Recycling_for_condos_and_apartments.html.

4.3.4.4 Bulky Item Recycling

Bulky items (including white goods) are collected in a method similar to manual service by the Division on a monthly basis. White goods are taken to a City-contracted metals processor or recycler, and all other bulky items are delivered to H-POWER. The City is investigating implementation of an appointment-based system for bulky item collection. A pilot project using an online appointment setup was launched in June 2019 for residents in metro Honolulu.[110] The City will consider the results of the pilot study when determining whether to implement appointment-based bulky item collection island-wide. The City plans to solicit proposals for the recycling of white goods at a new facility in Campbell Industrial Park in early 2019 and award a contract before the end of the year, assuming receipt of a successful proposal.[111] Section 5 provides more information on waste handling and diversion strategies for white goods.

4.3.5 Commercial Green Waste

The City began restricting the disposal of green waste from commercial generators in 1994 and completely banned green waste from disposal in 2003 per ROH Section 9-1.7. To encourage recycling and affect compliance with its operating permit, which limits the acceptance of green waste from residential sources to 50 percent and commercial sources to 25 percent, loads of waste being delivered to H-POWER are only allowed to contain 10 percent or less green waste. Local composting facilities accept green waste for a fee and process it into soil amendment products. Generators are also encouraged to consider small-scale, DIY mulching and composting.[112] The City plans to continue restricting green waste from disposal and enforcing the commercial green waste ordinance.

HER runs a composting facility that accepts commercial and City-hauled green waste. Because City green waste collected curbside may contain some plastic bags and other inorganic or unacceptable material, HER separates City-delivered green waste from commercial loads. As of November 2017, HER receives 70 percent of their material from City programs and 30 percent from other sources. HER notes that material from curbside collection typically has the highest level of contamination, followed by material from convenience centers, and then transfer stations. The green waste received at HER facilities is processed into soil amendments and compost, saleable to the public and commercial operations.[113] The City will continue education and enforcement efforts to decrease contamination and provide the added benefit of increasing the marketable value of soil amendment products.

Approximately 109,000 tons of green waste (including residential and commercial estimates) were recycled in 2017.[114]

4.3.6 Ferrous and Non-Ferrous Metal

The City separately collects residential white goods at the curbside for metals and refrigerant recycling on a regular monthly bulky waste collection schedule. White goods are also collected for recycling at the convenience centers and at certain transfer stations. In addition, H-POWER's magnetic system recovers virtually all of the ferrous metal delivered to the facility, and an eddy current system extracts non-ferrous metal from the ash. The collected and recovered metals are sent to metal recyclers for recycling.[115] In FY 2017, H-POWER recovered approximately 13,600 tons of metals.[116]

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[110] City and County of Honolulu, Department of Environmental Services. 2019. "Honolulu Bulky Item Collection Pilot." Accessed October 28, 2019. http://www.opala.org/solid_waste/Honolulu_Bulky_Pilot.htm.

[111] Ibid. September 5, 2018.

[112] Department of Environmental Services. 2017. *Report on the Enforcement of Mandatory Business Recycling Ordinances*. June. http://www.opala.org/solid_waste/pdfs/2017%20Report%20on%20Mandatory%20Business%20Recycling.pdf.

[113] Information provided by Hawaiian Earth Recycling. November 10, 2017.

[114] City and County of Honolulu, Department of Environmental Services. 2017. "Recycling and Landfill Diversion." Accessed August 21, 2018. http://www.opala.org/solid_waste/archive/facts2.html.

[115] Information provided by H-POWER staff. November 8, 2017.

[116] Covanta Energy. 2017. *Covanta Honolulu Resource Recovery Venture, 2016-2017 Annual Solid Waste Report*. July 31.

Approximately 111,000 tons of ferrous metals (including auto vehicles) and 22,000 tons of non-ferrous metals (including aluminum) were recycled in 2017.[117]

4.3.7 Office Paper, Cardboard, and Newspaper

The City mandated office paper, cardboard, and newspaper recycling (office fibers) for all City agencies in 1990 (ROH Section 9-1.11) and expanded this mandate to commercial office buildings in 1996 (ROH Section 9-3.1). The mandate applies to office buildings with 20,000 square feet or more of office space and states that owners "shall provide for the separate collection and recycling of office paper, newspaper, and corrugated cardboard."[118]

In addition, in 1994, the City began restricting the amount of commercial cardboard that can be disposed of at a landfill (ROH Section 9-1.7). Following this ordinance, only truck loads containing 10 percent or less of commercial cardboard are accepted at the Waimanalo Gulch Sanitary Landfill (WGSL), H-POWER, and the transfer stations.[119] To enforce this ordinance, City inspectors monitor trucks being unloaded and visually determine if a truckload is over the limit on restricted materials or contains any amount of banned materials. Offending vehicles may be denied access to City disposal facilities for up to 2 weeks per violation.[120]

If requested, the City will provide assistance with developing a recycling program. The City also provides the basic steps for developing a recycling program on opala.org.

As required, City offices recycle white office paper, colored office paper, newspaper, and cardboard at approximately 20 of its buildings. The City collects paper in dumpsters for pickup, and a contractor collects, processes, and markets the material. Initially, paper was sorted by type into 96-gallon carts or dumpsters and the recovered paper was auctioned to recyclers in 1- to 3-year-term contracts. The City was able to earn annual revenues depending on market conditions. By the end of 2005, the City was no longer able to realize revenues based on this system, as the recycler implemented charges for collection. In September 2015, the segregated paper collection system was changed to a mixed paper system, allowing white and colored ledger, cardboard and newspaper to be collected together. Carts are no longer used to collect paper, and the City uses dumpsters for commingled paper. The intent was to simplify the collection system to make contract bidding more competitive. Recovery rates increased by more than 15 percent under the new system. An estimated 195 tons of mixed paper were collected for recycling in FY 2016 under this program.[121]

To enforce the ordinances, the City mails compliance forms and conducts annual site inspections at businesses that are required to recycle. If, during a site inspection or as indicated on a completed compliance form, the business is not in compliance with the mandatory recycling ordinance(s), a City Recycling Specialist will work with management to improve or correct the system, as needed. A report on the progress and enforcement of ordinances is submitted annually to the City Council.[122] The City is planning to move compliance form correspondence to an online platform in 2019.[123]

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[117] City and County of Honolulu, Department of Environmental Services. 2018. "Recycling and Landfill Diversion." Accessed August 21, 2018. http://www.opala.org/solid_waste/archive/facts2.html.

[118] ROH Section 9-3.1.

[119] City and County of Honolulu, Department of Environmental Services. 2017. *Report on the Enforcement of Mandatory Business Recycling Ordinances*. June. http://www.opala.org/solid_waste/pdfs/2017%20Report%20on%20Mandatory%20Business%20Recycling.pdf.

[120] City and County of Honolulu, Department of Environmental Services. 2018. "Mandatory Recycling." Accessed January 18, 2018. http://www.opala.org/solid_waste/archive/Mandatory_Recycling_Laws.html.

[121] City and County of Honolulu, Department of Environmental Services. 2016. *Report on City Agency Mandatory Recycling*. June. http://www.opala.org/solid_waste/pdfs/2016%20Report%20on%20Mandatory%20City%20Agency%20Recycling.pdf.

[122] City and County of Honolulu, Department of Environmental Services. 2017. *Report on the Enforcement of Mandatory Business Recycling Ordinances*. June. http://www.opala.org/solid_waste/pdfs/2017%20Report%20on%20Mandatory%20Business%20Recycling.pdf.

[123] Information provided by Refuse Division staff. January 31, 2018.

Across all recycling programs (including residential curbside collection), approximately 66,000 tons of office paper, corrugated cardboard, newspaper, and other types of paper were recycled in 2017.[124]

4.3.8 Glass

In 1996, the City mandated glass recycling for restaurants and bars that serve alcoholic beverages (ROH Section 9-3.1). The City monitors compliance through compliance form mailers and annual site inspections.

The City administers a non-deposit (non-HI-5) Glass Recycling Program with funding and authorization from the State's ADF program. An ADF of 1.5 cents per non-deposit glass container is collected from glass bottle and jar importers by the State and is made available (based on per capita rates) to the counties to operate non-deposit glass recycling or reuse programs. This 1.5-cent ADF has not been increased since it was written into state law in 1994, and is insufficient to cover recycling costs. In April 2014, the City notified licensed glass recyclers of a reduction in the recycling incentive payment for non-deposit glass because of the limited funding received from the State to operate this program. Following this notification, licensed glass recyclers informed the City that they would no longer accept non-deposit glass from the public for recycling as of June 2014. As a result, the City suspended ROH Section 9-3.1 as applicable to non-deposit glass (the ordinance is still in effect for HI-5 deposit glass).[125]

In the past few years, various bills have been introduced at the state legislature that would directly or indirectly result in increased funding for the State's ADF non-deposit glass recycling program, but none have passed. The City continues to advocate for an increase in the ADF for non-deposit glass.

Because the market value for glass is low, recycling requires a subsidy. There are currently no public recycling options for non-deposit glass. However, non-deposit glass is still collected in the residential blue cart recycling program and in two licensed glass recyclers' commercial accounts.[126] HI-5 deposit glass containers can be recycled as part of the HI-5 Program (detailed in Section 4.3.2).

As part of the new refuse facility being constructed in Campbell Industrial Park, Kapolei, the City has plans for a building to process glass into beneficial reuse material. The City issued a request for proposal (RFP) for the management of glass recyclables and beneficial reuse processes in mid-2018, but because of the limited number of offers, will be reissuing the RFP in early 2019. Assuming receipt of a successful proposal, the City anticipates awarding a contract in 2019.[127]

Approximately 15,000 tons of glass were recycled in 2017.[128]

4.3.9 Commercial Food Waste and Biosolids

In 1997, the City established a mandatory recycling ordinance (ROH Section 9-3.5) for large commercial food waste generators, such as restaurants, hotels, hospitals and manufacturers. The specific criteria for establishments that must comply with the mandatory recycling ordinance are as follows:

- Restaurants that occupy 5,000 square feet or more of floor area and serve 400 or more prepared meals per day based on an annualized average. If a restaurant is also a catering establishment, it is also considered a restaurant.
- A food court within a building or shopping center where five or more food establishments are situated and serviced by a common dining area.

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[124] City and County of Honolulu, Department of Environmental Services. 2018. "Recycling and Landfill Diversion." Accessed August 21, 2018. http://www.opala.org/solid_waste/archive/facts2.html.

[125] City and County of Honolulu, Department of Environmental Services. 2017. *Report on the Enforcement of Mandatory Business Recycling Ordinances*. June. http://www.opala.org/solid_waste/pdfs/2017%20Report%20on%20Mandatory%20Business%20Recycling.pdf.

[126] Ibid.

[127] Information provided by Refuse Division staff. September 5, 2018.

[128] City and County of Honolulu, Department of Environmental Services. 2018. "Recycling and Landfill Diversion." Accessed January 15, 2018. http://www.opala.org/solid_waste/archive/facts2.html.

- A hotel with a kitchen or kitchens and one or more function rooms.
- A market that occupies 18,000 square feet or more of floor area.
- A food manufacturer or processor that occupies 5,000 square feet or more of floor area.
- A catering establishment that is not also a restaurant or part of a restaurant and that serves or sells 400 or more prepared meals per day based on an annualized average.
- A hospital that serves 400 or more prepared patient meals a day based on an annualized average.

Leftover quality food can be delivered to food banks and similar establishments, but most food waste is delivered to or collected by hog farmers. Certain types of food waste can be co-composted with green waste.[129]

HER accepts a limited amount of food waste, including food not able to be fed to hogs and a small amount of coffee husks, at their facilities.[130] HER then processes the food waste into soil amendments and compost, products saleable to the public and commercial operations. HER has plans to receive more food waste, but staff noted that more capital is needed to move forward.[131]

In 2017, approximately 43,000 tons of food waste were recycled or prevented from reaching disposal (source reduction), including food waste sent to hog farms, HER, and food banks.[132]

Sewage sludge (biosolids) is taken to H-POWER for combustion or is processed for reuse by Synagro.

4.3.10 Tires

The State requires tire retailers and wholesalers to accept used tires in exchange for new ones purchased, and typically prohibits the disposal of whole, used motor vehicle tires at all landfills and incinerators within the state per HRS Section 342I. However, in 2014, the City received a variance that allows H-POWER to accept and process tires collected by the Division at convenience centers and transfer stations, and through other collection methods.[133] The City would like to work with state regulators to send all City Government-derived tires to H-POWER for processing. This change would not be significant, as the majority of the City-Government tires are derived from the Division.[134] It should be noted that most tires shipped off-island are recycled for use as tire-derived-fuel to generate electricity.[135]

Residents can bring up to four tires per month to City convenience centers and transfer stations. Tires dropped off at the convenience centers and transfer stations are taken to H-POWER. Oversized tires and tires from City facilities that H-POWER cannot effectively process are delivered to the City's contracted tire recycler. All other scrap tires, island-wide, derived from commercial and government entities are required to be properly disposed and recycled in accordance with state regulations.

In FY 2017, approximately 42,000 tires were received and combusted at H-POWER.[136]Approximately 6,500 tons of tires were recycled in 2017.[137]

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[129] City and County of Honolulu, Department of Environmental Services. 2017. *Report on the Enforcement of Mandatory Business Recycling Ordinances*. June. http://www.opala.org/solid_waste/pdfs/2017%20Report%20on%20Mandatory%20Business%20Recycling.pdf.

[130] Information provided by Refuse Division staff. February 1, 2018.

[131] Hawaiian Earth Recycling. 2018. Homepage. Accessed January 17, 2018. https://hawaiianearth.com/; Information provided by Hawaiian Earth Recycling. November 10, 2017.

[132] City and County of Honolulu, Department of Environmental Services. 2018. "Recycling and Landfill Diversion." Accessed August 21, 2018. http://www.opala.org/solid_waste/archive/facts2.html; Information provided by Refuse Division staff. January 29, 2018.

[133] City and County of Honolulu. 2017. *Audit of the City's Recycling Program*. Report No. 17-06. October.

[134] Information provided by Refuse Division staff. January 29, 2018.

[135] Ibid. December 12 and 15, 2017.

[136] Covanta Energy. 2017. *Covanta Honolulu Resource Recovery Venture, 2016-2017 Annual Solid Waste Report*. July 31.

[137] City and County of Honolulu, Department of Environmental Services. 2018. "Recycling and Landfill Diversion." Accessed January 15, 2018. http://www.opala.org/solid_waste/archive/facts2.html.

Section 5 provides more information on used-tire handling and diversion strategies.

4.3.11 Lead Acid Batteries

The State prohibits the disposal of lead acid batteries in landfills by individuals, retailers, or wholesalers. The State also requires retailers and wholesalers to do the following:

- Accept old batteries in quantities at least equal to the number of new batteries purchased by retail and individual customers
- Post written notices including -
  - "It is illegal to discard a motor vehicle battery or other lead acid battery"
  - "Recycle your used batteries"
  - "State law requires us to accept used motor vehicle batteries or other lead acid batteries for recycling, in exchange for new batteries purchased"
  - "The price of a new battery includes disposal of your old battery"

Similar to used tires, the City allows residents to bring lead acid batteries to the convenience centers at no cost. These batteries are collected by the City's contracted battery recycler and, in most cases, are shipped to the mainland for processing. In the future, the City may accept different types of rechargeable batteries (such as lithium ion) at convenience centers (further details are provided in Section 8).[138]

In FY 2017, a total of 2,178 lead acid batteries were recycled using City Refuse collection services.[139] Approximately 6,800 tons of lead acid batteries were recycled in 2017.[140]

Section 5 provides more information on lead acid battery handling and diversion strategies.

4.3.12 C&D Debris

Because of the amount of C&D activities constantly occurring on Oahu, this waste stream could have a significant impact on disposal capacity. The amount of C&D debris generated on the island has risen over the years, with large impacts from the Honolulu Rail Transit Project since 2011.[141] In an effort to encourage recycling, the City has banned C&D debris from WGSL. This ban requires generators to separate C&D from MSW, promoting recycling or alternate means of disposal.

Since January 2003, commercial haulers have been precluded from delivering loads containing any C&D debris to City facilities. Commercial haulers are directed to the PVT Landfill for the disposal of C&D materials. The following businesses and organizations also recycle or reuse C&D debris on the island:

- Island Demo
- Schnitzer
- West Oahu Aggregate Co., Inc.
- Grace Pacific
- Re-use Hawaii
- Nanakuli Housing Corporation

[138] Information provided by Refuse Division staff. January 29, 2018.

[139] Obtained from Recovery FYs15.16.17.xlsx. City and County of Honolulu.

[140] City and County of Honolulu, Department of Environmental Services. 2018. "Recycling and Landfill Diversion." Accessed August 21, 2018. http://www.opala.org/solid_waste/archive/facts2.html.

[141] City and County of Honolulu, Office of the Mayor. 2011. *News Release: Honolulu Rail Project Groundbreaking.* February 11. http://hartdocs.honolulu.gov/docushare/dsweb/Get/Document-17118/20110211-news-release-groundbreaking.pdf; Information provided by Refuse Division staff. January 31, 2018.

Reuse of building materials is primarily achieved through deconstruction to preserve material for use in new building projects. This strategy is more effective than C&D recycling since it keeps C&D debris out of the waste stream and reduces the amount of new material required for development.

Approximately 763,000 tons of C&D debris were recycled in 2017.[142] In 2014, a new reuse and recycling system came online at the PVT Landfill to divert C&D debris away from disposal at the landfill. This addition has given the PVT Landfill the ability to process up to 1,775 tons of material per day, diverting up to 80 percent for reuse and recycling. The PVT Landfill is planning a new gasification facility (to be located in the Campbell Industrial Park) that would be able to burn feedstock, including material accepted at and recovered from the landfill, for energy production.[143] The PVT Landfill is also currently excavating and reclaiming buried waste at their landfill for recycling. It is anticipated that this effort will be completed by year 2021 and a total of 4 million cubic yards will be excavated and reclaimed.[144]

Section 5 provides more information on C&D debris handling and diversion strategies, including a proposed bill and resolution.

4.3.13 Energy Recovery

H-POWER employs RDF and mass burn combustion methods to process MSW into energy. MSW, including bulky waste, sewage sludge, certain types of tires, and medical waste and other special wastes are accepted at H-POWER. Up to 90 percent of the volume of the MSW received at H-POWER is diverted from WGSL and converted into renewable electric energy.[145] H-POWER can provide up to 10 percent of Oahu's electricity. H-POWER also extracts ferrous and non-ferrous metals from the waste and ash using magnets and an eddy current separator.[146]

In 2012, H-POWER increased the plant's capacity by adding a third mass-burn boiler. This expansion in WTE capacity resulted in the ability to accept 900,000 tons (or more) of waste per year. In 2015, a new receiving station was installed to handle sewage sludge, effectively diverting up to 20,000 tons per year of sludge and 20,000 tons of bulky waste (used to bulk up the sludge) from WGSL.[147]

The City has a waste supply commitment with H-POWER's operator to deliver 800,000 tons of solid waste per year to the facility.[148] The majority of residential and commercial MSW collected on the island is delivered to H-POWER. In FY 2017, over 736,000 tons of MSW, including special waste, sludge, and tires, was received at H-POWER to generate renewable energy.[149] The City has a power purchase agreement with HECO to purchase the electricity generated at H-POWER.

The resulting residue and ash, produced as a result of WTE processes, totaled to approximately 185,000 tons sent to WGSL.[150] This is equivalent to a 70 percent reduction of waste by weight that would otherwise have been landfilled.[151]

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[142] City and County of Honolulu, Department of Environmental Services. 2018. "Recycling and Landfill Diversion." Accessed August 21, 2018. http://www.opala.org/solid_waste/archive/facts2.html.

[143] PVT Land Company. 2017. "When is a landfill more than a landfill?" Accessed on December 8, 2017. http://www.pvtland.com/landfill/.

[144] Information provided by PVT Land Company Limited. November 21, 2018.

[145] Renewable electric energy as defined in Section 269-91, Hawaii Revised Statutes.

[146] City and County of Honolulu, Department of Environmental Services. 2018. "How the City Manages Our Waste." Accessed January 18, 2018. http://www.opala.org/solid_waste/archive/How_our_City_manages_our_waste.html.

[147] Ibid.

[148] Information provided by Refuse Division staff. November 9, 2017.

[149] Covanta Energy. 2017. *Covanta Honolulu Resource Recovery Venture, 2016-2017 Annual Solid Waste Report.* July 31; H-POWER received and combusted 42,240 tires; however, the exact tonnage was not recorded. This tonnage is included in addition to the reported 736,000 tons of waste.

[150] Covanta Energy. 2017. *Covanta Honolulu Resource Recovery Venture, 2016-2017 Annual Solid Waste Report.* July 31.

[151] Note that the percent reduction by weight is greater than 70 percent because the total tonnage does not reflect 42,240 tires received and combusted.

4.4 Strategies for Additional Recycling and Bioconversion

As discussed in the preceding sections, the City is currently promoting recycling and bioconversion through a variety of existing programs. Through these efforts, the City increased material recycling from 5 percent in 1998 to 35 percent in 2005 and to 57 percent in 2017.[152]

When converting waste into energy is included in this calculation, the City landfill diversion rate rises to over 82 percent. By 2018, the City aims to dispose little more than ash and residue from H-POWER at WGSL.[153]

Existing programs as strategies for increasing recycling and bioconversion are not discussed further in this section, unless there is a specific change recommended for that existing program. While landfill diversion significantly increased during the last 18 years, the City will continue its objective to decrease landfill disposal by increasing landfill diversion through the following strategies:

- Evaluate the environmental and economic benefits of WTE
- Evaluate the efficiency and storage capacity of energy recovery
- Enhance education on recycling programs
- Optimize curbside collection of residential mixed recyclables
- Expand mixed recyclables and green waste collection to manual service areas
- Strengthen implementation of recycling and material bans/ordinances
- Advocate for regulations that promote beneficial reuse of hard-to-recycle materials

Section 5 identifies City plans to increase sewage sludge biosolids processing and WTE potential.

4.4.1 Evaluate the Environmental and Economic Benefits of WTE

Oahu's physically remote location as an island results in higher costs for import and export activities for recyclable commodities. In addition, recycling markets can fluctuate, making recycling an unprofitable endeavor for businesses. As a result, it may not always make economic or environmental sense to export recyclables off-island when materials can be processed on-island.

Such conditions bear a burden on the City's current recycling practices and programs. In fact, an audit of the City's recycling program revealed that revenues generated from "the sale of solid waste are insufficient to offset the costs of processing the collected recycled waste."[154] Furthermore, the audit identified barriers prohibiting cost effectiveness of recycling practices on Oahu, specifically the following:[155]

- Due to the remote location and high transportation costs, shipping a standard container of recyclable materials from Honolulu to Asia could cost six times the amount for shipping the same container from Los Angeles to Asia.
- Shipping lines do not offer competitive freight rates for shipping containers with recyclables.
- Compared to the mainland, supply and demand for recyclables is low, the volume of recyclables is low, and the demand for end products made from recycled materials is low.
- For most commodities, developing manufacturing facilities in Hawai'i for recycled products is not cost-effective.
- Operating costs in Honolulu are high for land, water, and electricity.

[152] City and County of Honolulu, Department of Environmental Services. 2018. "Recycling and Landfill Diversion." Accessed August 21, 2018. http://www.opala.org/solid_waste/archive/facts2.html.
[153] City and County of Honolulu, Department of Environmental Services. 2017. "Future Plans." Accessed December 14, 2017. http://www.opala.org/solid_waste/archive/Future_Plans.html.
[154] City and County of Honolulu, Office of the City Auditor. 2017. *Audit of the City's Recycling Program.* Report No. 17-06. October.
[155] Ibid.

Because of the fluctuating markets for recyclables, lack of local markets, and uncertainty in the viability and worth of recyclable commodities moving forward, the City plans to evaluate the environmental and economic implications of sending recyclables through WTE processes. In conjunction with other waste reuse and recycling approaches, this assessment will aid the City in managing waste in the most economically favorable and environmentally sustainable way possible. The results from this analysis will inform and guide the City on how it manages its solid waste to optimize existing programs, inform future H-POWER initiatives, and pursue changes to local and state laws.[156]

4.4.2 Evaluate Efficiency or Expanding the Storage Capacity of Energy Recovery

As discussed in Section 4.3.14, the H-POWER facility recycles up to 90 percent by volume of the MSW generated on Oahu. This facility currently has a processing capacity of 900,000 tons of waste per year. If and when the need arises, the City will evaluate the feasibility of increasing the facility's efficiency, expanding H-POWER's storage capacity, or both. Any such evaluation should be done after ensuring that on-island reuse and recycling options and technologies are used first, if economically viable. This evaluation could follow or supplement the environmental and economic evaluation of WTE processes proposed in Section 4.4.1, in conjunction with other waste reuse and recycling approaches. Section 10 provides further discussion about the energy balance of the City's waste management system.

4.4.3 Enhance Education on Recycling Programs

Promoting public education and awareness is key to successful recycling, especially for residents. Equally important is the need to adequately fund educational programs. This education and awareness is especially important to reduce recyclable contamination because of China's recent mandate that imported recyclables meet strict, low-contamination standards. Inadequate funding limits the number and types of programs that can be provided, as well as their effectiveness. Allocation of funds for a dedicated Public Education Specialist is a top priority to ensure adequate support for public education programs.

The City uses the opala.org website to share information and resources related to solid waste, and plans on making the information on recycling programs even more accessible on the site. The City should also continue to look for opportunities to explore new partnerships (similar to the ones currently done with businesses modeling recycling programs for others).

The City has established a partnership with the NRDC to produce advertisements about food waste and is pursuing a partnership with Hawaii Public Radio for short advertisement spots. Plans for these programs will be fully developed and implemented in late 2018 to early 2019.

Additional information regarding public education is presented in Section 7, Public Education.

4.4.4 Optimize Curbside Collection of Residential Mixed Recyclables

Blue carts currently have a set-out rate of 55 to 60 percent, which is low compared to the usage rates of other types of carts and programs. The blue cart program collects between 22,000 and 24,000 tons per year of materials compared to the green cart program, which collects between 70,000 to 80,000 tons per year with the same amount of collection resources dedicated. As a result, the City may reduce blue cart collection to approximately once-per-month (every fourth week) to optimize the residential curbside collection program and reallocate resources to other tasks, such as bulky item collection or increased gray and green cart service.[157]

In addition, depending on results from the economic and environmental evaluation of WTE, the City may choose to further optimize as appropriate.

[156] Information provided by Refuse Division staff. January 17, 2018.
[157] Information provided by Refuse Division staff. December 12, 2017.

4.4.5 Expand Mixed Recyclables and Green Waste Collection to Manual Service Areas

As detailed in Section 4.3.4, manual collection service is currently provided to approximately 20,000 homes where access with an automated truck is limited.[158] These areas do not have separate mixed recyclables or green waste collection, and refuse is collected twice a week. Adding service for mixed recyclables and green waste collection would increase the recovery of recyclables and green waste. The City is investigating ways to expand recycling collection to these areas; the type of collection system (automated or semi-automated) will depend on equipment restrictions created by the street or neighborhood.

4.4.6 Strengthen Implementation of Recycling and Material Bans and Ordinances

As discussed in Section 4.3, the City has ordinances to reduce the amount of commercial office paper, newspaper and corrugated cardboard, green waste, food waste, and glass that requires disposal. Ordinances are enforced through compliance form mailers and site inspections. The City plans to increase the number of inspections as staff are available.

The City has the authority to suspend recycling requirements for any business if the cost to collect and recycle is more than the cost to collect and dispose of the targeted materials. The City evaluates each case individually by meeting with the business, assessing the problems specific to that site and working with the business to set up recycling operations. Through this evaluation and assistance process, the City's recycling specialist will determine whether recycling is feasible for the business. The City encourages businesses to report uncooperative or uninformed recycling and collection service providers.[159]

In addition to this focused feasibility assessment, the City may want to further evaluate the overall efficacy of the existing bans, based on results from the economic and environmental evaluation of WTE.

4.4.7 Investigate Options for Beneficial Reuse of Hard-to-recycle Materials

4.4.7.1 Ash

In 2008, the City advertised two RFPs for the beneficial reuse of bottom ash and fly ash. At the time, there was no award given because there were no viable offers. Despite the previous result, the City issued a new RFP in early 2018 for a beneficial reuse technologies project for ash that could significantly reduce the need for ash landfill disposal. This RFP will be reissued in early 2019 in an attempt to solicit a greater number of eligible offers. The technology to process ash for beneficial reuse has advanced somewhat, and this RFP will provide information about the feasibility of such a project at this time. Assuming receipt of a successful proposal, the City anticipates awarding a contract in 2019.[160]

The beneficial reuse project for ash would take place in a building that is part of a new refuse facility being constructed in Campbell Industrial Park, Kapolei, on City-owned property adjacent to the H-POWER property.[161]

In FY 2017, approximately 141,000 tons of ash from H-POWER were disposed of at WGSL.[162] The City believes this waste stream has potential for landfill diversion and will continue to pursue options for the beneficial reuse of ash. Section 5 provides more information on current practices and future strategies for ash.

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[158] City and County of Honolulu, Department of Environmental Services. 2018. "3-Cart Refuse / Recycling Collection." Accessed January 25, 2018. http://www.opala.org/solid_waste/curbside.htm.

[159] City and County of Honolulu, Department of Environmental Services. 2018. "Mandatory Recycling." Accessed January 18, 2018. http://www.opala.org/solid_waste/archive/Mandatory_Recycling_Laws.html.

[160] Information provided by Refuse Division staff. September 5, 2018.

[161] Ibid. November 6 and December 19, 2017.

[162] Covanta Energy. 2017. *Covanta Honolulu Resource Recovery Venture, 2016-2017 Annual Solid Waste Report*. July 31.

4.4.7.2 Non-deposit Glass

The current landscape for non-deposit glass recycling requires immediate legislative attention. In the past few years, various bills have been introduced at the state legislature that would directly or indirectly result in increased funding for the State's ADF glass recycling program, but none have passed. As a result, as described in Section 4.3.9, the City was forced to make significant changes to its ADF glass recycling requirement.

Because of the low recycling incentive payment offered by the State, there are no public options for recycling non-deposit glass. With limited recycling options and no anticipated changes to the ADF, the City issued an RFP for beneficial reuse of ADF glass in mid-2018. However, the RFP will be reissued in early 2019 in an attempt to solicit a greater number of eligible offers. Assuming receipt of a successful proposal, the City anticipates awarding a contract in 2019. In addition, the City continues to advocate for an increase in the ADF and to collaborate with DOH for a solution considering the status of non-deposit glass programs.

4.4.8 Co-Digestion

In 2019, the City began to investigate the feasibility of co-digestion of biosolids and food waste at one or more of the City's wastewater treatment plants, with the resulting biogas used to generate energy. Co-digestion of organic waste with sewage sludge in an anaerobic digester would provide a single system to handle both organic waste and sludge, provide beneficial use of the energy content in those materials, and reduce the need to process both at H-POWER. Further evaluation is needed prior to determing whether co-digestion will be implemented during the term of this ISWMP.

4.4.9 On-Site Commercial/Institutional Composting or Anaerobic Digestion

Historically, the most common strategy for diverting food waste includes delivering waste to a community-scale compost facility or anaerobic digester. At this time, the City has many other urgent priorities and does not have the resources to develop and operate a food waste composting facility (either with or without a residential food waste collection program) that would meet the stringent health and environmental requirements of such a facility.

In recent years relatively small on-site organics processing units have become more prevalent, giving individual businesses, government, or non-governmental organizations alternative food waste processing options. Onsite treatment of organics reduces hauling costs and may be a good option for facilities that have the space and willingness to acquire the necessary expertise to implement such an option. Onsite anaerobic digestion (AD) systems can bring facilities to energy neutral and/or net energy-positive status. Depending on the specific technology chosen, these units can electricity, heat, biogas, compost, an organic residual (referred to as digestate), or gray water which is sent to the sewer.

The City supports small-scale onsite composting and digestion of food waste and envisions that these projects would be led by private industry or non-governmental organizations. The City is interested in exploring partnerships with entities that have interest in advancing on-site food waste diversion solutions.

4.5 Action Item Summary

The City is currently planning or progressing through several initiatives to continue diverting landfilled waste to reuse or recycling alternatives. In the long-term, the City's goal is to pursue ongoing implementation of diversion and conversion practices so that landfill developments will no longer be required. The action items for recycling and bioconversion are summarized in Table 4-2.

Table 4-2. Recycling and Bioconversion Action Item Summary

Material Type	Action Item	Initiative Status	Implementation Dates
Paper and Cardboard	Perform an environmental and economic evaluation of recycling and WTE to inform future material handling practices and regulations, pursue changes to laws for more flexibility in sending recyclables to H-POWER, and explore potential for new markets for recyclables	Planned	FY19-FY20
	Continue to educate and promote existing residential curbside collection program	Ongoing	FY19-FY28
	Optimize residential curbside collection program (reduction in blue cart collection)	Planned	FY19-FY20
	Expand curbside recycling service to manual collection areas	Planned	FY19-FY22
	Continue to educate and enforce office paper, cardboard, and newspaper ordinances for businesses and City agencies	Ongoing	FY19-FY28
	Increase the number of recycling containers in public locations	Ongoing	FY20-FY21
	Transition ordinance compliance forms from mailers to an online platform	Planned	FY19
	Enhance education of recycling programs island-wide	Planned	FY19-FY21
	Increase number of inspections to monitor compliance with recycling ordinances	Planned	FY19-FY20
Plastic and Aluminum Containers	Perform an environmental and economic evaluation of recycling and WTE to inform future material handling and regulations, pursue changes to laws for more flexibility in sending recyclables to H-POWER, and explore potential for new markets for recyclables	Planned	FY19-FY20
	Continue to educate and promote existing HI-5 program for DBCs	Ongoing	FY19-FY28
	Identify City-owned parcels on which to locate additional HI-5 program redemption centers	Ongoing	FY20-FY21
	Continue to educate and promote existing residential curbside collection program	Ongoing	FY19-FY28
	Optimize residential curbside collection program (reduction in blue cart collection)	Planned	FY19-FY20
	Expand curbside recycling service to manual collection areas	Planned	FY19-FY22
	Continue to educate and promote portable ClearStream recycling receptacle loans for events	Ongoing	FY19-FY28
	Increase the number of recycling containers in public locations	Ongoing	FY20-FY21
	Transition ordinance compliance forms from mailers to an online platform	Planned	FY19
	Enhance education of recycling programs island-wide	Planned	FY19-FY21
Glass Containers	Continue to educate and promote existing residential curbside collection program	Ongoing	FY19-FY28
	Optimize residential curbside collection program (reduction in blue cart collection)	Planned	FY19-FY20
	Expand curbside recycling service to manual collection areas	Planned	FY19-FY22
	Continue to educate and promote existing HI-5 program for DBCs	Ongoing	FY19-FY28
	Identify City-owned parcels on which to locate additional HI-5 program redemption centers	Ongoing	FY20-FY21
	Solicit proposals for recycling or beneficial reuse of glass DBCs and non-deposit glass at the planned refuse facility site adjacent to H-POWER property	Planned	FY19

Table 4-2. Recycling and Bioconversion Action Item Summary

Material Type	Action Item	Initiative Status	Implementation Dates
	Transition ordinance compliance forms from mailers to an online platform	Planned	FY19
	Enhance education of recycling programs island-wide	Planned	FY19-FY21
	Investigate options for beneficial reuse of hard-to-recycle materials (non-deposit glass)	Planned	FY19-FY28
	Advocate for an increase in the ADF for non-deposit glass	Ongoing	FY19-FY28
	Work with DOH to find a solution for non-deposit glass recycling	Ongoing	FY19-FY28
	Increase number of inspections to monitor compliance with recycling ordinances	Planned	FY19-FY20
Green Waste	Continue to educate and promote existing residential curbside collection program	Ongoing	FY19-FY28
	Optimize residential curbside collection program (possible increase in green cart collection)	Planned	FY19-FY20
	Expand curbside recycling service to manual collection areas	Planned	FY19-FY22
	Continue to ban commercial green waste disposal from transfer stations, H-POWER, and WGSL	Ongoing	FY19-FY28
	Enhance education of recycling programs island-wide	Planned	FY19-FY21
	Increase number of inspections to monitor compliance with recycling ordinances	Planned	FY19-FY20
Ferrous and Non-ferrous Metals	Continue to evaluate any new recycling or disposal approaches that become available	Ongoing	FY19-FY28
	Enhance education of recycling programs island-wide	Planned	FY19-FY21
Food Waste	Perform an environmental and economic evaluation of WTE to inform future material handling and regulations	Planned	FY19-FY20
	Continue to educate and enforce food waste ordinance for businesses	Ongoing	FY19-FY28
	Plan and implement food waste advertisements in collaboration with NRDC	Ongoing	FY19
	Transition ordinance compliance forms from mailers to an online platform	Planned	FY19
	Investigate the feasibility of co-digestion of biosolids and food waste at City wastewater treatment plants	Planned	FY20
	Investigate partnering with private industry and non-governmental organizations to implement small-scale on-site composting	Planned	FY22
	Increase number of inspections to monitor compliance with recycling ordinances	Planned	FY19-FY20
Used Tires	Perform an environmental and economic evaluation of recycling and WTE to inform future material handling and regulations, pursue changes to laws for more flexibility in sending recyclables to H-POWER, and explore potential for new markets for recyclables	Planned	FY19-FY20
	Continue to educate and promote existing program	Ongoing	FY19-FY28
	Work with state regulators to allow for disposal of all waste tires managed by the City at H-POWER.(See Section 5 for more information.)	Planned	FY19-FY20
Lead Acid Batteries	Continue to educate and promote existing program	Ongoing	FY19-FY28

Table 4-2. Recycling and Bioconversion Action Item Summary

Material Type	Action Item	Initiative Status	Implementation Dates
Bulky Items and White Goods	Continue to educate and promote existing program	Ongoing	FY19-FY28
	Solicit proposals for recycling of white goods at the planned refuse facility site adjacent to H-POWER property	Planned	FY19
	Continue pilot online appointment scheduling system for bulky item collection and consider implementation island-wide	Ongoing	FY19-FY28
	Optimize residential curbside collection program	Planned	FY19-FY20
C&D Debris	Continue to enforce the ban of commercial and business C&D debris from WGSL	Ongoing	FY19-FY28
	Continue to enforce the ban of burnable resident-generated C&D debris from WGSL (See Section 5 for more information.)	Ongoing	FY19-FY28
	Continue to evaluate a potential policy to require builders to submit a C&D debris recovery plan with building permit applications (See Section 5 for more information.)	Ongoing	FY19-FY28
	Enhance education of recycling programs island-wide	Planned	FY19-FY21
Other	Perform an environmental and economic evaluation of recycling and WTE to inform future material handling and regulations, pursue changes to laws for more flexibility in sending recyclables to H-POWER, and explore potential for new markets for recyclables	Planned	FY19-FY20
	Continue to evaluate the efficiency and storage capacity of H-POWER	Ongoing	FY24-FY28
	Solicit proposals for recycling/beneficial reuse of ash	Planned	FY19
	Investigate options for beneficial reuse of hard-to-recycle materials	Planned	FY19-FY28
	Enhance education of recycling programs island-wide	Planned	FY19-FY21

5. Special Wastes

The proper management of special wastes is an important element to the success of the City's Plan because some of these materials may pose environmental concerns or challenges to facility operations. In addition, some of the materials, such as used oil, lead-acid batteries, and white goods, have recycling potential.

5.1 Goals and Objectives

The goal of this section is to assess how special wastes are being managed, evaluate if these management techniques are adequate, and identify strategies to improve the management of special wastes where necessary. Examples of options the City may investigate that have the potential to divert special wastes from landfill disposal include sending agricultural waste to H-POWER and diverting treated medical sharps from the landfill.

The City has processes in place to divert the materials described as a special waste in HRS Section 342G-1 and further described in HRS Section 342I. The City aims to continue programs to divert special waste from disposal with MSW where appropriate, and to manage those special wastes that remain in the MSW management stream in accordance with state and local laws and policies.

5.2 Background

5.2.1 Legislative

HRS Section 342G-1 defines "special waste" as any solid waste that, because of its source or physical, chemical, or biological characteristics, requires special consideration for its proper processing or disposal or both. As required in HRS Section 342G-26(e), the special wastes component of the Plan must describe existing and proposed programs for the management of the following, at a minimum:

- Asbestos
- Used oil
- PCS
- Lead acid batteries
- Municipal waste combustion ash
- Sewage sludge that is not hazardous waste
- Agricultural and farm generated waste that are normally placed in landfills
- Medical wastes
- Tires
- White goods
- Derelict vehicles

5.2.2 Current System

The City accepts and funds the recycling of various special wastes generated by residents, including batteries, tires, white goods, and a limited amount of C&D waste. These wastes are either collected by the City curbside (as part of the City's bulky item collection service) or self-hauled by the resident to the City's transfer stations, convenience centers, or WGSL for disposal at no cost to the resident. Commercial waste generators, with some limited exceptions, do not receive City curbside collection service and are not permitted to deliver special wastes to City disposal facilities. Providing residents these services at no cost decreases the potential for illegal dumping and minimizes the likelihood of special waste being placed into the regular trash where, because of their nature, it could (1) damage collection equipment or disposal facility processing equipment, (2) violate the disposal facility's solid waste permit, or (3) introduce environmental pollutants to the environment. The management of residential special wastes is the responsibility of the City, who will continue to provide these services to preserve the public health and welfare and the beauty of this island.

5.3 Existing Programs

The City's efforts focus on providing convenient programs and services to facilitate recycling, disposal, and overall proper management of special waste. The following sections provide an overview of the City's existing programs for special wastes and related regulations.

5.3.1 Asbestos

Currently, ACM is accepted at the PVT Landfill. Historically, ACM was accepted at WGSL, but that practice was discontinued in early 2017 by City policy (WGSL is still permitted to accept ACM). Because C&D debris (a major source of ACM) is not accepted at the H-POWER facility, it receives no significant quantities of asbestos.

All asbestos-containing waste is required to be contained in sealed drums or barrels, or be double-wrapped or double-bagged in 6 mil thickness (minimum) plastic. All contained ACM must have affixed asbestos hazard warning labels, as well as labels with the owner's name, address, and telephone number.[163]

5.3.2 Used Motor Oil

City residents can dispose of motor oil with their household trash once it is properly prepared; residents maintaining their own vehicles are encouraged to use locally manufactured oil-absorbing boxes that are sold at auto supply and other stores. Residents can also prepare used oil for disposal by pouring it into a plastic bag containing enough absorbent material and sealing the bag such that there is no free liquid that could leak during the collection process. These boxes and properly sealed bags can be disposed of in the municipal waste stream for combustion at H-POWER. For questions about proper handling of used oil, the public can call the City's Refuse and Recycling Services (808-768-3200) or visit the City's website at opala.org.

Commercial generators must handle and dispose of used oil in accordance with EPA and DOH guidelines.

The City will continue to accept used motor oil from residents that has been properly prepared for disposal. The City will also continue to educate residents and promote the existing procedures for proper disposal. Commercial generators must handle and dispose of used oil in accordance with EPA and DOH laws and regulations.

5.3.3 Petroleum-contaminated Soil

The PVT Landfill accepts PCS on a pre-arranged basis. PCS must be from a known source and must pass soil testing requirements in accordance with the DOH Office of Hazard Evaluation and Emergency Response Technical Guidance Manual.[164]

PCS can also be managed or treated at the site of origin. Treatment of PCS can remove concentrations of petroleum so that PCS can be managed as soil and used at WGSL as daily cover, provided that it is non-hazardous.

5.3.4 Lead Acid Batteries

Lead acid batteries are a rechargeable power source used in motor vehicles, electric vehicles, telecommunications equipment, and solar-powered systems. Over time, lead sulfate accumulates on the surface of a battery's lead plates, and it cannot be recharged; at this point, the battery must be replaced.

[163] PVT Land Company. 2017. "Asbestos." Accessed on December 8, 2018. http://www.pvtland.com/landfill/asbestos/.

[164] DOH. 2008. *Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan.* http://hawaiidoh.org/tgm-pdfs/HTGM.pdf. November.

Because lead and sulfuric acid are highly toxic, lead acid battery recycling and disposal handling procedures are addressed in HRS Section 342I.

The City educates residents to leave old auto batteries with the dealer, service station, or auto repair shop when purchasing a new one. HRS Section 342I requires that these retailers accept the old battery when a new one is purchased. Some shops and retailers accept old auto batteries without purchase of a replacement. In addition, residents may take up to two batteries per month to any of the City's convenience centers and transfer stations.[165] These batteries are taken to the City's contracted battery recycler.

In FY 2017, a total of 2,178 lead acid batteries were recycled using City Refuse collection services.[166]

5.3.5 Combustion Ash

Ash is a byproduct generated when trash is combusted at H-POWER and turned into energy. Combustion byproduct from H-POWER contains two components, bottom ash and fly ash. The bottom ash primarily consists of ash from the grate of the furnace. Fly ash is a material collected from the fabric filtered baghouses downstream of the furnace section of H-POWER. The amount of ash produced by H-POWER is approximately 19 percent of the MSW received by weight.[167]

Between 1990 and 2012, H-POWER operated two boilers using a refuse-derived-fuel technology. In 2012, H-POWER increased the plant's capacity by adding a third mass-burn boiler. This expansion in WTE capacity resulted in the ability to accept 900,000 tons of waste per year. In 2015, a new receiving station was installed to handle sewage sludge, effectively diverting up to 20,000 tons per year of sludge and 20,000 tons of bulky waste (used to bulk up the sludge) from WGSL.[168] These expansions have increased the tonnage of ash produced at H-POWER.

In FY 2017, H-POWER received over 736,000 tons of solid waste and generated about 141,000 tons of ash. Ash is landfilled at WGSL in an ash monofill. As of July 2017, the ash monofill is projected to have 30.8 years of life remaining.[169]

The City is working to obtain the appropriate permitting modifications to allow WGSL to balance the MSW and ash portions of the landfill. The intent is to maximize the available air space at WGSL for acceptance of both MSW and ash so that the landfill will reach capacity in both MSW and ash portions at the same time. Currently, the ash portion of WGSL has more space than the MSW portion. Once modified, WGSL is expected to reach maximum capacity for both MSW and ash in year 2038 based on current existing processes.[170] The City will continue to look for ways to divert ash from the landfill in direct support of its goal of eliminating the need for an everyday landfill.

5.3.6 Sewage Sludge

Sewage sludge refers to the residual solids and semi-solids separated during the treatment of wastewater by municipal and private WWTPs. In the wastewater industry, sewage sludge has historically been disposed of in MSW landfills because it is the cheapest and easiest disposal alternative. However, there has been an effort to use sewage sludge as a resource and have it processed into EPA-approved

[165] City and County of Honolulu. 2017. "Drop-Off Convenience Centers for Refuse and Recycling." Accessed on December 8, 2017. http://www.opala.org/solid_waste/Drop_off_Centers_for_Refuse.html.

[166] Obtained from Recovery FYs15.16.17.xlsx. City and County of Honolulu.

[167] Information provided by Refuse Division staff. December 15, 2017.

[168] City and County of Honolulu. 2017. "How the City Manages Our Waste." Accessed on December 8, 2017. http://www.opala.org/solid_waste/archive/How_our_City_manages_our_waste.html.

[169] Waste Management of Hawaii, Inc. 2017. *2017 Annual Operating Report, Waimanalo Gulch Sanitary Landfill.* Final. July 27.

[170] R. M. Towill Corporation & SMS Research Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu.* November.

biosolids for use as fertilizer. Processing sewage sludge into fertilizer can greatly reduce reliance on landfill disposal.

Most of the sewage sludge generated on the island is derived from WWTPs owned and operated by the City. These plants include Sand Island WWTP, Honouliuli WWTP, and six smaller plants. A WWTP facility in Laie that was privately owned and operated is now operated by the City in a cooperative agreement with Hawaii Reserves, Inc.[171] The State originally owned a WWTP at Waimanalo, but as of 2012, it is owned and operated by the City.[172] An additional WWTP in Hawaii Kai is privately owned and serves the Hawaii Kai area. The military also has several WWTPs at their facilities.[173]

The City currently contracts with Synagro to process sewage sludge from the Sand Island WWTP into biosolids. DOH has given approval to use the Synagro biosolid pellets for use as a general all-purpose fertilizer. In 2016, a second digester was added to the Sand Island WWTP to provide additional processing capacity, as well as to provide redundancy, if needed.[174] Synagro reports that 93 percent of incoming sewage sludge is beneficially used. [175]

Most Oahu sewage sludge (except from the Sand Island WWTP) generated before 2015 was disposed of at WGSL. The sludge was required to be stabilized, solidified, or dried by the generator before disposal. Odorous loads were deodorized by the generator either by bagging the material or treating the load with odor control products before delivery to WGSL. To minimize odors, the sludge was unloaded close to the working face and then covered immediately with solid waste.[176]

In 2015, when the new sludge receiving station at H-POWER became operational, sewage sludge from City WWTPs were diverted from WGSL to H-POWER. In FY 2017, H-POWER received and combusted approximately 14,430 tons of sludge.[177] H-POWER is now the primary destination for City sewage sludge; when temporary operational issues prevent the facility from receiving and processing sludge, it is then routed to WGSL for disposal.[178]

Sludge from military WWTPs is composted at the Navy Biosolids Treatment Facility in Kalaeloa (former Barbers Point). Constructed in 1997, this facility covers 24 acres and combines biosolids with green waste to make a soil additive or compost. The Navy Biosolids Treatment Facility accepts sewage sludge from various Department of Defense facilities, including the Wastewater Treatment Facility at Fort Kamehameha and the Schofield Barracks Wastewater Treatment Facility. The facility accepts approximately 48 wet tons of sludge on a weekly basis.[179]

Sewage sludge from the private Hawaii Kai WWTP is being diverted from disposal at the WGSL to H-POWER as of July 1, 2018.[180] The Hawaii Kai WWTP will be required to modify their drying process to make the sewage sludge acceptable at H-POWER.[181] The City additionally plans to process all sewage

[171] City and County of Honolulu. 2018. "Laie Water Reclamation Facility." http://www.honolulu.gov/cms-env-menu/site-env-sitearticles/1154-wwm_laie_wrf.html. Last updated July 17.

[172] City and County of Honolulu. 2018. "Waimanalo Wastewater Treatment Plant." http://www.honolulu.gov/cms-env-menu/site-env-sitearticles/1193-wwm_waimanalo_wwtp.html. Last updated July 17.

[173] Information provided by Refuse Division staff. December 15, 2017.

[174] City and County of Honolulu. 2013. *2013 Interim Status Report on the Integrated Solid Waste Management Plan (2008)*. December 16.; KHON 2. 2016. Second sewage digester built at Sand Island plant. Accessed on December 12, 2017. http://khon2.com/2016/10/27/second-sewage-digester-built-at-sand-island-plant/.

[175] Synagro. http://www.synagro.com/locations/honolulu-sand-island-wastewater-treatment-plant/. Accessed on February 1, 2019.

[176] R.W. Beck. 2008. *Integrated Solid Waste Management Plan Update.* October.

[177] Covanta Energy. 2017. *Covanta Honolulu Resource Recovery Venture, 2016-2017 Annual Solid Waste Report.* July 31.

[178] Information provided by Refuse Division staff. November 17, 2017; City and County of Honolulu. 2017. "How the City Manages Our Waste." Accessed on December 8. http://www.opala.org/solid_waste/archive/How_our_City_manages_our_waste.html.

[179] Navy Facilities Engineering Command (NAVFAC Hawaii). 2017. *Fact Sheet on the Navy Biosolids Treatment Facility, Kalaeloa, Oahu, Hawaii.* January. https://www.navfac.navy.mil/content/dam/navfac/NAVFAC%20Pacific/NAVFAC%20Hawaii/PDFs/Fact%20Sheets/Fact%20Sheet%20-%20Navy%20Biosolids%20Treatment%20Facility-FINAL_31Jan17.pdf.

[180] Information provided by Refuse Division staff. September 11, 2018.

[181] Ibid. December 15, 2017.

sludge at H-POWER, except sludge from the Sand Island WWTP, which is processed at the Synagro facility. In the future, the City has long-term plans to convert all WWTP sludge to biosolids for use as fertilizer as the first management option. H-POWER would serve as a backup in the event that conversion facilities are unable to process the sludge, with disposal at WGSL as a third option only if those first two options are unavailable.[182]

The City's Department of Environmental Services plans to upgrade the Honouliuli WWTP to install an anaerobic system to process sludge. H-POWER will eventually (within the next 5 years) become the backup option for sludge.

5.3.7 Agricultural Waste

Agricultural wastes are generated in the private sector and include animal and plant residues from agricultural processes and require special handling. Agricultural wastes can include manure and carcasses. (Byproducts from rendering plants and food processing wastes are considered industrial wastes, which are sent to H-POWER.) Agriculture, dairy, and livestock farms and slaughter houses are sources of agricultural waste.

Most agricultural waste on Oahu is processed through bioconversion or other means at the site on which it is generated. For that reason, very little enters the City's municipal waste stream. The City does allow landfill disposal of some animal carcasses. An appointment must be scheduled before dropping off dead animals or rendering byproducts at WGSL, and carcasses must be wrapped or covered for loads to be accepted.[183]

5.3.8 Medical Waste

In general, regulations require that infectious medical waste must be sterilized (rendered non-infectious) or incinerated. If waste is sterilized, the bag must indicate sterilization. All containers carrying medical waste must be labeled or placed in specially marked red bags.

There are a number of private companies on the island that treat medical waste. The City coordinates with generators and processors to direct certain autoclaved medical wastes (excluding treated sharps) to H-POWER and treated sharps to WGSL. Residents can dispose of medical sharps in their trash cans, provided the sharps are encased in rigid screw-top plastic containers.[184]

5.3.9 Scrap Tires

Motor vehicle tires are generated by residential, commercial, and industrial vehicle owners and create a potential health risk when disposed of in the landfill or when illegally dumped. They can catch on fire, harbor vectors (mosquitoes), and, when landfilled, can rise to the landfill surface, creating operational problems. State law bans the landfill disposal or incineration of whole tires (HRS Section 342I-22) and requires dealers to accept old tires and recycle them (HRS Section 342I-25).

Residents can dispose of up to four tires per month at City convenience centers and transfer stations. Tires dropped off at the convenience centers and transfer stations are taken to H-POWER or the City's contracted tire recycler as a backup. In 2014, the City received a variance from the DOH that allows H-POWER to accept and process tires collected by the Refuse Division (at convenience centers, transfer

[182] Information provided by Refuse Division staff. December 12, 2017.

[183] City and County of Honolulu. 2017. "SORT IT OUT: What to Recycle/How to Dispose of…" Accessed on November 13, 2017. http://www.opala.org/solid_waste/what_goes_where_table.html#deadanimals.

[184] City and County of Honolulu. 2017. "Household Hazardous Waste." Accessed on December 8, 2017. http://www.opala.org/solid_waste/Household_Hazardous_Waste.html.

stations, or through bulky item pickup) and community cleanup events.[185] In FY 2017, approximately 42,000 tires were received and combusted at H-POWER.[186]

Tires that are not sent to H-POWER are collected by a tire-recycling contractor. Tires may then be used to generate tire-derived fuel or undergo retreading. Scrap tires would be a good candidate for an EPR program, which would ensure adequate funding for recycling and proper disposal.

All other scrap tires, island-wide, obtained from commercial and government entities are required to be properly disposed of and recycled in accordance with state regulations. HRS Section 342I-22 prohibits the discard or disposal of a motor vehicle tire by said entities except by delivery to any motor vehicle tire retailer, tire wholesaler, or to an authorized tire collection or authorized tire recycler.

5.3.10 White Goods

White goods are household and industrial appliances, such as stoves, refrigerators, dishwashers, hot water heaters, clothes washers, and dryers that are less than 3 cubic feet in volume. White goods requiring disposal are generated in both the residential and commercial sectors. Refrigerators, freezers, heat pumps, and air conditioners contain refrigerants, some of which are regulated under the Clean Air Act Amendments of 1990 because they deplete the ozone layer and require special handling. Most white goods have significant metal quantities, which are recyclable. State regulations prohibit the disposal of unprocessed white goods at disposal facilities, and the EPA regulates the disposal of chlorofluorocarbon-containing items. As such, refrigerators, freezers, heat pumps, and air conditioners that contain refrigerant have been banned from disposal at WGSL and H-POWER.

The City provides residents several options to ensure that white goods are properly disposed of. Residents can set their bulky items out for collection in the City's monthly curbside collection service, or make an appointment for bulky item pickup if located in the metro Honolulu pilot study area. Residents can also self-haul and dispose of up to two large appliances per month at City convenience centers or transfer stations. Appliances containing refrigerant are separated by City crews and taken to a white goods processor who removes, reclaims, and recycles the refrigerant. The resulting scrap metal is sent to a metal recycler and the non-recyclable residue is sent to WGSL for disposal; the City's recent waste composition study estimated about 21,800 tons of auto shredder residue were disposed of at WGSL in 2017. In FY 2017, over 85,000 white good items were disposed of by the Refuse Division through its residential drop-off and collection programs.[187]

Residents are also educated about reuse organizations that will accept reusable white goods on opala.org or in response to telephone inquiries to the Refuse Division. Residents purchasing new appliances are encouraged to arrange for appliance dealers to remove old appliances when they deliver new ones. Commercial entities are directed to deliver white goods directly to a recycler.

5.3.11 Abandoned and Derelict Vehicles

The primary origins of abandoned and derelict vehicles are private individuals; vehicles are abandoned in vacant lots, backyards, and on the street. Abandoned vehicles pose environmental problems and provide vector habitats.

Abandoned and derelict vehicles on City-owned streets are managed by the City's Department of Customer Service.[188] The City funds the abandoned and derelict vehicle program through the Highway Beautification and Disposal of Abandoned Vehicles Revolving Fund. The source of this fund is vehicle

[185] City and County of Honolulu. 2017. *Audit of the City's Recycling Program.* Report No. 17-06. October.
[186] Covanta Energy. 2017. *Covanta Honolulu Resource Recovery Venture, 2016-2017 Annual Solid Waste Report.* July 31.
[187] Obtained from Recovery FYs15.16.17.xlsx. City and County of Honolulu.
[188] Information provided by Refuse Division staff. December 15, 2017.

certificates of registration ($7 per vehicle), and is primarily used for the beautification of highways and handling of abandoned vehicles.[189]

Residents can report abandoned vehicles online, by phone, and through the 311 mobile application.[190] If the abandoned automobile is located on a City street, City staff will mark the vehicle for towing after 24 hours. The vehicle is then hauled to a yard where, if unclaimed after 90 days, it is auctioned. Abandoned vehicles reported on private or state- or federally owned properties are not handled by the City, and these reports are forwarded to the respective agencies.[191]

Abandoned and derelict vehicles, if not auctioned, are ultimately processed for disposal at a metals recycler. Recycling residue from these operations is taken to WGSL for disposal.[192]

5.3.12 Construction and Demolition Debris

Residents serviced by the Refuse Division are allowed to place limited quantities (up to 1 cubic yard) of C&D debris at the curbside for collection in the City's monthly bulky item collection service, or make an appointment for bulky item pickup if located in the metro Honolulu pilot study area.[193] Residents are also allowed to take certain types and quantities of C&D material (except for rock, dirt, and concrete) to the City's convenience centers and transfer stations.[194] Residents may deliver rock, dirt, and concrete to WGSL (no combustible debris accepted at WGSL), but are limited to a maximum of two loads per day and four loads per week.[195]

Since January 2003, commercial haulers have been precluded from delivering loads containing any C&D debris to City facilities. Commercial haulers are directed to the PVT Landfill for the disposal of C&D materials. The following businesses and organizations also recycle or reuse C&D debris on the island:

- Island Demo
- Schnitzer
- West Oahu Aggregate Co., Inc.
- Grace Pacific
- Re-use Hawaii
- Nanakuli Housing Corporation
- Tajiri Lumber

In 2014, a new reuse and recycling system came online at the PVT Landfill to divert C&D debris away from disposal at the landfill. This addition has given the PVT Landfill the ability to process up to 1,775 tons of material per day, diverting up to 80 percent for reuse and recycling. The PVT Landfill is planning a new gasification facility that would be able to burn feedstock, including material accepted at and recovered from the landfill, for energy production.[196] The PVT Landfill is also currently excavating and reclaiming buried waste at their landfill for recycling. It is anticipated that this effort will be completed by year 2021, and a total of 4 million cubic yards will be excavated and reclaimed.[197]

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[189] City and County of Honolulu. 2016. *The Executive Program and Budget, Fiscal Year 2017*. Volume 1. Final. March 2. http://www.honolulu.gov/rep/site/bfs/bfs_docs/FINAL_Volume_1_Operating_Program_and_Budget_FY_2017.pdf.

[190] City and County of Honolulu, Department of Customer Services. 2019. "Abandoned Vehicle Report." Accessed on October 28, 2019. http://www11.honolulu.gov/csdavcomplaints/.

[191] Information provided by Refuse Division staff. November 17, 2017.

[192] Information provided by Refuse Division staff. December 15, 2017.

[193] Ibid. December 15, 2017.

[194] City and County of Honolulu. 2017. "Drop-Off Convenience Centers for Refuse and Recycling." Accessed on December 6. http://www.opala.org/solid_waste/Drop_off_Centers_for_Refuse.html#waimglch.

[195] City and County of Honolulu. 2017. *City no longer accepting household combustibles at landfill*. Accessed on December 8. https://www.honolulu.gov/rep/site/env/wwm_news_2017/170315_City_restricting_combustibles_from_WGSL.pdf.

[196] PVT Land Company. 2017. "When is a landfill more than a landfill?" Accessed on December 8, 2017. http://www.pvtland.com/landfill/.

[197] Information provided by PVT Land Company Limited. November 21, 2018.

In the past, some C&D debris generated on Oahu is known to have been dumped in non-permitted and illegal locations. When C&D wastes are disposed of in non-permitted illegal dump sites, other (potentially hazardous) materials may also be included that can degrade water quality. In addition, illegal dump sites may be located in areas where landfilling is prohibited by the Board of Water Supply, which is concerned about leakage and runoff from the sites degrading the underground aquifers that are the source of the City's water supply.

The City's Departments of Environmental Services, Planning and Permitting, and Facility Maintenance, along with DOH, work cooperatively to address illegal dumping and will target C&D debris as well as other illegally disposed materials. The City has implemented the Environmental Concern Line (808-768-3300) where citizens can report any type of illegal dumping. City staff will evaluate the information from the caller and depending on the location of the dumping, will notify the appropriate responsible parties to address the problem.[198] The DOH has the responsibility to permit and enforce the regulations for C&D disposal sites, both legal and illegal.

The City will continue to direct commercial and business generated C&D waste away from WGSL and H-POWER to the PVT Landfill for disposal and recycling. Only residents are allowed to dispose of limited types and quantities at convenience centers, transfer stations, and WGSL, with restrictions on commercial and business C&D material enforced through signage and City disposal-site monitoring.[199] Having an aggressive program to monitor and divert C&D waste from landfill disposal is a high-priority waste management strategy for the City. In banning C&D waste from the WGSL, the City also hopes to encourage commercial generators and haulers to pursue reuse and recycling alternatives.

The City will continue to allow residents to deliver limited types of combustible C&D material to convenience centers and transfer stations. This waste is collected in bins labeled "Combustible" and sent to H-POWER.

In 2017, the Honolulu City Council began developing an ordinance requiring construction companies to estimate the amount of C&D materials that may be generated by their project and to identify the specific disposal site to be used or amount reused to get a building permit. The intent behind requiring builders to submit a C&D debris recovery plan is to encourage recycling and reuse of materials. If the policy is implemented, the City may need to add staff to verify compliance with the recovery plan. Evaluation of this potential program is ongoing, but the proposed bill was deferred in a May 2017 hearing with the City Council's Committee on Public Works, Infrastructure and Sustainability.[200]

On January 3, 2018, Resolution 18-3 was introduced, advocating that City contracts for C&D projects require that no less than 30 percent of C&D debris generated will be recycled or reused.[201] This resolution was deferred in a January 2018 hearing with the City Council's Committee on Public Works, Infrastructure and Sustainability.[202]

The SRWG can also explore the effectiveness of deconstruction strategies and deconstruction versus demolition permit classifications. This may result in more effective reuse of C&D debris.

In 2012, the City reported that 110,000 tons of asphalt and 70,000 tons of concrete were recycled, and that the quantity recycled continues to increase.[203] The City will continue to incorporate the reuse of asphalt and concrete in its projects whenever appropriate.

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[198] City and County of Honolulu. 2017. "Illegal Dumping." Accessed on December 8, 2017. http://www.opala.org/solid_waste/Stop_Illegal_Dumping.html.

[199] City and County of Honolulu. 2013. *2013 Interim Status Report on the Integrated Solid Waste Management Plan (2008)*. December 16.

[200] City and County of Honolulu. 2017. *Minutes for the May 3, 2017 Meeting of the Committee on Public Works, Infrastructure and Sustainability*. June 28. http://www4.honolulu.gov/docushare/dsweb/Get/Document-195413/050317%20Committee%20on%20Public%20Works%2c%20Infrastructure%20and%20Sustainability%20Adopted%20Minutes.pdf.

[201] City and County of Honolulu. 2018. Resolution No. 18-3. January 3.

[202] City and County of Honolulu. 2018. Resolution Status/Text 2018. Accessed September 11, 2018. http://www4.honolulu.gov/docushare/dsweb/View/Collection-2861.

[203] City and County of Honolulu. 2013. *2013 Interim Status Report on the Integrated Solid Waste Management Plan (2008)*. December 16.

In contrast to the 2008 ISWMP, the City is not currently seeking to site a new C&D landfill on the windward side of the island. Instead, the City's current goal is to not require a daily-use landfill and to redirect as much material away from landfill disposal.[204]

5.4 Strategies for Additional Special Waste Management

Existing programs as strategies for additional special waste management are not discussed further in this section, unless there is a specific change recommended for that existing program. The City should continue to support existing special waste management programs and activities and also consider the strategies in the following sections.

5.4.1 Evaluate Collection of an Expanded Variety of Battery Types

The City may begin to accept an expanded variety of battery types (such as lithium ion) at convenience centers and transfer stations. More information is provided in Section 8.

5.4.2 Solicit Proposals for the Beneficial Reuse of Ash

In 2008, the City advertised two RFPs for the beneficial reuse of bottom ash and fly ash. At the time, there was no award given, as there were no viable offers. Despite the previous result, the City issued a new RFP in early 2018 for a beneficial reuse technologies project for ash that could significantly reduce the need for ash landfill disposal. The RFP will be reissued in early 2019 in an attempt to solicit a greater number of eligible offers. The technology to process ash for beneficial reuse has advanced somewhat, and this RFP will provide information about the feasibility of such a project at this time. Assuming receipt of a successful proposal, the City anticipates awarding a contract in 2019.[205]

The beneficial reuse project for ash would take place in a building that is part of a new refuse facility being constructed in Campbell Industrial Park, Kapolei, on City-owned property adjacent to the H-POWER property. This facility will add refuse processing capacity to the island, and will include a new convenience center, multi-purpose warehouse (known as the Solar Building because it will have photovoltaic panels on the roof), a building that will house a facility that will process glass into a beneficial reuse material, and a building that will house a facility that will process H-POWER ash into a beneficial reuse material.[206]

5.4.3 Investigate Potential of Sending Agricultural Waste to H-POWER

To improve landfill diversion efforts, the City plans to investigate with Covanta the potential of handling agricultural wastes such as dead animals at H-POWER.[207]

5.4.4 Investigate Landfill Diversion of Medical Sharps

No additional strategies have been identified as medical waste is currently handled adequately in the private sector. However, City staff will work with medical waste generators and processors to investigate methods in which treated medical sharps can be diverted away from disposal at WGSL.[208]

5.4.5 Work with State Regulators to Allow for Disposal of Additional Tires

The City would like to work with state regulators to send all City Government-derived tires to H-POWER for processing. Currently, there are restrictions on H-POWER processing only Refuse Division-collected tires (from convenience centers, transfer stations, and bulky item pickup). It should be noted, however,

[204] Information provided by Refuse Division staff. December 15, 2017.
[205] Information provided by Refuse Division staff. September 5, 2018.
[206] Ibid. November 6 and December 19, 2017.
[207] Ibid. December 15, 2017.
[208] Ibid. December 15, 2017.

that most tires shipped off-island are recycled for use as tire-derived-fuel on the mainland to generate electricity.[209]

5.4.6 Solicit Proposals for the Recycling of White Goods

The new City refuse facility being constructed in Campbell Industrial Park, Kapolei, is planned to incorporate a white goods facility (within the Solar Building) to handle and process all white goods collected and received through Refuse Division programs.[210] In early 2019, the City plans to solicit proposals for recycling and processing of white goods at this new facility. Assuming receipt of a successful proposal, the City also anticipates awarding a contract in mid-2019.[211] White goods collected and processed by commercial entities will continue to be processed in the private sector, and they will not be affected by the City's project.[212]

5.4.7 Solicit Proposals for the Beneficial Reuse of Auto Shredder Residue

Along with the RFP for ash and residue, proposals for the beneficial reuse of auto shredder residue (i.e., ASR) generated from the scrap automobile recycling process and other metal recycling processes were solicited in early 2018. Assuming receipt of a successful proposal, the City anticipates awarding a contract in 2019. This RFP is part of the City's ongoing efforts to increase landfill diversion.[213]

5.5 Action Item Summary

The City is currently planning for several initiatives to continue diverting landfilled waste to reuse or recycling alternatives, as well as to optimize existing waste capacities and processes. In the long-term, the City's goal is to pursue ongoing implementation of diversion and conversion practices so that landfill developments will no longer be required. The action items for special wastes are summarized in Table 5-1.

Table 5-1. Special Wastes Action Item Summary

Special Waste	Action Item	Initiative Status	Implementation Dates
Asbestos	Continue to evaluate any new recycling or disposal approaches that become available	Ongoing	FY19-FY28
Used Motor Oil	Continue to educate about and promote existing program	Ongoing	FY19-FY28
PCS	Continue to evaluate any new recycling or disposal approaches that become available	Ongoing	FY19-FY28
Lead Acid Batteries	Continue to educate about and promote existing program	Ongoing	FY19-FY28
Combustion Ash	Continue to work with DOH and H-POWER on programs to divert ash from landfill disposal	Ongoing	FY19-FY28
	Solicit proposals for beneficial reuse technologies for ash	Ongoing	FY19
	Work through DOH permitting to allow WGSL to balance the MSW and ash portions of the landfill	Ongoing/Planned	FY19-FY20
	Continue to design, permit, and construct the new refuse facility in Campbell Industrial Park, Kapolei, to house the ash processing facility	Planned	FY19-FY21

[209] Ibid. December 12 and 15, 2017.
[210] Ibid. November 6, 2017.
[211] Ibid. September 5, 2018.
[212] Ibid. December 15, 2017.
[213] Information provided by Refuse Division staff. September 5, 2018.

Table 5-1. Special Wastes Action Item Summary

Special Waste	Action Item	Initiative Status	Implementation Dates
Sewage Sludge	Continue working with Synagro and DOH to process biosolids pellets for use in a wide range of applications	Ongoing	FY19-FY28
	Continue City long-term plans to convert all WWTP sludge to biosolids for use as fertilizer as the first management option	Ongoing	FY19-FY28
	Continue to work with Hawaii Kai WWTP to have sludge from there made acceptable for H-POWER disposal	Ongoing	FY19
Agricultural Waste	Investigate the potential of handling certain agricultural waste at H-POWER	Planned	FY19-FY20
Medical Waste	Continue to educate about and promote existing program	Ongoing	FY19-FY28
	Investigate methods to divert treated medical sharps from disposal at WGSL	Planned	FY19-FY20
Scrap Tires	Continue to educate about and promote existing program	Ongoing	FY19-FY28
	Work with state regulators to allow for disposal of all waste tires managed by the City at H-POWER	Planned	FY19-FY20
White Goods	Continue to educate about and promote existing program	Ongoing	FY19-FY28
	Solicit proposals for recycling of white goods at the planned refuse facility site adjacent to H-POWER property	Planned	FY19
Abandoned and Derelict Vehicles	Continue to educate about and promote existing program	Ongoing	FY19-FY28
	Solicit proposals for beneficial reuse technology of ASR	Planned	FY19
C&D Debris	Continue to enforce the ban of commercial and business C&D debris from WGSL	Ongoing	FY19-FY28
	Continue to enforce the ban of burnable resident-generated C&D debris from WGSL	Ongoing	FY19-FY28
	Continue to evaluate a potential policy to require builders to submit a C&D debris recovery plan with building permit applications	Ongoing	FY19-FY28

6. Household Hazardous Waste and Electronic Waste

HHW, along with electronic waste (or e-waste), can pose a risk to public health and the environment when managed improperly. The safe handling and proper disposal of these materials plays an important role in minimizing these risks. Reducing the generation of HHW and e-waste at the source also plays a significant role in their management. In addition, management and recycling of e-waste can result in economic benefit from recovery of the high value of materials within electronics and prevention of environmental pollution.

6.1 Goals and Objectives

The City's goals for the management of HHW and e-waste are as follows:

- Minimize disposal of HHW and used electronics at H-POWER and WGSL
- Minimize the cost to manage or recycle HHW and used electronics
- Increase the repair, reuse, and recycling of e-waste
- Continue to meet City National Pollutant Discharge Elimination System (NPDES) permit obligations by providing HHW collection events, thereby preventing disposal of HHW into storm drains or into the environment

Each of these waste types is separately discussed in the sections that follow.

6.2 Household Hazardous Waste

6.2.1 Background

6.2.1.1 Legislative

Hazardous waste is defined in Hawaii Revised Statutes (HRS) Section 342J-2 as follows:

> *"Hazardous waste" means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may:*
>
> *(1) Cause or significantly contribute to an increase in mortality or an increase in a serious irreversible or incapacitating reversible illness; or*
>
> *(2) Pose a substantial existing or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.*[214]

Household-generated waste is not considered hazardous waste under federal Resource Conservation and Recovery Act (RCRA) rules (40 Code of Federal Regulations [CFR] Part 261.4) and State Hazardous Waste Management rules (Hawaii Administrative Rules [HAR] Title 11, Chapter 261.1), and as such, is exempt from regulation under these rules. 40 CFR Part 261.4(b)(1) and HAR Section 11-261.1-4(b)(1), incorporating and amending 40 CFR Part 261.4(b)(1), define household waste as follows:

> *"Household waste" means any material (including garbage, trash and sanitary wastes in septic tanks) derived from households (including single and multiple residences, hotels and motels,[*[215]*] bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds and day-use recreation areas).*

[214] See also HAR Section 11-261.1-3.

[215] Although wastes generated by hotel guests are non-hazardous and are not regulated under hazardous waste rules, hazardous wastes generated by hotel activities and operations are regulated. See the DOH Solid and Hazardous Waste Branch's "Regulatory Education: Hotels Bulletin" at http://health.hawaii.gov/shwb/p2/.

While not covered by hazardous waste regulations, some components of household-generated waste may pose human health or environmental hazards when improperly managed. According to HRS Section 342G-1, "household hazardous waste" is defined as follows:

> *"Household hazardous waste" means those wastes resulting from products purchased by the general public for household use which, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may pose a substantial known or potential hazard to human health or the environment when improperly treated, disposed of, or otherwise managed.*

Also exempt under the federal (40 CFR Part 261.5) and state (HAR Section 11-261.1-5, incorporating and amending 40 CFR Part 261.5) rules are conditionally exempt small quantity generators (CESQGs). CESQGs are small businesses that generate 100 kilograms or less (approximately 220 pounds, or 25 gallons) of hazardous waste per month. As commercial generators, CESQGs are referred to the DOH for guidance on proper disposal of hazardous waste.

Federal Universal Waste regulations (40 CFR Part 273) streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (e.g., thermostats), and lamps (e.g., fluorescent bulbs). The rule is designed to reduce hazardous waste in the MSW stream by making it easier for universal waste handlers to collect these items for recycling or proper disposal. Per the state Universal Waste rules (HAR Section 11-273.1-8, incorporating and amending 40 CFR Part 273.8), certain household wastes and CESQG wastes in the following categories can be managed as universal wastes under HAR Section 11-273.1: batteries, pesticides, mercury containing equipment, lamps, and electronic items. Universal waste quantities are not necessarily counted towards hazardous waste quantities when determining the type of generator (i.e., CESQG, small quantity generator, or large quantity generator); however, these commercial generators are referred to the DOH for guidance on proper disposal of universal and hazardous waste.

6.2.1.2 Current Waste Diversion

Approximately 6,200 gallons of HHW were diverted during the City's six HHW collection events in FY 2017.[216] More than 650 appointments were scheduled in FY 2017, amounting to an approximate 14 percent increase from FY 2016. According to the *2017 Waste Composition Study* prepared by Cascadia Consulting Group, HHW makes up less than 1 percent by weight of the waste stream going to H-POWER or WGSL.[217]

6.2.2 Existing Programs

Proper management of HHW is essential to protect the health and welfare of the public. The City provides residents with detailed information on waste prevention, safe handling, and proper disposal of HHW on its opala.org website. Many types of HHW can be safely disposed of in the City's existing refuse and sewage systems. For HHW requiring special handling, drop-off events are also hosted by the City every other month to collect these materials.

6.2.2.1 Public Education

The City's website provides extensive information regarding the safe handling and disposal of HHW. The City's Refuse and Wastewater Treatment divisions collaborated to determine the most appropriate approach for managing over 60 products; a discussion of the management strategies for these products can be found at opala.org.[218] This detailed level of public education allows residents to focus on proper

[216] Obtained from 3049 HHW Recovery.xls. City and County of Honolulu.

[217] Cascadia Consulting Group. 2018. *2017 Waste Composition Study*. Final. June.

[218] City and County of Honolulu, Department of Environmental Services. 2018. "Household Hazardous Waste: Hazardous Products and Guidelines." http://www.opala.org/solid_waste/Household_Hazardous_Waste.html#guide.

management of each material based on its potential impact on public health and the environment.[219] Households with large quantities of any type of hazardous waste should contact the Refuse Division for disposal instructions.

The website also provides extensive tips to minimize the use of hazardous products and prevent the need to dispose of HHW. The website provides guidance on how to use less, use the entire container for intended purposes, and use non-hazardous alternatives to products that would become HHW, with the goal of significantly reducing the generation of this type of waste at the source.[220]

6.2.2.2 Collection Events

For HHW that residents cannot dispose of safely on their own, the City hosts an HHW collection event every other month. Residents can dispose of HHW that requires special handling during these collection events by calling the Refuse Division's Household Hazardous Waste Line at 808-768-3201 to schedule an appointment. The following materials are accepted during these events:

- Acetone
- Arsenic
- Boric acid
- Chlordane
- Compact fluorescent lights – large quantities
- Dichlorodiphenyltrichloroethane (DDT)
- Dieldrin
- Fertilizers (liquid)
- Fluorescent tubes – large quantities
- Formaldehyde
- Gasoline
- Herbicides
- Hydrochloric acid
- Insecticides
- Kerosene
- Lead
- Lighter fluid
- Malathion
- Mercury
- Paint stripper
- Paint thinner
- Paraquat
- Pentachlorophenol
- Paris green
- Photographic chemicals
- Rust remover
- Solvents
- Swimming pool chemicals
- Turpentine
- Varathane
- Wood preservatives

The City contracts with a private company for receiving, verifying via field testing, segregating, packaging, transporting, and disposing of RCRA-exempt HHW received during these collection events. The contractor also provides the receiving site. The City plans to continue contracting with a private company to collect and process HHW.[221]

Dates for upcoming HHW collection events are advertised on opala.org. Upcoming dates for and materials accepted at HHW events are also advertised prior to every other event (three times a year) in the Honolulu Star-Advertiser and MidWeek publications.

[219] The City is also required to implement public education and outreach programs focused on reducing polluted runoff as a component of the City's Storm Water Management Plan (SWMP). The City is required to develop and implement an SWMP because Oahu's storm drain system is regulated under an NPDES permit. Additional information about the City's NPDES permit and SWMP is available on the City's website at https://www.honolulu.gov/dfmswq/aboutus.html.

[220] City and County of Honolulu, Department of Environmental Services. 2018. "Household Hazardous Waste: Waste Prevention Tips." http://www.opala.org/solid_waste/Household_Hazardous_Waste.html#tips.

[221] Collection and recycling of certain HHW materials, such as used oil and lead-acid batteries, are described in more detail in Sections 4 and 5.

6.2.2.3 Monitor Quantities Collected and Costs Associated with HHW Collection Program

The City continues to evaluate the HHW collection program to ensure that it meets the needs of residents on Oahu. Factors considered in optimizing the program include the following:

- Are there more residents who call for appointments than the 200 homeowners the contractor is required to handle during each collection event?
- Is the volume of HHW being collected increasing or decreasing at each event and over time? Is the current system the most cost-effective system?
- Are the advertisement and promotion strategies effectively reaching the maximum number of residents possible?

The City's HHW program provides Oahu residents with a convenient and no-cost opportunity to dispose of a waste that could impact public health and the environment if disposed of improperly or illegally. It is imperative that funding be maintained for this type of program to continue to protect the health and welfare of the public and the island. In the future, the City may consider imposing or collecting fees on items such as batteries and tires to ensure adequate funding for HHW programs.

6.2.3 Strategies for Expansion of HHW Programs

No new strategies are recommended for managing HHW as a whole; however, the City is evaluating the feasibility of accepting an expanded variety of battery types at convenience centers and transfer stations (more detail on this initiative is provided in Section 8).

6.3 Electronic Waste

6.3.1 Background

6.3.1.1 Legislative

Used electronics or e-waste includes discarded computers, cell phones, televisions and other electronic products. Those with cathode ray tubes (CRTs), such as color computer monitors and televisions, are considered hazardous when discarded because of the presence of lead in the CRT. Lead is not considered an environmental problem while the monitor or television is intact; however, the lead can leach out when these products are compacted or broken and create an environmental hazard. Liquid crystal displays (LCDs) from flat screen panels and laptop computers are also considered hazardous by the State of Hawaii.[222]

In addition to lead, electronics can contain chromium, cadmium, mercury, beryllium, nickel, zinc, and flame retardants. When electronics are not disposed of or recycled properly, these toxic materials can present problems.

The Hawaii Electronic Waste and Television Recycling and Recovery Law (HRS Chapter 339D) was adopted in 2008 and requires electronics manufacturers to provide recycling programs for televisions, computers, computer printers, computer monitors, and portable computers. According to HRS Section 339D-1, "covered electronic device" and "covered television" are defined as follows:

> *"Covered electronic device" means a computer, computer printer, computer monitor, or portable computer with a screen size greater than four inches measured diagonally.*[223]

[222] HAR Section 11-273.1.

[223] Excludes telephones and covered electronic devices that are part of factory-assembled motor vehicles; part of larger equipment intended for industrial, commercial, or medical use; and contained within appliances.

> *"Covered television" means any device that is capable of receiving broadcast, cable, or satellite signals and displaying television or video programming, including without limitation any direct view or projection television with a viewable screen of nine inches or larger with display technology based on cathode ray tube, plasma, liquid crystal, digital light processing, liquid crystal on silicon, silicon crystal reflective display, light emitting diode, or similar technology marketed and intended for use by a household.*[224]

As discussed in Section 6.2.1.1, some electronic items can be managed as universal wastes under HAR Section 11-273.1.

Because the quantities of e-waste have been rapidly increasing, many state and local governments are experimenting with collection, donation, and recycling of used electronic products, as well as ways to involve producers of electronics in helping to recover these products at end-of-life. While electronics manufacturers are required to provide recycling programs for the covered devices identified above at no cost to residents, there is currently no legislation in Hawaii regulating the disposal or requiring the recycling of household electronics. Household electronics can be disposed of with MSW or during bulky item collection. Large quantity (over 1,000 kilograms [kg] per month or approximately 2,200 pounds) generators of e-waste cannot dispose of these materials at WGSL or H-POWER and must follow hazardous waste rules (40 CFR Part 261.3, as incorporated and amended in HAR Section 11-261.1-3) if the amounts of lead, mercury, cadmium, chromium, or similar cause them to test hazardous under state and federal laws.

6.3.1.2 Current Waste Diversion

As shown in Table 4-1, approximately 2,000 tons of electronic scrap were recycled in 2017. According to the *2017 Waste Composition Study*, e-waste makes up approximately 1 percent by weight of the island's waste stream.[225]

It is anticipated that the number of electronic items being discarded will continue to increase in the future with advances in technology.

6.3.2 Existing Programs

The City provides residential and commercial generators of e-waste with detailed information on reuse, recycling, and proper disposal of e-waste. Commercial generators are banned from disposing of e-waste on Oahu and must work with manufacturers, retailers, private e-waste recyclers, and/or the DOH to find an alternative. Residents are allowed to dispose of e-waste with residential MSW or during bulky item collection, but are encouraged to take advantage of recycling options. E-waste management will become increasingly important as the amount generated increases over time. Additional information regarding available recycling programs is provided in the following sections.

6.3.2.1 Residential Generators

Residential electronics are not banned from disposal with MSW. However, residents are encouraged to find alternatives. It should be noted that H-POWER can process this material in compliance with state and federal laws, and that the metal parts of electronics are recycled. Options for residents to donate computer equipment to local organizations for reuse, drop off e-waste with local e-waste recyclers, and take advantage of manufacturer take-back programs are listed on the City's website at opala.org.[226] Available information includes the types of items accepted, drop-off locations and pickup options, and

[224] Excludes computers, computer printers, computer monitors, portable computers, telephones, global positioning systems, and covered televisions that are part of factory-assembled motor vehicles and larger equipment intended for industrial, commercial, or medical use.

[225] Cascadia Consulting Group. 2018. *2017 Waste Composition Study*. Final. June; E-waste in this reference includes covered electronic devices and non-covered electronic devices.

[226] City and County of Honolulu, Department of Environmental Services. 2019. "E-waste (Electronic Waste)." https://www.opala.org/solid_waste/eWaste.html.

contact information. Some organizations offer e-waste recycling at no cost to residents, while others charge a disposal fee. Residents are encouraged to contact the manufacturer or retailer directly if information regarding a specific item is not available on the City's website.

As required by the Electronic Device and Television Recycling Law, manufacturers must take covered electronics back at no cost to residents when dropped off for recycling. A list of manufacturer recycling programs for covered electronics is available on the DOH website at health.hawaii.gov/ewaste/.[227]

The City also encourages residents to re-use old products and rethink purchasing decisions to reduce the generation of e-waste. The City will continue to update information on opala.org regarding disposal procedures for used electronics, including old computers and cell phones, and will continue to promote manufacturer take-back programs.

6.3.2.2 Commercial Generators

The City enacted a disposal ban on electronics for commercial and government generators (effective July 2006).[228] These generators are directed to seek recycling alternatives by contacting the DOH or one of the reuse organizations, computer manufacturers, retailers, or private e-waste recyclers listed on the City's website.

The City maintains updated information at opala.org regarding alternatives to disposing of e-waste. The site lists the local non-profit agencies that are interested in receiving used computers, as well as the computer manufacturers (e.g., Dell, Gateway, Hewlett-Packard, and IBM) that provide recycling or trade-in services.[229]

6.3.3 Strategies for Expansion of E-Waste Programs

As discussed in Section 6.3.2, the City is currently promoting proper management of e-waste through a variety of existing programs. The City will continue to promote these programs and activities. Existing programs are not discussed further as far as strategies for increasing proper management of e-waste, unless there is a specific change recommended for that existing program.

6.3.3.1 Producer Responsibility

The City will advocate for the state legislature to develop a state-wide solution and funding source to address the growing e-waste problem as opportunities arise and as appropriate. As part of this effort, the City will encourage the state legislature to consider an ADF to generate a fee on the sale of electronics to support end-of-life management. The SRWG, as mentioned in Section 3, can assess the necessary tasks and state bills needed to further producer responsibility.

Note that the EPA is evaluating strategies to enhance the management of electronics throughout the product lifecycle in support of the *National Strategy for Electronics Stewardship*.[230] EPA also collaborates with governments and environmental officials around the world on e-waste management through the International E-Waste Management Network (IEMN). The IEMN hosts annual meetings to discuss global advances in e-waste management.[231] The City is not alone in recognizing the challenges associated with proper e-waste management or evaluating strategies to expand upon current e-waste management programs.

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[227] DOH. 2018. "Electronic Device and Television Recycling Law." http://health.hawaii.gov/ewaste/.

[228] City and County of Honolulu, Department of Environmental Services. 2018. "E-waste (Electronic Waste)." http://www.opala.org/solid_waste/eWaste.html.

[229] City and County of Honolulu, Department of Environmental Services. 2018. "E-waste (Electronic Waste)." http://www.opala.org/solid_waste/eWaste.html.

[230] Interagency Task Force on Electronics Stewardship. 2011. National Strategy for Electronics Stewardship. https://www.epa.gov/smm-electronics/national-strategy-electronics-stewardship-nses.

[231] EPA. 2018. "Cleaning Up Electronic Waste (E-Waste)." Accessed on January 30. https://www.epa.gov/international-cooperation/cleaning-electronic-waste-e-waste.

6.3.3.2 Bi-Monthly E-Waste Drop-Off Program

The City is considering implementing bi-monthly e-waste drop-off events to increase e-waste recycling options for residents. It is anticipated that that the program could be paired with HHW collection and would include drop-off with the City's e-waste recycling vendor and/or at transfer stations.

6.4 Action Item Summary

Without the ability to direct waste through flow control to safe, environmentally acceptable and cost-effective facilities, the improper or illegal disposal of specific components of HHW and e-waste could cause harm to public health and the environment.

The action items that the City has already implemented or plans to implement to encourage effective management of HHW and e-waste are summarized in Table 6-1.

Table 6-1. HHW and E-Waste Action Item Summary

Material Type	Action Item	Initiative Status	Implementation Dates
HHW	Continue to promote waste prevention, safe handling, and proper disposal of HHW through the City's website, opala.org	Ongoing	FY19-FY28
	Continue to host every-other-month collection events for HHW	Ongoing	FY19-FY28
	Continue to monitor quantities collected and per-ton costs associated with HHW collection events and evaluate cost effectiveness	Ongoing	FY19-FY28
E-waste	Continue to update information on opala.org regarding disposal procedures for residential and commercial generators discarding used electronics	Ongoing	FY19-FY28
	Continue to promote manufacturer take-back programs	Ongoing	FY19-FY28
	Urge the state legislature to develop a state-wide solution and funding source to address the growing e-waste problem	Planned	FY19-FY20
	Encourage the state legislature to consider an Advanced Disposal Fee for electronics	Planned	FY19-FY20
	Implement bi-monthly e-waste drop-off events	Planned	FY22-FY28

7. Public Education

Public education is instrumental to increasing awareness and compliance with solid waste and recycling related policies, programs, and procedures. It can be achieved through many means, including printed materials, digital and online media, presentations, and enforcement.

7.1 Goals and Objectives

The goals and objectives of the City's solid waste and recycling public education programs are to increase awareness and provide the public with information on the following:

- Strategies for effectively sorting waste
- Options for source reduction, recycling, and bioconversion
- Proper handling of hazardous and special wastes
- Other solid waste related issues

The City's public education programs are designed to reach all sectors of the community, such as residents, businesses, and schoolchildren. This is accomplished using a variety of avenues, including but not limited to the following:

- The City's website, opala.org
- Printed materials
- Media
- School curriculum
- Special events
- A dedicated technical assistance phone line (808-768-3200)

The following sections describe the City's approach to achieve these goals and objectives.

7.2 Background

Per HRS Section 342G-26(g), the public education and information component of the Plan shall describe the programs that the City will use, in coordination with the DOH, to do the following:

- Provide comprehensive and sustained public notice of the options for source reduction, recycling and bioconversion, and for the proper handling of household hazardous and special wastes
- Distribute information and education materials regarding general solid waste issues through the media, schools and community organizations

These requirements dictate the specific elements that are included in this Plan.

In addition to the HRS Plan requirements, there are two City resolutions and an ROH section that are also related to public education on solid waste issues. The City has adopted the following resolutions related to public education:

- Resolution 07-356, which supports implementation of recycling workshops in public schools
- Resolution 07-395, which supports initiation of a curbside recycling education program

To assist with implementation of recycling programs, ROH Section 9-1.9 establishes the Office of the Recycling Coordinator. The recycling coordinator is tasked with the following, in order of priority:

1) Establishment and implementation of recycling education and promotion programs;
2) Establishment and implementation of recycling programs within or by city government;
3) Conduct of research and development of recycling issues and techniques; and
4) Provision of technical assistance concerning recycling.

As presented in the following sections, the City has ongoing programs in place that support public education.

7.3 Existing Programs

The City's public education efforts focus on awareness of existing programs, resources, and tools/regulatory mechanisms that promote waste management, source reduction, and recycling practices on the island. These approaches are similar to the type of programs offered in many communities around the United States. The success of public education efforts is dependent on the effectiveness of the communications describing waste management and recycling activities and the willingness of the community to implement them.

Additional discussion regarding each of the City's existing public education programs is presented in the following sections. Samples of educational materials can be found in Appendix B.

7.3.1 Digital Campaigns

7.3.1.1 Website

The cornerstone of the City's public education program is its website, opala.org. The website is a repository of information on solid waste generation and collection, source reduction and reuse, recycling, bioconversion, and proper handling of HHW and special wastes. Available information includes waste composition data, a "History of Garbage in Paradise," master planning studies and reports, descriptions of recycling programs and operations, photos, graphics, video clips, music, and an archive of local and national news stories on waste and recycling.

The City's website instructs all types of generators (i.e., residents, businesses, schools, and condominium associations) on how to properly manage and reduce their solid waste. It provides residents with information on proper set-out techniques and collection schedules, and contains answers to frequently asked questions. The Media Library page includes educational materials for use by the public such as graphics, recycling songs, and videos; electronic copies of all distributed print materials; links to other City Departments and other environmental programs; and a calendar of events related to solid waste on Oahu.[232] All published materials reference the web address and the information phone line.

In 2017, the City's website garnered an approximate total of 768,000 page views, with the curbside collection schedule the most accessed web page. This page was viewed over 188,500 times, amounting to approximately 25 percent of opala.org traffic. Other highly visited pages were on the topics of refuse drop-off centers and bulky item collection.[233]

7.3.1.2 WasteLine Blog and e-Newsletter

WasteLine is a blog and quarterly e-newsletter that is updated regularly by City staff.[234] The publication includes concise notifications and reminders about waste reduction and recycling programs, tips and tricks for being green, and upcoming City solid waste-related studies, projects, and special events. The blog sidebar contains web links to items of interest, such as "Bulky Items," "Business Recycling," and "Household Hazardous Waste," that lead to applicable portions of the City's website.[235] New blog updates are typically broadcast via the City's social media accounts.

[232] City and County of Honolulu, Department of Environmental Services. 2018. "Media Library." Accessed on March 23, 2018. http://www.opala.org/solid_waste/media/Media_Library.html.
[233] Google. 2018. "All Web Site Data: Jan 1, 2017 - Dec 31, 2017."
[234] Information provided by Refuse Division staff. February 13, 2018.
[235] City and County of Honolulu, Department of Environmental Services. 2018. *WasteLine*. https://wasteline.wordpress.com/wasteline-home/.

7.3.1.3 Opalavision

Opalavision is programming content from the Department of Environmental Services that was formerly broadcasted on The Green Channel (Channel 332 and digital channel 1332 under Spectrum). The Green Channel was the first network in the nation to be geared towards environmental awareness in the community. The Department of Environmental Services recently ended the contract with Spectrum for this channel, and programming is no longer funded; however, Opalavision videos can still be found on opala.org. Opalavision consists of a series of short videos featuring local actors teaching and learning about recycling and waste management techniques.[236] A sampling of Opalavision video content includes the following:[237]

- "Curbside Recycling Tip[s]" provides a collection of tips ranging from what to do with your plastic and glass containers to collection schedules and convenient kitchen advice
- "It's So Easy Being Green… With Green Waste" explores proper handling of green waste and shows how compost is made, what it can do, and where citizens can purchase it
- "Trashes to Ashes" explores how trash gets transported to H-POWER and how it turns into electricity
- "Recycled Art Vignette" showcases a local artist explaining how he recycles materials into art pieces
- "Pimp My Ride, City and County Edition" presents a ride-along with a curbside collection truck to learn what goes on along the route and proper bin etiquette, enabling residents to optimize curbside collection

7.3.1.4 Facebook

The City manages a Refuse Division Facebook page, facebook.com/HNL.Opala, to broadcast information and updates about waste and recycling programs and upcoming events. The City strives to update the Facebook page two to three times per week, and often communicates or links the same messages posted on the *WasteLine* blog and other digital platforms.[238] As of September 2018, there were over 120 followers.

7.3.1.5 Twitter

The City also provides real-time solid waste and recycling-related information and updates via a shared Department of Environmental Services Twitter account (@hnl_env). Much of the information posted to the City's Facebook page is also posted to the City's Twitter account. The City strives to use Twitter two to three times per week, and is looking to increase the number of followers. As of September 2018, there were over 500 followers.

7.3.2 Flyers, Handouts, and Other Educational Materials

7.3.2.1 Recycling and Disposal Guide

The City publishes a brochure, *Recycling and Disposal Guide for Oahu*, that provides comprehensive information to residents and businesses on how to recycle and properly dispose of solid waste.[239] The most recent edition of the *Recycling and Disposal Guide*, an 8-page mailer sent to residents and businesses, was published in 2015. This mailer is sent out upon request and is distributed at special events attended by the City. A truncated 1-page guide for sorting refuse into the proper cart is also provided by the City on request or when residents request additional gray carts.

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[236] City and County of Honolulu, Department of Environmental Services. 2018. "The Green Channel." Accessed on February 27, 2018. http://www.opala.org/solid_waste/media/Making_Opalavision.html#opalavision.

[237] OpalaHawaii. 2018. "The Green Channel." Online video clips. *YouTube*. Accessed on February 27, 2018. https://www.youtube.com/playlist?list=PLcUMnSZjqXiDSeTbR9AQm7dJMv_n1KPni.

[238] Information provided by Refuse Division staff. February 13, 2018.

[239] City and County of Honolulu, Department of Environmental Services. 2015. *Recycling and Disposal Guide for Oahu.* http://www.opala.org/solid_waste/pdfs/Rec_Disp_Guide%202015.pdf.

7.3.2.2 "Food: Too Good to Waste" Guide

Another publication by the City, "Food: Too Good to Waste," contains recipes from local food establishments and tips that promote efficient food use to prevent food waste. The most recent version of the booklet, published in 2018, discusses such topics as smart shopping (e.g., identifying the best storage methods and refrigerator organization to keep foods fresher longer), smart storage and preparation (e.g., knowing the area of your refrigerator that is best for different foods and freezing foods that are approaching their end of life), smart eating (e.g., using the "eat me first" sign or repurposing leftovers), and donating excess food.[240]

7.3.2.3 Bring-Your-Own-Bag and Recycling Handy List Stickers

The City distributes free Bring-Your-Own-Bag (BYOB) stickers that can be displayed in obvious places as a self-reminder to bring and use reusable bags when shopping. If requested, the City will mail stickers to residents or residents can pick them up at local partner stores (such as farmers' markets) and events. These stickers serve to complement the City's Plastic Bag Ban by encouraging residents to use reusable bags instead of relying on disposable bags.[241] The City has also been developing banners and working with stores to further promote the BYOB program. The City also distributes Recycling Handy List stickers on request or in response to gray curbside cart requests, which are helpful guides for what items can be put in the blue curbside recycling cart.

7.3.2.4 Activity Books

The City publishes several activity books geared towards students and their families, including *The Opala IQ Book*, *The Spirits of Recycling* Coloring Activity Book, and the *Where Do Things Go?* Coloring Activity Book. These books contain activities such as crossword puzzles, word finders, trivia questions, and coloring pages that aim to educate on source reduction and recycling practices. These activity books are available for download on the City's website; copies may also be ordered for classrooms.[242] The City also distributes these books through partner organizations and, upon request, provides them to educators and schoolchildren throughout the year.[243] In 2017, approximately 2,400 copies of *The Opala IQ Book* and 3,300 copies of *Where Do Things Go?* were distributed.[244] A copy of the *Where Do Things Go?* Coloring Activity Book is provided in Appendix B.

7.3.3 Public Announcements and Updates

7.3.3.1 Print Advertisements

The City has purchased print advertising in local newspapers to discourage illegal dumping and support recycling and source reduction programs. The print advertisements detail City services for solid waste disposal and recycling and encourage the public's participation in programs such as the every-other-month HHW drop-off events and the Tour de Trash.

7.3.3.2 Direct Mailers

The City periodically sends out direct mailers to notify residents of any significant changes to solid waste disposal and recycling programs, and annually mails the over 12,000 businesses that are impacted by its mandatory recycling ordinances (including the plastic bag ban). Businesses receive information on the

[240] City and County of Honolulu, Department of Environmental Services. 2018. "Food: Too Good to Waste." Accessed January 18, 2018. http://www.opala.org/solid_waste/pdfs/Food_Too_Good_to_Waste.pdf.

[241] City and County of Honolulu, Department of Environmental Services. 2017. "'Bring Your Own Bag' Stickers and 'Food: Too Good to Waste' Guides Now Available." *WasteLine*. https://wasteline.wordpress.com/2017/05/17/bring-your-own-bag-stickers-and-food-too-good-to-waste-guides-now-available/. May 17; Information provided by Refuse Division staff. March 16, 2018.

[242] City and County of Honolulu, Department of Environmental Services. 2018. "Educational Tools." Accessed on February 26. http://www.opala.org/solid_waste/learning_center/Educational_Resources_Tools.html.

[243] Information provided by Refuse Division staff. March 16, 2018.

[244] Ibid. August 1, 2018.

requirements and are instructed to complete surveys to confirm compliance.[245] A response rate of up to 60 percent was reached in FY 2017. The City performs follow-up calls to responding businesses when compliance can be improved; however, does not have the resources to ensure a 100 percent response rate.[246]

Examples of a residential curbside collection flyer and a business ordinance tip sheet are provided in Appendix B.

7.3.3.3 Press Releases

In conjunction with direct mailers, the Department of Environmental Services Public Information Office coordinates press releases to discuss major solid waste program changes or announcements. Press releases concerning system changes are sent out three to four times per year. News stations may pick up on the press releases and further promote these items.[247]

7.3.4 School Programs

7.3.4.1 Educational Presentations

To raise awareness of recycling options and programs in the City, the Recycling Branch gives presentations to schools and senior groups. The age group for school presentations typically ranges from preschool-age through sixth grade, with audience sizes ranging from 20 to over 100 students. Topics covered include City solid waste and recycling programs and the 3Rs (reduce, reuse, recycle). In addition to speaking, staff bring print materials, stickers, and pencils to distribute.

In 2017, the Recycling Branch gave 18 educational presentations, reaching approximately 850 people.[248] The City has increased its reach in 2018, presenting to approximately 1,850 people as of mid-2018 (including tours). The City is planning to increase the number of staff that deliver presentations in order to reach more citizens.[249]

In addition, several organizations have been working in conjunction with the City in 2018 to develop a list of schools with high recycling-bin contamination rates. After identification of these schools, a resource packet is planned to be distributed to ensure awareness of accessible on-campus recycling as well as best practices to facilitate recycling.[250]

7.3.4.2 The Learning Center

The Learning Center at opala.org provides students and teachers with recycling projects, field trip ideas, educational tools, graphics, music, and recycled art, plus tips and guidelines for organizing recycling programs and fundraisers. This information repository has been compiled to assist educators in integrating information about recycling and reducing waste into a classroom setting.[251]

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[245] Information provided by Refuse Division staff. March 16, 2018.
[246] City and County of Honolulu, Department of Environmental Services. 2018. Compliance Form Response Rates.xls.
[247] Information provided by Refuse Division staff. February 13, 2018.
[248] Ibid. March 20, 2018.
[249] Ibid. August 1, 2018.
[250] Ibid. August 1, 2018.
[251] City and County of Honolulu, Department of Environmental Services. 2018. "Learning Center." Accessed on February 26, 2018. http://www.opala.org/solid_waste/learning_center/Learning_Center.html.

7.3.4.3 Honolulu Theatre for Youth

Since 2010, the City has partnered annually with the Honolulu Theatre for Youth (HTY) to sponsor and produce a solid waste educational performance workshop titled "Sort It Out."[252] Sort It Out tours 20 to 25 schools per year, educating students on the City's three-cart curbside collection system. HTY coordinates the performance schedule directly with the schools and is requested by the City to target areas with high contamination rates. Through this partnership, the City is able to reach nearly 20,000 elementary and middle school students, their teachers, and some parents, delivering messages on proper and effective solid waste management.[253]

In addition to Sort It Out, the City also partners with HTY on other solid waste and sustainability-themed theatre productions, including their annual Christmas production. Examples include the following:[254]

- "SHOCKA: The Story of Energy in Hawaii," an educational performance on energy culture and challenges in Hawaii
- "A Plantation Celebration," an educational performance on the culture of waste reduction and reuse that is integrated into Hawaii's customs
- "The Spirits of Recycling," an adaptation of *A Christmas Carol* teaching the importance of recycling, featuring the ghosts of recycling past, present, and future

7.3.4.4 School Recycling Project Grant Program

The School Recycling Project Grant Program allows teachers to request up to $100 of recycled products (such as lanyards, hats, and water bottles) for rewards as incentive for students to engage in recycling projects. Teachers can find educational guidance, tools, and materials for use in the classroom on opala.org, and the City promotes educational recycling projects by offering this grant.[255] However, the City has not received funding for this program in the last several fiscal years but hopes to revive the program by requesting funding in the next budget cycle.[256]

7.3.5 Peer Consulting

Peer consultants are representatives of companies with established and successful recycling programs who can provide advice to other companies on how to develop and implement a recycling program. Peer consultant businesses include hotels, restaurants, property management firms, food and beverage operations, and commercial offices.[257] Peer consultants are also available to help businesses purchase products with recycled content. The individuals who serve as peer consultants and their companies often participate in the Tour de Trash, a popular special event consisting of tours of waste management and recycling operations at various facilities.[258] Peer consultants can be contacted directly, or the City can facilitate an introduction. A list of peer consultants and profiles of their model programs can be found on opala.org.[259]

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[252] City and County of Honolulu, Department of Environmental Services. 2013. *2013 Interim Status Report on the Integrated Solid Waste Management Plan (2008)*. December 16.

[253] Information provided by Refuse Division staff. March 16, 2018.

[254] City and County of Honolulu, Department of Environmental Services. 2018. "School Recycling Shows." Accessed on February 27, 2018. http://www.opala.org/solid_waste/learning_center/School_Recycling_Shows.html.

[255] Ibid. "Educational Tools." Accessed on February 26, 2018. http://www.opala.org/solid_waste/learning_center/Educational_Resources_Tools.html.

[256] Information provided by Refuse Division staff. August 1, 2018.

[257] City and County of Honolulu, Department of Environmental Services. 2018. "Peer Consultants." Accessed on February 27, 2018. http://www.opala.org/solid_waste/Partnership_for_the_Environment.html.

[258] Ibid. "Tour de Trash." Accessed on February 27, 2018. http://www.opala.org/solid_waste/Tour_de_Trash.htm.

[259] Ibid. 2018. "Peer Consultants." Accessed on February 27. http://www.opala.org/solid_waste/Partnership_for_the_Environment.html; Ibid. "Model Programs." Accessed on February 27, 2018. http://www.opala.org/solid_waste/Partnership_Model_Programs.htm.

7.3.6 Special Events

The City conducts special events and public education campaigns year-round. The following sections describe the two types of special events that garner the most participants.

7.3.6.1 Tour de Trash

The most popular special event put on by the City is the Tour de Trash. Initiated in 1999, this event consists of four to five free tours per year for citizens to learn about local businesses that are engaged in recycling at many levels. The intent is to transcend lectures, slideshows, and workshops by providing an up-close experience on how waste is managed. Each year the City plans a variety of tours, including the following:[260]

- One tour to water and wastewater treatment facilities
- Two tours to recyclers and waste processors (e.g., H-POWER, RRR, HER, and WGSL) – one during the work week and one on the weekend to allow students and educators to attend
- One tour of green businesses (e.g., Hawaii Convention Center, Sheraton Waikiki, Gyotaku Restaurant, and Whole Foods)

In 2018, Tour de Trash celebrated its 20th anniversary. To mark the milestone, the City conducted an additional tour to visit C&D processors on the island (e.g., Island Demo, West Oahu Aggregate, and the PVT Landfill).[261] This additional tour is planned to be held each year moving forward. The City also added a reuse-focused tour in 2019.

The City also conducts private tours by request for groups that are able to provide their own transportation and meet the age requirements. These tours may consist of H-POWER, RRR, HER, and WGSL.[262]

In 2017, a total of 23 tours (including Tour de Trash and private tours) were conducted, with an estimated attendance of 550 people.[263]

7.3.6.2 Festivals and Other Public Events

The City exhibits at the annual Mauka to Makai Environmental Expo, hosted by the City's Stormwater Quality Branch. This festival commemorates Earth Month and is filled with educational activities and entertainment. At the 10th Annual Mauka to Makai Environmental Expo, the City showcased activity books, brochures, stickers, and a "Wheel of Recycling" with blue cart trivia and prizes.[264] The Division continues to expand its presence at public exhibits and events and, as of 2018, has begun participating in the Hawaii Seniors' Fair – The Good Life Expo, the Walk on the Wild Side event, and many others.[265] The City aims to participate in at least 6 to 10 community events annually.

7.3.7 Public Input and Involvement

The City provides a number of opportunities for the public to provide input on matters related to solid waste management on Oahu. The various opportunities are further discussed in the following sections.

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[260] City and County of Honolulu, Department of Environmental Services. 2018. "Tour de Trash." Accessed on February 27, 2018. http://www.opala.org/solid_waste/Tour_de_Trash.htm.

[261] Information provided by Refuse Division staff. February 13, 2018.

[262] Ibid. March 20, 2018.

[263] Ibid. August 1, 2018.

[264] City and County of Honolulu, Department of Environmental Services. 2017. "10th Annual Mauka to Makai Environmental Expo." *WasteLine*. https://wasteline.wordpress.com/2017/05/17/10th-annual-mauka-to-makai-environmental-expo/. May 17.

[265] Information provided by Refuse Division staff. March 20, 2018.

7.3.7.1 Environmental Concern Line

The City established an Environmental Concern Line (808-768-3300) so that the public could report environmental concerns, access information about proper disposal and recycling, and get more involved with cleanup education and volunteer programs.[266] Depending on the concern, callers are routed via an automated tree to the correct department.[267] A recorded answering machine is used to make this a 24-hour information line. In a given month, the City may respond to over 250 public calls.[268]

7.3.7.2 Public Surveys

The City conducts periodic public surveys to gain feedback on pilot programs and initiatives. Historically, public surveys are sent out iteratively (i.e., before, during, and after a program or initiative) to obtain data on customer satisfaction levels and program effectiveness. The City then uses the data to evaluate the viability of pilot programs, make improvements before wider implementation, or both. In 2011, the City coordinated a public survey effort by conducting its own surveys, contracting with a survey company to perform phone interviews, and collaborating with Costco to run intercept surveys to gauge the effectiveness of City messaging in its educational material. The results were used to make improvements to messaging with the intent to increase participation in public recycling programs and increase the public's proficiency in waste sorting.[269]

The City is currently conducting public surveys to gather feedback on the appointment-based bulky item collection pilot program launched in June 2019 for metro Honolulu residents. More information on the bulky item pilot program is provided in Section 4.

7.3.7.3 Integrated Solid Waste Management Plan Advisory Committee

To obtain input on the development of the Integrated Solid Waste Management Plan, consistent with HRS Sections 342G-22(a) and 342G-24(b), the City convenes an Advisory Committee (AC) that is comprised of representatives from local and state government, private industry, and community organizations, all of whom have an interest in solid waste. The purpose of the AC is to provide input and advise on solid waste issues, policies, and programs. As written in HRS Section 342G-24(b), the AC is entitled to 120 days to review the draft Plan prior to DOH submittal. AC meetings are regularly held during development of the plan and are open to the public, with time allotted for public comments. In addition, once the draft Plan is published after DOH review, the public is given the opportunity to review and provide comments at a public hearing.

7.3.7.4 Mayor's Advisory Committee on Landfill Site Selection

The Mayor's Advisory Committee on Landfill Site Selection (MACLSS) is another example of a committee formed to engage public input. In 2010, the City convened MACLSS to obtain input on locating a future landfill site. The 2010 MACLSS was comprised of representatives from private industry, community organizations, professionals and experts in their respective fields, and individuals from various communities around the island. Numerous meetings of the MACLSS were held; these were open to the public and the public was afforded time to provide input during the public comment portions of the meetings.

The MACLSS is not currently active. As noted in other sections, the City is working to rebalance the existing landfill, increase source reduction, and maximize diversion to extend the life of the current landfill and avoid siting a new landfill.

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[266] City and County of Honolulu, Department of Environmental Services. 2018 "Illegal Dumping." Accessed on February 27, 2018. http://www.opala.org/solid_waste/Stop_Illegal_Dumping.html.

[267] Information provided by Refuse Division staff. February 13, 2018.

[268] Ibid. March 20, 2018.

[269] Ibid. March 16, 2018.

7.3.8 Technical Assistance and Enforcement Tools

7.3.8.1 Technical Assistance

The City provides technical assistance on a wide range of topics from recycling program set-up for businesses, schools, and multi-family complexes; compliance with City ordinances; and composting. Citizens can call the Refuse and Recycling Services line (808-768-3200). Recorded information is provided to answer the most common questions with options to access a live person to obtain guidance.

7.3.8.2 Enforcement Mechanisms

As an enforcement mechanism to educate residents and to address contamination in curbside collected green and blue carts, the City performs inspections of carts and issues reminders or error notices if they find contamination, using "Opalagies" cart tags.[270] The inspectors denote the nature of the violation on the tags. City refuse truck operators also report addresses that are not recycling correctly, using the Opalagies cart tags or operator report pads containing fillable note sheets with choices for common violations.[271]

If a violation leads to non-collection, such as overfilling a cart or having a blocked cart when the collection truck arrives, an informational letter is sent to the offending address.

If the violation is placing non-recyclable items in a recycling cart, a letter explaining non-compliance is mailed to the offending address upon the first violation. If a second violation occurs within 6 months, the City mails a notice that the green and blue carts will be retrieved on the third violation. On the third violation within 6 months, the City removes the green and blue carts.[272] These enforcement efforts contributed to a blue cart contamination rate of 9.52 percent by weight during 2016, which is lower than the 11 percent contamination rate estimated for curbside recycling contract bidding purposes.[273] In the future, if current cart removal enforcement efforts decrease in effectiveness, the City may consider implementing fines for cart contamination.

7.4 Strategies for Expansion of Public Education Programs

As discussed in Section 7.3, the City is actively pursuing public education through a variety of existing means and programs, and should continue to promote these programs and activities. The City should also expand public education efforts and programs by focusing on the following additional strategies:

- Develop a Public Education Plan by 2021.
- Increase funding for public education programs and initiatives.
- Seek a dedicated public education resource or staff person to provide comprehensive public education efforts across the Division.
- Improve the opala.org website.
- Promote and improve the City's social media presence.
- Develop quarterly print newspaper advertisements on matters related to solid waste (e.g., recycling, source reduction, composting, and proper waste handling) and increase electronic distribution.
- Offer home composting workshops and revive the School Recycling Grant Program.
- Increase the number of Tour de Trash tours.

[270] City and County of Honolulu, Department of Environmental Services. 2018. "Curbside Recycling – From Curbside to Processing." Accessed January 17. http://www.opala.org/solid_waste/curbside_inspect_and_process.htm.

[271] Information provided by Refuse Division staff. January 29, 2018.

[272] Ibid. February 13, 2018.

[273] Ibid. February 1, 2018; City and County of Honolulu, Department of Environmental Services. 2016. Contract No. MA-ENV-1700007, Solicitation No. RFB-ENV-977903. August.

- Work towards integrating a public viewing area or education center at the new refuse facility in Campbell Industrial Park, Kapolei.
- Update the HTY program.
- Update the *Recycling and Disposal Guide*.

7.4.1 Public Education Plan

The City plans to develop a Public Education Plan to evaluate its education and outreach efforts and set measurable goals for the future. The goal of the plan is to assess the effectiveness of programs, identify opportunities to improve public awareness and compliance, and develop steps to improve implementation in order to increase public awareness. This plan is anticipated to be completed by year 2021 and will describe current and long-term future efforts in education and outreach across the City's ongoing and planned solid waste and recycling programs, including but not limited to the programs detailed within this section. The plan will evaluate the best methods to target various audience sectors (e.g., age groups, demographics, geographic regions based on cart contamination rates, residents, or contractors) for different types of programs. The Public Education Plan will set forth metrics and milestones for education programs depending on anticipated City resources and priorities.

7.4.2 Funding Increase for Public Education

Historically, the City has had to work with a limited budget to develop and conduct public education campaigns. Reducing funding for public education is often a first option when evaluating the need to reallocate a limited City budget across divisions and departments. Nevertheless, public education is vital to the success of solid waste and recycling programs. The City will evaluate ways to optimize the usage of available funds to prioritize public education.

7.4.3 Dedicated Resource for Public Education

Public education efforts are currently spread across the Division, with the majority of education administered by the Recycling Branch. Although there is one person who specializes in public education in the Recycling Branch, there is no dedicated person responsible for creating and administering public education programs and materials in a comprehensive manner. To maximize the reach of awareness campaigns, the City will prioritize the selection and hiring of a full-time Public Education Coordinator, dedicated to understanding education needs and streamlining efforts across the Division. This position would serve as the driver and centralized spokesperson for public education to provide the public a unified and consistent message and develop new and innovative programs to reach out to the public.

At the time of this Plan, the effort that can be allocated to public education is on the order of 0.5 full-time employee equivalent. The City's goal is to increase the allocation to at least one full-time employee equivalent.

7.4.4 Website Improvements

The City's website, opala.org, contains a wealth of information on waste management and recycling programs, technical reports and information, public notices, and more. However, because of the large volume of information, organizing the website for ease of navigation is challenging. The City recently completed a study using Google Analytics and identified the website's most trafficked sections. The City could use these insights to streamline the website for a better user experience. An update to the City's website is planned and includes the following potential improvements:

- Converting the website layout to responsive design (web pages adapt to the user's device/screen size, facilitating viewing and navigation)
- Adding a slideshow banner on the homepage to highlight announcements, recent news, and upcoming events

- Reorganizing content on the homepage
  - Identifying the key elements (informed by Google Analytics) to emphasize on the homepage so as not to overwhelm the user upon arrival
  - Streamlining sections for residents, businesses, and schools/communities (e.g., keeping a bold header for Residents on the homepage and moving the subordinate links under the Residential Services header to a dedicated Residents page)
- Adding a news and announcements section with dynamically updated information
- Understanding why users visit the website and arranging content to best suit their needs (informed by Google Analytics)
- Using appropriate fonts, font sizing, and colors to draw a user's attention to certain parts of the web page

7.4.5 Social Media Improvements

The City currently manages a dedicated Division Facebook page and shares a Twitter account with the Department of Environmental Services that provides real-time solid waste and recycling-related information and updates. Increasing the number of followers would result in a wider reach for educational campaigns, making them more effective. For each of these social media platforms, the City is considering paying to have their accounts promoted in an effort to acquire more followers, who would then directly receive City updates in their feeds. Paying for promotion has the additional benefit of being able to target specific demographics and users in certain locations. Increasing engagement on social media platforms could also encourage more feedback from the public, in turn providing the City with insight on how to better serve the community. Social media continues to be a highly efficient and effective way to reach a wide audience at relatively little cost. The City will continue to pursue the creative use of social media as a way to convey its messaging to the public.

7.4.6 Quarterly Print Advertisements and Electronic Mailers

The City uses periodic print advertisements to share information about City services for solid waste disposal and recycling with readers of the local newspapers. The City plans to increase the frequency of print advertisements to a quarterly basis. Because print advertisements can be costly, use of this media will depend on the availability of funds.

The City is also planning to move towards electronic mailers instead of printed material for business compliance surveys. In 2019, the City plans to only print and mail business ordinance tip sheets and will direct businesses to complete (previously printed) compliance surveys online.

7.4.7 Home Composting Workshops

In the past, the City has partnered with HER to offer free composting workshops.[274] This provided a fun hands-on experience for citizens to learn how to compost and reduce the waste stream. During development of this Plan, the City reinstated the free composting workshops previously offered, with two workshops offered in 2018 and four workshops to be offered in 2019. Section 3 of this Plan contains more details on composting and this initiative.

7.4.8 School Recycling Project Grant Program

In the past, the City has distributed $100 grants for teachers to purchase recycled products (such as lanyards, hats, and water bottles) to reward students who participate in recycling projects. The City has not received funding for this program in the last several fiscal years but hopes to revive the program by requesting $1,000 of funding per year in the upcoming budget cycles.[275] Future grant awardees could be

[274] R.W. Beck. 2008. *Integrated Solid Waste Management Plan Update.* October.
[275] Information provided by Refuse Division staff. August 1, 2018.

encouraged to offer reusable items such as reusable straws, cups, and utensils as prizes to align with the City's focus on source reduction.

7.4.9 Tour de Trash and Recycling Presentation Development

Because Tour de Trash events and presentations are popular and a good way of reaching wider audiences, the City aims to increase the annual number of tours and presentations. As discussed in Section 7.3.6.1, Tour de Trash added new tours in 2018 and 2019 with a focus on reuse in 2019. The City also aims to train another staff that will deliver presentations, as well as increase the number of presentations given each year.

7.4.10 Public Viewing/Education Center in the New Refuse Facility

A new multiuse refuse facility is in various stages of planning and construction at Campbell Industrial Park, Kapolei. This new complex will be the location of a convenience center, 140,000-square-foot solar-paneled building, glass recycling facility, white goods processing facility, and ash recycling operation. The City is considering integrating a public viewing area, education center, or both within the facility as a new public education initiative, conducive for school field trips or community tours. Inclusion of public viewing and education centers into solid waste facilities is a growing trend and provides an opportunity to connect with visitors and users of the facility. The education center would provide an opportunity for visitors to learn about strategies for source reduction, reuse, and recycling.

7.4.11 HTY Program Update

To spread awareness about other aspects of solid waste management, source reduction, reuse strategies, and recycling, the City is updating the HTY program for the 2020 season. Although the current program is already highly effective, updates such as new show content with increased emphasis on source reduction strategies, new engagement format, an increased number of performances, more public venues, or collaboration with local businesses (possible sponsors) for an added dimension to events could increase the reach and effectiveness of messaging.

7.4.12 Recycling and Disposal Guide and Other Educational Materials Update

The most recent version of the *Recycling and Disposal Guide* was published in 2015.[276] Since then, there have been changes to existing programs, including solid waste facility changes (e.g. changes to the acceptable materials at WGSL and Keehi Transfer Station), the addition of new programs (e.g., Plastic Bag Ban), and the discontinuation of The Green Channel. The City will be updating the *Recycling and Disposal Guide* based on current conditions. This could call greater attention to common inappropriately disposed materials (e.g. propane tanks and batteries), while being cognizant of other planned program developments.

In addition to the *Recycling and Disposal Guide*, the City commits to updating other educational materials in 2019 and annually thereafter.

7.4.13 Public Advertisements for Food Waste Reduction

In coordination with the Office of Climate Change, Sustainability and Resiliency, the Refuse Division has established a partnership with the NRDC to display food waste reduction advertisements in public venues. The NRDC is providing display graphics, the Division is providing funding for printing, and both are finding display space. The campaign will run in FY 2019.

[276] City and County of Honolulu, Department of Environmental Services. 2015. *Recycling and Disposal Guide for Oahu*. http://www.opala.org/solid_waste/pdfs/Rec_Disp_Guide%202015.pdf.

7.4.14 Radio Advertisements through Hawaii Public Radio

The Division is in planning stages to establish a partnership with Hawaii Public Radio to do short radio sponsorship spots to advertise information related to the Division and potentially the entire Department of Environmental Services between broadcasts. The anticipated 15- to 30-second clips are projected to be aired beginning in FY 2020.

7.5 Action Item Summary

As new programs and issues are developed or as service changes occur, the City will continue to apply the public education strategies currently used while improving effectiveness based on public feedback. Specific action items for public education are summarized in Table 7-1.

Table 7-1. Public Education Action Item Summary

Education Type	Action Item	Initiative Status	Implementation Dates
Print Media	Continue to develop and distribute printed (and electronically available) media, including *Recycling and Disposal Guide*, Food: Too Good to Waste Guide, BYOB and Recycling Handy List stickers, and activity books	Ongoing	FY19-FY28
	Continue to develop and distribute print advertisements, direct mailers, and press releases and increase frequency of print advertisements to quarterly	Ongoing/Planned	FY19-FY28
	Update the *Recycling and Disposal Guide* for Oahu and other educational materials in 2019, and annually thereafter	Planned	FY19-FY28
Digital Content	Continue to maintain *WasteLine*, existing Opalavision videos, and social media accounts	Ongoing	FY19-FY28
	Make improvements to website based on Google Analytics and other available tools	Planned	FY19-FY20
	Pay to promote social media accounts and target specific demographics and/or geographies	Planned	FY19-FY28
	Continue to maintain and update content on The Learning Center	Ongoing	FY19-FY28
	Move towards electronic distribution of announcements to cut down on printed materials	Ongoing/Planned	FY19
Entertainment and Special Events	Update HTY program with new content, engagement format, or collaboration opportunities	Planned	FY19, FY24-FY28
	Increase the number of Tour de Trash events by one location or event per year	Ongoing	FY19-FY28
	Continue to participate in other events such as Mauka to Makai Environmental Expo and find opportunities to attend additional public events; aim to participate in at least 6 to 10 community events per year	Ongoing/Planned	FY19-FY28
Public Input and Technical Assistance	Continue to provide and manage peer consulting program	Ongoing	FY19-FY28
	Continue to host Environmental Concern Line	Ongoing	FY19-FY28
	Increase use of public surveys	Ongoing	FY20
	Establish an Integrated Solid Waste Management Plan AC for future iterations of the Plan and begin process earlier	Planned	FY24-FY28
	Continue to perform and ramp up frequency of cart inspections and compliance enforcement	Ongoing	FY19-FY28
	Continue to provide technical assistance to citizens on specific subject matter areas	Ongoing	FY19-FY28
	Offer home composting workshops	Ongoing/Planned	FY19

Table 7-1. Public Education Action Item Summary

Education Type	Action Item	Initiative Status	Implementation Dates
Other	Develop a Public Education Plan by 2021	Planned	FY20-FY21
	Re-establish school recycling program grants	Planned	FY20-FY28
	Pursue ways to increase funding for public education programs and initiatives	Planned	FY20-FY28
	Prioritize the selection and hiring of a full-time Public Education Coordinator to serve as a centralized hub for all Refuse Division education initiatives	Planned	FY20-FY28
	Consider building a public viewing area or education center at the new refuse facility in Campbell Industrial Park, Kapolei	Planned	FY20-FY21
	Collaborate with NRDC to display food waste reduction advertisements in public venues	Planned	FY19
	Develop and air radio advertisements in partnership with Hawaii Public Radio	Planned	FY19-FY28
	Evaluate messaging about materials not appropriate for curbside collection and consider update (may include revisions to cart imprints)	Planned	FY19
	Continue to explore opportunities for promotional partnerships with major retailers (i.e., BYOB campaign)	Ongoing	FY19-FY28

8. Facility Capacity and Siting

MSW is managed using a network of public and private solid waste facilities on the island. The City owns convenience centers, transfer stations, a WTE facility, an active landfill, and contracts for additional recycling and processing facilities. Understanding the existing capacity of this network as well as the future capacity needs of the City is both a required element of this Plan and a crucial element of solid waste planning.

8.1 Goals and Objectives

The City has the following goals and objectives related to the matrix of solid waste facilities that handle MSW in the City's system:

- Provide the type and size of facilities that are needed to provide comprehensive and cost-effective solid waste disposal, reuse, and recycling services to the public
- Evaluate and respond to changes that are needed at existing facilities (for example, required maintenance, changes in operations to modify how certain materials are handled, different locations, and different contracts)
- Develop infrastructure at facilities that will support the conversion to a renewable energy vehicle fleet by 2035 as well as conversion to onsite renewable energy by 2045
- Plan for needed future facilities (as required by gaps in service in certain locations, increased waste generation, new and improved processing technologies or opportunities, or expiring contracts). Such plans include supporting source reduction measures that would ensure the longevity of existing disposal facilities and reduce the need for additional facility siting through reduced MSW stream volume.

The City's approach to achieving these goals and objectives is to continuously evaluate the capacities of existing facilities while observing the onset of new recycling and disposal technologies or facilities that may be needed to more effectively manage solid waste. The current and future solid waste facility needs of the City are further described in Section 8.3.

8.2 Background

8.2.1 Legislative

Per HRS Section 342G-25(c), the facility capacity and siting element shall include descriptions of existing capacity and future needs, facility implementation tasks, and enterprise zones. Expanding on HRS Section 342G-25(c), HRS Section 342G-27 further details the information to be included within each component, as follows:

- Existing capacity and future needs: Identify existing and future facilities needed by the county for solid waste management
- Facility implementation: Describe the specific tasks that are necessary to provide for the development or expansion of source reduction, reuse, recycling, bioconversion, and disposal facility capacity
- Enterprise zones: Describes the county's current and planned actions to establish enterprise zones

In addition to the facility capacity and siting element, Section 8 does the following to provide the information required by HRS Section 342G-26(h) for the Plan's landfill and incineration component:

- Assesses the county's current landfill capacity and ways to extend that capacity
- Assesses the availability of land for future landfills

- Estimates the amount of waste currently going into incineration facilities and the remaining available capacity
- Estimates the quantity of ash generated at incineration facilities
- Describes provisions for ash disposal

This section intends to address the requirements of HRS while providing an overview of the City's solid waste network.

8.2.2 Waste-processing Capacity and Solid Waste Growth

MSW is managed using a variety of solid waste facilities on the island, including convenience centers, transfer stations, a WTE facility, landfills, and recycling and processing facilities. Understanding the existing capacity and future needs of those facilities is an important element of solid waste planning. In 2017, the *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu* report (2017 Assessment) was prepared for the City.[277] This report included waste projections through the year 2040 based on historical solid waste generation patterns and the expected *de facto* population on Oahu as predicted by the DBEDT. Findings from the 2017 Assessment have been incorporated into the capacity analyses prepared in this section. In general, the methodology to project solid waste generation within Section 8 is as follows:

- **Convenience centers and transfers stations**: The total growth rate for MSW received at these facilities was calculated from the projected 2017 and 2028 Total Tons Received at H-POWER and LF quantities presented in Appendix B of the 2017 Assessment.[278] The resulting total growth rate of 3.1 percent was applied to actual 2017 tonnages received at each convenience center and transfer station to project 2028 tonnages.
- **H-POWER and Waimanalo Gulch Sanitary Landfill**: The total growth rate for all MSW received at these two facilities was calculated from the projected 2017 and 2028 Total Tons Received at H-POWER and LF quantities presented in Appendix B of the 2017 Assessment.[279] The resulting total growth rate of 3.1 percent was applied to the total actual 2017 tonnage of MSW received at H-POWER and WGSL to forecast the total MSW tonnage in 2028. Subsequently, portions of the forecasted 2028 total MSW tonnage were then allocated to H-POWER and WGSL based on the expected operational ability of H-POWER in 2028 (H-POWER is expected to process approximately 95.5 percent of total MSW in 2028 per Appendix B of the 2017 Assessment). A similar methodology was used to derive the 2028 Projected Receipt of ash at WGSL. Using the total projected MSW for the two facilities and then applying the anticipated division of that material between the two facilities corrects for the atypical allocation of materials in 2017 (caused by diversions of MSW to WGSL as a result of several major refurbishment projects at H-POWER that year).
- **PVT Landfill**: The forecast for C&D debris was derived from the 2015 *Final Environmental Impact Statement for PVT Integrated Solid Waste Management Facility – Expanded Recycling, Landfill Grading and Renewable Energy Project*. This report forecasted approximately 200,000 tons of C&D debris generated for disposal by year 2030.[280]
- **Recycling and processing facilities**: The total growth rate for recyclable materials received at these facilities was calculated from the projected 2017 and 2028 Recycled Materials tonnages presented in Appendix A of the 2017 Assessment.[281] The resulting total growth rate of 7.6 percent was applied to actual 2017 tonnages received at each recycling/processing facility to project 2028 tonnages. This recycling growth rate is assumed to be an accelerated rate.

[277] R.M. Towill Corporation and SMS Research Services. 2017. A*ssessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu*. November. http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.
[278] Ibid.
[279] Ibid.
[280] Lyon. 2015. Final Environmental Impact Statement for PVT Integrated Solid Waste Management Facility – Expanded Recycling, Landfill Grading and Renewable Energy Project. September 21. Final.
[281] R.M. Towill Corporation and SMS Research Services. Ibid.

In general, solid waste generation is expected to follow an increasing trend over the next 10 years. Based on the 2017 Assessment, it is projected that from year 2017 to year 2028, the MSW tonnage will increase by a total of approximately 3.1 percent, and the recyclable materials tonnage by a total of 7.6 percent.[282] This projection does not include expected effects from source reduction. To understand facility capacity and siting needs for solid waste management on Oahu, a comparison of future receipts versus current and permitted capacities is presented in Section 8.3.

8.2.3 Inclusion of Solid Waste Facilities in Enterprise Zones

HRS Section 342G-25 lists inclusion of "an enterprise zone component" as part of "the facility capacity and siting element" of the Plan. This section provides a description regarding the purpose of enterprise zones, the location of enterprise zones within the island, and the potential applicability of enterprise zones to solid waste-related facilities.

The Hawaii State Legislature has established enterprise zones to encourage certain types of business activity, job creation, and economic diversification in desired areas. The State offers tax exemptions and other incentives to businesses willing to locate in enterprise zones and provide employment in these designated areas. In addition to State benefits, legislation requires that counties offer their own incentives.

At the state level, the following tax benefits are provided to eligible businesses for up to 7 years:

- 100 percent general excise tax and use tax exemption on eligible revenues
- An 80 percent reduction of state income tax in the first year, with the percentage declining by 10 percent in each year for 6 more years
- An additional income tax reduction equal to 80 percent of annual unemployment insurance premiums the first year, with the percentage declining by 10 percent in each year for 6 more years[283]

In addition, the City offers the following incentives to eligible businesses in enterprise zones:

- 2-year exemption from any increase in property taxes resulting from new construction at enterprise zone sites by enterprise zone firms
- Waiver of building and grading permit fees for 7 years[284]

Each county may nominate up to six areas for enterprise zones, with each area consisting of one or more adjoining census tracts. To qualify for enterprise zone designation, an area must meet unemployment criteria based on the latest U.S. census data, as well as criteria surrounding the economic conditions of the area, potential benefits that may accrue to the state and county from business and industrial development, and potential for job creation.

There are currently six designated enterprise zones on Oahu, as shown in Table 8-1 and on Figure 8-1.

Table 8-1. Designated Enterprise Zones

Enterprise Zone	Effective Date	Expiration Date
North Shore – Mililani – Wahiawa	8/18/2016	8/17/2036
Pearl City – Ewa – Central Oahu	8/18/2016	8/17/2036
Waipio Oahu	8/18/2016	8/17/2036
Leeward Oahu	4/1/2001	3/31/2021
Urban Honolulu	4/1/2001	3/31/2021
Waimanalo	4/1/2001	2/28/2028

[282] Ibid.
[283] DBEDT. 2018. "State of Hawaii Enterprise Zones (EZ) Program."
[284] Ibid.

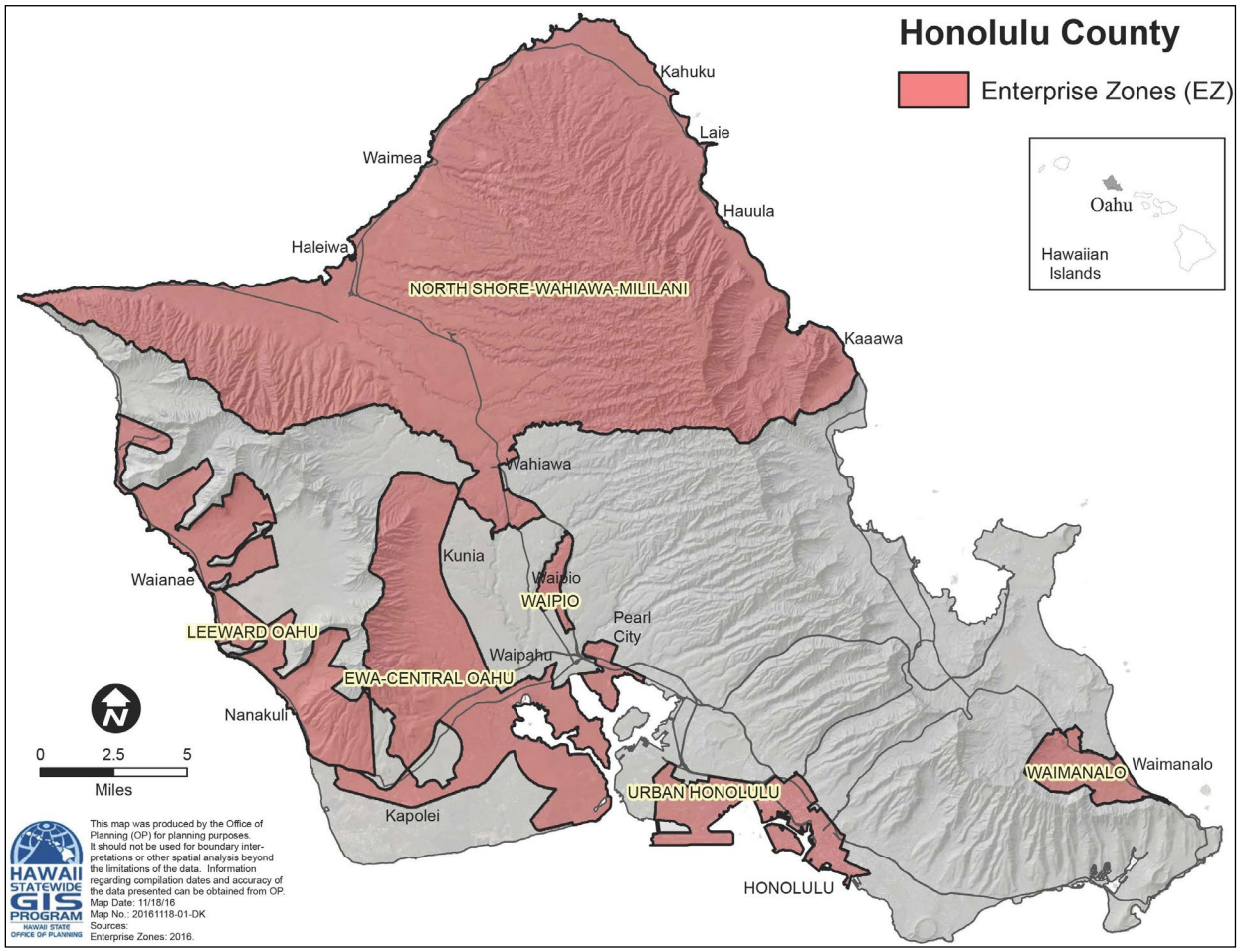

Figure 8-1. Enterprise Zones

Source: Hawaii State Office of Planning, Hawaii Statewide GIS Program[285]

The type of solid waste-related business that may be appropriate for development in an enterprise zone would likely be one that processes or manufactures materials, such as a material recovery facility, a composting facility, or a facility used for manufacturing products from recycled materials. Businesses seeking enterprise zone status are required to submit an application for approval from DBEDT. The City is currently planning a new recycling facility in the Leeward Oahu enterprise zone (further detailed in Section 8.3.7), and businesses responding to contracts issued by the City for the various services may be eligible.

The tax and permitting incentives offered in enterprise zones could be key in promoting economic viability for proposed projects. The City will continue to promote the Enterprise Zone program though its Enterprise Zone Coordinator in the Department of Community Services, Office of Special Projects, and through informational outreach regarding the benefits of siting a business in an enterprise zone, available tax credits, and other incentives available to potential businesses.

8.3 Existing Capacity and Future Needs

The primary focus of this section is on City facilities such as the convenience centers, transfer stations, H-POWER, and WGSL. Because the City has limited control over waste flow through private and contracted facilities, these solid waste facilities are discussed to a lesser extent. The following sections evaluate existing capacity, future needs, and implementation tasks.

[285] Hawaii Statewide Office of Planning, Hawaii Statewide GIS Program. 2016. *Honolulu County.* https://invest.hawaii.gov/wp-content/uploads/2012/05/ez_oahu.pdf.

8.3.1 Convenience Centers

The Division operates six convenience centers (Waianae, Ewa, Waipahu, Waimanalo, Laie, and Wahiawa) located throughout the island, where residents can drop off up to two loads of waste per day (see Figure 8-2). Residents may use any of the convenience center locations for free; however, no more than two loads per resident per day are allowed.[286] Commercial or business refuse (e.g., from tree trimmers, roofers, or small stores) is strictly prohibited at convenience center locations, as is disposal by commercial and private haulers.

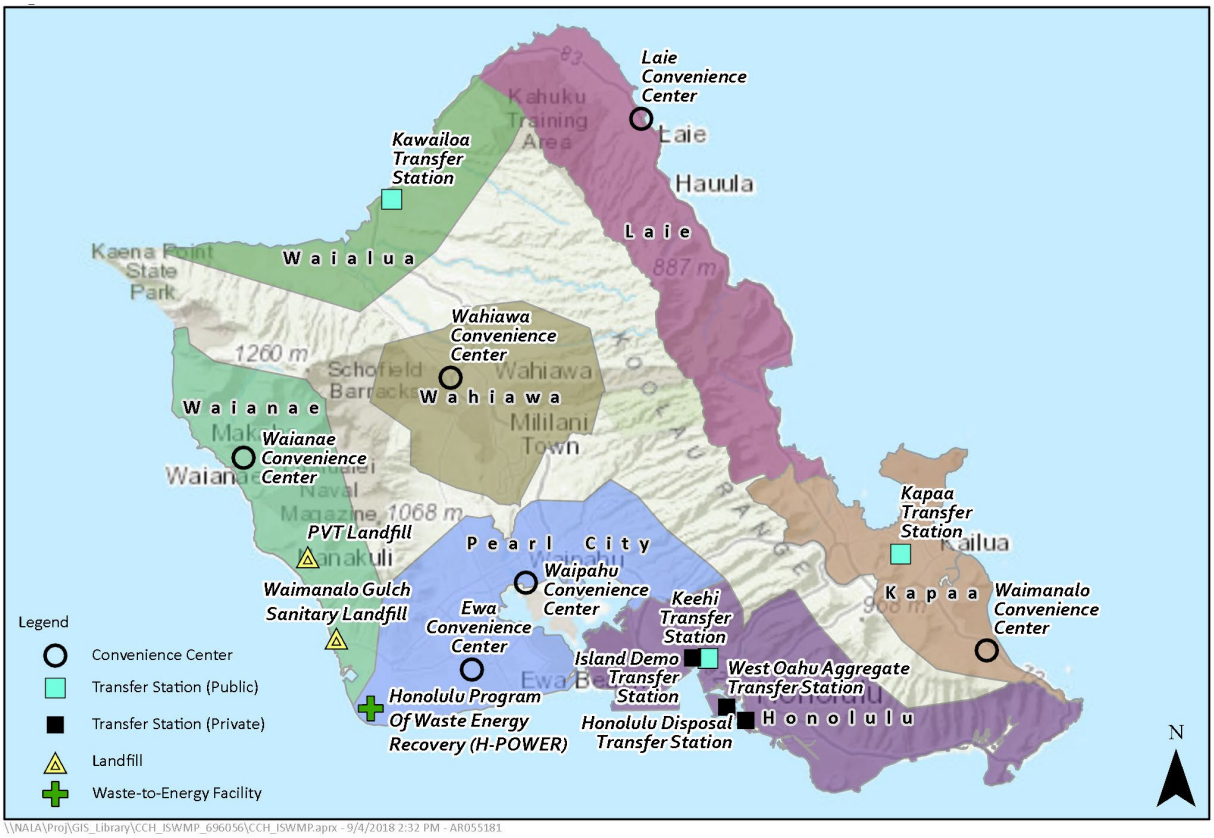

Figure 8-2. Convenience Centers and Transfer Stations

Residential household waste accepted at convenience centers includes residential refuse, green waste, auto batteries, tires, compressed gas cylinders such as propane tanks and fire extinguishers, and appliances. Accepted refuse is separated as follows and picked up or delivered to the appropriate disposal or recycling location:

- *MSW* is delivered to H-POWER
- *Green waste* is delivered to the mulching and composting facility
- *Large appliances, tires, auto batteries, propane tanks, fire extinguishers and other materials* are set aside for separate collection and pickup or delivery to recycling facilities

All convenience centers are open daily from 7 a.m. to 6 p.m. and accept the listed materials, except for Wahiawa. Wahiawa no longer accepts green waste since the opening of the nearby HER green waste facility; residents can deliver green waste directly to HER.

[286] City and County of Honolulu, Department of Environmental Services. 2017. "Drop-Off Convenience Centers for Refuse and Recycling." http://www.opala.org/solid_waste/Drop_off_Centers_for_Refuse.html.

Prohibited materials at convenience centers include, but are not limited to, dirt, rock, sand, concrete, asphalt, unabsorbed petroleum products, animal carcasses, large automobile parts, explosives, hazardous waste, wet paints, solvents, pesticides and herbicides, and medical waste.[287]

The facility configurations for each convenience center are quite similar, comprising a small covered guard shack, 8 to 10 roll-off bins and designated material staging areas, and a one-lane thoroughfare for material drop-off. The existing convenience centers typically encompass 1 acre or less in area.

8.3.1.1 Existing Capacity

Each convenience center is permitted to accept up to approximately 14,600 tons of MSW per year (or 40 tons per day). Convenience centers are heavily used, with vehicle queues commonly occurring during peak times (weekends and holidays).[288] During FY 2017, approximately 44,700 tons of MSW was accepted at convenience centers. Waipahu receives the most materials, accepting approximately 13,500 tons of MSW in FY 2017. Table 8-2 shows the amounts of materials received at each convenience center in FY 2017.

Table 8-2. Receipts at Convenience Centers, FY 2017

Facility	MSW (Tons)	Green Waste (Tons)	White Goods (Units)	Tires (Units)	Batteries (Units)	Propane Tanks (Units)
Waipahu	13,490	465	2,399	4,341	522	1,446
Ewa	9,266	1,064	2,329	3,934	704	1,480
Waianae	6,911	807	2,303	7,012	145	924
Wahiawa	5,859	0	3,259	4,951	133	1,192
Laie	4,009	1,539	5,244	2,201	94	577
Waimanalo	5,160	2,045	3,224	2,345	93	964
Total:	**44,695**	**5,920**	**18,758**	**24,784**	**1,691**	**6,583**

Note:

There are other material types, such as fire extinguishers, that are not tabulated here. However, quantities of these types of materials do not typically make up a significant portion of the convenience center waste stream.

Solid waste generation projections over the next 10 years project an increase of approximately 1,300 tons that may be routed to convenience centers. The quantities of waste currently accepted at the convenience centers are well within permitted capacities. The forecasted increase of materials at convenience centers is not expected to cause an exceedance of permitted capacities within the next 10 years. Waipahu is the only convenience center that is approaching capacity; this is discussed further in Section 8.3.1.2. Table 8-3 provides a summary of current and anticipated capacities for convenience centers.

[287] City and County of Honolulu, Department of Environmental Services. 2017. "Drop-Off Convenience Centers for Refuse and Recycling." http://www.opala.org/solid_waste/Drop_off_Centers_for_Refuse.html.

[288] Information provided by Refuse Division staff. March 13, 2018.

Table 8-3. Capacity Analysis for Convenience Centers

Facility	Annual Permitted Capacity (Tons)[a]	2017 Receipt (Tons)[b]	2028 Projected Receipt (Tons)[c]	Projected Receipt Exceeds Permitted Capacity
Waipahu	14,600	13,490	13,900	No
Ewa	14,600	9,266	9,600	No
Waianae	14,600	6,911	7,100	No
Wahiawa	14,600	5,859	6,000	No
Laie	14,600	4,009	4,100	No
Waimanalo	14,600	5,160	5,300	No

Notes:

[a] Permitted capacity is based on the 40 tons per day set forth in the current permit, multiplied by the 365 days of the year.

[b] 2017 Receipt encompasses quantities collected in FY 2017.

[c] 2028 Projected Receipt tonnages are based on a total growth percentage (3.1 percent) derived from the *2017 Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu* forecasted 2017 and 2028 tonnages, applied to 2017 Receipt tonnages. The projected receipt does not include effects from source reduction efforts.

8.3.1.2 Future Needs

Based on the capacity analysis in Section 8.3.1.1, it is not anticipated that any of the existing convenience centers other than Waipahu will require expansion or support from neighboring facilities to accommodate solid waste growth. The Waipahu facility currently receives an MSW tonnage of approximately 13,500 tons per year and is nearing capacity.

In anticipation of future needs and to provide additional drop-off options to residents, the City is currently planning to construct a seventh convenience center on the leeward side of the island. The convenience center is planned to be located at the new refuse facility in Campbell Industrial Park in Kapolei. The new location could alleviate the traffic received at the Ewa, Waianae, and Waipahu convenience centers, and providing more options for disposal may lead to a decrease in illegal dumping. More information on the siting and planning of this facility is provided in Section 8.3.7.

From a level-of-service and operations perspective, improvements could be made to address lengthy vehicle queues, customer service, site security, and material disposal compliance. Updated and improved signage as well as improved training for attendants may help the City achieve greater customer satisfaction and enforce disposal compliance. The City is reviewing a personnel reorganization to increase the number of truck drivers currently available to service the convenience centers, especially on weekends and holidays, so that full bins can be rotated out in an expedited manner. This would help to minimize wait times and the queuing of vehicles at the facilities.

In terms of facility conditions, in general, the convenience centers may benefit from minor maintenance and improvements. Beginning in 2018, regular inspections have been conducted at the convenience centers, with a goal of two convenience centers visited per month. Various aspects of the convenience centers are inspected, including the pavement condition, guard shack condition, vegetation overgrowth, potential for onsite and offsite runoff, security behaviors and responsibilities, and the correct separation of waste. Conditions are noted for repair or improvement at a later date. To fund these sorts of improvements, the City includes approximately $750,000 to $1,000,000 per year of design and construction funds in its annual budgets to ensure that facility needs can be met.

The City has a few planned and in-progress projects for convenience centers. In addition to the regular replacement of 15 to 20 bins every 3 to 4 years and upcoming planning for replacement or repair of the guard shacks at the convenience centers, the City currently is pilot-testing a scrap metals bin at Ewa to

reduce the amount of metal going to H-POWER. This pilot test is planned to be completed in 2019, at which point metals bins may be placed at other convenience centers in late 2019. In terms of future projects, the City plans to accept helium tanks, in addition to propane tanks. The contract will be modified to specify helium tanks in early 2019. In addition, the City is evaluating the feasibility of accepting an expanded variety of battery types (such as lithium ion). However, the decision to accept more types will depend on their proliferation in the waste stream. The City is also evaluating possible partnerships with nonprofit organizations to host reuse and donation stations at the transfer stations to determine whether such a partnership is feasible given spacing constraints at the convenience centers. In addition, the City would like to explore ways to allow community cleanup organizations better disposal options at convenience centers.

It should be noted that permits associated with all six convenience centers expire in August 2020. Permit renewal applications will need to be prepared and submitted prior to that timeframe.

8.3.2 Transfer Stations

The Refuse Division operates three transfer stations in Keehi, Kapaa, and Kawailoa, as shown on Figure 8-2. These transfer stations serve to consolidate waste from MSW collection trucks into large transfer trailers for more efficient and economical transport to H-POWER. Residents may dispose of their MSW and certain other waste materials at the transfer stations for free; businesses and commercial users must pay a tipping fee.[289]

The Keehi Transfer Station is located at 606 Middle Street in Honolulu, between Nimitz Highway and the H-1 Freeway. It is operated by 24 employees, including supervisors, equipment operators, truck drivers, scale attendants, ramp attendants, and laborers. The transfer station operates from 4 a.m. to 7 p.m., Monday through Saturday.[290] The primary customer during the morning is the City's Honolulu Refuse Collection Yard. Because of the congested traffic from the large trucks in the morning hours, residential self-haul customers are only allowed to deliver waste from 12 p.m. to 6 p.m. The Keehi Transfer Station has fewer residential customers than Kapaa because of the reduced hours and limited scope of accepted materials. Keehi Transfer Station accepts combustible MSW and used auto batteries only.[291]

The Kapaa Transfer Station is located at 100 Kapaa Quarry Access Road. The transfer station is operated by 34 employees, including supervisors, equipment operators, truck drivers, scale attendants, ramp attendants, and laborers. This facility operates seven days a week from 6 a.m. to 6:30 p.m., and is open to residential self-haul customers from 10 a.m. to 6 p.m. Monday through Friday and 7 a.m. to 6 p.m. Saturday and Sunday.[292] Similar to Keehi Transfer Station, the primary customer is the City's Kailua Refuse Collection Yard in the morning, with residents later in the day. Of the City transfer stations, Kapaa Transfer Station accepts the most material types, including MSW, green waste, scrap metal, white goods, tires, batteries, propane tanks, and fire extinguishers.

The Kawailoa Transfer Station is located at 62-180 Kawailoa Drive, next to the closed Kawailoa Landfill. The facility is operated by six employees, including the lead operator, two equipment operators, and three truck drivers. The primary customers are the City's Laie and Waialua Refuse Collection Yards and residential self-haulers. Green waste is not accepted for recycling at Kawailoa Transfer Station, and these loads are directed to the nearby green waste composting facility. However, if incidental green waste is delivered to Kawailoa, it is hauled to H-POWER with the normal trash. The facility operates 7 days a week from 7 a.m. to 6 p.m.

In addition to the three City transfer stations, three private transfer stations operate on Oahu: the Honolulu Disposal Service transfer station, the West Oahu Aggregate transfer station, and the Island

[289] City and County of Honolulu, Department of Environmental Services. 2004. *Refuse Collection and Disposal Rate Schedule.* July 30. http://www.opala.org/pdfs/solid_waste/rates04.pdf.
[290] Information provided by Refuse Division staff. June 1, 2018.
[291] City and County of Honolulu, Department of Environmental Services. 2017. "Drop-Off Convenience Centers for Refuse and Recycling." http://www.opala.org/solid_waste/Drop_off_Centers_for_Refuse.html.
[292] Obtained from file 2017 Staffing Needs Assessment Nov2016.xls. City and County of Honolulu.

Demo transfer station. Because the City does not send materials to nor manage these private transfer stations, they have not been included in the capacity analysis.

8.3.2.1 Existing Capacity

The Keehi and Kapaa transfer stations are the largest transfer stations operated by the City, each with a permitted capacity of 182,500 tons per year of MSW (or 500 tons per day). Kawailoa Transfer Station has a permitted capacity of 29,200 tons per year of MSW (or 80 tons per day). A total of more than 198,000 tons of MSW were delivered to the City's transfer stations in FY 2017; most of this waste goes to the Keehi Transfer Station in southern Oahu. In addition, a total of nearly 24,000 tons of green waste were delivered to the Kapaa Transfer Station. Table 8-4 shows the quantities of materials transferred at each of the three public transfer stations.

Table 8-4. Receipts at Transfer Stations, FY 2017

Facility	MSW (Tons)	Green Waste (Tons)	Scrap Metal (Tons)	White Goods (Units)	Tires (Units)	Batteries (Units)	Propane Tanks (Units)
Keehi	100,978	NA	NA	NA	NA	38	NA
Kapaa	80,608	23,950	2,140	9,717	4,938	174	3,237
Kawailoa	16,602	NA	NA	1,992	4,186	217	642

Notes:

NA = not accepted

There are other material types, such as fire extinguishers that are not tabulated here. However, quantities of these types of materials do not typically make up a significant portion of the transfer station waste stream.

Solid waste generation projections over the next 10 years (through 2028) project an increase of approximately 6,100 tons total that may be routed to transfer stations. Currently, the quantities of waste accepted at the transfer stations are well within the permitted capacities. This statement holds true with the forecasted increase of materials, and the transfer stations are not expected to exceed permitted capacities within the next 10 years. Table 8-5 provides a summary of current and anticipated capacities for transfer stations.

Table 8-5. Capacity Analysis for Transfer Stations

Facility	Annual Permitted Capacity (Tons)[a]	2017 Receipt (Tons)[b]	2028 Projected Receipt (Tons)[c]	Projected Receipt Exceeds Permitted Capacity
Keehi	182,500	100,978	104,100	No
Kapaa	182,500	80,608	83,100	No
Kawailoa	29,200	16,602	17,100	No

Notes:

[a] Annual permitted capacity is based on the permitted capacity of 500 tons per day (Keehi and Kapaa) and 80 tons per day (Kawailoa) set forth in the current permit, multiplied by 365 days per year.

[b] 2017 Receipt encompasses quantities collected in FY 2017.

[c] 2028 Projected Receipt tonnages are based on a total growth percentage (3.1 percent), derived from the *2017 Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu* forecasted 2017 and 2028 tonnages, applied to tonnages in the 2017 Receipt column. The projected receipt does not include effects from source reduction efforts.

8.3.2.2 Future Needs

Based on the capacity analysis in Section 8.3.2.1, it is not anticipated that existing transfer stations will require expansion to accommodate solid waste growth. The facility receiving the most tonnage, Keehi Transfer Station, currently receives an MSW tonnage of approximately 101,000 tons per year. It is projected that by year 2028 the tonnage receipt will increase to 104,100 tons; this quantity is still within the permitted capacity of 182,500 tons.

From a level-of-service and operations perspective, improvements could be made to address vehicle traffic, site security and material disposal compliance. To address queuing, particularly on weekends for residents or in anticipation of increasing traffic, the City may consider evaluating facility configurations to improve traffic flow. Because residents can use the transfer stations for free upon arrival (services paid for through property taxes), it is not uncommon for haulers carrying commercial waste to pose as residential haulers. In addition, customers (particularly residents) are turned away on a daily basis if the particular transfer station does not accept the material they are hauling (for example, Keehi Transfer Station does not accept green waste so residents hauling these materials will be re-directed to another facility upon arrival). Updated and improved signage as well as improved training for attendants may also help the City achieve greater customer satisfaction and enforce disposal compliance. The City is working towards standardizing material acceptance at transfer stations; however, this is highly dependent on permit restrictions and space availability.

In terms of facility conditions, in general, the transfer stations may benefit from minor maintenance and improvements that can be funded by the City's $750,000 to $1,000,000 annual design and construction improvements fund. The transfer stations currently have a variety of maintenance needs including repairs to roofing, fencing, and paved surfaces. A structural assessment was recently performed at Kapaa Transfer Station, and projects are currently being implemented to perform the necessary maintenance and upgrades. Structural assessments are planned for the Keehi and Kawailoa transfer stations within the next 2 years. To address the needed repairs, each transfer station will be assessed, projects prioritized, and those projects subsequently budgeted for repair.

The City has several ongoing and planned improvements at its transfer facilities. Keehi Transfer Station is currently transitioning from a four-line compactor operation to a two-chute open-top loading operation to improve efficiency. Improvements completed in 2018 included the decommissioning of two compactors and the completion of one open-top load-out chute; the second load-out chute is planned to be completed by the end of 2019. These improvements will allow Keehi Transfer Station to accept and process self-hauled householder bulky items and, if improved efficiency is achieved, Honolulu green waste route trucks as well. The throughput achieved from these changes is not expected to near or exceed permitted capacity, although the City will continue to evaluate this as new services are made available. Householder bulky items are planned to be accepted at the Keehi Transfer Station by the end of 2018, with the receiving schedule from 10 a.m. to 6 p.m. on weekdays and 7 a.m. to 6 p.m. on Saturday. The receiving schedule for Keehi Transfer Station is also being reevaluated for early morning routes.

Longer-term, after the completion of the second load-out chute, the ability for Keehi Transfer Station to accept Honolulu blue bin route material and expanded householder items (including white goods, tires, propane tanks, and fire extinguishers) will be reevaluated. Keehi Transfer Station will also be reevaluated for Sunday operation, similar to the current operation of Kapaa Transfer Station.[293]

Kapaa Transfer Station recently underwent repairs to the pit floor and tip floor exit, with additional building and structural improvements scheduled to be completed by 2019. Planning and design is also currently ongoing for a new green waste load-out area to more effectively handle household green waste. Plans are scheduled to be completed by 2019 with construction to follow thereafter.

At Kawailoa Transfer Station, planning and design for an additional load-out area is currently ongoing, with construction to be scheduled in the future. This project will provide redundancy and improve flexibility.

As with convenience centers, the City is planning to accept helium tanks in addition to propane tanks. The contract will be modified to specify helium tanks in early 2019. In addition, the City is evaluating the feasibility of accepting an expanded variety of battery types (such as lithium ion). However, the decision to accept more types will depend on their proliferation in the waste stream. Again, as with the convenience centers, the City is evaluating whether partnership with nonprofit organizations to host reuse and donation

[293] Information provided by Refuse Division staff. June 1, 2018.

stations at the transfer stations is feasible given space constraints at the transfer stations. The City will explore ways to allow community cleanup organizations better disposal options at transfer stations.

Permits associated with the City's three transfer stations expire in August 2020. Permit renewal applications will need to be prepared and submitted before that time.

8.3.3 Waste-to-Energy Facility

The City-owned H-POWER facility is the only WTE facility on Oahu. H-POWER has been in commercial operation since 1990 and is managed through a full-service vendor contract with Covanta.[294] The majority of residential and commercial MSW collected on the island is delivered here.

H-POWER is located in Kapolei on a 28-acre site owned by the City in Campbell Industrial Park. Waste deliveries are accepted from 5:30 a.m. to 6:30 p.m. on weekdays and 6:30 a.m. to 4 p.m. on weekends.[295] MSW, dewatered sewage sludge, used automobile tires, bulky waste, and other special wastes are accepted at H-POWER.

The facility uses the following two combustion processes to process combustible solid waste materials into energy:

- RDF combustion
- Mass burn combustion

RDF combustion requires MSW to be processed into RDF that is used as fuel to generate electricity. H-POWER operates two 854-ton-per-day RDF boilers with two RDF processing lines. In 2012, the City increased the plant's capacity by adding a third, 900-ton-per-day boiler equipped for mass burn.[296] Mass burn combustion allows MSW to be burned to generate electricity with minimal processing.

Historically, up to 90 percent of the volume of the MSW received at H-POWER has been diverted from WGSL and converted into renewable electric energy. H-POWER also extracts ferrous and non-ferrous metals from the waste or ash using magnets and an eddy current separator. Recovered metals are sent to recycling facilities for further processing. The ash and residue generated from H-POWER are delivered separately to WGSL.[297]

The City has a waste supply commitment with the facility operator to deliver 800,000 tons of solid waste per year to H-POWER.[298] In FY 2016, approximately $548,000 was paid to the facility operator because of shortfall on the supply commitment.[299]

H-POWER provides 68.5 megawatts of dispatchable renewable energy to HECO, which supports the State's Renewable Portfolio Standards (RPS) goals.[300] During FY 2017, H-POWER generated over 408,000 megawatt-hours of electricity.[301]

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[294] City and County of Honolulu, Department of Environmental Services. 2013. *2013 Interim Status Report on the Integrated Solid Waste Management Plan (2008).*

[295] Information provided by Refuse Division staff. June 1, 2018; Information provided by Covanta staff. June 15, 2018.

[296] Covanta. 2017. "Covanta Honolulu." https://www.covanta.com/Our-Facilities/Covanta-Honolulu.

[297] R.M. Towill Corporation and SMS Research Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu. November.* http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.

[298] Information provided by Division staff. November 9, 2017.

[299] City and County of Honolulu. 2018. *Covanta's Unrealized Energy Tru-ups 2014 thru 2018.xls*. August.

[300] Information provided by Covanta staff. June 15, 2018.

[301] Total "On-Peak" and "Off-Peak" hours; Covanta Honolulu Resource Recovery Venture. 2016-2017. Monthly Summary Operations Reports.

8.3.3.1 Existing Capacity

H-POWER's total annual facility capacity is based on the design capacities of the three boilers and the facility's seven day per week operating schedule. The boilers have a combined design capacity of approximately 2,600 tons per day, resulting in an existing facility capacity of approximately 952,000 tons per year. Accounting for annual and periodic major maintenance, the operational maximum capacity is estimated to be 900,000 tons per year.[302]

Covanta, H-POWER's operator, lists the facility's waste-processing capacity (the ability to accept and process waste for burning) as 2,900 tons per day.[303] Waste receipt typically varies throughout the week, with light days offsetting heavy days to ensure all acceptable waste received at H-POWER is burned and that the boilers can operate continuously for maximum operational efficiency.

In 2017, H-POWER received approximately 695,400 tons of MSW.[304] This quantity is atypically low because of diversions of MSW to WGSL required by several major refurbishment projects at H-POWER. The anticipation is that completion of the major refurbishments will allow for quicker and more reliable waste processing. In future years, H-POWER is expected to process the majority of MSW generated on Oahu, with waste disposed at WGSL limited to ash, residue, and unacceptable waste from H-POWER.[305]

As forecasted in the 2017 Assessment, solid waste generation is expected to increase over the next 10 years.[306] Projected H-POWER receipts are not expected to exceed the combined design capacity of the boilers within the next ten years. Table 8-6 provides a summary of current and anticipated receipts compared to the existing capacity for H-POWER.

Table 8-6. Capacity Analysis for H-POWER

Facility	Annual Boiler Design Capacity (Tons)[a]	2017 Receipt (Tons)[b]	2028 Projected Receipt (Tons)[c]	Projected Receipt Exceeds Permitted Capacity
H-POWER	900,000	695,414	793,000	No

Notes:

[a] Annual boiler design capacity is based on the sum of the individual boiler design capacities (that is, 854 tons per day, 854 tons per day, and 900 tons per day) multiplied by 365 days per year and reduced to allow for maintenance time.

[b] 2017 Receipt is based on Covanta's monthly material reports for CY 2017.

[c] 2028 Projected Receipt tonnages are based on a total growth percentage (3.1 percent) derived from the *2017 Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu* applied to the total quantity of MSW received in 2017. A portion of the forecasted 2028 total MSW tonnage was then allocated to H-POWER based on the forecasted split in 2028 between anticipated MSW tonnages to H-POWER and WGSL. The projected receipt does not include effects from source reduction efforts.

8.3.3.2 Future Needs

Based on the capacity analysis in Section 8.3.3.1, existing H-POWER processing capacity will be sufficient to handle projected solid waste growth. H-POWER expansion for additional capacity is not anticipated in the next 10 years. However, to ensure that H-POWER is able to operate as projected, the City plans to complete a number of maintenance and capital improvement projects, most of which have been budgeted in the City's Capital Improvements Plan.[307]

From a level-of-service and operations perspective, improvements could be made to address vehicle traffic flow issues impacting various areas at the site. Limited space for queuing onsite has resulted in vehicle queues extending offsite during peak waste-delivery periods. Should adjacent land not be

[302] Information provided by Refuse Division staff. April 30, 2018.
[303] Information provided by Covanta staff. June 15, 2018.
[304] Covanta Honolulu Resource Recovery Venture. 2017. Monthly Material Reports.
[305] Information provided by Covanta staff. June 15, 2018.
[306] R.M. Towill Corporation and SMS Research Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu.* November. http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.
[307] City and County of Honolulu, Department of Environmental Services. 2017. *Solid Waste CIP FY2019.* September.

available for expansion, improvements should focus on reconfiguring the existing driveway and parking area. The City is in the process of commissioning a study to identify strategies for mitigating traffic flow issues; the study may consider widening the access driveway and improving access at the scale house, truck ramps, tip floor, outbound scale, and waste auxiliary building. Following completion of the traffic study, the City will need to assess the recommendations, develop cost estimates, and secure budget for improvements as needed.

In terms of facility conditions, H-POWER would benefit from several key structural improvements. Roof replacement will be required before the mandated installation of solar panels on facility roofs; a roof rehabilitation project is underway (including fire sprinkler redesign) and is expected to be completed by 2019.[308] The ash building, built before 1990, requires major refurbishment. The refurbishment, expected to be completed in 2019, should address regulatory requirements associated with the existing ash building. The third boiler structure is planned to be enclosed to prevent weathering and corrosion, reducing wear and tear and maintenance. This project is slated for 2022.[309]

Process equipment refurbishment and process improvements should also be considered to maintain maximum plant performance. Equipment refurbishment projects would focus on restoring equipment that has reached the end of useful life. No equipment refurbishment projects were included in the City's Capital Improvement Plan; however, it is expected that such projects will be necessary in the next 10 years. The City should collaborate with the operations contractor to identify equipment refurbishment projects, develop a budget, and implement as appropriate. Expansion or alternatives will be considered as needed.

With regards to operational improvements, the City is evaluating various alternatives to increase the waste storage capability at H-POWER to provide more storage volume during scheduled and unscheduled maintenance periods. The additional storage capability would reduce the MSW that would need to be diverted to WGSL during such conditions. The alternatives currently being evaluated include, but are not limited to, baling and storing of MSW, expansion of MSW tipping floor space, and expansion of RDF storage space.[310] The City also has plans for an enhanced metal recovery project and a heat recovery and energy utilization project in 2020.[311]

H-POWER continues to plan three boiler maintenance intervals per year. Each maintenance interval occurs over a 2-week period and results in one boiler taken offline. These maintenance intervals are typically performed in late January/early February, late April/early May, and late October/early November.[312]

While additional H-POWER capacity is not expected to be needed in the next 10 years, the City should continue to assess future needs and plan for future expansion as appropriate, especially considering lengthy development time for major projects. Preliminary long-range planning for future expansion should begin as appropriate during the next ten years. This could include a capacity analysis to identify when and if a future WTE expansion may be required, including the need for the redundancy of a fourth boiler to ensure boiler availability, preliminary discussion of potential sites, and an updated technology review. Because the process for budgeting, contracting, permitting, and constructing a new facility from conception to completion is expected to take approximately 10 years, the City should begin the process as soon as a potential need is identified.[313] It should be noted that the City supports ways to reduce greenhouse gas emissions, including significantly reducing plastics and other fossil-fuel based products from the waste stream over the term of this ISWMP, to reduce the carbon pollution emissions from H-POWER.

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[308] Covanta Honolulu Resource Recovery Venture. 2017. *H-POWER - June 2017 Summary Operations Report*. July.

[309] City and County of Honolulu, Department of Environmental Services. 2017. *Solid Waste CIP FY2019*. September.

[310] Information provided by Covanta staff. June 15, 2018.

[311] City and County of Honolulu, Department of Environmental Services. 2017. Ibid.

[312] Covanta Honolulu Resource Recovery Venture. 2018. "CHRRV – HPOWER Five-Year Maintenance Schedule Projection (Revised)." Letter to W. Hamada. June 19.

[313] Information provided by Refuse Division staff. April 4, 2018.

8.3.4 Municipal Solid Waste Landfill

WGSL is the primary permitted MSW landfill on Oahu. It is owned by the City and has been in operation since September 1989. Operations at WGSL are under contract to Waste Management of Hawaii Inc.

The facility is located at 92-460 Farrington Highway in Kapolei on the western side of Oahu in Waimanalo Gulch, Kahe Valley. The WGSL property encompasses over 200 acres, with the majority of the property permitted for landfilling and support operations. The landfill is open 7 days a week from 7 a.m. to 4:30 p.m.

Both commercial haulers and residents can drop waste off at WGSL, but the City has set policies to accept only limited types of materials. Accepted materials include ash, special handle wastes, and small amounts of dirt, rock, sand, gravel, and concrete (small amounts of inert C&D debris are accepted from residents only; commercial C&D debris must be hauled to private facilities). Special-handle wastes include, but are not limited to, certain sludges, dead animals and offal, and ASR.[314] Because of either permit restrictions or City policy, WGSL does not accept hazardous waste, combustible waste (most MSW, only accepted during H-POWER diversions), ACM, bulky items (only accepted during H-POWER diversions), tires, batteries, appliances, or scrap metals.[315] Residents are directed to take unaccepted materials to convenience centers and transfer stations while commercial haulers must make their own arrangements for proper disposal. These policies help to divert most materials from WGSL to H-POWER so that little more than ash and residue (byproducts of H-POWER) are disposed of at WGSL. The City's intent is to preclude items from being disposed of at the landfill unless there are no other alternatives.

MSW and ash are disposed of in separate units at WGSL: the MSW landfill portion and the ash monofill. The City and the operator are working to optimize the life of the landfill by balancing the MSW and monofill portions of the landfill. Based on analyses performed in the 2017 Annual Operating Report for WGSL and the 2017 Assessment, the rebalanced configuration of cells will extend the life of WGSL to year 2038.[316] In addition, if the City succeeds in diverting more materials from the landfill (e.g., ash RFP process establishes beneficial reuse practices), the year 2038 projection can be extended even further.

8.3.4.1 Existing Capacity

WGSL is permitted to receive 3,500 tons of MSW per day and 600 tons of H-POWER ash per day. In FY 2017, WGSL received approximately 49,000 tons of MSW, 30,000 tons of special handle waste, 142,000 tons of ash, and 43,000 tons of process residue from H-POWER. It should be noted that the FY 2017 volume of MSW is atypically high because of several major refurbishment projects at H-POWER that caused MSW that would have been processed at H-POWER to be diverted to WGSL. WGSL received a total of approximately 264,000 tons of material in FY 2017, including an average of 337 tons per day of MSW and H-POWER residue, and 390 tons per day of ash.[317] Table 8-7 shows the quantities of materials received at WGSL in FY 2017.

As forecasted in the 2017 Assessment, solid waste generation is expected to increase over the next 10 years.[318] H-POWER is expected to process the majority of MSW on the island so that much of the waste disposed of at WGSL will be limited to ash, residue, and special handle wastes. In terms of permitted capacities, WGSL receipts are not expected to exceed the permitted quantities within the next 10 years. Table 8-8 provides a summary of current and anticipated capacities for WGSL.

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[314] Waste Management of Hawaii, Inc. 2017. *2017 Annual Operating Report, Waimanalo Gulch Sanitary Landfill.* Final. July 27.

[315] City and County of Honolulu, Department of Environmental Services. 2018. "Drop-Off Convenience Centers for Refuse and Recycling." Accessed May 15, 2018. http://www.opala.org/solid_waste/Drop_off_Centers_for_Refuse.html#waimglch.

[316] Waste Management of Hawaii, Inc. 2017. *2017 Annual Operating Report, Waimanalo Gulch Sanitary Landfill.* Final. July 27; R.M. Towill Corporation and SMS Research Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu.* November. http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.

[317] Waste Management of Hawaii, Inc. Ibid.

[318] R.M. Towill Corporation and SMS Research Services. Ibid.

Table 8-7. Receipts at WGSL, FY 2017

Facility	MSW (Tons)[a]	Ash (Tons)[b]	Residue (Tons)[b]	Special Handle Waste (Tons)
WGSL	49,233	141,648	42,766	30,490

Notes:

[a] The quantity of MSW received in FY 2017 is atypical. Major refurbishment projects at H-POWER resulted in MSW being diverted to WGSL for disposal.

[b] Ash and residue are byproducts of H-POWER operations.

Table 8-8. Capacity Analysis for WGSL

Facility	Annual Permitted Capacity (Tons)[a]	2017 Receipt (Tons)[b]	2028 Projected Receipt (Tons)[c]	Projected Receipt Exceeds Permitted Capacity
WGSL (MSW Landfill)	1,270,500	122,489	97,500	No
WGSL (Ash Monofill)	217,800	141,648	144,300	No

Notes:

[a] Annual permitted capacity is based on the permitted capacity of 3,500 tons of MSW per day and 600 tons of ash per day set forth in the current permit multiplied by 363 operational days per year (closed on Christmas and New Year's Day).

[b] 2017 Receipt encompasses quantities collected in FY 2017.

[c] 2028 Projected Receipt tonnages are based on a total growth percentage (3.1 percent) derived from the *2017 Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu* applied to the total quantity of MSW received in 2017. A portion of the forecasted 2028 total MSW tonnage was then allocated to WGSL based on the forecasted split in 2028 between anticipated MSW tonnages to H-POWER and WGSL. The same methodology was performed for the 2028 projected receipt of ash.

8.3.4.2 Future Needs

The City has plans to rebalance the MSW and ash portions of the landfill to prolong the life of WGSL. The analysis performed as part of the 2017 Assessment anticipates that the landfill will reach capacity in 2038.[319] It should be noted that the life of the landfill can be extended if the City succeeds in diverting more materials from WGSL (e.g., successful ash RFP). The process to rebalance cell configuration is currently ongoing and will require approval by the State

In 2010, the MACLSS was convened to advise on site selection for a new landfill. The MACLSS initially identified 465 potential sites, then narrowed the pool to 11 ranked candidate sites for further evaluation. The background and process the MACLSS used during site evaluation is provided in the Final 2012 Report of the Mayor's Advisory Committee on Landfill Site Selection.[320] Further evaluation was performed on these 11 sites in 2016, including additional criteria development and application. The analysis, presented in the 2017 Assessment, recommended that 5 of the 11 candidate sites be considered for selection and that 7 to 10 years be allotted for the landfill development process. It anticipated that the landfill siting process would begin in 2028, 10 years before WGSL is projected to reach capacity. The report also noted that, although the analysis is reflective of current and anticipated conditions, future conditions at the time of landfill siting may alter the conclusions of the evaluation (e.g., a smaller site may be viable if the tonnage requiring disposal is less).[321]

Existing capacity at WGSL is estimated to be sufficient for the next 10 years, but the City should remain cognizant of the landfill's diminishing life and begin the site selection process at least 10 years in advance of the landfill's end-of-life. It is recommended that the City continue to perform annual capacity analyses (or review those performed by the landfill operator in the WGSL annual operating reports) to be aware of

[319] R.M. Towill Corporation and SMS Research Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu*. November. http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.

[320] City and County of Honolulu, Department of Environmental Services. 2012. *Report of the Mayor's Advisory Committee on Landfill Site Selection (MACLSS)*. September. http://www.opala.org/solid_waste/pdfs/MACLSS%20REPORT%20FINAL%20092512.pdf

[321] R.M. Towill Corporation and SMS Research Services. Ibid.

any changes to the anticipated landfill end-of-life timeframe. If the 2038 end-of-life date continues to hold, site selection for a future MSW landfill should begin in year 2028, 10 years before WGSL is anticipated to reach capacity. Between 2028 and 2037, the City should reanalyze the sites ranked in previous landfill siting reports and investigate potential new landfill sites; conduct the site selection; undertake land acquisition (e.g., negotiation, condemnation, or purchase); obtain environmental permits, land use permits, and operating permits; and conduct site planning, design, engineering, and construction.[322] It is important to note that conclusions drawn from previous landfill site selection studies may no longer be valid based on future conditions. Solid waste generation trends may change over the next 10 years, particularly as a result of source reduction efforts and if the City is able to implement additional beneficial reuse practices for materials such as ash and ASR (more information on beneficial reuse initiatives is provided in Section 8.3.7).

In addition, the City's contract with the current landfill operator, Waste Management of Hawaii Inc., is set to expire in 2024. As the contract expiration date nears, the City should determine if the contract should be extended or rebid.

8.3.5 Construction and Demolition Debris Landfill

The PVT Landfill is a privately owned and operated permitted C&D debris landfill located in Waianae. In addition to C&D landfill operations, the PVT Landfill also conducts recycling and materials recovery operations to divert C&D debris from disposal. Recycling and materials recovery operations consist of mining and reclamation of previously landfilled material, as well as operation of an MRF. Recovered materials are sold for recycling and other reuse purposes, reducing the amount of material ultimately disposed of in the landfill.[323]

The PVT Landfill is the only C&D debris landfill on Oahu, and is open to customers Monday through Friday between 7 a.m. and 3:30 p.m. and Saturdays from 7 a.m. to 1 p.m. The facility accepts C&D debris, organic-containing materials that can be processed into feedstock for bioconversion, scrap metal, ACM, liquid wastes for solidification, and approved contaminated soil. The PVT Landfill does not accept MSW or hazardous waste. In the case of natural disasters, the PVT Landfill is the designated disposal site for C&D-related disaster debris.[324] In a Category 4 hurricane, an entire year's worth of C&D debris can be generated in 1 day. PVT Land Company and the landfill have worked with the City and are prepared to accept this quantity of waste so essential public services can be restored.[325]

Since January 2003, commercial haulers have been banned from delivering loads containing C&D debris to City facilities. Commercial haulers are directed to the PVT Landfill for the disposal of C&D materials. As a result, the vast majority of the island's C&D debris is landfilled or recycled at the PVT Landfill.

8.3.5.1 Existing Capacity

The PVT Landfill is permitted to dispose of up to 3,000 tons per day of C&D debris and up to 500 tons per day of ACM.[326] Recycling operations at the facility are able to process up to 1,775 tons of debris each day, and it is expected that the PVT Landfill's recycling rate will reach approximately 235,000 tons annually within the next 2 years.[327]

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[322] Information provided by Refuse Division staff. March 13, 2018.

[323] R.M. Towill Corporation and SMS Research Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu*. November. http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.

[324] Lyon. 2015. *Environmental Impact Statement for PVT Integrated Solid Waste Management Facility – Expanded Recycling, Landfill Grading and Renewable Energy Project*. Final. September 21.

[325] Information provided by PVT Land Company Limited. November 21, 2018.

[326] City and County of Honolulu, Department of Environmental Services. 2018. *Meeting Summary: Advisory Committee Meeting 05 – June 12, 2018*. Final; Hawaii State Department of Health, Environmental Management Division. 2011. Solid Waste Management Permit No. LF-0152-09.

[327] City and County of Honolulu, Department of Environmental Services. Ibid; Lyon. Ibid.

It is forecasted that by year 2030, approximately 200,000 tons of C&D debris may be generated per year.[328] The volume of ACM is expected to decrease yearly, so that the facility's ACM disposal capacity will suffice for the remaining ACM on Oahu.[329] In its entirety, the PVT Landfill is not expected to reach capacity within the next 10 years. The facility is currently excavating and reclaiming buried waste at their landfill for recycling.[330] These reclamation efforts (resulting in additional landfill capacity) and recycling activities (slowing depletion of the facility's disposal capacity) will extend the life of the landfill.[331]

8.3.5.2 Future Needs

The PVT Landfill is progressing through several initiatives to increase recycling and reclamation activities, increase disposal capacity, and configure renewable energy sources to power onsite operations. In particular, the PVT Landfill is planning a new gasification facility that would be able to process C&D feedstock accepted at and recovered from the landfill for energy production.[332]

The landfilling of C&D materials is currently handled in the private sector and this is not expected to change in the next 10 years.[333] Because the PVT Landfill is privately owned and operated, it is the responsibility of the facility to undertake the necessary tasks with respect to facility planning.

8.3.6 Recycling and Processing Facilities

The City contracts with a number of recycling and processing facilities to process certain components in the waste stream, including mixed recyclables, green waste, white goods, batteries, gas cylinders, and tires. Contracts with each of the facilities specify minimum tonnages that the facility must be able to accept from the City. These facilities may also have contracts in place with private commercial businesses; however, as the City does not control waste flow for businesses other than at City facilities (i.e., transfer stations, H-POWER, and WGSL), commercial material quantities are excluded from the capacity analysis. Furthermore, because mixed recyclables, green waste, and white goods either comprise a significant portion of the waste stream or a City facility is planned to accommodate these materials, the capacity analysis will focus on these items. The capacity analysis will focus on existing facility contract capacities in comparison to projected mixed recyclables, green waste, and white goods waste generation. It should be noted that projected quantities do not include effects from source reduction efforts.

8.3.6.1 Existing Capacity

Mixed Recyclables

The City procures the services of a recycling and processing facility to handle mixed recyclables collected by the City's residential curbside (blue cart) collection program. The current contract expires in 2019 with two optional 1-year extensions, and requires that the contractor be able to process a minimum of 23,000 tons of mixed recyclables from the City. The contract does not specify a maximum that can be received. In 2017, the City sent approximately 23,300 tons of mixed recyclables to the processor. This is approximately one percent over the current contracted minimum quantity. Based on the projections from the 2017 Assessment, a total 7.6 percent increase in recyclables may be realized between 2017 and 2028, resulting in approximately 25,000 tons of mixed recyclables in 2028.[334]

Because the contract expires in 2021 at the latest, the contracted facility is expected to handle the additional recyclables generated through the contract period. After the existing contract expires, it is expected that the City will establish a new contract that includes sufficient capacity for future growth.

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[328] Lyon. Ibid.

[329] City and County of Honolulu, Department of Environmental Services. Ibid.

[330] Information provided by PVT Land Company Limited. December 18, 2017.

[331] Lyon. Ibid.

[332] PVT Land Company. 2017. "When is a landfill more than a landfill?" Accessed December 8, 2017. http://www.pvtland.com/landfill/.

[333] Information provided by Refuse Division staff. March 13, 2018.

[334] R.M. Towill Corporation and SMS Research Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu.* November. http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.

Green Waste

The City also procures the services of a green waste processor to handle green waste accepted at City solid waste facilities (self-hauled by residents) and collected as part of the residential curbside (green cart) collection program. The current contract expires in 2025 with two optional 5-year extensions, and requires that the contractor be able to process a guaranteed annual minimum of 75,000 tons of green waste (or 1,440 tons per week) from the City. The contract has a guaranteed capacity of 100,000 tons with flexibility for more. In 2017, the City delivered approximately 71,600 tons of green waste to the processor, approximately 98 percent of the contracted minimum quantity (note that the contract year for the guaranteed tonnage is from April to March of the following year). Based on the projections from the 2017 Assessment, a total 7.6 percent increase in recyclables (including green waste) is projected between 2017 and 2028. If this percentage is applied to green waste, this results in a total of approximately 77,000 tons of green waste in 2028.[335]

The processing capacity at the contracted facility is expected to handle the additional green waste generated through the contract period. Leading up to the existing contract expiration date, the City can evaluate other alternatives to processing green waste (new compost facility) or establish a new contract that includes sufficient capacity for future growth.

White Goods

The City contracts with a white goods processor to handle white goods collected at convenience centers, transfer stations, and through the City's bulky item collection program. The current City contract is expired; however, white goods services continue to be handled by an interim emergency purchase order. In 2017, the City delivered approximately 42,200 units of refrigerated white goods and 41,500 units of non-refrigerated white goods to the processor, for an approximate total of 83,700 units. The City is currently preparing an RFP to contract the operation of a white goods processing facility at its new refuse facility in Campbell Industrial Park, Kapolei (more details on this initiative are provided in Section 8.3.7). The existing purchase order is planned to be discontinued once this new facility is operational.

8.3.6.2 Future Needs

Because the recycling and processing facilities are contracted by the City, the City holds the contractors responsible for meeting throughput and capacity provisions set forth in the signed contracts. It is up to the contractor to assess their own facility operations and expand to meet capacity, if needed. All current contracts for recyclable materials hold expiration dates within the 10-year horizon of this Plan. As contract expiration dates near, the City will decide whether each contract should be extended or rebid.

In addition to maintaining contracts for recyclables processing, the City is progressing through several initiatives to assess the feasibility of and develop City-owned, contractor-operated facilities that will process recyclable materials. The City's future needs with respect to recyclable materials are detailed below.

Mixed Recyclables

Based on generation projections, mixed recyclables are anticipated to reach approximately 25,000 tons per year in 10 years. The City has several options available for processing recyclables in the near-term and long-term timeframe, including continuing to contract for service or installing a new City-owned, contractor-operated facility within the City-owned building at Campbell Industrial Park. More information on the new refuse facility is provided in Section 8.3.7.

[335] R.M. Towill Corporation and SMS Research Services. 2017. *Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu*. November. http://www.opala.org/solid_waste/pdfs/WGSL%20Assessment%202017.pdf.

Green Waste

Based on generation projections, green waste is anticipated to reach approximately 77,000 tons per year in 10 years. The City contract with the processor is set to expire in year 2025. The City can then choose to extend the contract for up to 10 additional years, rebid the contract, or evaluate alternate methods of green-waste processing (new compost facility).[336]

White Goods

Based on the projected total increase in recyclables of 7.6 percent from the 2017 Assessment, white goods recovery is expected to reach approximately 90,000 units per year in 10 years. However, the quantity of white goods collected by the City is highly market-dependent with a significantly increasing number of units collected during poor recyclable metal market conditions (e.g., the units collected by the City increased from 52,300 units in 2014, when the value of metal was higher, to 83,700 units in 2017, when the value of metal was lower; prevalence of scavenging contributes to the collection trend). The City has several options for handling white goods in the near-term and long-term timeframe, including continuing the current purchase order or selecting a new contractor through its current RFP to process white goods at the City-owned facility at Campbell Industrial Park. More information on this facility is provided in Section 8.3.7.

8.3.7 New Refuse Facility in Campbell Industrial Park

A new refuse facility is currently under construction on a 23-acre, City-owned property on Kaomi Loop within Campbell Industrial Park, Kapolei. The facility is intended to include several buildings with different material-handling areas, including a convenience center, white goods processing facility, glass processing facility, ash and ASR facility, and MRF. This facility has not yet been fully constructed (there is one vacant 140,000 square-foot building currently on the property); however, the City is currently evaluating the necessary capacity and feasibility of each of these facilities as detailed in the following sections. As noted in Section 7.4.10, the City is considering a public viewing and education center that would provide information about source reduction, reuse, and recycling methods.

8.3.7.1 Existing Capacity

As described in previous sections, the City's waste streams are routed through a number of different solid waste facilities, including convenience centers, transfer stations, landfills, and contracted recycling and processing facilities. While the capacity at each of these facilities is expected to meet solid waste needs for the next 10 years, the City is planning to supplement the existing facility network with this new refuse facility. As this is a new facility with projects in various stages of planning and construction, there is no existing capacity.

8.3.7.2 Future Needs

The future needs of the new refuse facility largely include feasibility studies, planning, bid solicitation, design, permitting, and construction tasks to complete each facility. It should be noted that the technologies for these future facilities have not yet been set. The City will perform additional evaluation on the facility design once responses to applicable RFPs are received. The intent for these facilities is to provide practical and cost-effective methods for managing waste. Depending on responses to the RFPs, the City will determine to what extent these facilities are feasible. The specific needs and implementation tasks for each facility are provided below.

Convenience Center

The City is planning to construct a seventh convenience center to serve the leeward area and provide additional drop-off options to residents. In addition to providing another drop-off location, this new convenience center is intended to alleviate some of the queuing and bin hauling issues currently

[336] Information provided by Refuse Division staff. March 13, 2018.

experienced at the most heavily-used convenience centers, Waipahu Convenience Center and Ewa Convenience Center. The Waipahu location receives the most tonnage, nearing permitted capacity; the construction of this seventh convenience center should help offset the amount of material taken to Waipahu. The new convenience center is planned to include a larger number of drop-off bins compared to other convenience centers on the island. The availability of drop-off bins will also decrease the urgency for refuse staff to change out the bins once they have reached capacity. In addition, because of the proximity of the new convenience center to H-POWER, hauling full bins will be less time-consuming compared to the other convenience centers.

The location of the convenience center has been selected and the City is currently progressing through the planning, design, and permitting stages of the project. Construction is expected to commence in year 2019, and the facility is planned to be operational and open to the public in early 2020.

White Goods Processing Facility

A white goods processing facility is also planned to be located within the Solar Building on this City parcel. The City currently contracts with a private processor to handle refrigerated and non-refrigerated white goods.

The future white goods processing facility is planned to process up to 100,000 units annually from the City's bulky item pick-up program, convenience centers, and transfer stations. This meets the projected capacity discussed in Section 8.3.6.1.

The facility will be City-owned but operated by a contractor. An RFP is in development for the design, installation, and 10-year operation of the facility. This RFP is planned to be released in early 2019, with the facility operational in 2020.

Glass Processing Facility

Another facility planned for the City property on Kaomi Loop is a glass processing facility. City-collected glass (HI-5 and non-deposit) currently goes to the contractor along with City blue cart mixed recyclables and, after sorting, is subsequently shipped to the continental U.S. for recycling. Commercial deposit glass and limited non-deposit glass is also processed by recyclers on the island for shipment to the continental U.S. However, because of limited funding for the State ADF program and its effect on the reduction in the recycling payment for non-deposit glass, non-deposit glass is no longer accepted by licensed glass recyclers from the public. As a result, the ordinance requiring businesses to recycle their non-deposit glass has been suspended. More information on the status of the State ADF program is provided in Section 4.

This glass processing facility is planned to process up to 10,000 tons per year of glass, scalable to account for future growth. Because of historical hurdles in glass recycling, the City intends for this new facility to use a technology to process the glass for beneficial reuse on-island. In addition to glass collected in its curbside recycling program, the City is considering acceptance of glass from businesses. Depending on the success of the facility, the City may lift the suspension on the aforementioned ordinance, increasing the overall tonnage accepted by the facility.

The facility will be City-owned but equipped and operated by a contractor. In mid-2018, the City released an RFP for the planning, design, construction, and 5-year operation of the facility with an option to extend for an additional 5 years. Because of the limited number of eligible offers received, the City is rereleasing the RFP in early 2019. The facility may be operational as soon as 2021. Depending on responses to the RFP, the planned materials and tonnages to be processed may be revised.

Ash- and Auto-Shredder-Residue Processing Facility

The last remaining standalone facility envisioned to be built on the City parcel is a facility to process ash and ASR. Ash is a byproduct of H-POWER operations, while ASR is primarily derived from the processing of automobiles for recycling. Although ASR is combustible, it is currently diverted away from H-POWER

because of potential damage it may cause to the boilers.[337] Because H-POWER cannot process these materials, they are sent to WGSL for disposal. Both materials have the potential to be at least partially recycled or reused, but there is currently no recycling of ash or ASR on the island.

The ash and ASR processing facility is planned to process 180,000 to 200,000 tons per year of ash and 15,000 to 20,000 tons per year of ASR. To account for future growth, the facility will be expandable to higher tonnages. The goal is to divert the majority of ash and ASR from the landfill, to be processed for beneficial reuse rather than disposal.

The facility will be City-owned but operated by a contractor. In early 2018, the City released an RFP for the planning, design, construction and 5-year operation (with option to extend an additional 5 years) of the new facility. This RFP will be reissued in early 2019 in an attempt to solicit a greater number of eligible offers. The facility may be operational by 2020. Depending on responses to the RFP, the planned materials for the facility and tonnages to be processed may be revised.

Materials Recycling Facility

The City is evaluating the feasibility of constructing a MRF within the Solar Building to process City-collected recyclables. Processing of mixed recyclables is currently handled through a private contracted facility. The contract is due to expire in 2019 and the City has options to either extend the contract or rebid the contract.

The potential MRF is envisioned to process over 23,000 tons per year of City-collected mixed recyclables (consistent with current processor contract terms and delivered tonnage) and would be scalable for future growth. The facility would be owned by the City but operated by a contractor. The facility would only accept recyclables collected by the City. Commercial organizations would not be able to haul their recyclables to this facility.

When the City decides to move forward with the project, the City will decide upon a procurement method (e.g., RFP for facility design, build, and operate), with an anticipated operational date within a 10-year timeframe. The City may choose to adjust the facility's processing capacity and materials accepted.

Leeward Base Yard

The City is planning to relocate its Pearl City Corporation Yard to a new location to accommodate fleet expansion and facilitate more effective and efficient routing for refuse collection vehicles. It is planned to be located near the Honouliuli WWTP and will be rechristened the Leeward Base Yard. Siting, planning, construction and eventual operation of the facility will take place within the next three years.

8.4 Action Item Summary

To continue providing comprehensive and cost-effective solid waste disposal services to the island of Oahu, the City must monitor solid waste generation, maintain facilities, and develop new facilities. It should be noted that source reduction efforts can lessen or delay the need for large infrastructure expenses in the future. As discussed within this section, the City has a multitude of plans to advance their solid waste facility network. Action items and specific implementation tasks are provided in Table 8-9.

[337] City and County of Honolulu, Department of Environmental Services. 2017. *Status of Actions Taken to Comply with the State Land Use Commissioner's Order Dated October 2, 2009 and Status of Operations, Waimanalo Gulch Sanitary Landfill. Seventh Annual Report*. July 15. http://www.opala.org/solid_waste/pdfs/Annual%20Report-LUC-SUP-WGSL-7-20-17.pdf.

Table 8-9. Facility Capacity and Siting Action Item Summary

Facility/Future Need	Action Item/Implementation Task	Initiative Status	Implementation Dates
All	Evaluate and optimize schedule to accommodate planned facility down-time to minimize impacts to facilities (e.g., curbing collection at convenience centers, transfer stations, and bulky item pickups during period of planned H-POWER maintenance)	Ongoing	FY19-FY28
Convenience Centers			
Facility Signage	Investigate the need for updating or improving facility signage	Planned	FY19-FY20
Staff Training	Investigate better training of facility attendants to enforce disposal compliance	Planned	FY19-FY28
Compliance	Investigate improving tracking systems at convenience centers and transfer stations (e.g., electronic systems) to restrict commercial use	Planned	FY21-23
Driver Availability	Increase the number of drivers available to change out bins at facilities	Planned	FY20-FY28
Facility Inspections	Continue to conduct regular inspections to identify maintenance needs (e.g., pavement condition, guard shack condition, and vegetation overgrowth)	Ongoing	FY19-FY28
Bin Replacement	Replace 15 to 20 roll-off bins every 3 to 4 years	Planned	FY19, FY24-FY28
Guard Shacks	Replace/repair existing guard shacks	Planned	FY20-FY21
Metals Bin Pilot Test	Conclude pilot test of a metals bin at Ewa Convenience Center and roll out to other convenience centers, if appropriate	Ongoing/Planned	FY19-FY20
Materials Acceptance	Investigate accepting more types of materials (such as more battery types and compressed gas tanks) and modify recycler contracts accordingly	Planned	FY19-FY28
Nonprofit Organization Collaboration	Investigate feasibility of partnering with nonprofit organizations to host reuse and donation stations at convenience centers or Zero Waste/Re-use hubs where durable, reusable materials can be consolidated and distributed at convenience centers and transfer stations and to allow community cleanup organizations better disposal options.	Planned	FY19-FY20
Permit Renewals	Renew convenience center permits (expiration date of August 2020)	Planned	FY20, FY24-FY28
Transfer Stations			
Facility Configuration	Evaluate the traffic flow through facilities and then design and construct improvements, as appropriate	Planned	FY19-FY20
Facility Signage	Investigate the need for updating or improving facility signage	Planned	FY19-FY20
Staff Training	Investigate better training of facility attendants to enforce disposal compliance	Planned	FY19-FY28
Structural Assessments	Perform structural assessments at Keehi and Kawailoa transfer stations and identify facility needs and secure contracts for repair work	Planned	FY19-FY21
Open-top Loading Transition	Complete transition from four-line compactor operations to two-chute open-top loading at Keehi Transfer Station	Ongoing	FY19-FY20
Pit Floor and Tip Floor Exit Improvements	Complete structural improvements at Kapaa Transfer Station	Ongoing	FY19-FY20
Green Waste Load-out Area	Plan, design, and construct a new green waste load-out area at Kapaa Transfer Station	Ongoing	FY19-FY21

Table 8-9. Facility Capacity and Siting Action Item Summary

Facility/Future Need	Action Item/Implementation Task	Initiative Status	Implementation Dates
Additional Load-out Area	Plan, design, and construct an additional load-out area at Kawailoa Transfer Station	Planned	FY19-FY21
Materials Acceptance	Implement acceptance of householder bulky waste and expanded householder hours at Keehi Transfer Station; investigate accepting more types of materials at Keehi Transfer Station, including Honolulu green waste and blue bin material, and householder white goods, tires, propane tanks, and fire extinguishers; investigate adding Sunday as a normal day of operations to Keehi Transfer Station and evaluate receiving schedule for early morning routes; investigate accepting more types of materials at all transfer stations (such as more battery types and compressed gas tanks) and modify recycler contracts, accordingly	Ongoing/Planned	FY19-FY22
Nonprofit Organization Collaboration	Investigate feasibility of partnering with nonprofit organizations to host reuse and donation stations at transfer stations or Zero Waste/Re-use hubs where durable, reusable materials can be consolidated and distributed at convenience centers and transfer stations and to allow community cleanup organizations better disposal options.	Planned	FY19-FY20
Permit Renewals	Renew transfer station permits (expiration date of August 2020)	Planned	FY19-FY20
H-POWER			
Improvements to Vehicle Traffic Flow	Complete traffic flow study, assess recommendations, secure contract, and complete improvements	Ongoing	FY19-FY20
Roof Rehabilitation	Secure contract and complete work	Ongoing	FY19-FY20
Ash Building Rehabilitation	Develop plans, secure contract, and complete work	Planned	FY19-FY20
Third Boiler Enclosure	Develop plans, secure contract, and complete work	Planned	FY22-FY28
Equipment Refurbishment	Work with Covanta to assess needs, secure contracts, and complete work	Ongoing/Planned	FY19-FY28
Waste Processing and Baling	Develop plans, secure contract, and complete work	Ongoing/Planned	FY19-FY21
Enhanced Metal Recovery	Investigate feasibility, develop plans, secure contract, and complete work	Planned	FY20-FY22
Heat Recovery and Energy Utilization	Investigate feasibility, develop plans, secure contract, and complete work	Planned	FY20-FY21
Long-range Planning	Increase the efficiency and capacity of H-POWER (e.g., adding additional facilities for waste storage and baling, investigating alternative technologies, and similar)	Planned	FY24-FY28
Long-range Planning	Assess future needs and plan for future expansion as appropriate	Ongoing	FY24-FY28
WGSL			
Landfill End-of-life Monitoring	Perform annual evaluations to monitor the effect of solid waste generation on landfill life (evaluations are currently performed in the landfill's annual reports)	Ongoing	FY19-FY28

Table 8-9. Facility Capacity and Siting Action Item Summary

Facility/Future Need	Action Item/Implementation Task	Initiative Status	Implementation Dates
New Landfill	Begin activities to site a new landfill at least 10 years before the depletion of landfill capacity: finalize site selection, undertaking land acquisition (e.g., negotiation, condemnation or purchase); obtain environmental permits, land use permits and operating permits; and conduct site planning, design, engineering, and construction	Planned	FY28
Permit Renewal	Continue to monitor the permit-renewal process and rebalance configuration approval	Planned	FY19-FY20
Contract Extension or Re-bid Landfill Operator	Determine whether the contract with the landfill operator will be extended or rebid before contract expiration (expiration in 2024); extend or re-bid, as appropriate	Planned	FY22-FY23
PVT Landfill			
Landfill End-of-life Monitoring	Keep apprised of the PVT Landfill's disposal and recycling initiatives to understand developments in C&D debris management	Ongoing	FY19-FY28
Recycling and Processing Facilities			
Mixed-recyclables Contract	Determine if the contract with the mixed-recyclables contractor should be extended or re-bid before contract expiration (expiration in 2019); extend or re-bid, as appropriate	Planned	FY19-FY21
Green-waste Contract	Determine if the contract with the green-waste contractor should be extended or re-bid, or if alternate processing methods are sensible, before contract expiration (expiration in 2025); extend, re-bid, or evaluate alternate methods to process green waste (e.g., new compost facility), as appropriate	Planned	FY24-FY28
Contracts for Other Commodities	Determine if contracts with other recyclables processors (e.g., white goods, batteries, and tires) should be extended, re-bid, or terminated before contract expiration	Planned	FY19-FY28
New Refuse Facility in Campbell Industrial Park, Kapolei			
Convenience Center	Plan, design, permit, and construct facility	Ongoing/Planned	FY19-FY21
White goods Processing Facility	Evaluate proposals, plan, design, permit, and construct facility	Planned	FY19-FY21
Glass Processing Facility	Evaluate proposals, plan, design, permit, and construct facility	Planned	FY19-FY21
Ash and ASR Facility	Evaluate proposals, plan, design, permit, and construct facility	Ongoing/Planned	FY19-FY21
MRF	Assess feasibility, release RFP, evaluate proposals, plan, design, permit, and construct facility	Planned	FY20-FY22
Base Yard	Leeward Base Yard: Site, plan, construct, and relocate the Pearl City Corporation Yard in the Leeward District	Planned	FY20
Public Viewing Area	Consider building a public viewing area, education center, or both at the new refuse facility (see Section 7 for more details.)	Planned	FY20-FY22

9. Materials Marketing and Procurement

While collecting post-consumer materials is an essential component of any solid waste management program, securing viable markets for those materials is equally important for a sustainable materials management system. The City is a key participant in the upstream portions of Oahu's post-consumer materials management system. The City administers programs and policies that help to ensure post-consumer materials effectively enter the system. The City also promotes local uses for materials made with recycled content, as well as the procurement of those materials by county agencies.

9.1 Goals and Objectives

To secure viable markets for Oahu's post-consumer materials, the City's goals for materials marketing and procurement of materials made with recycled content are to focus on improvement through further program/policy development and collaboration with relevant stakeholders.

9.2 Background

9.2.1 Legislative

HRS Chapter 342G requires that county integrated solid waste management plans include a *marketing and procurement of materials* element. More specifically, HRS Section 342G-26(i) requires that this component describe the following:

- Existing county, state, or other markets for materials diverted from the solid waste stream
- Methods to increase access to markets, including the promotion of local uses for materials derived from solid waste
- Methods to promote the procurement of recycled materials by county agencies

This section of the Plan addresses these requirements.

9.2.2 Current Market Challenges

The Office of the City Auditor published an audit of the City's recycling program in October 2017. This audit included an analysis of the global commodities market for recyclable materials. The report concluded that market prices for recyclable commodities have declined. As a result, revenues generated from "the sale of solid waste are insufficient to offset the costs of processing the collected recycled waste."[338]

This situation is at least partly the result of the unique challenges affecting development of markets for recyclables in the City and the other counties in the State of Hawaii, including the following:

- **The City's remoteness and resultant high transportation costs**—Shipping a standard-sized container of recyclable materials from Honolulu to Asia could cost six times the amount for shipping from Los Angeles to Asia.[339] Because of high transport costs, local processors receive significantly less return for their materials.
- **Lack of competition among shipping lines** —There is relatively little competition among the limited number of shipping companies that service Honolulu and are capable of inter-island/continental transportation service. As a result, there is little incentive for those companies to offer their customers reduced freight charges for shipping containers with recyclables.[340]

[338] City and County of Honolulu, Office of the City Auditor. 2017. *Audit of the City's Recycling Program.* Report No. 17-06. October.
[339] Ibid.
[340] Ibid.

- **Low supply and demand for recyclables**—The City generates a relatively low volume of recyclables and has a relatively low demand for end products made from recycled materials on the island. Therefore, for most commodities, it would not be cost-effective to develop manufacturing facilities to make products from recycled materials locally.[341]
- **High costs**—The City faces relatively high costs for land, water, and electricity. Even if manufacturing plants existed on Oahu, it would be difficult for Oahu manufacturers to compete with those on the mainland.[342]

In addition, given Oahu's lack of local recyclable material end users, the economics of recycling programs within the City are significantly impacted by fluctuations in global recycling markets (as discussed in Section 4).

9.3 Existing Programs and Markets

The City, the State, and commercial recyclers and processors are all key participants in Oahu's overall post-consumer materials management system. They each play an important role in the general market for recycled materials.

The City's role in the post-consumer materials management system focuses on developing and implementing programs and policies (see Sections 4 and 6) to guide the capture of materials, as well as contracting with recyclers/processors to manage post-consumer materials after collection. The City also encourages the procurement of recycled materials and promotes local use by showcasing recycled-content products (e.g., plastic benches made from milk jugs and decorative statues made from recycled glass, at the Honolulu Zoo).[343]

The State's role in the post-consumer materials management cycle is similar to the City's in that it dictates policy and implements additional programs (such as the HI-5 program) to encourage diversion of waste material from the landfill. This affects the type of materials entering the post-consumer materials market.

This section summarizes the existing markets within the City and County, State, and commercial sectors, as well as activities that are being conducted to promote local use of post-consumer materials and procurement of goods made with recycled content. Sections are organized by material type.

9.3.1 Paper

Post-consumer paper (e.g., used corrugated cardboard, newspaper, and office paper) is collected through the City's curbside recycling program. The City indirectly impacts markets for recycled paper through implementation of recycling programs (e.g., curbside collection) and policies (e.g., recycling ordinances) that affect the supply of this post-consumer material. The City also enforces ordinances requiring the separate collection and recycling of paper (e.g., ROH 9-3.1) in all City offices and other offices larger than 20,000 square feet through random inspections and compliance mailers. For City offices, the City contracts with a recycler for collection and recycling.

To support the recycled paper markets, the City purchases recycled-content paper. This includes products from toilet tissue and paper towels to copier and computer paper.[344] More information on paper recycling can be found in Section 4.

Hawaii State procurement laws (in particular, HRS Section 103D-1005) followed by the City encourage State agencies to give preference to bidders who use recycled-content materials, and to "ensure, to the maximum extent economically feasible, the purchase of materials that may be recycled or reused when

[341] City and County of Honolulu, Office of the City Auditor. 2017. *Audit of the City's Recycling Program.* Report No. 17-06. October.
[342] Ibid.
[343] City and County of Honolulu, Department of Environmental Services. 2018. "How the City Manages Our Waste." Accessed January 18, 2018. http://www.opala.org/solid_waste/archive/How_our_City_manages_our_waste.html.
[344] Ibid.

discarded, and to avoid the purchase of products deemed environmentally harmful." When purchasing office paper and printed material, agencies are urged to purchase only office paper and printed materials with recycled content.

Certain local processors and brokers ship recovered paper materials to off-island markets, both on the mainland and in Asia. Off-island markets for paper demand low contaminant levels, and pricing has fallen significantly in the past year. In December 2017, the average U.S. pricing for mixed paper was $29.45 per ton, compared to $77 per ton in 2016. In addition, the average U.S. pricing for old corrugated cardboard was $104.72 per ton in December 2017, fluctuating over the year, and reached as low as $96.67 per ton.[345]

The key barriers to enhancing post-consumer paper markets are related to the City's remoteness and the resulting low volume of post-consumer recycled material it generates. Large-scale, on-island paper processing and manufacturing is not economically viable, although some quantity of post-consumer paper may be repurposed for applications such as animal bedding, cellulose insulation, hydro-mulch, and shipping and packaging.

Opportunities to enhance recycled paper markets include identification of lower cost transportation alternatives (e.g., through backhauling), focused efforts to reduce contamination levels, and increased cooperation in recycling among the City and other counties in the state to strengthen the negotiating position in the marketplace.

A summary of paper market programs and the market outlook is provided in Table 9-1.

Table 9-1. Paper Market Programs and Outlook

Market Sector	Existing Methods to Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets
City and County	Curbside collection of paper Regulations guiding recycling and reuse Contracts with paper recyclers	Regulations requiring purchase of recycled paper products	Recycled paper products (e.g., toilet tissue, paper towels, and office paper)
State	Regulations guiding recycling and reuse	Regulations requiring purchase of recycled paper products	
Commercial	Shipment to the mainland and Asia for recycling and processing	None	

9.3.2 Glass

Oahu markets for glass recycling are low, and the market value for recycled glass does not sustain the cost of its recycling. Consequently, glass requires a recycling subsidy. There are two glass recycling subsidy programs in state law: the DBC (also known as HI-5) program for deposit single-serving beverage containers and the ADF program for non-deposit (non-HI-5) glass, such as wine and spirit bottles and other glass containers and jars. Currently, most of the glass that is recycled is collected through the City's curbside collection program and through the HI-5 program.

The State oversees the HI-5 program for various types of DBCs, including glass containers. As part of the HI-5 program, a 5-cent deposit and 1- to 1.5-cent non-refundable fee are assessed with the purchase of each DBC. The 5-cent deposit is returned upon redemption. More information on the HI-5 program is provided in Section 4.

The State's ADF program for non-deposit glass has undergone a series of changes since its inception in 1994. Through this program, the State provides funding to the City to issue a recycling incentive payment to glass processors. The current amount of money the City receives to subsidize non-deposit glass

[345] Recycling Today. 2018. "Concerning changes." Accessed March 12, 2018. http://magazine.recyclingtoday.com/article/january-2018/paper-scrap-report-jan-2018.aspx.

recycling on Oahu is insufficient.[346] However, non-deposit glass is still collected in the residential blue cart recycling program and in two licensed glass recyclers' commercial accounts.[347] The City contracts with a glass recycler to process both ADF and HI-5 glass collected in the blue carts. Recyclers typically ship glass to off-island markets on the mainland or in Asia. More information on the State's ADF program is provided in Section 4.

The City enforces business ordinances to regulate the recycling of HI-5 and non-HI-5 glass through random inspections and compliance mailers. However, the ordinance for non-deposit glass is currently suspended because subsidies from the ADF program are limited.

In addition, City ordinance (ROH Chapter 9-8.2) and State statute (HRS Section 103D-407) allow for the use of crushed glass in roadways and other traffic surfaces. Examples of sites with crushed glass incorporated into traffic ways include the Waipio Soccer Park (glasphalt parking surface and access road) and Hoomaluhia Botanical Garden (glasphalt paved walkway).[348]

The key barriers to strengthening on-island recycled glass markets are the lack of acceptance of recycled glass in beneficial reuse applications, the lack of processing capacity for consistently high-quality supplies of finely ground glass, and the high cost of processing. For off-island markets, there is no financial incentive for recyclers to accept the material, as the current subsidy does not offset the costs to recycle.

A summary of glass market programs and the market outlook is provided in Table 9-2.

Table 9-2. Glass Market Programs and Outlook

Market Sector	Existing Methods to Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets
City and County	Non-deposit glass ADF program Curbside collection of glass Contract with a blue bin processor Identification of future sites for HI-5 redemption centers	Regulations allowing use of crushed glass in road construction	None (regulations are in place for crushed glass reuse in road construction but practice is no longer implemented)
State	Non-deposit glass ADF program HI-5 Deposit Program	Regulations allowing use of crushed glass in road construction	
Commercial	Shipment to the mainland and Asia for recycling/processing	None	

9.3.3 Non-Ferrous and Ferrous Metals

The City administers the curbside collection of mixed recyclables (which includes post-consumer ferrous and non-ferrous metals), monthly curbside collection of residential white goods, and white goods collection at convenience centers and certain transfer stations. Post-consumer non-ferrous and ferrous metals collected through these programs and methods are sent to contracted recyclers for processing.

The State oversees the HI-5 program for DBCs, including aluminum and bi-metal containers. As part of the HI-5 program, a 5-cent deposit and 1- to 1.5-cent non-refundable fee are assessed with the purchase of each DBC. The City plans to add more redemption centers by identifying City-owned parcels with the capacity for redemption center capabilities (redemption centers would be privately operated). More information on the HI-5 program is provided in Section 4.

[346] City and County of Honolulu, Department of Environmental Services. 2017. *Report on the Enforcement of Mandatory Business Recycling Ordinances*. June. http://www.opala.org/solid_waste/pdfs/2017%20Report%20on%20Mandatory%20Business%20Recycling.pdf.
[347] Ibid.
[348] Beck, R. W. 2008. *Integrated Solid Waste Management Plan*. October.

At H-POWER, all non-ferrous and ferrous metals in the waste stream are extracted for sorting and processing before and after the combustible process. The metals are marketed through a contracted recycler.

Within the commercial sector, metal recyclers collect and ship to markets off-island, mostly located in Asia. Commercial operations with automobile shredders shred vehicles into a mixture of metals and ASR. ASR can consist of many different materials, including "plastics, glass, rubber, wood, foam, tramp metal, wire, fibers, sand and dirt" and has the potential to be, but is not currently, recycled.[349]

A summary of metal market programs and the market outlook is provided in Table 9-3.

Table 9-3. Metal Market Programs and Outlook

Market Sector	Existing Methods to Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets
City and County	Curbside, bulky item, convenience center, and select transfer station collection Contracts with metal recyclers Identification of future sites for HI-5 redemption centers	None	Recycled metal
State	HI-5 Deposit Program	None	
Commercial	Shipment to the mainland and Asia for recycling/processing	None	

9.3.4 Plastics

Post-consumer plastics are primarily collected through the HI-5 program and the curbside collection of mixed recyclables.

As with glass, aluminum, and bi-metal containers, plastic DBCs can be redeemed through the HI-5 program administered by the State. The City plans to add more redemption centers by identifying City-owned parcels with the capacity for redemption center capabilities (redemption centers would be privately operated). More details on the HI-5 program are provided in Section 4.

Recycling companies receive plastic collected curbside as well as plastic collected from HI-5 redemption centers in the form of #1 and #2 coded plastics. #2 coded plastic, high density polyethylene (HDPE), and #1 coded plastic, polyethylene terephthalate (PET), make up most of the post-consumer plastics stream. Currently, pricing is approximately $14 per ton for PET bales and less than $35 per ton for HDPE bales.[350] The main barrier for this market is the difficulty in achieving low contaminant levels in plastic bales.

A summary of plastic market programs and market outlook is provided in Table 9-4.

Table 9-4. Plastic Market Programs and Outlook

Market Sector	Existing Methods to Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets
City and County	Curbside collection of plastics Contracts with a plastic recycler Identification of future sites for HI-5 redemption centers	None	Recycled plastic products (e.g., bottles made from recycled plastic, insulation, and plastic furniture)
State	HI-5 deposit program	None	
Commercial	Shipment to the mainland and Asia for recycling/processing	None	

[349] Waste Advantage. 2014. "Recycling Auto Shredder Residue." September 23. https://wasteadvantagemag.com/recycling-auto-shredder-residue/.

[350] Resource Recycling. 2018. "2018 Recycling Market Update." Webinar presentation. February 15. https://www.epa.gov/smm/sustainable-materials-management-smm-web-academy-webinar-recycling-market-update.

9.3.5 Green Waste

The City collects green waste at the curb from residential customers and accepts residential green waste at convenience centers and the Kapaa Transfer Station. Green waste is transported to a composting facility contracted by the City, currently HER, for the processing of this material into mulch and soil amendment products to conserve water and enrich existing soil. These products are bagged, distributed, and sold throughout Hawaii. HER also sells their product in bulk by the cubic yard. HER's customers include local farmers, landscapers, nurseries, and developers, as well as the City and State. More information on green waste management and HER's operations is provided in Section 4.

In an effort to divert commercial green waste toward recycling markets, the City enforces a disposal ban (ROH Section 9-1.7) at WGSL and H-POWER.

The green waste market is limited to on-island customers. Barriers to the market include space constraints for processing material and limited customers.

A summary of green waste market programs and the market outlook is provided in Table 9-5.

Table 9-5. Green Waste Market Programs and Outlook

Market Sector	Existing Methods to Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets
City and County	Curbside collection of green waste Regulations on commercial green waste disposal Contract with a composting facility	None	Compost, mulch, and other soil amendment products Compost filter socks
State	None	None	
Commercial	Processing of green waste into mulch and soil amendment products for sale throughout Hawaii	None	

9.3.6 Additional Organics

Additional organic material collected and processed on Oahu includes food waste and biosolids. Pre-consumer and post-consumer food is reused and recycled through a variety of means. Edible food is donated to food banks or other non-profit organizations such as Aloha Harvest for human consumption. Food unsuitable for human consumption can be used as animal feed or composted. HER accepts a limited amount of pre-consumer food waste for their composting operations.

The City enforces a mandatory recycling ordinance (ROH Section 9-3.5) for large commercial food waste generators, such as restaurants, grocery stores, food courts, hotels, hospitals, and manufacturers, through inspections and compliance surveys. This has an indirect impact on the quantity of food waste generated.

Biosolids are also processed and reused on Oahu. The City has contracted with Synagro to digest, dewater, and heat-dry sewage sludge from the Sand Island WWTP. The end-product is a Class A biosolid pellet that is used as a general all-purpose fertilizer.

Barriers to the markets for materials made from food and biosolids include the declining number of pig farms, more restrictive regulations for compost facilities that process certain types of food, and the limited number of other existing outlets for food waste and biosolids.

A summary of additional organics market programs and the market outlook is provided in Table 9-6.

Table 9-6. Additional Organics Market Programs and Outlook

Market Sector	Existing Methods to Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets
City and County	Regulations on food waste disposal Source reduction campaigns Processing of sewage sludge to make biosolids pellets for use as fertilizer	None	Donations to food banks and other non-profit organizations such as Aloha Harvest Compost and soil amendment products Animal feed Biosolids pellets (fertilizer)
State	None	None	
Commercial	Donations to food banks Collection of food waste to be used as animal feed Processing of food waste to make compost and soil amendment products	None	

9.3.7 Used Oil

The State mandates that commercially generated used oil must be handled through a recycling company. Used motor oil and oil filters can be processed by Unitek. The filters are cleaned and sold as scrap metal to a processor on the mainland.

The City promotes recycling of used cooking oil and advertises drop-off events and local recyclers on their website, opala.org.[351] There are several commercial entities that collect and process used cooking oil into products such as biodiesel or animal feed.[352] The City also uses B20 biodiesel fuel (comprised of a 20 percent biodiesel and 80 percent petroleum diesel blend) for a number of vehicles within its fleet.

The State promotes markets for used cooking oil and biodiesel by developing policies that guide usage. For example, HRS Section 103D-1012 provides for a 5-cent per-gallon price preference for 100 percent biodiesel and "for blends containing both biodiesel and petroleum-based biodiesel, the preference is to be applied to only the biofuel portion of the blend."

Barriers to the market include a limited market for biodiesel.

A summary of used oil market programs and the market outlook is provided in Table 9-7.

Table 9-7. Used Oil Market Programs and Outlook

Market Sector	Existing Methods to Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets
City and County	Promotion of used cooking oil recycling methods on the City's website Use B20 biodiesel fuel in certain City vehicles	None	Re-refined motor oil Biodiesel and other fuels
State	Regulations on used-oil recycling Regulations promoting the use of biodiesel	None	
Commercial	Recycling of used oil and oil filters Processing of used cooking oil into products such as biodiesel and animal feed	None	

[351] City and County of Honolulu, Department of Environmental Services. 2018. "SORT IT OUT: What to Recycle/How to Dispose of…" Accessed March 12, 2018. http://www.opala.org/solid_waste/what_goes_where_table.html#oil.

[352] Pacific Biodiesel. 2018. Pacific Biodiesel Logistics. Accessed March 9, 2018. http://www.biodiesel.com/company/logistics/; Baker Commodities, Inc. 2018. "Products." Accessed March 9, 2018. http://bakercommodities.com/products/.

9.3.8 Tires

The State bans tire disposal at WGSL, but accepts tires from residents at convenience centers and transfer stations island-wide (see ROH 9-1.7). In 2014, the City received a variance from the State that allows H-POWER to accept and process tires collected by the Refuse Division and gathered through community cleanup events.[353] The tires collected at convenience centers and transfer stations are therefore subsequently taken to H-POWER to be processed. Oversized tires that H-POWER cannot process are taken to the City's contracted tire recycler. More information on used tires is provided in Section 5.

The State requires tire retailers and wholesalers to accept used tires in exchange for new ones purchased, and typically prohibits the disposal of whole, used motor vehicle tires at all landfills and incinerators within the state. All scrap tires derived from commercial and government entities, except those processed at H-POWER, are required to be properly disposed and recycled in accordance with state regulations.

In the commercial sector, a large portion of tires are processed by Unitek, while others are shipped to processors on the mainland, with some limited markets present in the state. Tires can be retreaded and used again, shredded for tire-derived fuel (TDF), or crumbed for use in artificial turf or athletic applications; however, these are limited markets on the islands.

Demand is expected to be steady. Barriers to strengthening scrap-tire demand include the limited market and applications on-island.

A summary of used tire market programs and the market outlook is provided in Table 9-8.

Table 9-8. Used Tires Market Programs and Outlook

Market Sector	Existing Methods to Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets
City and County	Regulations on used-tire disposal Collection at convenience centers and transfer stations for processing at H-POWER Contract with a tire recycler	None	Retreaded tires Feedstock for electricity (H-POWER) TDF Crumb rubber (for use in artificial turf or athletic applications)
State	Regulations on retailers and wholesalers to accept used tires	None	
Commercial	Recycling as TDF or crumb rubber Shipment to the mainland for recycling or processing	None	

9.3.9 Electronic Waste

There is not currently a City recycling program for household-generated post-consumer electronics (e-waste), which includes discarded computers, cell phones, televisions, and other electronic products. While only residential e-waste is allowed to be disposed of with MSW or during bulky item collection, the City encourages residents to pursue source reduction and recycling options such as providing them as donations or returning electronics to manufacturers (e.g., take-back programs) as enforced by extended producer responsibility regulations. For commercial and government generators of e-waste, the State enforces a ban on disposal of electronics (effective July 2006), encouraging generators to investigate recycling options.[354]

In 2008, the State adopted the Hawaii Electronic Waste and Television Recycling and Recovery Law (HRS Chapter 339D) requiring electronics manufacturers to provide recycling programs for electronic

[353] City and County of Honolulu. 2017. *Audit of the City's Recycling Program.* Report No. 17-06. October.
[354] City and County of Honolulu, Department of Environmental Services. 2018. "E-waste (Electronic Waste)." http://www.opala.org/solid_waste/eWaste.html.

devices and televisions. Manufacturers must take covered electronics back at no cost to residents when dropped off for recycling.[355] As of January 1, 2010, consumers can recycle their covered electronic devices through these programs. As of January 1, 2011, consumers may recycle their covered TVs through these programs.[356]

According to the 2016 report to the state legislature, the total amount of e-waste recycled has increased from 3,235,432 pounds in 2010 to 4,235,276 pounds in 2014.[357] The report also notes that although the amount of e-waste that is recycled has slightly increased, the overall effectiveness of these programs is impacted by how convenient the programs are for customers. For instance, some programs only accept limited types of e-waste and are confusing for customers.[358]

In the commercial sector, manufacturers take back used electronics and send them to the mainland for recycling and processing. With the rise of technology, the landscape for electronics recycling is shifting. Some notable trends in electronics are that devices are becoming more lightweight and integrated (weight becomes an ineffective measure of recycling program effectiveness), as well as the decline in usage of precious metals and other valuable materials housed in devices.[359]

A summary of electronics and e-waste market programs and the market outlook is provided in Table 9-9.

Table 9-9. Used Electronics Market Programs and Outlook

Market Sector	Existing Methods to Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets
City and County	Source reduction and recycling campaigns	None	Recycled electronic components
State	Regulations on used electronics disposal Regulations on manufacturers to take back electronics (Extended Producer Responsibility)	None	
Commercial	Shipment to the mainland for recycling or processing	None	

9.3.10 Ash

Ash is a byproduct generated when MSW is combusted at H-POWER and turned into energy. Currently, the ash from H-POWER is disposed of at WGSL in the ash monofill. More information on ash produced at H-POWER is provided in Section 5.

Ash is also generated from AES' coal-fired power plant, some of which is used to manufacture concrete or is otherwise reused. Ash produced at the AES plant is different from H-POWER ash in that it is a byproduct of 95 percent coal, resulting in a consistent ash product.[360]

Current markets for ash are extremely limited, especially with respect to ash produced at H-POWER. However, there is potential for a larger market for the beneficial reuse of ash. Barriers to the market include low acceptance of existing reuse technologies.

A summary of ash market programs and the market outlook is provided in Table 9-10.

[355] State of Hawaii, Department of Health. 2018. "Electronic Device and Television Recycling Law." http://health.hawaii.gov/ewaste/.
[356] State of Hawaii, Department of Health. 2018. *Hawaii Electronic Waste and Television Recycling and Recovery Law.* http://health.hawaii.gov/ewaste/files/2013/06/consumer.pdf.
[357] State of Hawaii, Department of Health. 2018. *Report to the Twenty-Eighth Legislature State of Hawaii 2016.* http://www.bottlebill.org/resources/pubs/2016_OSWM_Annual_Report.pdf.
[358] Ibid.
[359] Resource Recycling. 2017. "Landscape View." September 19. https://resource-recycling.com/e-scrap/2017/09/19/landscape-view/.
[360] Beck, R. W. 2008. *Integrated Solid Waste Management Plan*. October.

Table 9-10. Ash Market Programs and Outlook

Market Sector	Existing Methods to Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets
City and County	Disposal of ash at WGSL	None	Concrete Asphalt
State	None	None	
Commercial	Beneficial reuse of ash	None	

9.3.11 Untreated Wood

Untreated wood can be considered C&D debris, or can be treated as green waste and processed into mulch. The City has a disposal ban on C&D debris and green waste at WGSL and H-POWER; C&D debris can be disposed of at the PVT Landfill or reused through donations or resale to the community. The PVT Landfill currently accepts much of the C&D debris collected by commercial haulers. In addition, the PVT Landfill is planning a new gasification facility (located in the Campbell Industrial Park) that would burn feedstock, including wood waste, for energy production.[361] There are also several businesses and organizations that recycle or reuse C&D debris on-island (see Section 4 for details). As green waste, untreated wood is accepted at composting facilities to be processed into mulch and soil amendment products. These products are distributed and sold throughout Hawaii. More information on C&D debris is provided in Section 5; more information on green waste is provided in Section 4.

Barriers to the market include cost-effectiveness to sort wood waste and mainstream acceptance of reuse practices.

A summary of untreated wood market programs and market outlook is provided in Table 9-11.

Table 9-11. Untreated Wood Market Programs and Outlook

Market Sector	Existing Methods to Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets
City and County	Regulations on the disposal of C&D debris and green waste	None	Mulch and soil amendment products Reuse in local building projects Gasifier feedstock
State	None	None	
Commercial	Disposal/recycling of C&D debris at the PVT Landfill Processing of green waste into mulch and soil amendment products for sale throughout Hawaii Reuse for local building projects	None	

9.3.12 Concrete

Concrete is a common component in the C&D debris stream. As stated in Section 9.3.11, the City enforces a disposal ban on commercially-generated C&D debris at WGSL and H-POWER, encouraging diversion towards the C&D landfill (State-regulated) or recycling. Concrete can be crushed and reused in applications such as aggregate base; several commercial firms provide this service on the island. Concrete is also recycled and made into new concrete. More information on C&D debris is provided in Sections 4 and 5.

While recovery and recycling of aggregates are occurring to some degree on Oahu, specifications limit the materials that can be reused (e.g., aggregate sizing and makeup, and contaminant levels) and limit the amount of accepted material that can be used.[362]

[361] PVT Land Company. 2017. "When is a landfill more than a landfill?" Accessed December 8, 2017. http://www.pvtland.com/landfill/.

[362] Pit & Quarry. 2018. "Hawaii operation overcomes waste coarse aggregate issue." January 26. http://www.pitandquarry.com/hawaii-operation-overcomes-waste-coarse-aggregate-issue/.

A summary of concrete market programs and the market outlook is provided in Table 9-12.

Table 9-12. Concrete Market Programs and Outlook

Market Sector	Existing Methods to Increase Access to Markets	Existing Methods to Promote Procurement	Existing Markets
City and County	Regulations on the disposal of C&D debris	None	Reuse as aggregate or recycled concrete
State	Regulations on C&D debris facilities	None	
Commercial	Disposal and recycling of C&D debris at the PVT Landfill Processing of concrete for sale as aggregate or recycled concrete throughout Hawaii	None	

9.4 Strategies to Increase Access to Markets and Promote Procurement of Recycled Materials

As discussed above, the City is currently a key participant in a variety of existing markets for several recycled materials. The City will continue to promote the programs and policies that support these markets. In addition, the City will increase access to markets and promote the procurement of recycled materials through the following strategies:

- Soliciting proposals for the beneficial reuse of materials, including glass, ASR, and ash
- Investigating new ways and best practices for managing electronics and e-waste
- Investigating new ways to promote the procurement of processed organics

Sections 4, 5, and 6 also provide information on these strategies.

9.4.1 Solicit Proposals for the Beneficial Reuse of Materials

The City released RFPs to solicit proposals for the beneficial reuse of several materials, including glass, ASR, and ash, in mid-2018. However, these two RFPs will be rereleased in early 2019 in an attempt to solicit a greater number of eligible offers. An additional RFP for recycling and processing of white goods is also planned for release in early 2019. Currently, these materials have limited to no recycling options available on the island, and the latter two make up most of the material going to WGSL. The purpose of the RFPs is to gather information on and ultimately implement new management techniques so that these materials can be beneficially reused, which will promote access to markets and local reuse of materials. If beneficial reuse technologies could be implemented for any of these materials, the City would be successful in supporting new markets as well as diverting waste from WGSL.

9.4.2 Investigate Additional E-Waste Management Practices

The City plans to investigate and evaluate electronics and e-waste management practices to improve handling and recycling on the island. To begin, the City will advocate for the state legislature to develop a state-wide solution and funding source to address the growing e-waste problem as opportunities arise and as appropriate. As part of this effort, the City could encourage the State to consider an ADF on the sale of electronics to support end-of-life management. Further evaluation of electronics and e-waste management practices may also be performed by the City's SRWG.

Nationwide, e-waste management is evolving, and EPA is evaluating strategies to enhance the management of electronics throughout the product lifecycle in support of the *National Strategy for Electronics Stewardship*.[363] EPA also collaborates with governments and environmental officials around the world on e-waste management through the IEMN.[364] The City could consider keeping apprised of findings from the IEMN and EPA to improve e-waste management.

[363] Interagency Task Force on Electronics Stewardship. 2011. "National Strategy for Electronics Stewardship." https://www.epa.gov/smm-electronics/national-strategy-electronics-stewardship-nses.

[364] EPA. 2018. "Cleaning Up Electronic Waste (E-Waste)." Accessed January 30, 2018. https://www.epa.gov/international-cooperation/cleaning-electronic-waste-e-waste.

9.4.3 Investigate New Ways to Promote the Procurement of Processed Organics

Hawaii State procurement laws (HRS Section 103D-1005), already encourage State agencies to give preference to bidders who use recycled-content materials (the law includes mulch and soil amendments).

The City and State could evaluate the potential for exploring the expansion of these procurement requirements, to specify the use of local compost products in Department of Parks and Recreation and Hawaii Department of Transportation (DOT) projects.

This would promote the use of processed organics (i.e. compost and other soil amendments) in a manner that has been employed by state DOTs throughout the country. Compost has been used in a variety of DOT applications,[365] including the following:

- Landscape, wildflower, and roadside plantings
- Wetland creation
- Turf and vegetation establishment
- Erosion control
- Onsite topsoil manufacturing
- Revegetation of difficult slopes
- Soil bioengineering

In 2016, BioCycle published an article that discussed compost use by three state DOTs (California, Texas, and Washington). According to this article, use of compost by DOTs has increased dramatically since the early 2000s. The Texas DOT is reportedly the largest single market for compost in the U.S., and the State of Washington DOT (WSDOT) is the largest purchaser for compost in that state.[366]

In these and other states, several actions have led to the widespread acceptance of compost in DOT projects. In Washington, the state legislature enacted a law in 1991 requiring 80 percent of funds used for soil amendments purchased by state agencies be spent on compost. In addition, the state identified new applications and updated stormwater guidance, making compost an approved stormwater management tool. WSDOT used several large projects to demonstrate the effectiveness of compost and attract other large users (e.g., universities).

The City could consider the experience obtained from various programs across the country when investigating new ways to promote the procurement of processed organics.

9.5 Action Item Summary

The City is currently planning or progressing several initiatives to support current and new markets for recycled materials. In the long term, the City's goal is to pursue ongoing implementation of diversion and conversion practices so that a landfill will no longer be required; a large part of this is fostering sustainable markets. The action items for materials marketing and procurement are summarized in Table 9-13.

Table 9-13. Materials Marketing and Procurement Action Item Summary

Material Market	Action Item	Initiative Status	Implementation Dates
Paper	Optimize curbside collection of paper	Ongoing	FY19-FY28
	Continue to enforce City ordinances	Ongoing	FY19-FY28
	Continue to contract with paper recyclers	Ongoing	FY19-FY28

[365] EPA. 2018. *Current Compost Usage by State DOTs.* Accessed March 25, 2018. https://www.epa.gov/sites/production/files/2015-11/documents/highwy3a.pdf.

[366] BiocCycle. October 2016. "Compost Use by State DOTs." Accessed March 26, 2018. https://www.biocycle.net/2016/10/24/compost-use-state-dots/.

Table 9-13. Materials Marketing and Procurement Action Item Summary

Material Market	Action Item	Initiative Status	Implementation Dates
Glass	Optimize curbside collection of glass	Ongoing	FY19-FY28
	Support and improve accessibility of HI-5 deposit program	Ongoing	FY19-FY28
	Continue identification of future sites for HI-5 redemption centers	Planned	FY20-FY21
	Continue to contract with blue bin processors	Ongoing	FY19-FY28
	Solicit proposals for the beneficial reuse of glass	Ongoing/Planned	FY19
Metals	Optimize curbside collection of non-ferrous and ferrous metals	Ongoing	FY19-FY28
	Support and improve accessibility of HI-5 deposit program	Ongoing	FY19-FY28
	Continue identification of future sites for HI-5 redemption centers	Planned	FY20-FY21
	Continue to contract with metal recyclers	Ongoing	FY19-FY28
	Solicit proposals for the beneficial reuse of ASR	Ongoing/Planned	FY19
	Solicit proposals for the beneficial reuse of white goods	Ongoing/Planned	FY19
Plastics	Optimize curbside collection of plastics	Ongoing	FY19-FY28
	Continue identification of future sites for HI-5 redemption centers	Planned	FY20-FY21
	Support and improve accessibility of HI-5 deposit program	Ongoing	FY19-FY28
	Continue to contract with a plastics recycler	Ongoing	FY19-FY28
	Regulate plastic bag usage	Ongoing	FY19-FY28
Green Waste	Optimize curbside collection of green waste	Ongoing	FY19-FY28
	Continue to contract with a composting facility	Ongoing	FY19-FY28
	Continue to enforce disposal bans and City ordinances	Ongoing	FY19-FY28
	Investigate new ways to promote the procurement of processed organics	Ongoing	FY19-FY28
Additional Organics	Continue to enforce City ordinances	Ongoing	FY19-FY28
	Continue source reduction campaigns	Ongoing	FY19-FY21
	Investigate new ways to promote the procurement of processed organics	Ongoing	FY19-FY28
Used Oil	Continue to promote used oil disposal and recycling practices	Ongoing	FY19-FY28
Tires	Continue to enforce disposal bans	Ongoing	FY19-FY28
	Optimize collection of tires at convenience centers and transfer stations for processing at H-POWER	Ongoing	FY19-FY20
	Continue to contract with a tire recycler	Ongoing	FY19-FY28
Electronics/E-waste	Implement source reduction and recycling campaigns	Planned	FY19-FY28
	Continue to accept residential e-waste disposed of in household trash and bulky item collection	Ongoing	FY19-FY28
	Continue to enforce commercial disposal bans	Ongoing	FY19-FY28
	Investigate additional e-waste management practices	Planned	FY19-FY28
Ash	Continue to dispose of ash at WGSL until a reuse alternative is implemented	Ongoing	FY19-FY28
	Solicit proposals for the beneficial reuse of ash	Ongoing	FY19
Untreated Wood	Continue to enforce disposal bans	Ongoing	FY19-FY28
Concrete	Continue to enforce disposal bans	Ongoing	FY19-FY28

10. Energy Balance

Energy is a particularly valuable resource to the state of Hawaii because it depends heavily on imported fossil fuels to meet its energy demand, and the cost associated with transporting fuels to the islands is significant. As of 2017, 79 percent of energy consumed by the City and County of Honolulu was produced by combustion of hydrocarbon fuels. Of the remaining 21 percent from renewable sources, 9 percent was from customer-sited solar, 6 percent was from WTE, 3 percent was from wind, 2 percent was from grid-scale solar, and 1 percent was from biofuels.[367] On Oahu, the ability to generate energy through the combustion of solid waste not only reduces the state's dependence on hydrocarbon reserves, but also reduces the energy required to transport hydrocarbon fuel to the island. However, it should be noted that there are greenhouse gas emissions related to H-POWER that would be avoided if waste materials can be reduced at source or recycled on-island. More information about the existing waste to energy facility can be found in Section 8.3.3 of this Plan.

10.1 Goals and Objectives

The City has expressed their support of the state renewable energy goals by signing a proclamation in December 2017 in which Hawaii's four mayors, including Honolulu Mayor Kirk Caldwell, pledged to transition all City and County fleet vehicles to 100 percent renewable power by 2035 and to commit to 100 percent renewable fuel sources for public and private ground transportation by 2045.[368]

This pledge is in alignment with the larger, state-wide Aloha+ Challenge,[369] which includes the following goals:

- Increase renewable energy in the electricity sector to 40 percent and 30 percent energy efficiency by 2030. Work towards 100 percent clean energy by 2045.
- By 2030, reduce total annual fossil fuel use to below the 2008 level.

These goals are aligned with House Bill (HB) 623, which sets a 100 percent RPS for the electricity sector by 2045.

10.2 Background

To ensure that solid waste programs account for the energy spent to run them, Hawaii regulations require that each county develop and maintain a solid waste management plan that includes an energy balance component. The HRS include language specifying this requirement.

Per HRS Title 19, Sections 342G-25(b)(4) and 342G-26(d), the county solid waste management plan must include an energy balance component that describes the programs by which the county will investigate or incorporate ways of increasing the energy efficiency of the solid waste management process, including the assessment of energy and fuel-production options such as composting, AD, acid hydrolysis, production of liquid fuels, incineration, or a combination thereof. The component should identify and assess the following:

- The amount of energy input required by the plan for the accomplishment of collection, recycling, composting, bioconversion, waste handling, disposal, and landfilling
- The amount of energy produced from the waste

[367] Hawaiian Electric, Maui Electric and Hawaii Electric Light. *2017-2018 Sustainability Report*. https://view.hawaiianelectric.com/2017-sustainability-report/.

[368] City and County of Honolulu. 2018. *Oahu News*. http://www.honolulu.gov/rep/site/may/may_citynews/18-01_Oahu_News_FINAL.PDF. January.

[369] State of Hawaii. 2018. "Total Solid Waste Reduction. Aloha+ Challenge Dashboard." https://dashboard.hawaii.gov/stat/goals/5xhf-begg/7rpz-qst3/rwam-iyev.

- The net energy use or energy production attributable to the solid waste program
- Methods by which net energy use may be decreased or net energy or fuels production may be increased

This section addresses these HRS requirements.

Per ROH Section 9-1.13, the county plan must include an evaluation of alternative technologies that may be developed in the future to dispose of solid waste. This section includes an evaluation of alternative technologies and performs an energy balance on a proposed alternate scenario.

10.3 Energy Balance Estimates

This section includes the results of an analysis of the energy inputs required to operate the existing solid waste management system, including the beneficial energy effects of recycling and the production of energy at H-POWER, use of H-POWER rather than the landfill, and the net energy use of the system. Two scenarios are considered, as follows:

1) The first scenario uses actual data from CY 2017 to represent the current waste system.
2) The second scenario represents a typical calendar year for the current waste system. This case was added because H-POWER experienced atypical downtime in CY 2017 during which waste that would typically be processed at H-POWER was sent to the landfill.

10.3.1 Methodology

The EPA Waste Reduction Model (WARM) was used to evaluate the energy impact of the current waste system (data for CY 2017) and the two alternatives described in Section 10.3.[370] The WARM model calculates and totals energy generation and usage of baseline and alternative waste management practices for source reduction, recycling, combustion, composting, AD, and landfilling.

WARM is a tool designed and supported by EPA to help solid waste planners and organizations track energy balances and greenhouse gas emissions associated with different waste management practices. The WARM model performs a lifecycle analysis for a given waste system and accounts for many of the processes required to support that waste system, including the following:

1) Transportation to move recyclables (including organics) to facilities for reprocessing so they can be converted to feedstocks and reused
2) The energy involved in reprocessing recyclables
3) The energy savings resulting from the use of recycled feedstocks, rather than virgin materials
4) Transportation to move solid waste to energy recovery facilities and landfills
5) Energy used to operate energy recovery facilities and landfills
6) Electricity production offset by the generation of electricity at energy recovery facilities

10.3.2 Scenario 1: Energy Inputs of Existing System, Calendar Year 2017

Scenario 1 includes estimating the energy inputs associated with the existing conditions for generation, recycling, composting, and combustion quantities organized into the material components recognized in the WARM Model.[371] The WARM model was not used for recyclables sent overseas to recycling markets, because it does not allow for marine transport of materials. Instead, transportation energy for recyclables was estimated outside the model using an approximate marine distance between Honolulu and Shanghai

[370] EPA. 2018. Waste Reduction Model (WARM). https://www.epa.gov/warm.

[371] The WARM model does not recognize auto batteries or reuse materials. These items were accounted for in the model as mixed recyclables. On-land transportation is estimated to be 20 miles for all material that stays on Oahu.

(4,000 miles) for overseas transport and the actual distance from the recycling facility to the Port of Honolulu.[372]

The WARM model inputs for Scenario 1 (CY 2017) are included in Table 10-1. Information provided in this table uses waste generation and waste composition information reported in Section 2, and the composition categories were converted from those shown in Section 2 to the categories in Table 10-1, as required for the WARM model.

Table 10-1. WARM Model Baseline Scenario 1 Tons, CY 2017

Material	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total Energy Use (MMBtu)
Aluminum Cans	20,168	369	3,401	NA	(3,079,000)
Ferrous Metal	111,495	2,121	17,881	NA	(2,532,548)
Copper Wire	2,241	0	0	NA	(185,083)
Glass	14,713	3,265	9,055	NA	(26,207)
HDPE	2,061	456	4,201	NA	(171,625)
PET	2,061	531	4,891	NA	(107,090)
Cardboard (OCC)	43,119	5,159	47,542	NA	(695,215)
Newspaper	12,501	1,198	11,042	NA	(275,639)
Office Paper	9,337	701	6,455	NA	(129,051)
Dimensional Lumber	14,643	10,599	77,020	NA	(496,721)
Fiberboard	0	958	8,830	NA	(57,974)
Yard Trimmings	NA	6,689	43,289	56,064	(54,933)
Grass	NA	0	0	33,638	19,645
Leaves	NA	0	0	11,213	6,548
Branches	NA	0	0	11,213	6,548
Mixed Paper (general)	863	14,694	96,405	NA	(541,020)
Mixed Metals	0	2,248	11,157	NA	(122,455)
Mixed Plastics	1,767	30,394	60,533	NA	(753,153)
Mixed Recyclables	39,675	0	0	NA	(478,606)
Food Waste	NA	22,234	139,850	42,109	(212,417)
Mixed Organics	NA	12,870	56,747	0	(104,906)
Mixed MSW	NA	16,666	50,019	NA	(194,497)
Carpet	0 0 -	408	3,757	NA	(22,489)
Personal Computers	1,997	972	8,954	NA	(113,755)
Clay Bricks[a]	NA	3,532	NA	NA	948
Concrete[a]	0	1,659	NA	NA	445
Tires	6,477	82	757	NA	(44,642)
Asphalt Shingles	0	12	107	NA	(910)
Drywall[a]	0	5,400	NA	NA	1,449
WARM Subtotal	283,118	143,218	661,893	154,237	(10,364,353)
Overseas Transport	N/A	N/A	N/A	N/A	162,590
Total:	**283,118**	**143,218**	**661,893**	**154,237**	**(10,201,763)**

[372] This analysis assumes that there will be empty containers available to be shipped from Honolulu to Shanghai and the energy estimates account for the shipping of the full containers one way only.

Table 10-1. WARM Model Baseline Scenario 1 Tons, CY 2017

Material	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total Energy Use (MMBtu)

Notes:

[a] Clay bricks, concrete, and drywall are included in the materials to H-POWER. Because they do not readily combust, the WARM model is not capable of estimating the energy impacts of combusting these materials. Therefore, these materials were accounted for as part of the residue stream (the material that is diverted from H-POWER because it does not combust).

OCC = old corrugated cardboard

Using these inputs, the WARM model calculates baseline lifecycle energy use in million British thermal units (MMBtus) for each of these materials (Table 10-1). The resulting total energy use for Scenario 1 from the WARM model is -10,364,353 MMBtu.

Energy use to transport recyclables to overseas markets was estimated using a separate method. In the WARM model, the transport miles for recyclables were manually set to zero. The energy use was estimated using energy factors from two documents: one from the organization Business for Social Responsibility (BSR)[373] and the other from the Texas Transportation Institute (TTI),[374] and it was assumed that the recyclables will be transported to Asia for processing.[375] The calculations show that the energy cost to transport the 283,118 tons of recyclables to Asia is 162,590 MMBtu. Therefore, the total energy balance for Scenario 1 is -10,201,763 MMBtu, which is a savings in net energy use resulting from recycling and WTE compared to landfilling.

10.3.3 Scenario 2: Energy Inputs of Existing System Assuming Typical H-POWER Operations

This scenario assumes CY 2017 waste flows as if H-POWER operated normally and was not subject to planned outages for major maintenance. This is representative of a typical year, and is used to compare what actually occurred (Scenario 1) to a more typical year. The WARM model inputs for this case are shown in Table 10-2. Using these inputs, the WARM model calculates baseline lifecycle energy use in MMBtus for each of these materials (Table 10-2).

Table 10-2. WARM Model Existing System Assuming Typical H-POWER Operations

Material	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total Energy Use (MMBtu)
Aluminum Cans	20,168	57	3,712	NA	(3,078,914)
Ferrous Metal	111,495	482	19,521	NA	(2,561,139)
Copper Wire	2,241	0	0	NA	(185,083)
Glass	14,713	2,435	9,885	NA	(26,046)
HDPE	2,061	71	4,586	NA	(177,990)
PET	2,061	82	5,339	NA	(111,020)
Cardboard (OCC)	43,119	800	51,902	NA	(718,359)
Newspaper	12,501	186	12,055	NA	(282,075)
Office Paper	9,337	109	7,047	NA	(131,909)
Dimensional Lumber	14,643	3,536	84,083	NA	(544,947)
Fiberboard	0	149	9,640	NA	(63,521)
Yard Trimmings	NA	2,720	47,259	56,064	(63,600)

[373] BSR. 2015. *How to Calculate and Manage CO_2 Emissions from Ocean Transport.* February.

[374] Texas Transportation Institute (TTI). 2012. *A Model Comparison of Domestic Freight Transportation Effects on the General Public: 2001-2009*. Center for Ports and Waterways. February.

[375] Specifically, this analysis assumes that the materials will be shipped 23 miles by truck from the recycling facility to the Port of Honolulu, then transported by container ship approximately 4,000 miles from Honolulu to Shanghai. Upon arrival at Shanghai, the analysis assumes that the recyclables will be transported an average of 20 miles by truck to arrive at a recyclable processing facility.

Table 10-2. WARM Model Existing System Assuming Typical H-POWER Operations

Material	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted	Total Energy Use (MMBtu)
Grass	NA	0	0	33,638	19,645
Leaves	NA	0	0	11,213	6,548
Branches	NA	0	0	11,213	6,548
Mixed Paper (general)	863	5,854	105,245	NA	(588,484)
Mixed Metals	0	1,225	12,180	NA	(134,014)
Mixed Plastics	1,767	24,843	66,084	NA	(818,162)
Mixed Recyclables	39,675	0	0	NA	(478,606)
Food Waste	NA	9,410	152,674	42,109	(233,802)
Mixed Organics	NA	7,666	61,950	0	(114,890)
Mixed MSW	NA	12,079	54,606	NA	(211,906)
Carpet	0 0 -	63	4,102	NA	(24,654)
Personal Computers	1,997	151	9,775	NA	(118,931)
Clay Bricks[a]	NA	3,532	NA	NA	948
Concrete[a]	0	1,659	NA	NA	445
Tires	6,477	13	827	NA	(46,642)
Asphalt Shingles	0	2	117	NA	(996)
Drywall[a]	0	5,400	NA	NA	1,449
WARM Subtotal	**283,118**	**82,521**	**722,589**	**154,237**	**(10,680,105)**
Overseas Transport	N/A	N/A	N/A	N/A	162,590
Total:	**283,118**	**82,521**	**722,589**	**154,237**	**(10,517,515)**

Note:

[a] Clay bricks, concrete, and drywall are included in the materials to H-POWER. Because they do not readily combust, the WARM model is not capable of estimating the energy impacts of combusting these materials. Therefore, these materials were accounted for as part of the residue stream (the material that is diverted from H-POWER because it does not combust).

The resulting total energy use for Scenario 2 from the WARM model is -10,680,105 MMBtu. Using the methodology described for Scenario 1, it is estimated that the energy required to transport the 283,118 tons of recyclables is 162,590 MMBtu. Therefore, the total energy balance for the CY 2017 case is -10,517,515 MMBtu. That means that there is 10,517,515 MMBtu of energy saved from recycling and WTE compared to landfilling. This is 315,752 MMBtus of net energy savings compared to Scenario 1.

10.3.4 Energy Balance Summary and Conclusions

Table 10-3 provides a summary of total energy use and ranking of the two energy balance scenarios. The total energy use in the table is the net energy of the system in each waste management scenario, including actions that use, produce, and save energy. It demonstrates that there is less net energy use for materials sent to H-POWER than there is for materials sent directly to landfill, and emphasizes the need for the City to facilitate reduced downtime at H-POWER or pursue options to store waste during H-POWER downtime to avoid sending materials to the landfill.

Table 10-3. Summary of Total Energy Use and Ranking for Energy Balance Scenarios, CY 2017

Scenario	Name	Total Energy Use (MMBtu)	Net Energy Addition (Reduction)
1	Existing System, CY 2017	(10,201,763)	--
2	Existing System Assuming Typical H-POWER Operations	(10,517,515)	(315,752)

10.4 Alternative Technology Assessment

As required under ROH Section 9-1.13, an evaluation of potential alternative disposal technologies (other than landfilling) was completed. The evaluation was performed on alternative disposal technologies that could potentially manage portions of Oahu's solid waste stream.

The following technologies were selected for review based on the current state of development:

- Anaerobic digestion (AD)
- Pyrolysis and gasification
- WTE
- MSW composting

10.4.1 Anaerobic Digestion

AD is a processing technology that breaks down the organic fraction of a waste stream by using biological processes in the absence of oxygen. There are a wide range of feedstocks that are suitable for AD, including food waste, green waste, wood waste, sewage sludge, and animal manure.[376] Three byproducts are generated as part of the AD process: biogas, digestate, and effluent.[377] Of these byproducts, biogas can be further used as a renewable energy source, and the nutrient-rich digestate can be used as a fertilizer.[378] AD technology is primarily used in wastewater treatment plants, stand-alone digesters, and on-farm digesters.[379]

10.4.1.1 Applicability to Oahu Waste Stream

A 2017 Waste Composition Study shows that the MSW stream on Oahu is composed of nearly 36 percent organics, including, but not limited to, food waste, green waste, and wood. Within the 36 percent organics fraction, food waste and green waste comprise 20 percent and 6 percent of the overall Oahu waste stream, respectively. In addition to food waste, green waste, and other organics, sewage sludge can be used as a feedstock for AD, and this material comprises approximately 2.5 percent of the Oahu waste stream (AD is currently being used at many of the island's wastewater treatment plants).[380] AD can be applied to these fractions of the waste stream to convert organics into biogas and digestate (i.e., solid residues).

10.4.1.2 Commercial Status

The City's Sand Island WWTP processes sewage sludge through AD to create a Class A biosolid pellet that can be used for fertilizer. Biogas from this facility is used to power the facility's dryers. The City's other wastewater treatment plants employ AD to treat sewage sludge that is ultimately dewatered and hauled to

[376] Global Methane Initiative. 2016. *Overview of Anaerobic Digestion for Municipal Solid Waste.* https://www.globalmethane.org/documents/AD-Training-Presentation_Oct2016.pdf; Additional information provided by PVT Land Company Limited. November 21, 2018.

[377] Environment Canada. 2013. *Technical Document on Municipal Solid Waste Organics Processing*. https://www.ec.gc.ca/gdd-mw/3E8CF6C7-F214-4BA2-A1A3-163978EE9D6E/13-047-ID-458-PDF_accessible_ANG_R2-reduced%20size.pdf.

[378] Global Methane Initiative. Ibid.

[379] EPA. 2018. "Types of Anaerobic Digesters." Accessed June 13, 2018. https://www.epa.gov/anaerobic-digestion/types-anaerobic-digesters.

[380] Cascadia. 2018. *2017 Waste Composition Study.* June. Final.

H-POWER for processing with MSW. The City's long-term plan is to modify these WWTPs to produce marketable biosolids. At that point, H-POWER will serve only as a back-up disposal option for sludge.[381]

In Europe, numerous AD applications for MSW have been constructed, largely because of restrictive waste disposal policies that ban organic waste from landfill and high landfill tipping fees,[382] and there are some applications of this technology applicable to MSW in North America.[383] There are a handful of AD facilities in the U.S., but most of these process source-separated organics rather than the full MSW waste stream, as AD requires biodegradable feedstock.[384] As of 2017, there were over 1,200 WWTPs in the U.S. that use anaerobic digesters (of these, over 133 are co-digesting biosolids with high-strength organics [e.g., fats, oil, grease, and food processing waste]), 38 are stand-alone digesters that accept food waste, and 240 are anaerobic digesters used on farms.[385]

On the Big Island of Hawaii, BioEnergy Hawaii is developing an integrated resource recovery facility that will process both MSW and C&D waste. At the planned facility, organic waste would be separated and treated to generate renewable biogas suitable for transportation and power generation, and a stabilized organic material suitable for compost and liquid fertilizers. Inorganic material would be separated and processed to produce a solid fuel for thermal energy conversion operations.[386]

AD facilities for a highly processed or pre-treated MSW waste stream have proven to be profitable in limited circumstances when accompanied by a regulatory climate that limits or prevents disposal of organic waste (such as commercial food waste), and where there are favorable local electricity, gas, and solid waste disposal rates. Oahu has relatively high tipping fees and energy costs, but it also has made significant recent investment in the H-POWER facility used to produce electricity. The economies of scale provided by H-POWER's existing infrastructure would make it more challenging to develop a competitively-priced AD facility for the organic fraction of the MSW waste stream on Oahu.

10.4.1.3 Risk Factors

Technology risks may include inadequate pre-processing equipment to remove contamination in MSW feedstocks. While this area has greatly improved in the last few years, concerns over batteries and heavy metals in MSW can make it difficult to beneficially use the digestate stream produced from MSW feedstocks, and may pose safety risks to workers. Environmental risks may include odor from preprocessing and digestion activities, exceedance of air emissions limits when using biogas as fuel, and the inability to site a facility because of perceived threats to water, air, and property values. Financial risks may include lack of markets for biogas or digestate materials and failure to receive adequate quantities of materials to ensure needed economies of scale.

10.4.2 Pyrolysis and Gasification

Pyrolysis and gasification are well-proven technologies that have been in operation for over 200 years, mostly using coal and biomass as feedstocks. These technologies are different from mass burn combustion in that they do not combust the waste; they convert the solid organic (carbon-based) portion of the waste stream into a synthesis gas, or syngas, composed primarily of carbon monoxide, hydrogen, carbon dioxide, and methane. These components are combustible and can be combusted for use in

[381] Information provided by Refuse Division staff. June 30, 2016.

[382] Global Methane Initiative. 2016. *Overview of Anaerobic Digestion for Municipal Solid Waste.* https://www.globalmethane.org/documents/AD-Training-Presentation_Oct2016.pdf.

[383] Environment Canada. 2013. *Technical Document on Municipal Solid Waste Organics Processing*. https://www.ec.gc.ca/gdd-mw/3E8CF6C7-F214-4BA2-A1A3-163978EE9D6E/13-047-ID-458-PDF_accessible_ANG_R2-reduced%20size.pdf.

[384] Global Methane Initiative. *Overview of Anaerobic Digestion for Municipal Solid Waste*. https://www.globalmethane.org/documents/AD-Training-Presentation_Oct2016.pdf.

[385] BioCycle. 2017. "The State of Organics Recycling in the U.S." https://www.biocycle.net/2017/10/04/state-organics-recycling-u-s/.

[386] BioEnergy Hawaii. 2018. "Recovering Resources and Creating Value for a Sustainable Hawai'i." http://www.bioenergyhawaii.com/our-hawaii-our-future.html.

making steam or for generating power. The syngas can also be converted to a wide variety of downstream products, such as liquid and gaseous fuels, chemicals, and fertilizers.[387]

10.4.2.1 Applicability to Oahu Waste Stream

Pyrolysis and gasification technologies can accommodate a wide range of materials, provided that processes are optimized for the material type. Common materials in Oahu's waste stream that pyrolysis and gasification systems can process include MSW, ASR, tires, wood, and mixed plastic waste and packaging residues.[388]

10.4.2.2 Commercial Status

Use of waste as the feedstock for pyrolysis and gasification systems is much more recent than for coal and biomass. There are numerous small-scale MSW pyrolysis and gasification systems operating worldwide, mostly in applications where the syngas is simply combusted, and the flue gas vented through a stack. The resulting ash and moisture byproduct of the system typically amounts to 15 to 20 percent by weight of the feedstock throughput.[389] In the U.S., these facilities typically are owned and operated by small municipalities. One example is the City of Dillingham, Alaska, which installed a 20-ton-per-day gasification plant in 2014.[390] As noted in Section 8, the local PVT Landfill is planning a gasification facility that would be able to process C&D feedstock accepted at and recovered from the landfill for energy production.

Other waste gasification facilities worldwide combust syngas for steam or electricity generation. In Japan, seven plants use the Thermoselect high-temperature pyrolysis/gasification process to produce steam or generate electricity.[391] Newer applications with waste feedstocks use downstream technologies similar to (but smaller than) those in use in large coal gasification plants, to convert the syngas to alcohols. The most current example is Enerkem's MSW gasification to alcohols facility in Edmonton, Alberta. This facility, which began commercial operation in late 2017, converts 100,000 tons per year of RDF to approximately 10 million gallons per year of fuel-grade ethanol.[392] Enerkem is developing similar facilities worldwide, including one in Inver Grove Heights, Minnesota.[393]

10.4.2.3 Risk Factors

Technology risks may include reduced reliability because of the technology's complexity and the integration with downstream conversion systems for producing products other than electricity. Environmental risks may include exceedance of air emission limits, metals in ash, and inability to site a new facility because of perceived impacts to water, air, and property values. Financial risks may include unanticipated high operating costs and lower than anticipated prices for the sales of electricity or other downstream products.

10.4.3 Waste-to-Energy

WTE using mass burn or refuse-derived-fuel technology has an extensive operating history with a proven track record of volume reduction approaching 85 to 95 percent.[394] Mass burn consists of combustion and energy recovery with little front-end processing. Refuse-derived-fuel is another method of combustion that

[387] BioEnergy Consult. 2018. "Pyrolysis of Municipal Wastes." https://www.bioenergyconsult.com/pyrolysis-of-municipal-waste/.

[388] Juniper. 2018. *"Pyrolysis and Gasification Fact Sheet."* Accessed June 14, 2018. http://www.biomassinnovation.ca/pdf/factsheet_Juniper_Pyrolysis&Gasification.pdf; Additional information provided by PVT Land Company Limited. November 21, 2018.

[389] CH2M HILL Canada Limited. 2010. *Organic Waste and Biosolids Master Plan Thermal Treatment Technology Options.* Final. December 15.

[390] Global Syngas Technologies Council. 2017. "City of Dillingham Waste System." https://www.globalsyngas.org/resources/world-gasification-database/city-of-dillingham-waste-system.

[391] CH2M HILL Canada Limited. Ibid.

[392] Enerkem. 2018. "Enerkem Alberta Biofuels." Accessed June 14, 2018. https://enerkem.com/facilities/enerkem-alberta-biofuels/.

[393] Enerkem. 2018. In the News. Accessed June 14, 2018. https://enerkem.com/newsroom/in-the-news/.

[394] EPA. 2018. "Energy Recovery from the Combustion of Municipal Solid Waste (MSW)." Accessed June 16, 2018. https://www.epa.gov/smm/energy-recovery-combustion-municipal-solid-waste-msw.

involves some pre-processing of the MSW (i.e., removal of metals and other non-combustibles) to enhance the heating value of the MSW. (As noted in Section 8, the H-POWER facility was originally built as a refuse-derived-fuel facility, and its third boiler uses the mass burn technology.) WTE facilities generate electricity, a commodity that has a continuous and well-defined market.

The demand for the energy from non-conventional and renewable sources such as WTE continues to grow and is critical to Hawaii, which has the highest cost of energy in the U.S. Moreover, on Oahu, the generation of electricity from MSW directly offsets fossil fuel production, importation, and combustion, because most of Oahu's electricity, apart from H-POWER, is generated from imported fuel oil.

10.4.3.1 Applicability to Oahu Waste Stream

Since 1990, the City's H-POWER facility has successfully demonstrated that WTE is an applicable technology to process Oahu's waste stream. H-POWER has generated 8.5 million megawatt hours of electricity over the past 28 years, 68.5 megawatts of dispatchable energy to HECO, and 408,000 megawatt hours of electricity generated in FY2017.

Based on the 2017 Waste Composition Study, the overall waste stream is composed of approximately 85 percent combustible materials by weight.[395] Historically, H-POWER's MSW volume reduction has been 90 percent, with most of the remainder sent to landfill as ash and non-combustible residue.

10.4.3.2 Commercial Status

WTE is a fully commercialized processing technology with 86 facilities across 25 states in the U.S. alone, according to the EPA, and many others operating throughout the world. The facilities in the U.S. process over 28 million tons of waste per year to produce 2,720 megawatts of power.[396] In many instances, smaller U.S. facilities struggle to remain economically competitive with cheaper landfill disposal options available on the mainland. Many of these smaller facilities have had to be retrofitted with air emission controls in the last two decades, which has significantly increased overall costs.

10.4.3.3 Risk Factors

Technology risks may include boiler corrosion from waste composition and other operational issues that can require unscheduled maintenance. Environmental risks may include exceedance of air emission limits, metals in ash, and inability to site a new facility because of perceived impacts to water, air, and property values. Financial risks may include unanticipated high operating costs and lower than anticipated prices for the sales of electricity or other downstream products.

10.4.4 Municipal Solid Waste Composting

Composting is a well-established technology with a proven track record in the U.S. for processing separated green waste and yard waste or food waste. Composting converts the organics portion of the waste stream into a compost product that can have a beneficial reuse for soil conditioning and erosion control. MSW composting, however, refers to composting mixed solid waste, rather than a separated stream of green waste or food waste.

10.4.4.1 Applicability to Oahu Waste Stream

Based on the 2017 Waste Composition Study, food waste, green waste, and compostable paper alone comprise over 30 percent of the waste stream.[397] These materials would be acceptable feedstocks for MSW composting.

[395] Cascadia. 2018. *2017 Waste Composition Study.* June. Final.

[396] EPA. "Energy Recovery from the Combustion of Municipal Solid Waste (MSW)." Accessed June 16, 2018. https://www.epa.gov/smm/energy-recovery-combustion-municipal-solid-waste-msw.

[397] Cascadia. Ibid.

10.4.4.2 Commercial Status

BioCycle's 2017 State of Organics Recycling survey showed more than 4,700 operational composting sites in the U.S. The most common type of composting facility, at over 50 percent, processes only green waste and yard waste. MSW composting is much less common, with only 0.2 percent of U.S. composting facilities processing mixed MSW in the United States.[398] MSW composting is more common in Europe, where large-scale composting has proven to be economically feasible. As an example, composting facilities in Spain, France, and Germany process approximately 18 percent of their MSW.[399]

While MSW composting is not common in North America, the composting of separated organics and green waste has grown. For example, there are as many as 150 communities in the U.S. that collect food and other organic components of the waste stream, including Seattle, Portland, San Francisco, and San Antonio.[400] It should be noted that accepting these waste streams requires significant pre-processing to address contaminants that affect the usefulness of the end product.

Locally on Oahu, there are a number of composting operations that provide an alternative to sending green waste to the landfill. HER is currently the largest composting operation, and accepts green waste, a limited amount of food waste (including food not able to be fed to hogs), a small amount of coffee husks, and wood.[401] HER processes approximately 99,000 tons annually, turning feedstock into soil amendments, blends, mulching materials, and erosion control products for use throughout Hawaii.[402] The City currently contracts with HER to process City-collected green waste.

10.4.4.3 Risk Factors

Technology risks for MSW composting include limited materials decomposition and end products with high contents of metals and other contaminants; MSW composting facilities have been reported to have residue rates of materials requiring landfill disposal ranging from 30 to 50 percent of incoming materials.[403] Environmental risks may include odor from pre-processing or composting activities, potential for metals in the compost end-product, and inability to site a facility because of perceived threats to water, air, and property. Financial risks may include unanticipated high operating costs and lower than anticipated prices for the sales of electricity or other downstream products.

10.4.5 Findings from the Assessment

All of the technologies discussed are used to some degree in commercial operations within the U.S. There are far fewer MSW composting and MSW AD facilities in the U.S., and these technologies tend to be better suited for source-separated organics. Pyrolysis and gasification is another technology that can be successfully used on the organics fraction, but there are no operating facilities that have demonstrated the throughput that is needed for Oahu. The H-POWER facility on Oahu uses refuse-derived-fuel and mass burn WTE technologies to combust the island's MSW and generate electricity (see Section 8.3.3). Currently, H-POWER manages approximately 2,000 tons of incoming waste daily, which is significantly greater than any pyrolysis and gasification facility worldwide.

Based on the current existing technologies available, WTE (H-POWER) continues to be the most appropriate and cost-effective alternative to landfill disposal because of its level of commercialization, ability to process large throughputs, and ability to manage the larger multi-material MSW waste stream and not just a subset.

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[398] BioCycle. 2017. "The State of Organics Recycling in the U.S." https://www.biocycle.net/2017/10/04/state-organics-recycling-u-s/.

[399] Scarab International. 2017. "The Benefits of Composting Municipal Solid Waste." https://www.scarabmfg.com/2017/10/11/benefits-composting-municipal-solid-waste/.

[400] Scarab International. 2017. "The Benefits of Composting Municipal Solid Waste." https://www.scarabmfg.com/2017/10/11/benefits-composting-municipal-solid-waste/.

[401] Hawaiian Earth Recycling. 2018. "Our Story." Accessed June 16, 2018. https://hawaiianearth.com/about.

[402] Ibid.

[403] New York City Department of Sanitation. 2004. *New York City MSW Composting Report*. https://www1.nyc.gov/assets/dsny/docs/about_2004-municipal-solid-waste-composting-report_0815.pdf

10.5 Summary

The results of the energy balances outlined in this section demonstrate that the H-POWER facility results in less energy use than landfilling by making beneficial use of the energy contained in the waste. WTE facilities such as H-POWER generate electricity, a commodity that has a continuous and well-defined market. H-POWER currently has an RDF component that involves some pre-processing of the MSW (i.e., removal of metals and other non-combustibles) to enhance the heating value of the MSW. The demand for energy from non-conventional sources, such as energy from waste, continues to grow and is critical to Hawaii, which has the highest cost of energy in the U.S. Moreover, on Oahu, the generation of electricity from waste directly offsets fossil fuel production, importation, and combustion because approximately 79 percent of the state's electricity is generated from the combustion of hydrocarbon fuels. This reduced dependence on hydrocarbon fuels translates to environmental and economic benefits for the City and helps to meet initiatives set by the State and the City. It should be noted that the City will prioritize source reduction and reuse strategies in conjunction with H-POWER's continued operation to maximize the benefits associated with a reduction in waste generation and minimize the operational, environmental, and financial risks associated with WTE.

11. Solid Waste System Cost Analysis

11.1 Introduction

This section of the Plan describes the historical and projected revenues and expenses of the solid waste system, identifies the impact of the proposed solid waste management plan on the system's financial performance, and documents the ability of the City's economic self-sufficiency in managing solid waste. Current and projected capital improvements are also presented.

11.2 Goals and Objectives

The objective of this section is to ensure that the City can adequately fund all its programs related to solid waste.

11.3 Background

Per HRS Sections 342G-25(b)(11) and 342G-26(k), the county solid waste management plan must include a program funding component. Specifically, the section will do the following:

- Provide for each of the components, where applicable, the estimated cost to the county of program implementation.
- Demonstrate the county's economic self-sufficiency in managing solid waste pursuant to the implementation of the approved plan, including the identification of county funding sources that will be used to implement the plan as well as other viable sources of funding.

This section addresses these HRS requirements.

11.4 Key Assumptions

- The study period for the projected financial analysis is defined as FY 2019 through FY 2025.
- General inflation is assumed to be 2.5 percent per year over the analysis period for future costs that have not yet been projected. From 1990 to 2017, the Honolulu Consumer Price Index (CPI) has experienced an average annual increase of 2.5 percent.
- The projected annual average growth rate for MSW-related revenue (i.e., tip fees, recycling revenue, and electrical revenue) is 0.23 percent per year (consistent with the tonnage forecast provided in the *2017 Assessment of Municipal Solid Waste Handling Requirements for the Island of O'ahu* report).
- The City's Solid Waste Fund is not able to sustain itself solely though revenues received (e.g., tip fees and energy generated at H-POWER). To meet this deficit, the Solid Waste Fund receives a subsidy from the City's General Fund. In FY 2019, the subsidy is projected to be about $118 million.
- The General Fund will continue to make transfers to the Solid Waste Fund for operating expenses not covered through solid waste revenues. Any user fees proposed for refuse collection would reduce the General Fund subsidy.
- Capital improvements recommended for implementation in this ISWMP would be funded through the Solid Waste Capital Improvement Program (CIP) using a single debt issue, with an interest rate of 5.0 percent, a term of 20 years, and issuance costs of 2 percent. The annual debt service would be added to the solid waste operating expenses (as part of the existing line item CIP Debt Service).

11.5 Solid Waste Revenues

Table 11-1 presents the FY 2019 estimated revenues for the Solid Waste Fund. This fund accounts for all revenues derived from the operation of Division solid waste disposal programs, glass recycling program, and other recycling programs. All monies placed in this fund are maintained in separate accounts identified with, and expended for, the intended purpose.

Table 11-1. Solid Waste Fund Revenues, FY 2019 Budget

Revenues	Primary Source of Revenue	Estimate FY 2019
Refuse Division		
Refuse General Operating Account	Landfill and Transfer Station Disposal Fees; Business Collection	$2,750,900
Solid Waste Disposal Facility Account		
Tip Fees and Miscellaneous		$53,536,000
Electrical Revenue		$73,500,000
Glass Incentive Account	State DOH ADF Reimbursement	$500,000
Recycling Account	12% Surcharge on Disposal Fees	$6,500,000
User Fees	Residents Served by Refuse Division	$0
	Refuse Division Total:	***$136,786,900***
Other Sources		
Miscellaneous Revenue	Interest	$888,660
General Fund Subsidy	General Fund (Property Tax)	$117,759,703
	Other Sources Total:	**$118,648,363**
	Total Revenue:	**$255,435,263**

Total revenues generated by the Division for FY 2019 are budgeted at about $137 million. Revenues are generated primarily from disposal fees assessed at transfer stations, the WGSL, and the H-POWER facility, plus revenues from the sale of electric energy generated at H-POWER. Recycling programs are funded through a 12 percent assessment on the refuse disposal fee. The glass incentive account revenues come from reimbursements from the DOH ADF program. For FY 2019, there was no residential refuse collection fee implemented; therefore, Table 11-1 shows user fee revenue as $0.

The Solid Waste Fund also relies on other sources to sufficiently fund the solid waste program, with the major source a subsidy from the General Fund. For FY 2019, the General Fund subsidy to the Solid Waste Fund is projected to be about $118 million.

As discussed in Section 3, charging a user fee for residential services would provide a direct disincentive for generating waste and would decrease the subsidy from the General Fund that is currently required to pay a substantial amount of the cost of managing the City's solid waste system. User fees could increase the system's financial self-sufficiency.

Table 11-2 presents the projected revenues for the Solid Waste Fund from FY 2019 through FY 2025. In the future, revenues from the refuse division and other sources are expected to meet the additional costs associated with implementing the ISWMP. Solid waste disposal fee revenues and electrical revenue are estimated to increase by an average annual rate of 0.23 percent per year, which is the average annual tonnage increase for the analysis period. Division revenues are projected to increase from about $137 million in FY 2019 to approximately $139 million in FY 2025. The projected transfer from the General Fund is projected to increase from approximately $118 million in FY 2019 to $148 million in FY 2025. If disposal fees are increased at a rate greater than 0.23 percent per year, the General Fund transfer would likely be smaller. The converse is true if disposal fees are increased at a rate less than 0.23 percent per year. In addition, if the source reduction and reuse strategies outlined in this Plan are effective in decreasing MSW tonnage, then both revenues and operational expenses may decrease.

Table 11-2. Solid Waste Fund Revenue Projections, FY 2019-FY 2025

Revenues	Budgeted	Projected					
	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Refuse Division							
Refuse General Operating Account	$2,750,900	$2,757,000	$2,763,000	$2,769,000	$2,775,000	$2,781,000	$2,787,000
Solid Waste Disposal Facility Account	$127,036,000	$127,328,000	$127,621,000	$127,915,000	$128,209,000	$128,504,000	$128,800,000
Glass Incentive Account	$500,000	$501,000	$502,000	$503,000	$504,000	$505,000	$506,000
Recycling	$6,500,000	$6,515,000	$6,530,000	$6,545,000	$6,560,000	$6,575,000	$6,590,000
Refuse Division Total:	**$136,786,900**	**$137,101,000**	**$137,416,000**	**$137,732,000**	**$138,048,000**	**$138,365,000**	**$138,683,000**
Other Sources							
Miscellaneous Revenue	$888,660	$889,000	$889,000	$889,000	$889,000	$889,000	$889,000
General Fund Subsidy	$117,759,703	$123,867,812	$129,135,435	$134,005,714	$137,317,342	$143,387,717	$147,558,426
Other Sources Total:	**$118,648,363**	**$124,756,812**	**$130,024,435**	**$134,894,714**	**$138,206,342**	**$144,276,717**	**$148,447,426**
Total Revenue:	**$255,435,263**	**$261,857,812**	**$267,440,435**	**$272,626,714**	**$276,254,342**	**$282,641,717**	**$287,130,426**

11.6 Solid Waste Expenses

Annual Solid Waste Fund operating expenses include salary costs, fringe benefits, equipment, and current expenses for all Division operations, including collection, transfer station, landfill (i.e., WGSL), H-POWER, and recycling. In addition, the Solid Waste Fund incurs costs for services performed for the Division by other City agencies, such as vehicle maintenance and fueling, billing, and collections.

The following bullets provide additional information on each of these operations:

- Administration: This function is responsible for directing and managing all operations related to residential refuse, recyclable, and bulky item collection; transfer station and convenience center operations; transfer hauling; landfill operations; engineering; short- and long-range planning; disaster debris removal; conducting studies; and preparing and managing annual operating and CIP budgets.
- Inspection and Investigation: This function is tasked with coordinating the hiring and training of refuse employees, promoting and monitoring staff and worker safety, managing personnel records, managing and servicing all businesses and government refuse disposal accounts, reviewing refuse collection license applications, inspecting business account set out, managing the disposal tonnage tracking program, and coordinating performance data for the Division.
- Collection: This function provides for automated, manual, and front-loader refuse collection service for most of the residential waste collected on Oahu. Service is also provided to certain multi-family, government, small commercial, and non-profit customers. Collection service is provided for MSW, green waste, mixed recyclables, bulky items, and white goods.
- Maintenance and Waste Diversion: This function provides repair and maintenance support to the various Division collection yards, transfer stations, and convenience centers. They also provide for the 40-cubic-yard bin hauling of refuse and recyclables from the six convenience centers to the final disposal sites.
- Landfill: This function is primarily responsible for supporting the WGSL. Major costs budgeted under this function are all landfill-related expenses, including the cost for contracting WGSL operations and the maintenance and post-closure costs for previously closed City landfills.
- Transfer Station: This function provides for the operation of the City's three transfer stations, which are primarily used by City collection trucks so that waste collected on the route can be efficiently consolidated and transported in trailers to appropriate disposal sites. Residents also heavily use the transfer stations to drop off waste and recyclable materials.
- H-POWER: This function provides for the operation and management oversight of the H-POWER facility where most non-C&D waste generated on Oahu is taken for processing and converted into energy. Major costs budgeted under this function include all costs related to the contracted operation of H-POWER, disposal fees for Division waste, and (new for FY 2019) costs for the operation of an ash reuse facility.
- Recycling: This function provides mandated comprehensive recycling program support to the City. Services range from public education and outreach programs, commercial recycling program assistance, partnering with local recycling contractors, supporting media requests and managing the mixed recyclable and green waste recycling programs. In addition, recycling staff compile data on recycling statistics and program performance and provide support for the plastic bag ban and other mandated recycling ordinances. Major costs budgeted under this function are all costs related to the processing of recyclables such as green waste, mixed recyclables, white goods, tires, batteries, gas cylinders, and City office paper.
- Glass Recycling: Glass recycling expenses are associated with the ADF program; a major portion of the expenses are for payments to glass recyclers.
- Other City Services and Costs: In addition to the operating expenses discussed above, the Solid Waste Fund is charged for the support provided by other City entities in support of refuse operations. These services include such items as refuse truck maintenance and fuel, billing and collection, Central Administration Services expense, legal counsel, geographic information system (GIS) support, solid waste debt service, and other benefits and services.

Table 11-3 summarizes the Division's projected operating expenses. Operating expenses for FY 2019 are estimated to be nearly $165 million. Other costs associated with support from other city departments are budgeted at approximately $89 million. Including additional operating and CIP expenses from ISWMP implementation, total operating expenses are budgeted at approximately $255 million.

Table 11-3. Solid Waste Operating Expenses, FY 2019 Budget

Expense	Estimated Final Budget FY 2019
Refuse Division	
Administration	$1,503,786
Inspection and Investigation	$425,883
Collection	$21,207,362
Maintenance and Waste Diversion	$1,373,718
Landfill	$18,819,504
Transfer Station	$7,686,608
H-POWER	$102,872,650
Recycling	$10,319,022
Glass Recycling	$700,000
Subtotal Refuse Division Operating Expenses:	***$164,908,533***
Other Costs	
Accounting and Fiscal Service Support	$102,965
Treasury Support	$5,000
Information Technology Support	$59,616
Refuse Vehicle Fleet Maintenance and Fuel Support	$8,681,249
Environmental – Administrative Support	$231,620
Environmental – Custodial Support	$87,000
Retirement System Contribution – Employers' Share	$6,278,000
Federal Insurance Contributions Act (FICA) Tax – Employers' Share	$2,431,000
Health Benefits Trust Fund	$3,633,000
Workers Compensation	$1,500,000
Unemployment Compensation	$5,000
Provision for Salary Adjustments and Accrued Vacation	$700,000
Provision for Other Post Employee Benefits	$6,675,000
Provision for Vacant Positions	$2,675,946
CIP Debt Service	$43,502,494
Rent	$263,500
Other Central Administrative Services	$12,609,200
Subtotal Other Costs:	***$89,104,630***
Additional Operating Costs for ISWMP Implementation:	***$145,100***
Additional CIP Debt Service Expense:	***$1,277,000***
Total Operating Expenses:	**$255,435,263**

Table 11-4 presents projected operating expenses for the Solid Waste Fund from FY 2019 through FY 2025. Division expenses are projected to increase from about $255 million in FY 2019 to approximately $287 million in FY 2025.

Division operating expenses were estimated to increase by an average annual inflation factor of 2.5 percent, and waste disposal is projected to increase by an average annual average rate of 0.23 percent per year, as outlined in Section 2. Other costs, such as interagency support functions and central administrative services, were inflated by 2.5 percent per year. Existing CIP debt service costs were not escalated.

Implementation of programs and activities outlined in this ISWMP will be funded from the Solid Waste Fund and the CIP, resulting in increased operating costs and capital expenditures. The project to convert all WWTP sludge to biosolids for use as fertilizer, the relocation of the Leeward Base Yard, and the replacement of roll-off bins at convenience centers are estimated to cost a total of about $85 million. The WWTP sludge to biosolid project will be funded through the Wastewater Utility Division and will not impact the Refuse Division budget. Therefore, only the replacement of roll-off bins at the convenience centers and the relocation of the Leeward Base Yard have been added to projected CIP expenditures. Assuming a 5 percent interest rate, a 20-year term, and 2 percent finance costs, that results in about $1.3 million in additional debt service. Operating expenses are projected to increase because of the implementation of new programs outlined in Section 12, such as increasing the number of drivers to change out bins at convenience centers, expanding curbside recycling services to manual collection areas, and designating a Public Education Coordinator to handle all refuse division educational initiatives. Operating expenses associated with implementation are estimated to add about $2.0 million to total operating expenses in FY 2019.

Several programs were included in the implementation plan in Section 12 that have not had cost estimates developed at this time. Estimated costs for these programs are dependent upon work to be determined in the future and potential results from RFPs. It is assumed that as these costs become known, the Division will secure the required revenues to pay for them through added disposal fees or transfers from the General Fund.

Table 11-4. Projected Solid Waste Operating Expenses

Expenses	Budgeted	Projected					
	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Refuse Division							
Administration	$1,503,786	$1,541,000	$1,580,000	$1,620,000	$1,661,000	$1,703,000	$1,746,000
Inspection and Investigation	$425,883	$437,000	$448,000	$459,000	$470,000	$482,000	$494,000
Collection	$21,207,362	$21,786,000	$22,381,000	$22,992,000	$23,620,000	$24,265,000	$24,927,000
Maintenance and Waste Diversion	$1,373,718	$1,411,000	$1,450,000	$1,490,000	$1,531,000	$1,573,000	$1,616,000
Landfill	$18,819,504	$19,333,000	$19,861,000	$20,403,000	$20,960,000	$21,532,000	$22,120,000
Transfer Station	$7,686,608	$7,896,000	$8,112,000	$8,333,000	$8,560,000	$8,794,000	$9,034,000
H-POWER	$102,872,650	$105,681,000	$108,566,000	$111,530,000	$114,575,000	$117,703,000	$120,916,000
Recycling	$10,319,022	$10,601,000	$10,890,000	$11,187,000	$11,492,000	$11,806,000	$12,128,000
Glass Recycling	$700,000	$719,000	$739,000	$759,000	$780,000	$801,000	$823,000
Refuse Division Total:	**$164,908,533**	**$169,405,000**	**$174,027,000**	**$178,773,000**	**$183,649,000**	**$188,659,000**	**$193,804,000**
Other Costs							
Accounting and Fiscal Service Support	$102,965	$106,000	$109,000	$112,000	$115,000	$118,000	$121,000
Treasury Support	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Information Technology Support	$59,616	$61,000	$63,000	$65,000	$67,000	$69,000	$71,000
Refuse Vehicle Fleet Maintenance and Fuel Support	$8,681,249	$8,918,000	$9,161,000	$9,411,000	$9,668,000	$9,932,000	$10,203,000
Environmental - Administrative Support	$231,620	$238,000	$244,000	$251,000	$258,000	$265,000	$272,000
Environmental - Custodial Support	$87,000	$89,000	$91,000	$93,000	$96,000	$99,000	$102,000
Retirement System Contribution – Employers' Share	$6,278,000	$6,449,000	$6,625,000	$6,806,000	$6,992,000	$7,183,000	$7,379,000
FICA Tax – Employers' Share	$2,431,000	$2,497,000	$2,565,000	$2,635,000	$2,707,000	$2,781,000	$2,857,000
Health Benefits Trust Fund	$3,633,000	$3,732,000	$3,834,000	$3,939,000	$4,047,000	$4,157,000	$4,270,000
Workers Compensation	$1,500,000	$1,541,000	$1,583,000	$1,626,000	$1,670,000	$1,716,000	$1,763,000
Unemployment Compensation	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Provision for Salary Adjustments and Accrued Vacation	$700,000	$719,000	$739,000	$759,000	$780,000	$801,000	$823,000
Provision for Other Post Employee Benefits	$6,675,000	$6,857,000	$7,044,000	$7,236,000	$7,434,000	$7,637,000	$7,845,000
Provision for Vacant Positions	$2,675,946	$2,749,000	$2,824,000	$2,901,000	$2,980,000	$3,061,000	$3,145,000
CIP Debt Service	$43,166,534	$43,256,012	$41,380,635	$40,900,314	$40,225,942	$40,226,217	$38,173,926

Table 11-4. Projected Solid Waste Operating Expenses

Expenses	Budgeted	Projected					
	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Rent	$263,500	$270,000	$277,000	$284,000	$291,000	$298,000	$305,000
Other Central Administrative Services	$12,609,200	$12,924,000	$13,247,000	$13,578,000	$13,917,000	$14,265,000	$14,622,000
Other Costs Total:	**$89,104,630**	**$90,416,012**	**$89,796,635**	**$90,606,314**	**$91,257,942**	**$92,618,217**	**$91,961,926**
Additional O&M for ISWMP Implementation	**$145,100**	**$759,800**	**$2,339,800**	**$1,970,400**	**$70,400**	**$87,500**	**$87,500**
ISWMP CIP Debt Service	**$1,277,000**	**$1,277,000**	**$1,277,000**	**$1,277,000**	**$1,277,000**	**$1,277,000**	**$1,277,000**
Total Operating Budget:	**$255,435,263**	**$261,857,812**	**$267,440,435**	**$272,626,714**	**$276,254,342**	**$282,641,717**	**$287,130,426**

11.7 Capital Improvement Program

Table 11-5 presents the planned Division CIP for FY 2019 through FY 2024. Total anticipated capital expenditures through FY 2024 are projected to total approximately $145 million. Projects associated with H-POWER account for approximately 52 percent of the total planned expenditures. CIP costs are funded though the annual debt service expense charged to the Solid Waste Fund (see Table 11-3).

The implementation plan in Section 12 identifies additional capital investments for the utility, many of which were already included in the City's approved CIP. As noted, the project to convert all WWTP sludge to biosolids for use as fertilizer will be funded by the Wastewater Utility Division and will not impact the Refuse Division budget. Other projects identified do not have cost estimates available because they are in the midst of an RFP process at this time.

It was assumed the CIP would require a bond issuance to pay for the projects. The additional annual debt service associated with the CIP in Table 11-5 is included as a line item in the expenditures presented in Table 11-4.

Table 11-5. Capital Improvement Program ($000s)

Facility Type	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Landfill	$4,102	$0	$0	$0	$0	$0
H-POWER	$39,074	$8,952	$4,248	$23,036	$0	$0
Transfer Station	$5,301	$7,161	$0	$0	$0	$0
Closure Activities	$2,751	$0	$0	$0	$0	$0
Convenience Center and Collection Yard	$19,305	$0	$0	$0	$0	$0
Other Facilities	$8,158	$1,391	$1,432	$1,475	$1,519	$1,519
Total Planned CIP:	***$78,691***	***$17,503***	***$5,680***	***$24,511***	***$1,519***	***$1,519***
Implementation Plan Projects	$300	$15,000	$0	$0	$0	$300
Cumulative Total:	**$78,991**	**$111,494**	**$117,174**	**$141,685**	**$143,204**	**$145,023**

Note: Costs shown exclude the $70-million biosolids project that will be funded by the City's Department of Environmental Services.

11.8 Conclusion

The City has a stable financial system that includes adequate funding of the Solid Waste Fund, primarily from disposal fees, electrical revenue, and a subsidy from the City's General Fund. In forming the overall budget for the City, the Administration balances new program needs against the other priorities of City government; however, the City has always provided for adequate funding to deliver the services covered by this ISWMP. If user fees for residential refuse collection service are implemented in the future, it is expected that the General Fund subsidy to the Solid Waste Fund can be lessened and those funds may be used for other City priorities.

12. Implementation Plan

This section provides an implementation plan for the ISWMP that identifies the ongoing and planned actions required to meet the solid waste management goals and objectives of the City. For each planned action, an estimated cost to the City is provided when sufficient information is available to develop a cost estimate.

12.1 Goals and Objectives

To continuously improve solid waste management on Oahu, the City will develop an implementation plan to identify ongoing and planned initiatives for the 10-year period leading up to the next iteration of the Plan. The City's approach in determining worthwhile initiatives is to evaluate the current state of solid waste management programs and identify opportunities for improvement.

12.2 Background

12.2.1 Legislative

Per HRS Section 342G-25(b), the program element of the Plan includes a program implementation component, further detailed in HRS Section 342G-26(j) to include the following:

- Specific tasks and responsibilities
- Schedules for implementation
- Identification of proposed ordinances, contracts, and other guidelines
- Methods for evaluating the effectiveness of the county plan

In addition to the program implementation component, Section 12 includes information required for the program funding component described in HRS 342G-26(h), in the form of estimated costs to the county for program implementation.

This section provides the implementation plan for the ISWMP, including anticipated additional costs to the City over a 10-year planning horizon.

12.3 Implementation Plan

Although FY 2019 is planned to be the first year of implementation (beginning on July 1, 2018), many activities are ongoing up to and through the first year of implementation. The implementation plan for the ISWMP is shown in Table 12-1; the table is organized by Plan section and includes a numbered list of actions recommended for inclusion in the City's planning horizon. Some of these actions are ongoing aspects of the existing system, while others are planned. All actions are envisioned to be driven by the City, with support from the DOH and the SRWG where indicated. When an action is likely to require additional funding beyond what was projected by the City prior to development of the ISWMP, the table provides a cost estimate for that action.

In terms of evaluating effectiveness, the City continues to track tonnage and material quantities delivered to WGSL, H-POWER, and recycling and processing facilities. Because the City's goal is to manage solid waste in an economically, socially, and environmentally responsible fashion, the City continues to maximize diversion of materials from WGSL. Effectiveness is measured in the reduction of solid waste on the island (source reduction), increase in tonnage diversion from WGSL, and increase in tonnage and types of materials recycled.

A Public Hearing was held July 31, 2019 from 5:00 p.m. to 8:00 p.m. at Kapolei Hale to gather public feeback on the City's 2019 Plan Update. Appendix C documents questions from participants and answers provided by City staff and staff from Jacobs, the consulting firm assisting the City with development of the Plan. Appendix D documents statements made by members of the public during the Public Hearing and

closing remarks from City staff and Jacobs staff. The City considered all verbal feedback received during the Public Hearing and written feedback received during the public comment period when developing the final implementation plan.

Table 12-1. Honolulu ISWMP Implementation Plan

Item	Strategy	Status	Years						Strategy for Consideration by the Source Reduction Working Group (SRWG)
			1	2	3	4	5	6-10	
			FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024-28	
3. Source Reduction									
1	Continue to promote source reduction and reuse through the City's website, opala.org, and other educational avenues	Ongoing/Planned							X
2	Make changes to increase public education and awareness (update opala.org to make information on waste prevention and reuse even more accessible)	Ongoing/Planned							
3	Look for opportunities to explore new partnerships with businesses showing waste prevention methods in action	Planned							X
4	Interact directly with the public to increase awareness and provide support for commercial and residential source-reduction efforts as opportunities arise and as appropriate	Ongoing							
5	Continue to provide technical assistance regarding implementation of source-reduction activities to residents and businesses on request	Ongoing							
6	Continue to emphasize source reduction and reuse in the City's procurement policies	Ongoing							X
7	Advocate for EPR for product waste as opportunities arise	Ongoing/Planned							X
8	Continue to encourage consumers to choose reusable bags rather than plastic bags	Ongoing							
9	Continue to conduct annual surveys on business recycling and reuse activities	Ongoing							
10	Implement residential user fees as a possible mechanism to encourage waste prevention	Planned							X
11	Compare the existing City ordinance regarding plastic bags to other similar bans around the country; consider recommending changes to the law to optimize its effectiveness	Planned							X
12	Continue to encourage grasscycling and other yard waste minimization techniques through opala.org and other avenues	Ongoing							
13	Continue to provide technical guidance regarding grasscycling and other yard waste minimization techniques and food waste prevention practices to residents and businesses on request	Ongoing							X
14	Continue to conduct annual surveys on business recycling and reuse activities for green waste and food waste	Ongoing							
15	Offer home composting workshops	Ongoing/Planned							
16	Continue to encourage residents to become aware of the amount of food wasted and to practice food waste prevention techniques	Ongoing							X
17	Continue to enforce food waste recycling ordinances for businesses (See Section 4 for more information.)	Ongoing							
18	Monitor progress with respect to food waste to see if additional strategies are appropriate for implementation on Oahu; revise outreach as necessary	Planned							X
19	Establish a Source Reduction Working Group to spearhead evaluation of potential source reduction initiatives on Oahu	Planned							X
20	Investigate the potential for different ways to collect and process food waste	Planned							X
4. Recycling and Bioconversion									
1	Perform an environmental and economic evaluation of recycling and WTE to inform future material handling and regulations, pursue changes to laws for more flexibility in sending recyclables to H-POWER, and explore potential for new markets for recyclables	Planned	$100,000						
2	Continue to educate and promote existing residential curbside collection program	Ongoing							
3	Optimize residential curbside collection program (reduction in blue cart collection, possible increase in green cart collection, possible increase in bulky item collection)	Planned							
4	Expand curbside recycling service to manual collection areas	Planned			$1,900,000	$1,900,000			
5	Continue to educate and enforce office paper, cardboard, and newspaper ordinances for businesses and City agencies	Ongoing							
6	Increase the number of recycling containers in public locations	Ongoing		$10,000	$10,000				
7	Transition ordinance compliance forms from mailers to an online platform	Planned							
8	Enhance education of recycling programs island-wide	Planned							
9	Continue to educate and promote existing HI-5 program for DBCs	Ongoing							
10	Identify City-owned parcels on which to locate additional HI-5 program redemption centers	Ongoing							
11	Continue to educate and promote portable ClearStream recycling receptacle loans for events	Ongoing							

Table 12-1. Honolulu ISWMP Implementation Plan

Item	Strategy	Status	Years						Strategy for Consideration by the Source Reduction Working Group (SRWG)
			1	2	3	4	5	6-10	
			FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024-28	
12	Solicit proposals for recycling or beneficial reuse of glass DBCs and non-deposit glass at the planned refuse facility site adjacent to H-POWER property	Planned							
13	Investigate options for beneficial reuse of hard-to-recycle materials (e.g., non-deposit glass and ash)	Planned							
14	Advocate for an increase in the ADF for non-deposit glass	Ongoing							
15	Work with DOH to find a solution for non-deposit glass recycling	Ongoing							
16	Continue to ban commercial green waste disposal from transfer stations, H-POWER, and WGSL	Ongoing							
17	Continue to evaluate any new recycling or disposal approaches that become available for ferrous and non-ferrous metals	Ongoing							
18	Continue to educate and enforce food waste ordinance for businesses	Ongoing							
19	Plan and implement food waste advertisements in collaboration with NRDC	Ongoing							
20	Continue to educate and promote existing programs for used tires, lead acid batteries, and bulky item/white goods pickup	Ongoing							
21	Investigate the feasibility of co-digestion of biosolids and food waste at City wastewater treatment plants	Planned		Led by Wastewater Systems Division					
22	Investigate partnering with private industry and non-governmental organizations to implement small-scale on-site composting	Planned				$15,000			
23	Work with state regulators to allow for disposal of all waste tires managed by the City at H-POWER (See Section 5 for more information.)	Planned							
24	Solicit proposals for recycling of white goods at the planned refuse facility site adjacent to H-POWER property	Planned							
25	Continue pilot online appointment scheduling system for bulky item collection	Ongoing	$20,000	$20,000	$20,000	$20,000	$20,000	$100,000	
26	Continue to enforce the ban of commercial and business C&D debris from WGSL	Ongoing							
27	Continue to enforce the ban of burnable resident-generated C&D debris from WGSL (See Section 5 for more information.)	Ongoing							
28	Continue to evaluate a potential policy to require builders to submit a C&D debris recovery plan with building permit applications (See Section 5 for more information.)	Ongoing							X
29	Continue to evaluate the efficiency and storage capacity of H-POWER	Ongoing							
30	Solicit proposals for recycling/beneficial reuse of ash	Planned							
31	Increase number of inspections to monitor compliance with recycling ordinances	Planned							
5. Special Wastes									
1	Continue to evaluate any new recycling or disposal approaches that become available for asbestos and PCS	Ongoing							
2	Continue to educate about and promote existing programs for used oil, lead acid batteries, medical waste, used tires, white goods, and abandoned and derelict vehicles	Ongoing							
3	Continue to work with DOH and H-POWER on programs to divert ash from landfill disposal	Ongoing							
4	Solicit proposals for the beneficial reuse of ash and ASR	Ongoing							
6	Work through DOH permitting to allow WGSL to balance the MSW and ash portions of the landfill	Ongoing/Planned							
7	Continue to design, permit, and construct the new refuse facility in Campbell Industrial Park, Kapolei, to house the ash processing facility	Planned	Estimated dollars are dependent on the results of the RFP.						
8	Continue working with Synagro and DOH to process biosolids pellets for use in a wide range of applications	Ongoing							
9	Continue City long-term plans to convert all WWTP sludge to biosolids for use as fertilizer as the first management option	Ongoing	$70 million project that will be funded by the City's Department of Environmental Services.						
10	Continue to work with Hawaii Kai WWTP to have sludge diverted from landfill disposal	Ongoing							
11	Investigate the potential of handling certain agricultural waste at H-POWER	Planned							
12	Investigate methods to divert treated medical sharps from disposal at WGSL	Planned							
13	Work with state regulators to allow for disposal of all waste tires managed by the City at H-POWER	Planned							

Table 12-1. Honolulu ISWMP Implementation Plan

Item	Strategy	Status	Years						Strategy for Consideration by the Source Reduction Working Group (SRWG)
			1	2	3	4	5	6-10	
			FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024-28	
14	Solicit proposals for recycling of white goods at the planned refuse facility site adjacent to H-POWER property	Planned							
16	Continue to enforce the ban of commercial and business C&D debris from WGSL	Ongoing							
17	Continue to enforce the ban of burnable resident generated C&D debris from WGSL	Ongoing							
18	Continue to evaluate a potential policy to require builders to submit a C&D debris recovery plan with building permit applications	Ongoing							X
6. Household Hazardous Waste and Electronic Waste									
1	Continue to promote waste prevention, safe handling, and proper disposal of HHW through the City's website, opala.org	Ongoing							X
2	Continue to host every-other-month collection events for HHW	Ongoing							
3	Continue to monitor quantities collected and per ton costs associated with HHW collection events and evaluate cost effectiveness	Ongoing							
4	Continue to update information on opala.org regarding disposal procedures for residential and commercial generators discarding used electronics	Ongoing							X
5	Continue to promote manufacturer take-back programs	Ongoing							X
6	Urge the state legislature to develop a state-wide solution and funding source to address the growing e-waste problem	Planned							X
7	Encourage the state legislature to consider an Advanced Disposal Fee for electronics	Planned							X
8	Implement bi-monthly e-waste drop-off events	Planned				$100,000	$100,000	$500,000	
7. Public Education									
1	Continue to develop and distribute printed (and electronically available) media, including *Recycling and Disposal Guide*, Food: Too Good to Waste Guide, BYOB and Recycling Handy List stickers, and activity books	Ongoing							
2	Continue to develop and distribute print advertisements, direct mailers, and press releases; increase frequency of print advertisements to quarterly	Ongoing/Planned		$32,000	$32,000	$32,000	$32,000	$160,000	X
3	Update the *Recycling and Disposal Guide* for Oahu and other educational materials in 2019, and annually thereafter	Ongoing/Planned							
4	Evaluate messaging about materials not appropriate for curbside collection and consider update (may include revisions to cart imprints)	Planned							
5	Continue to maintain *WasteLine*, existing Opalavision videos, and social media accounts	Ongoing							
6	Make improvements to website based on Google Analytics and other available tools	Planned							
7	Pay to promote social media accounts and target specific demographics and/or geographies	Planned	$100	$100	$100	$100	$100	$500	
8	Continue to maintain and update content on The Learning Center	Ongoing							
9	Update HTY Program with new content, engagement format, or collaboration opportunities	Planned	$10,000					$10,000	
10	Increase the number of Tour de Trash events by one location or event per year	Ongoing		$2,000	$2,000	$2,000	$2,000	$10,000	
11	Continue to participate in other events such as Mauka to Makai Environmental Expo and find opportunities to attend additional public events; aim to participate in at least 6 to 10 community events per year	Ongoing/Planned		$300	$300	$300	$300	$3,000	
12	Continue to provide and manage peer consulting program	Ongoing							
13	Continue to host Environmental Concern Line	Ongoing							
14	Increase use of public surveys	Ongoing		$20,000					
15	Establish an Integrated Solid Waste Management Plan AC for future iterations of the Plan and begin the process earlier	Planned							
16	Continue to perform and ramp up frequency of cart inspections and compliance enforcement	Ongoing							
17	Continue to provide technical assistance to citizens on specific subject matter areas	Ongoing							
18	Offer home composting workshops	Ongoing/Planned							
19	Continue to explore opportunities for promotional partnerships with major retailers (i.e., BYOB campaign)	Ongoing							X
20	Re-establish school recycling program grants	Planned		$1,000	$1,000	$1,000	$1,000	$5,000	

Table 12-1. Honolulu ISWMP Implementation Plan

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			1	2	3	4	5	6-10	
			FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024-28	
21	Pursue ways to increase funding for public education programs and initiatives	Planned							X
22	Prioritize the selection and hiring of a full-time Public Education Coordinator to serve as a centralized hub for all Refuse Division education initiatives	Planned		1 Full Time Equivalent Staff Position					
23	Develop a Public Education Plan by 2021	Planned							
24	Consider building a public viewing area and education center at the new refuse facility in Campbell Industrial Park, Kapolei	Planned							
25	Move towards electronic distribution of announcements to cut down on printed materials	Ongoing/Planned							X
26	Collaborate with NRDC to display food waste reduction advertisements in public venues	Planned	$5,000						
27	Develop and air radio advertisements in partnership with Hawaii Public Radio	Planned	Cost dependent on extent of partnership						
8. Facility Capacity and Siting									
1	Investigate the need for updating or improving facility signage at convenience centers and transfer stations	Planned							
2	Investigate better training of convenience center and transfer station facility attendants to enforce disposal compliance	Planned							
3	Increase the number of drivers available to change out bins at convenience centers	Planned		3 Full Time Equivalent Staff Positions					
4	Continue to conduct regular inspections at convenience centers to identify maintenance needs (e.g., pavement condition, guard shack condition, or vegetation overgrowth)	Ongoing							
5	Replace 15 to 20 roll-off bins across all convenience centers every three to four years	Planned	$300,000					$300,000	
6	Replace/Repair existing guard shacks at convenience centers	Planned		$300,000					
7	Conclude pilot test of a metals bin at Ewa Convenience Center and roll out to other convenience centers, if appropriate	Ongoing/Planned							
8	Investigate accepting more types of materials (such as more battery types and compressed gas tanks) at convenience centers and transfer stations and modify recycler contracts, accordingly	Ongoing/Planned	$15,000	$15,000	$15,000	$15,000	$15,000	$75,000	
9	Investigate feasibility of partnering with nonprofit organizations to host reuse/donation stations or Zero Waste/Re-use hubs where durable, reusable materials can be consolidated and distributed at convenience centers and transfer stations and to allow community cleanup organizations better disposal options	Planned							X
10	Renew convenience center permits (expiration date of August 2020)	Planned							
11	Evaluate the traffic flow through transfer stations and then design and construct improvements, as appropriate	Planned							
12	Perform structural assessments at Keehi and Kawailoa transfer stations. Identify facility needs and secure contracts for repair work	Planned	$50,000	Estimated dollars are dependent on work to be determined in the future.					
13	Complete transition from four-line compactor operations to two-chute open-top loading at Keehi Transfer Station	Ongoing	$3,250,000						
14	Complete repairs to the pit floor and tip floor exit as well as other structural improvements at Kapaa Transfer Station	Ongoing	$5,500,000						
15	Plan, design, and construct a new green waste load-out area at Kapaa Transfer Station	Ongoing	$500,000	$4,500,000					
16	Plan, design, and construct an additional load-out area at Kawailoa Transfer Station	Planned	$250,000		Estimated dollars are dependent on the RFP.				
17	Implement acceptance of householder bulky waste at Keehi Transfer Station	Ongoing/Planned							
18	Assess acceptance of householder white goods, tires, propane tanks, and fire extinguishers at Keehi Transfer Station	Planned							
19	Expand householder hours, investigate adding Sunday as a normal day of operations at Keehi Transfer Station, and evaluate receiving schedule for early morning routes	Ongoing/Planned							
20	Assess acceptance of Honolulu green waste at Keehi Transfer Station	Planned							
21	Assess acceptance of Honolulu blue cart material at Keehi Transfer Station	Planned							
22	Renew transfer station permits (expiration date of August 2020)	Planned							
23	Complete traffic flow study at H-POWER, assess recommendations, secure contract, and complete improvements	Ongoing	$100,000						
24	Secure H-POWER roof rehabilitation contract and complete work	Planned	$5,000,000						

Table 12-1. Honolulu ISWMP Implementation Plan

Item	Strategy	Status	Years						Strategy for Consideration by the Source Reduction Working Group (SRWG)
			1	2	3	4	5	6-10	
			FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024-28	
25	Develop plans for H-POWER ash building rehabilitation, secure contract, and complete work	Planned	$12,000,000						
26	Develop plans for H-POWER third boiler enclosure, secure contract, and complete work	Planned				$21,000,000			
27	Work with Covanta to assess H-POWER equipment refurbishment needs, secure contracts, and complete work	Ongoing/Planned	Estimated dollars are dependent on work to be determined in the future.						
28	Develop plans for H-POWER waste processing and baling project, secure contract, and complete work	Ongoing/Planned	$500,000	$3,000,000					
29	Investigate feasibility of enhanced metal recovery at H-POWER, develop plans, secure contract, and complete work	Planned		$4,000,000	$4,000,000				
30	Investigate feasibility of H-POWER heat recovery and energy utilization project, develop plans, secure contract, and complete work	Planned		$1,000,000					
31	Increase the efficiency and capacity of H-POWER (e.g., adding additional facilities for waste storage and baling, investigating alternative technologies, and similar)	Planned							
32	Assess H-POWER's future needs and plan for future expansion as appropriate	Ongoing						Estimated dollars are dependent on work to be determined in the future.	
33	Perform annual evaluations to monitor the effect of solid waste generation on landfill life (evaluations are currently performed in the landfill's annual reports)	Ongoing							
34	Begin activities to site a new landfill at least 10 years prior to the depletion of WGSL capacity; tasks include finalizing site selection, undertaking land acquisition (e.g., negotiation, condemnation, or purchase), obtaining environmental permits, land use permits and operating permits, and conducting site planning, design, engineering, and construction	Planned						Estimated dollars are dependent on work to be determined in the future.	
35	Continue to monitor the WGSL permit renewal process and rebalance configuration approval	Planned							
36	Determine whether the contract with the WGSL operator will be extended or rebid prior to contract expiration (expiration in 2024); extend or re-bid, as appropriate	Planned							
37	Keep apprised of PVT Landfill's disposal and recycling initiatives to understand developments in C&D debris management	Ongoing							
38	Determine if the contract with the mixed recyclables contractor should be extended or re-bid prior to contract expiration (expiration in 2019); extend or re-bid, as appropriate	Planned							
39	Determine if the contract with the green waste contractor should be extended or re-bid, or if alternate processing methods are sensible prior to contract expiration (expiration in 2025); extend, re-bid, or evaluate alternate methods to processing green waste(e.g., new compost facility), as appropriate	Planned							
40	Determine if contracts with other recyclables processors (e.g., white goods, batteries, and tires) should be extended, re-bid, or terminated prior to contract expiration	Planned							
41	New Refuse Facility in Kapolei, Convenience Center: Plan, design, permit, and construct facility	Ongoing/Planned	$3,800,000						
42	New Refuse Facility in Kapolei, White Goods Processing Facility: Evaluate proposals, plan, design, permit, and construct facility	Planned	Estimated dollars are dependent on the results of the RFP.						
43	New Refuse Facility in Kapolei, Glass Processing Facility: Evaluate proposals, plan, design, permit, and construct facility	Planned	Estimated dollars are dependent on the results of the RFP.						
44	New Refuse Facility in Kapolei, Ash and ASR Facility: Evaluate proposals, plan, design, permit, and construct facility	Ongoing/Planned	Estimated dollars are dependent on the results of the RFP.						
45	New Refuse Facility in Kapolei, MRF: Assess feasibility, release RFP, evaluate proposals, plan, design, permit, and construct facility	Planned		Estimated dollars are dependent on the results of the RFP.					
46	New Refuse Facility in Kapolei, Leeward Base Yard: Site, plan, construct, and relocate the Pearl City Corporation Yard in the Leeward District	Planned		$15,000,000					
47	Consider building a public viewing area and/or education center at the new refuse facility (see Section 7 for more information.)	Planned							
48	Evaluate and optimize schedule to accommodate planned facility down-time to minimize impacts to facilities (e.g., curbing collection at convenience centers, transfer stations, and bulky item pickups during period of planned H-POWER maintenance)	Ongoing							
49	Investigate improving tracking systems at convenience centers and transfer stations (e.g., electronic systems) to restrict commercial use	Planned							

Table 12-1. Honolulu ISWMP Implementation Plan

Item	Strategy	Status	Years						Strategy for Consideration by the Source Reduction Working Group (SRWG)
			1	2	3	4	5	6-10	
			FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024-28	
9. Materials Marketing and Procurement									
1	Optimize curbside collection program for mixed recyclables and green waste	Ongoing							
2	Continue to enforce disposal bans and City ordinances	Ongoing							
3	Continue to contract with a blue bin processor and other recyclers	Ongoing							
4	Support and improve accessibility of HI-5 deposit program	Ongoing							
5	Solicit proposals for the beneficial reuse of glass	Ongoing/Planned							
6	Continue identification of future sites for HI-5 redemption centers	Planned							
7	Solicit proposals for the beneficial reuse of ASR	Ongoing/Planned							
8	Solicit proposals for the beneficial reuse of white goods at the planned refuse facility site adjacent to the H-POWER property	Ongoing/Planned							
9	Regulate plastic bag usage	Ongoing							
10	Continue to contract with a composting facility	Ongoing							
11	Investigate new ways to promote the procurement of processed organics	Ongoing							
12	Continue source reduction campaigns targeting organics	Ongoing	Estimated dollars are dependent on work to be determined in the future.						X
13	Continue to promote used oil disposal and recycling practices	Ongoing							
14	Optimize collection of tires at convenience centers and transfer stations for processing at H-POWER	Ongoing							
15	Implement source reduction and recycling campaigns targeting e-waste	Planned	Estimated dollars are dependent on work to be determined in the future.						X
16	Continue to accept residential e-waste disposed of in household trash and bulky item collection	Ongoing							
17	Investigate additional e-waste management practices	Planned							X
18	Continue to dispose of ash at WGSL until a reuse alternative is implemented	Ongoing							
19	Solicit proposals for the beneficial reuse of ash	Ongoing							

Note:
Shaded cells indicate that the action item will be in effect in that year.

Appendix A
Source Reduction Working Group

Appendix A. Source Reduction Working Group

As discussed in Section 3, the City recognizes the value of source reduction and has committed to establishing a Source Reduction Working Group (SRWG) to enable ongoing collaboration with stakeholders in the interest of increasing source reduction efforts on Oahu.

The SRWG will be tasked with the following goals:

- Developing quantifiable targets for source reduction
- Identifying metrics and milestones to track progress
- Evaluating the feasibility and practicality of potential source reduction initiatives

Ambitious yet achievable source reduction targets are a critical component of a successful source reduction program. The SRWG should consider the solid waste management system as a whole, evaluate the success of existing source reduction programs, and analyze the potential for future source reduction when developing these targets. The SRWG may wish to consider local and national Zero Waste models when setting targets.

Source reduction targets should be tied to metrics and broken up into milestones to allow tracking of progress. The SRWG should consider currently available data and possibilities for additional data tracking when identifying metrics. In addition, the process used by the SRWG to identify source reduction targets and metrics may provide a framework for development of state source reduction goals in support of the statewide Aloha+ Challenge waste target endorsed by the Governor of Hawaii and Mayor of Honolulu.

While there are a host of potential source reduction initiatives that could be implemented on Oahu, feasibility differs widely depending on a host of factors. Conceptualization and planning of source reduction initiatives must consider the following economic, social, and environmental factors:

- Availability of funding
- Costs to implement
- Cost effectiveness of action
- Return on investment
- Benefits to different entities
- Impacts on the community
- Impacts on the environment
- Impacts on businesses and customers
- Long-term viability and sustainability
- Volume impacts (will targeting this product/material make a practical impact on the overall waste stream, rather than just replacing one type of material in the waste stream with another?)
- Ease of adoption or of behavioral changes
- Possible consequences of initiatives (will it increase illegal dumping?)
- Existing rules, laws, and regulations
- Responsibilities of involved parties
- Environmental impacts associated with manufacture, distribution, use, and disposal of replacement products (can they be recycled or composted? Do viable end markets exist?)

In evaluating initiatives, it is particularly important to identify the roles and responsibilities for all parties involved. Some initiatives are more appropriate for different entities, such as for city, county, state, or federal governments; business and industry; non-governmental organizations; and individual citizens.

Table A-1 provides a starter list of potential source reduction initiatives (in no particular order), inspired by programs being employed by municipalities and other organizations. This list is not comprehensive, and the SRWG may identify other initiatives worth examining. The SRWG may also find the EPA Managing and Transforming Waste Streams Tool a useful resource.[404]

Those items in Table A-1 with asterisks are currently being implemented by the City or are planned as written in the 2018 ISWMP.

Table A-1. Potential Source Reduction Initiatives

Source Reduction Topics	Potential Initiatives
Solid Waste Disposal	• User fee or Pay-As-You-Throw solid waste rate structure* • Source separation incentives (such as discounted rates for separating recyclables and compostables from municipal solid waste)* • Every-other-week trash collection
Organics	• Backyard or neighborhood composting and grasscycling* • Food collection and distribution (collecting excess food from producers and provide to local food banks or meal programs; apps and websites) • Restaurant Sustainability Certification Program (helping restaurants reduce food waste) • Food recovery competitions among dining and food establishments • Food Waste Outreach and Prevention (program to inform vendors how to reduce food waste, packaging, and disposables)* • Food Waste Minimization Toolkit for schools
Policies and Programs	• Universal Recycling and Composting Ordinance (requires recycling services to be provided to all residents and businesses) • Construction and Demolition Recycling/Deconstruction Ordinance • Food Service and Packaging Waste Reduction Ordinance (prohibiting non-recyclable and non-compostable food service ware) • Commercial Organic Waste Disposal Ban* • Single-use material bans (such as a plastic bag ban)* • Green government procurement policies*/ Environmentally Preferable Purchasing Program • Extended producer responsibility (such as material take-back programs and other product stewardship strategies)* • Source reduction credit systems • Zero Waste recognition programs to encourage diversion • Competitive grant programs to support innovation • Use of waste audits and waste tracking software to help document a baseline, waste reduction opportunities, and documenting success • Policies to encourage use of durable goods rather than disposable ones* • Tourist Tax to support reduction and management of waste generated by visitors to the island
Behavioral Change	• Public education* • Reduce consumer use of common single-use items (such as plastic straws) • Provision of technical assistance to facilitate source reduction activities (such as proper deconstruction, building reuse, and building material reuse techniques)

[404] EPA. 2018. Managing and Transforming Waste Streams: A Tool for Communities. Accessed July 6, 2018. https://www.epa.gov/transforming-waste-tool.

Table A-1. Potential Source Reduction Initiatives

Source Reduction Topics	Potential Initiatives
Reuse	• Reuse stores or swap sheds • Donation stations at City disposal sites* • Repair and reuse workshops • Reuse and repair resource directories and Community Reuse programs*

Note:

* Items with asterisks are currently being implemented by the City or are planned as written in the 2018 ISWMP.

As the SRWG progresses through its evaluations, it may consider developing a matrix that indicates key information including, but not limited to, the following:

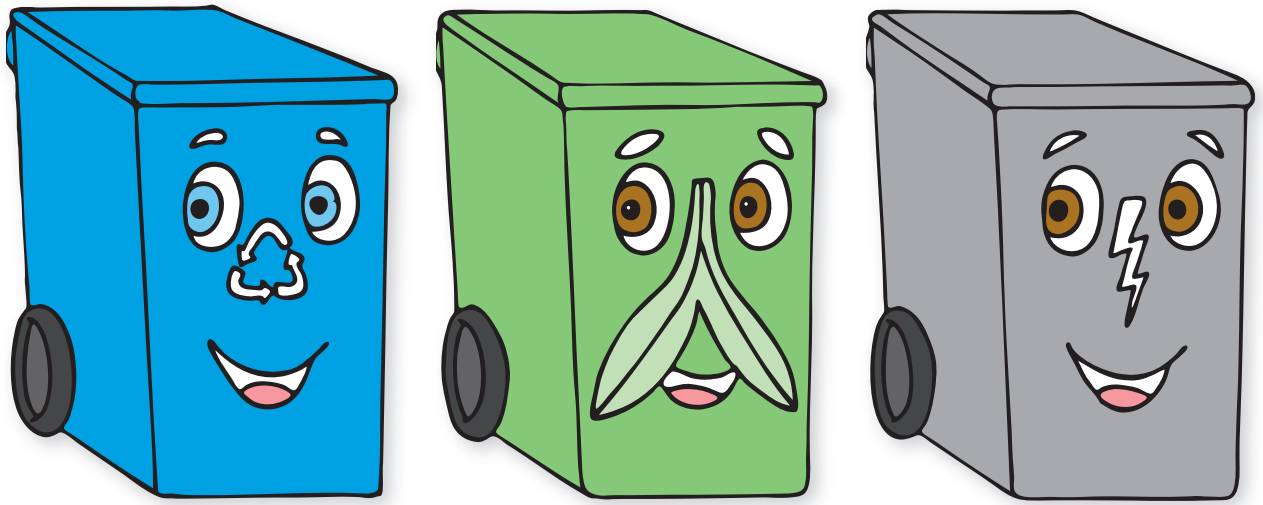
- Initiative name
- Implementers (such as who will drive change, execute policy, or physically participate in source reduction activity, among other responsibilities and tasks)
- Target materials
- Target audience
- Benefits
- Impacts
- Estimated cost
- Potential sources of funding
- Conceptual action plan

Recommendations from the SRWG shall be delivered to the appropriate parties, including the Mayor, City Council, the Director of the Department of Environmental Services, and the Office of Climate Change, Sustainability, and Resiliency.

Appendix B
Sample Public Education Materials

Where Do Things Go?

Kevin Sorts It Out



Coloring Activity Book

WHERE DO THINGS GO?

KEVIN SORTS IT OUT

COLORING ACTIVITY BOOK

STORY BY ANNIE CUSICK WOOD
ILLUSTRATIONS BY SANDRA PAYNE
COVER & BOOK DESIGN BY LEDBETTER KENNEDY CREATIVE
ADAPTED FROM THE HONOLULU THEATRE FOR YOUTH PRODUCTION OF WHERE DO THINGS GO?
PERFORMED DURING THEIR *2010-11* SEASON OF SCIENCE.
YOU CAN REWATCH THE PERFORMANCE ON THE GREEN CHANNEL ON OCEANIC 332
AND ONLINE AT OPALA.ORG.

PRODUCED BY THE CITY & COUNTY OF HONOLULU, DEPARTMENT OF ENVIRONMENTAL SERVICES
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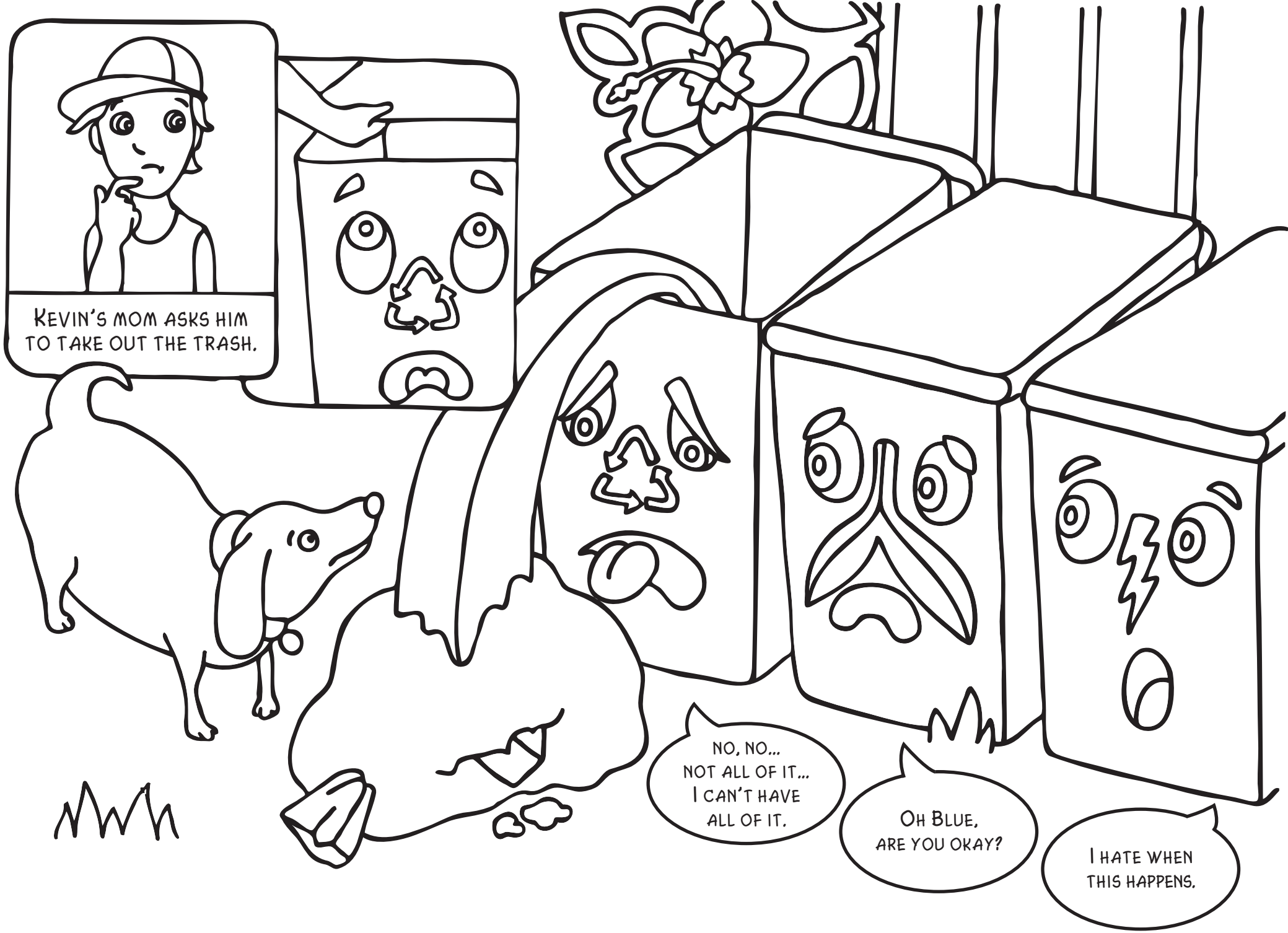
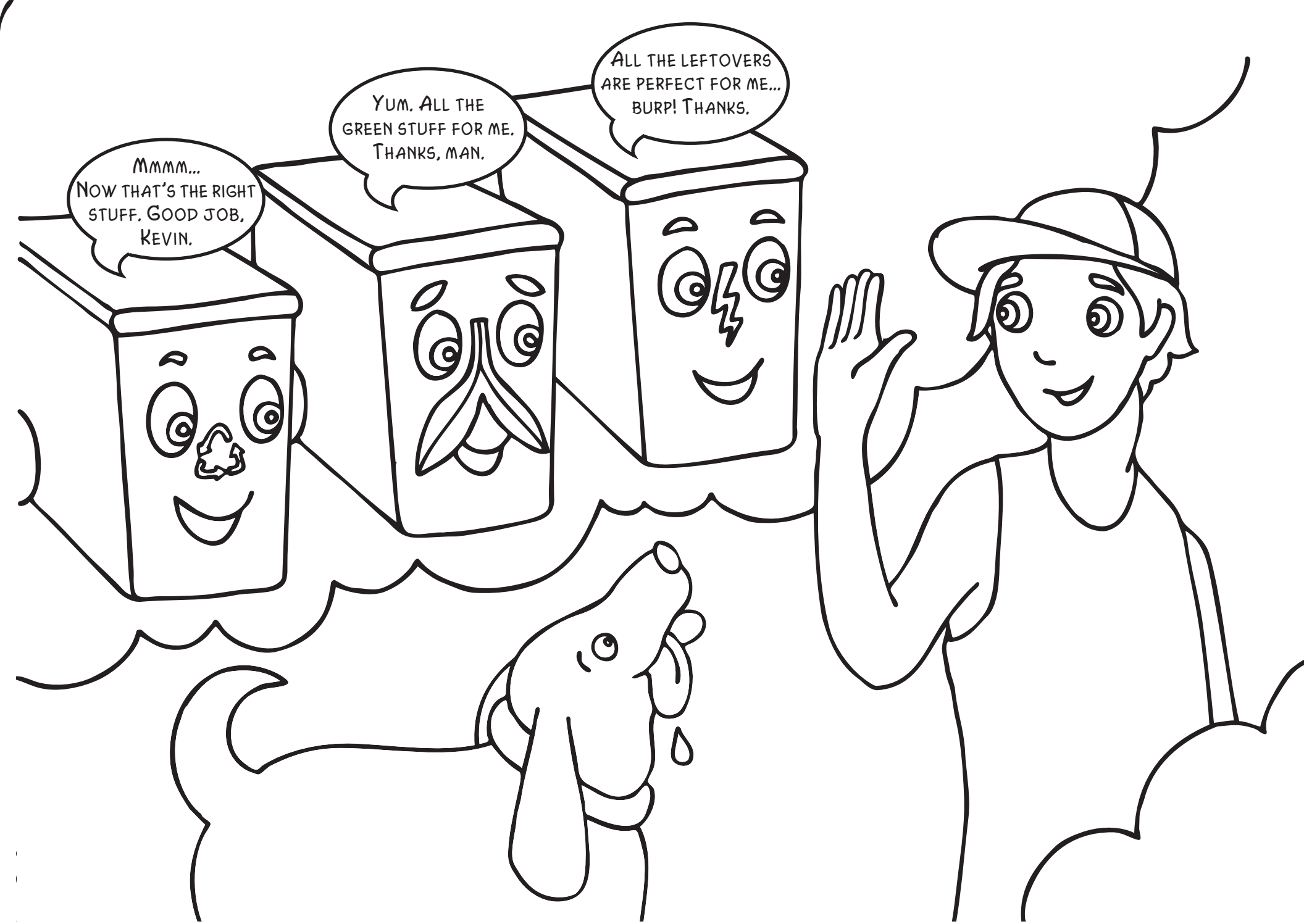


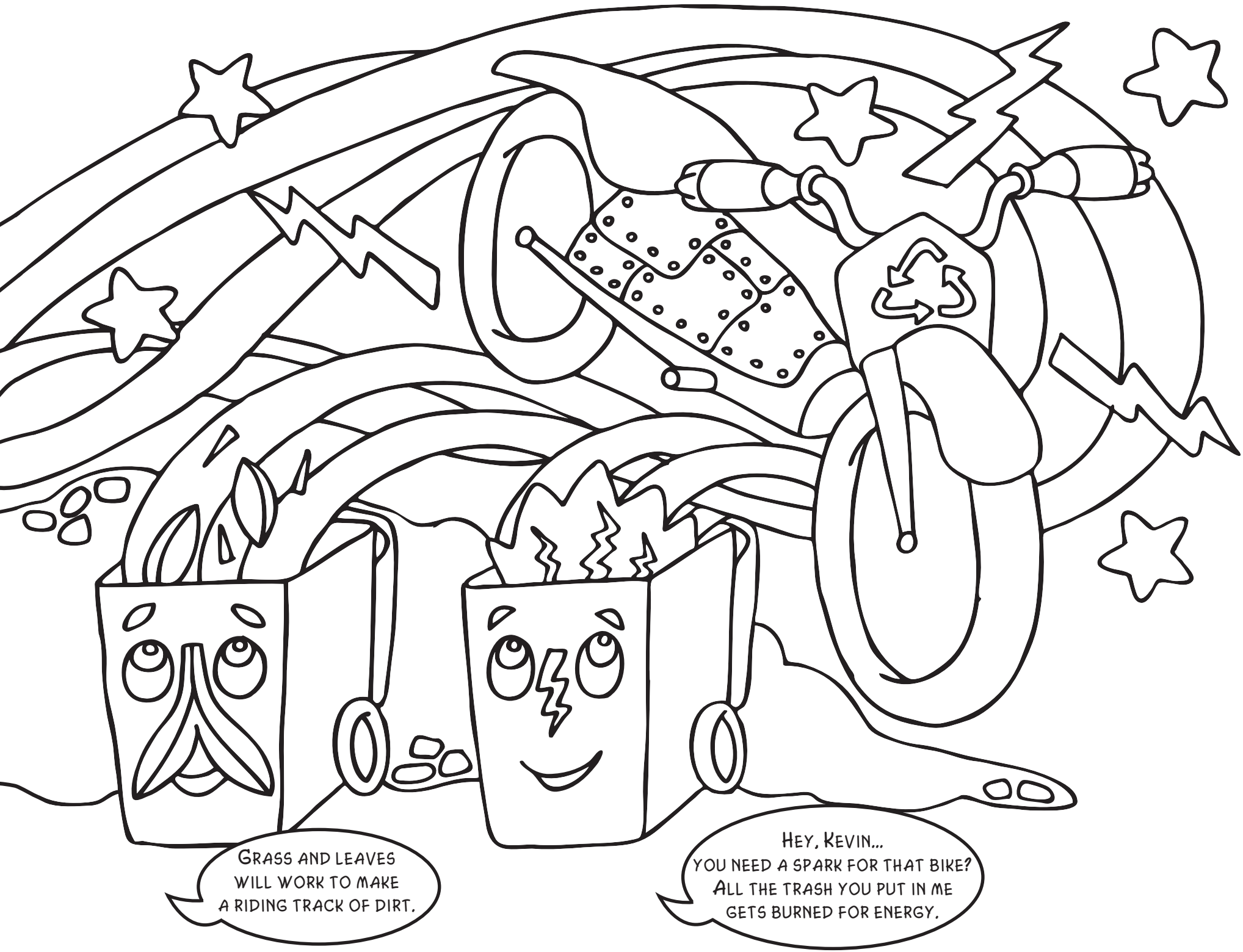
BUT WHEN HE PUTS ALL THE TRASH IN THE BLUE CART, BLUE GETS SICK AND SPITS IT OUT.

KEVIN LEARNS WHAT TO PUT INTO EACH CART.



Blue, Green and Gray are happy with Kevin's work.

BLUE GAVE KEVIN A DIRT BIKE, MADE OF THE THINGS HE RECYCLED. GREEN GAVE HIM DIRT FOR HIS RIDING TRACK. GRAY BURNED HIS TRASH TO MAKE ELECTRICITY TO MAKE THE BIKE GO.


GRASS AND LEAVES
WILL WORK TO MAKE
A RIDING TRACK OF DIRT.
HEY, KEVIN...
YOU NEED A SPARK FOR THAT BIKE?
ALL THE TRASH YOU PUT IN ME
GETS BURNED FOR ENERGY.

Newspaper

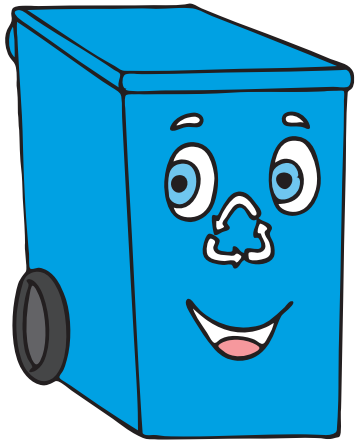
Christmas tree

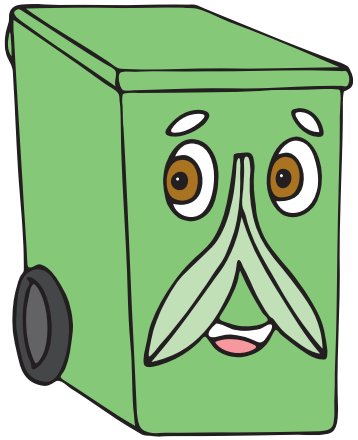
Plastic water bottle & cap

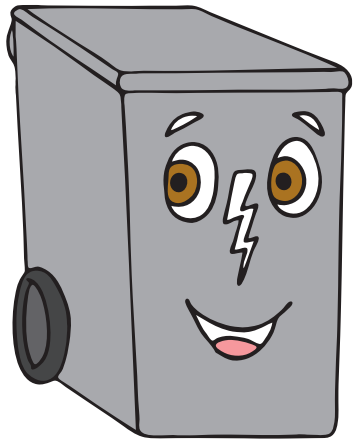
Cereal box

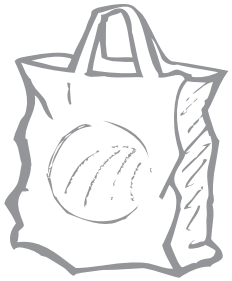
Liquid laundry detergent & cap

Where Does It Go?

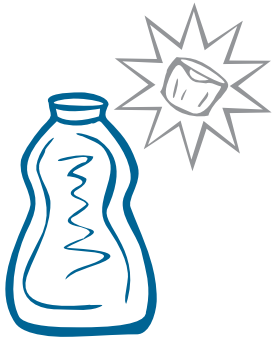








Plastic bag



Shampoo bottle & cap

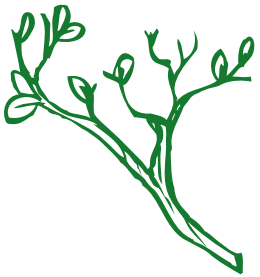
Waxed paper milk carton

Glass jelly jar & lid

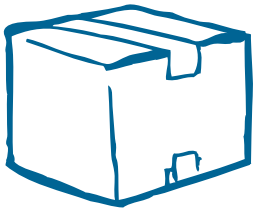
Aluminum soda can

Food can

Tree branches



Corrugated cardboard box



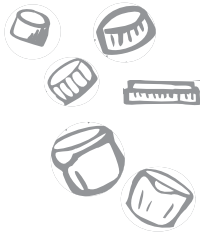
Plastic gallon milk jug & cap

Old standing fan

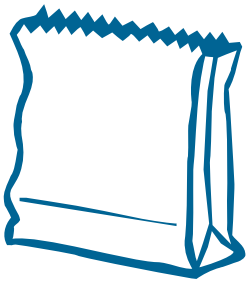
White & colored Office Paper

Can you SORT IT OUT like Kevin did?

Draw a line from each thing to the correct cart or truck.



Bottle caps and lids

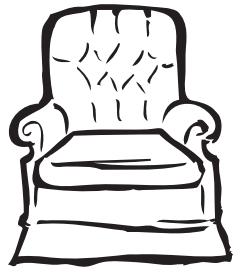


Paper Bag

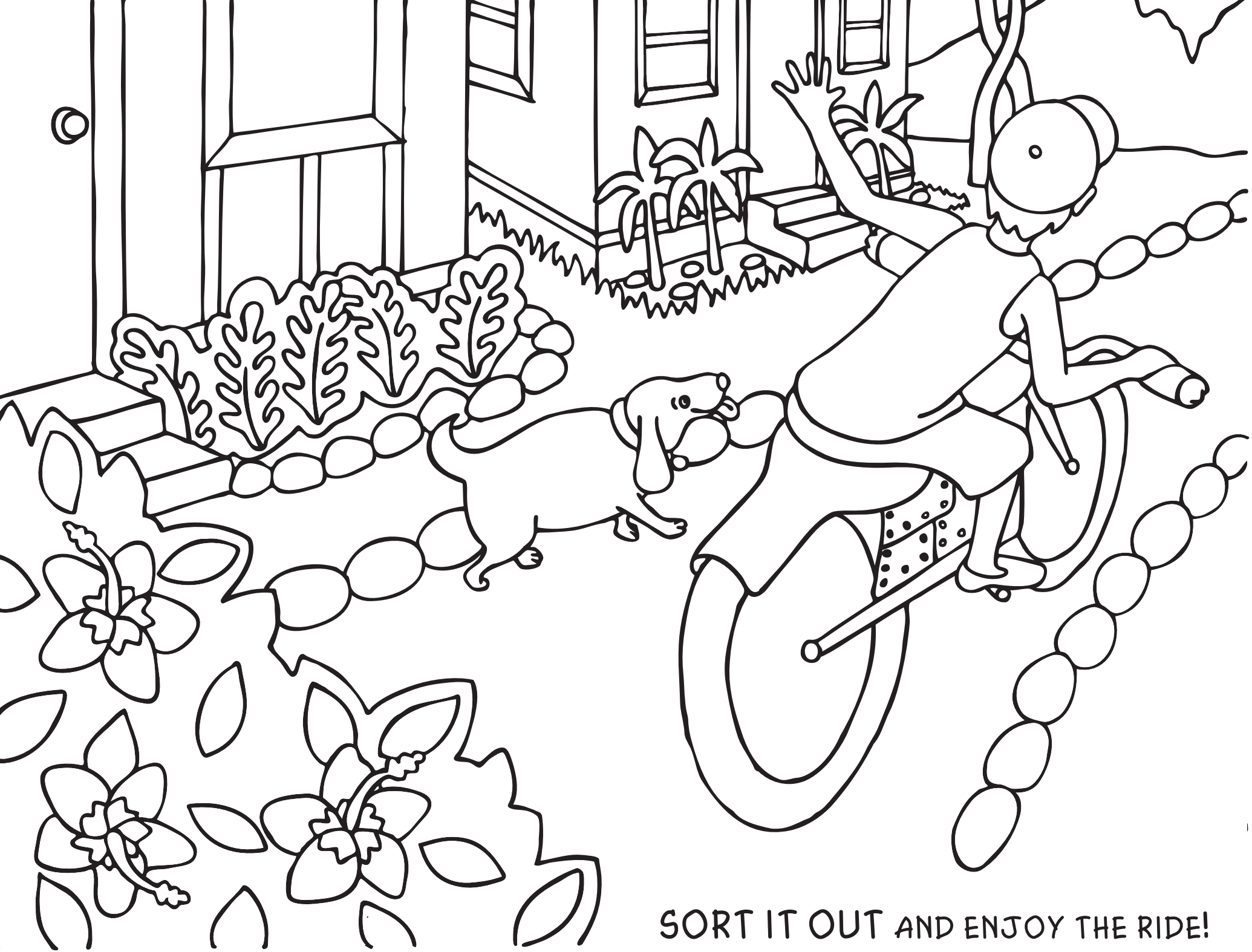
Soda bottle & cap

Leaves

Cup and Saucer

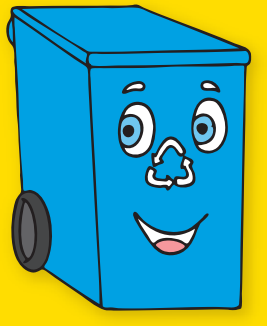


Old furniture



SORT IT OUT AND ENJOY THE RIDE!

SORT IT OUT AT HOME!



BLUE

METAL CANS
ALUMINUM / STEEL

GLASS BOTTLES AND JARS

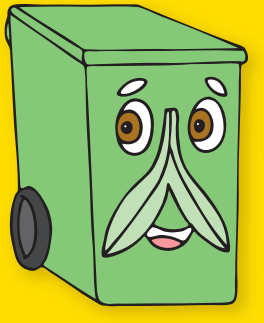
PLASTIC CONTAINERS 1 PETE AND 2 HDPE

NEWSPAPER

CORRUGATED CARDBOARD BOXES

WHITE AND COLORED
OFFICE PAPER

PAPER BAGS



GREEN

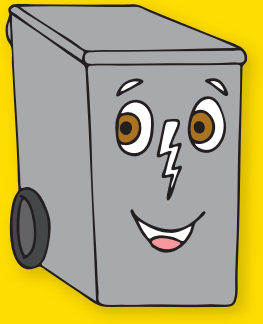
LEAVES

BRANCHES

GRASS

WEEDS

CHRISTMAS TREES



GRAY

WHATEVER IS LEFT

TRASH

PLASTIC BAGS

TELEPHONE BOOKS

CEREAL BOXES

JUNK MAIL

MAGAZINES

PAPER PLATES, NAPKINS

OTHER PLASTICS

OTHER GLASS

BOTTLE CAPS AND LIDS

TIPS: NO BAGS IN THE BLUE AND GREEN RECYCLING CARTS.
DEPOSIT IT ALL LOOSE FOR EASY SORTING & PROCESSING.
ALWAYS, ALWAYS BAG ALL YOUR TRASH IN THE GRAY CART,
TO PREVENT LITTER, ODOR AND FLIES.

FOR MORE TIPS VISIT: OPALA.ORG

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City & County of Honolulu
Department of Environmental Services
768-3200

VER5/REV10/2015

sort it out
for recycling & energy

Nothing wasted ...
Nothing to landfills!

Metal Cans
Aluminum & steel. Rinse.

Glass Bottles and Jars
Rinse, remove and discard lids and tops. Includes containers for beverages, wine, spirits, food.

Newspaper
Remove magazines and glossy inserts.

Corrugated Cardboard
Flatten boxes. No single-layer flatboard, such as cereal boxes and tissue boxes.

Plastic Containers
1 and 2 ONLY
Rinse, remove and discard lids and tops. Look for the plastic number code in a triangle embossed on containers.

White & Colored Office Paper
NO envelopes, junk mail, tape, stick-on labels, rubber bands, magazines, or shredded paper. Staples are okay.

Paper Bags

tip Place a small container in your kitchen for your family's convenience. All recyclables can be mixed together in the blue cart, so you only need a single container.

NOTE: *Deposit all items loose into your blue cart. Do not bag, tie or bundle recyclable materials.*

Yard Trimmings

Leaves

Christmas Trees
No ornaments, tinsel or flocking.

Grass Clippings

tip Deposit green waste LOOSE. No bags, please! Plastic is not compostable.

General Household Rubbish
Non-recyclable trash.

Other Plastic Containers
Plastic codes #3-#7.

Other Plastics
Plastic bags, styrofoam, toys, gadgets.

Other Paper
Telephone books, junk mail, magazines, cereal boxes, tissue boxes, paper plates, napkins.

Other Glass
Ceramics, dishes, glassware, window glass, light bulbs, mirrors.

tip Bag all trash to prevent odors, flies and litter.

Department of Environmental Services
City & County of Honolulu
Kirk Caldwell, Mayor

ENV

Learn more at opala.org

DON'T DUMP ON HAWAII. SORT IT OUT.

FOOD WASTE RECYCLING - Tips and Guidelines

You Can Recycle

Vegetable and Fruit Waste
Eggs
Meat and Fish Waste
Dairy Waste
Bakery Waste
Noodles
Rice
Cooking Oil (collected & recycled separately)

You Can't Recycle With Your Food Waste

Plastic
Plastic bags
Metal
Wood
Glass
Cardboard
Large amounts of paper
Landscape clippings

Check with your collector to verify acceptable materials.

- It's The Law
- Going Green Is Good For Business
- Collection Options

It's The Law

City & County of Honolulu Ordinance, Chapter 9, Article 3.5 requires the owners of food establishments located within the City and County of Honolulu to: 1) arrange and provide for the separate collection of food waste and for its recycling by a recycling facility in the city or 2) separate food waste from all other solid waste generated by the food establishment and deliver the food waste to a recycling facility.

To be in compliance with City law, restaurants, food courts, hotels, grocery stores, food manufacturers/processors and hospitals meeting the following criteria are required to recycle food waste.

- Restaurant that occupies 5,000 square feet or more of floor area and serves 400 or more prepared meals per day
- Food court in a building or shopping center where five or more food establishments are situated and serviced by a common dining area
- Hotel with one or more kitchens, and function rooms
- Grocery store that occupies 18,000 square feet or more of floor area
- Food manufacturer or processor that occupies 5,000 square feet or more of floor area
- Catering establishment that serves or sells 400 or more prepared meals per day
- Hospital that serves 400 or more prepared patient meals per day

NOTE: *Meals per day are based on an annualized average*

Going Green Is Good For Business

Recycling is not only the law, it is also the smart thing to do. It's good for business and good for the environment. Keeping food waste out of the dumpster lowers disposal costs, and recycling food waste and other materials helps to extend the life of our landfill. We all need to work together to reduce waste and promote sustainable waste management.

Collection Options

You can contract directly with the recyclers or food waste collectors. Most recyclers will charge a fee for the collection service. The Hawaii Food Bank and Aloha Harvest will pick up quality leftover food at no charge.

Quality Edibles

Aloha Harvest	537-6945
Hawaii Food Bank, Inc.	836-3600

Meat, Seafood, Cooking Oil

Island Commodities	682-5844
Pacific Pure Technologies	676-1010
Pacific Biodiesel	841-2177

Produce and Food Scraps

For a current list of collectors and pig farmers contact:

University of Hawaii, Swine Extension Specialist	956-7594	halina@hawaii.edu
City & County of Honolulu, Recycling Specialist	768-3426	sizuno@honolulu.gov

Providing this information does not constitute endorsement of these businesses. Also, this information is not comprehensive. Companies offering services may contact the City Recycling Office to be listed.

For more information about setting up a food waste recycling program for your business visit *www.opala.org* or call the City Refuse Division at 768-3200.

To complete the Food Waste Recycling Compliance Form online, go to www.honolulu.gov/opala/compliance or scan the QR Code.

City and County of Honolulu
Department of Environmental Services
768-3200

REVISED 3/2017

Appendix C
Public Hearing Questions, Comments, and Responses

Appendix C. Public Hearing Questions, Comments, and Responses

A Public Hearing was held July 31, 2019 from 5:00 p.m. to 8:00 p.m. at Kapolei Hale to gather public feeback on the City and County of Honolulu (City) 2019 Integrated Solid Waste Management Plan (Plan) Update. This appendix documents questions from participants and answers provided by City staff (Mr. Nagashima and Mr. Sadri) and staff from Jacobs, the consulting firm assisting the City with development of the Plan (Mr. Pitzler). Questions and responses are as recorded by a stenographer hired by the City with minor changes to improve the readability of the discussion.

Q. Is this money coming into this -- this is money coming into this budget?

MR. PITZLER: Yeah. This is where – this is what it costs in fiscal year 2019, $255 million, to run the system, is what the City spends. And then if you look over here, look at 2019. 255m this is in thousands -- there's that same number right there. The rounding was different with the zeroes, but -- So, that's the total revenue. Total revenue of $255m is the same as the total expense of $255m.

Q. Is this slide show available somewhere?

MR. PITZLER: We can make this available. This is in the plan, too. This is one of the tables in the plan.

Q. All of this?

MR. PITZLER: This is all in the solid waste plan. If you go to Chapter 10 of the plan -- you can get that on line at the website.

Q. Thank you for that presentation. My first question relates to two goals laid out in the plan: One was a 25 percent per capita waste reduction by 2030, I believe, and the other was a one percent reduction of plastics going into H-POWER by a certain time. And I'm wondering how those numbers were developed.

MR. NAGASHIMA: The 25 percent per capita waste reduction targets materials that would be easy to eliminate based on results from the waste composition study, including what we thought was a realistic goal for what could be reduced overall. And the one percent plastic reduction -- we were asked by the sustainability office to include a goal that reduced the carbon footprint of what was coming out of H-POWER. And so, you know, not really having an idea of what we could source reduce right now to eliminate that, we committed to that goal of one percent, which we thought was a realistic estimate of what we could reach.

MR. PITZLER: We mentioned the source reduction working group many times in the ISWMP: there's many great ideas out there. We'd love to see more. The more the better. Those are some of the topics that we're hoping to address with the working group.

Q. I had a clarifying question about the economic breakdown. Can you explain why we have to pay for electricity sales?

MR. PITZLER: Sorry I wasn't clear. The electricity sales are revenues. There are expenses for H-POWER that are off-set somewhat be revenues from the sale of electricity from the plant. So, the City pays funds out for the H-POWER operation and some funds come back in the form of electricity revenues.

Q. Just on that topic -- when you're looking at the piece for the ash, is that going to be another source of revenues, or are you going to be paying somebody to deal with that waste stream in order to make up some of the balance between the cost of H-POWER and the revenues gained by it?

MR. NAGASHIMA: Generally, most of the recycling and getting rid of ash and other materials currently going to the landfill is going to cost money, just because of the way the markets are. There's not much

that can be used in the Auto Shredder Residue that's worth anything after paying for the staff and machinery required to divert that material from landfill.

Q. In the process of deciding what the goals are and what's achievable and the -- I saw one of the charts like mentioned it goes all the way out to like 2040 -- do you guys look at other countries or other cities that have much more aggressive plans and then decide what we can do? Or is there no comparison of other cities, for example, on the mainland or other countries, island-specific communities in that process?

MR. PITZLER: When we looked at options, we looked worldwide. We're an international firm and our team is pretty up to speed on what's being done throughout the world. But then I've learned through the years everything has to be location-specific. We had to recognize the financial and fiscal realities and what applied to the Honolulu context. For example, what works in Denmark may not work here. We had to bring all those ideas -- find out what would work locally and consider fiscal realities.

Q. So, there were other island countries or communities that were referenced in making this plan?

MR. PITZLER: Island communities, yes.

Q. For example, like Sardinia, in Italy, a heavy tourist island; Taiwan; Singapore; Bali. I mean like other island communities that have similar problems with dealing with materials while being so isolated.

MR. PITZLER: I'd say in a general manner, but there was no detailed study of islands, if that's what you're asking. I think we're pretty up to speed on the opportunities that are out there. It's really a matter of tailoring it to what's gonna work.

Q. So, I have a question about process and how you use this public comment, our comments, to inform the plan. For instance, do we have any assurances that some of our insights or comments or concerns, or even some of the data that we've collected will actually impact how the planning is moving forward? Like what is kind of accountability to the public is there?

MR. PITZLER: Thank you for the question. I should have mentioned that. What we are committing to do, as we've done throughout this process, we'll publish our comment log. The project team has recorded every comment we have received from day one from our advisory committee to the publication of the draft plan. The City has provided a reply to each of those comments. Now, there's no commitment that you're going to like the answer you get, but it will be considered. And I think people on the advisory committee would agree that we've listened, we've made some changes, actually a lot of changes based on advisory committee feedback. So, good ideas we hear today, every one will be considered. There will be a formal response back to those comments and they will be considered when developing the final version of the plan.

Q. I have a quick question about the finances. So, on the previous slide, you had the expenses. So, obviously, H-POWER is our biggest expense. Right? So, aside from doing the baling and trying to reduce down-time, what other processes are built into the plan to really reduce H-POWER's expense? If we're look at that being, what, 50 percent of the budget, is there really a comprehensive way of looking at reducing that? That's the first question. And then the second question -- the second, I'm a spreadsheet person. I'm a business person. I don't really see projections of increased income or increased revenue into the system. So, the only thing that I see really changing drastically is the general fund. But are we not assuming that H-POWER electricity generation is going to garner more than a thousand dollar increase over the next six years? That seems really unlikely to me. And I know we don't want to levy a lot of fees on residents or whatever, but are we really not looking at any increased projection in order to bring more money into the system to provide for updates and coordinator positions and educator positions?

MR. PITZLER: Great question. The first thing I'd note is those are in thousands, so it's a million dollars of extra money coming into H-POWER. Part of it is -- it's a good thing. When those revenues aren't growing too much, that means you're getting material out of the system. So, the more successful we are

in source reduction, the lower those numbers are. It's one of the things you've got to work out when you have a pay-as-you-throw system. You know, to avert a death spiral -- if you reduce too much, the prices have to go up. We've seen that in places like Seattle that have had user pay for years and years and the cost of individual cans are really expensive. You still have to manage what's going in there. So, the long way of saying that we think those are commensurate with what we are currently forecasting going into there being requirement of disposal. And can you get user fees? I know that staff would love to have user fees. Correct me if I'm wrong, but currently there is not Council support at this time for user fees.

I don't know if there is anything you can add about when this was recently taken up. I think there's been some consideration of user fees, but about the best we probably can do in the Plan is note the advantages of a user pay system. I think you, as citizens, and others, if you support a user pay system, talk to your Council members and see if we can get support for this. There's only so much that staff can do beyond saying it's a great idea. There are people who will object. There's always controversy doing that. Josh, anything to add?

MR. NAGASHIMA: Yeah. I think what I would add to that is that as far as H-POWER's fees, we're in a contract right now and we're not set to negotiate any time soon, unless there's a big change in the tonnage that we're taking there. But if you notice, the electrical revenue and the tip fee revenue offsets the cost of H-POWER, so the cost was about a hundred million -- a little over a hundred million. If you look at the electricity, it's about 74 million, and the tip fees are a little over 50. And that's for both the landfill and also H-POWER, but we make more money with H-POWER than we spend -- or roughly about the same. Yeah. So, as compared to if we were to put the trash in the landfill, we would just be paying for that.

MR. PITZLER: Anything on user fees?

MR. NAGASHIMA: So, on user fees the last bill proposed had a $5 charge on it for each cart with the three-cart system, gray, green and blue, and that was modified to be basically $5 for the whole system, I believe, and that was shot down in Council.

You know, the idea behind the user fee is that today all the fees now are taken from property taxes. But we want to be transparent on how much people are actually spending on their trash collection, and also, disincentivize people from throwing away trash, right, as part of source reduction. But so far we haven't had support for that from the City Council. So, that's why we want to try to make up that deficit that we get from the general fund.

Q. Thanks for the presentation. Really appreciate it. I'm curious just because there's not too much in the plan about composting. On the outside, you mentioned how important it is and how big of an improvement it can be to waste systems. I'm curious if there was research done, because I'm looking through the markets for these types of things and the analysis done in here, and what I think is lacking a little bit is that while we look at Hawaiian Earth Products, that maybe there's not a large market for what they're selling, but also that's because, frankly, it's not a product that has nutrient rich, because it's not taking in food waste either. So, I'm wondering if there was any analysis done of how much we're actually paying, how much farmers are paying to import fertilizers and compost that are actually doing something good for their soils and if there actually is more of a market for compost than we think and that we could actually be a service by creating another revenue source by providing much more healthy composting from the system.

MR. PITZLER: We didn't do a detailed survey of farmers, for example, or compost markets here in Oahu. We used more general expertise that we've seen, work that was done previously here where there was a proposal to take food waste, and what it cost to build out the facilities. You know, once you get food waste, you have to have covered facilities. It's more expensive. The cost was, at that time, relatively prohibitive. So, we didn't see it this time, but the revenue potential wasn't anywhere close to the cost of building the type of facility, a covered facility that would meet regulations and something that they could afford with this type of a budgetary system at this time.

But I think everyone supports and sees the need there. We're looking for other ideas. It's something to sort of take up in that source reduction working group; there's more momentum to find something like that.

MR. NAGASHIMA: Sorry. I just want to add -- you know, I think food waste is one of those things that we're definitely going to look at. But currently, as the facility is built, it can't take food waste to be composted because of vectors and other dangers. But we're looking to improve that.

Q. I have three questions, but I'll start with one.

MR. PITZLER: One at a time.

Q. Okay. One at a time. So, the first question, I guess, goes back to this budget. And H-POWER is bringing in drastically more in energy sales than is represented here. And I guess my question is, how much of that is being sent back to Covanta, and is there any space for those revenues -- those funds to be used to subsidize things like composting and other technologies we're interested in?

And I'm getting that from the City auditor's report. They're just different numbers than are up there.

MR. PITZLER: Josh?

MR. NAGASHIMA: Yeah. So, Covanta gets -- we have a power purchase agreement with HECO and we have an agreement with Covanta and Covanta gets approximately 15 percent of the electrical revenues that come out. So, that's the number. Some of the numbers in the City auditor's report, we're not quite sure how they got those numbers, but these are the numbers from our books as far as they go.

MR. PITZLER: And you're saying in addition, Covanta gets about 15 percent on top of that 73.

And I would add that what Covanta gets and what the City pays is a product of negotiations that are fairly in depth and complex, as you can imagine. I think they just re-signed a 15-year agreement. We're about year five of a 15-year agreement[405]. But there's always little adjustments that are going on for different things.

Q. When is that contract ending?

MR. NAGASHIMA: I don't know the exact date, but, yeah, it's roughly ten years from now.

Q. Can I ask a second question or does anybody --

MR. PITZLER: You had three. We'll go with your three.

Q. Thanks. Okay. So, second question is -- there's a well-established relationship between the waste we generate and our greenhouse gas footprint. So, the U.S. EPA says about 42 percent of our greenhouse gas emissions come from this cycle of producing a lot of stuff that we throw away, and the City and the State have made pretty profound commitments to wanting to reduce our greenhouse gas footprint. So, I'm wondering how those things might have been merged in putting together this waste management plan which can really be positioned as a greenhouse gas mitigation strategy.

MR. NAGASHIMA: As far as the greenhouse gases, I mean, we hadn't looked at it too much before the plan. Right now, the main thing I can say that we're doing with regard to greenhouse gases is looking at what the greenhouse gas production of H-POWER will be in that waste-to-energy versus recycling study. So, we're going to look at the greenhouse gas production on the H-POWER side and on the recycling side -- so processing and shipping out those materials.

[405] After the public hearing, the City confirmed that a 20 year extension to the agreement was signed in 2009, so there are 10 years remaining on that agreement.

MR. PITZLER: To follow up -- the other thing I've been doing is some of the goals that we referenced at the top of the plan, there was a lot of input from Josh's office, the sustainability office on trying to be consistently looking at the mayor's goals and trying to get some of those into the plan, and that was actually another push from the advisory committee, what are the goals. So, with that, we added some goals.

MR. NAGASHIMA: Another goal that you might know about is we have to change our fleet to electric vehicles by 2045, I believe, so we're going to look into that. But that was outside of the scope of this plan.

MR. PITZLER: And I will say there's some really cool electric 18-wheelers that are in prototype and starting to be in production, not yet garbage collection vehicles, but -- Do you have a third?

Q. I forgot it.

MR. PITZLER: You can come back.

Q. Thank you. So, in your executive summary you reference the United Nations Paris Climate Agreement, as well as the 17 developmental goals. And I guess my question is: Were those kind of like in everyone's consciousness as you're coming up with a plan?

And you guys used the word alignment with those goals and with the Paris agreement. So, is that something that like almost anything that gets put into the plan would have to show that it's somehow aligned with the Paris agreement or the 17 development goals?

Is that kind of how you guys decided what you're even going to put in the plan? Do you know what I mean?

MR. PITZLER: I think I know what you mean. I think the answer is, probably not as explicitly as you would have liked or you're suggesting. I mean, those were general goal posts. When you put a plan in, you have to balance a whole host of things. There's broad general goals. There's State requirements for doing this -- what has to be in this plan. There's budget realities. There's input from the community. So, a whole host of factors have to go into it.

But it wasn't, you know, should we put this in, does it align with the goals -- we didn't do it quite that way.

Q. Right. Because I was just trying to get a sense by reading through the plan what was your prime directive, from a Star Trek kind of expression. But like what is the prime directive? And I was like, Oh, well, they mention it right here in the executive summary. It's the Paris --

MR. PITZLER: The prime directive was the State requirements for doing -- there's the HRS requirements -- that's what we -- knew we had to -- this is required by the State, we had to meet that; then on top of it, a whole host of other things. So, it wasn't much of a prime directive.

Other questions?

Q. I just have a really simple question. I'm just wondering, because the organics took a large part of that analyzation of how much trash was coming in, what does the organics actually consist of? What are all of the components?

MR. PITZLER: Green waste and food waste are the two largest components. Waste composition is broken into a lot more -- there's some sewage sludge. There's -- anything that's organic in nature can go in there. But it's -- you know, a high percentage of it is food and green waste.

Q. So, the sewage, all the sewage stuff --

MR. PITZLER: No, not all of it. But there's occasionally some sewage sludge, after it's stabilized, goes to landfill. But that -- has it stopped now or is it pretty close to stopping?

MR. NAGASHIMA: Most of the sludge goes to H-POWER.

MR. PITZLER: Most of it now goes to H-POWER. It used to go to the landfill. So, we're trying everything we can to keep from going in the landfill. But it's going in -- some of that goes into the disposal stream, so it gets counted -- it's either in the organic fraction or it may be a separate category for sewage sludge; I can't remember.

MR. NAGASHIMA: I believe sewage sludge was in the "other."

But one of the ones that I was asked a question about in organics was textiles. So, like carpet; why is that organic? Mostly, because its carbon based. So, that's the reason.

Q. Even though most carpets are made of plastic now?

MR. NAGASHIMA: Yeah. Even plastic is carbon.

Q. I guess it is.

MR. NAGASHIMA: So, I think if you want to get a rough breakdown, it's roughly 20 to 25 percent food waste, somewhere about five to eight percent green waste and four to five percent textiles, roughly.

Q. Thank you.

MR. PITZLER: We've had some new folks come in. I'm sorry you missed the presentation, but this is questions and answers about the plan, so if you have questions, raise your hand. We're just loosely going around. And then there will be a period of time when the questions are done that we'll allow people to make formal statements. So, that's kind of where we are right now. Feel free to raise your hand if you have a question and we'll get to you.

Q. I have the mike back. I remembered my third question.

MR. PITZLER: Very good.

Q. So, throughout the plan, part of the value proposition of waste to energy is that we're producing local energy. Sometimes it's referred to as clean energy. Technically, it's a part of our renewable energy portfolio. But when looking at the numbers around greenhouse gas emissions out of the smokestack, burning trash is producing more GHGs per megawatt hour than our largest oil plant. And I know you guys dealt with that a little bit in talking about diverting plastics out of that stream, because that is a big contributor to those emissions. But I wonder if the plan is authentically evaluating the negative impact of leaning on incineration so much when we know that to be the case, and how did that factor in? It's kind of a complex question. But are you guys factoring in that H-POWER is not as clean as we might hope it is?

MR. PITZLER: Let me respond to that first. We did an energy balance section as part of this plan, and we sort of agree with the City and County that the standard methods that are used really weren't granular enough to answer that question. So, this study that's being commissioned now is going to look at that in a bit more detail. So, that work is ongoing. It's really complex. I'm not a scientist. I haven't spent enough time studying it. But there's been a reasonable amount of work done on that. More is being done. So, all I can say is additional information will be coming out on that.

MR. NAGASHIMA: Yeah. I think I was going to just say something similar. We're going to rely a lot on that study to see what the impacts of H-POWER are. And we always have to compare that to something. Right? So, what would we do with the trash otherwise? Again, we always go back to the base case of land filling, and then in this case, with the report, we're going to look at recycling, as well.

MR. PITZLER: Let's go here and here. Go ahead. You had one, too.

Q. Anyway -- sure. Hi. I was just wondering if there's any discussion within the plan about trash being lost through the disposal system, trash on the street, stuff that isn't making it into any of these disposal mechanisms, and whether there's any talk about increasing public infrastructure for waste disposal?

MR. PITZLER: Are you referring to trash pick-up, just trash on the streets, or --

Q. Yeah. Trash on the streets, whether there are more public waste bins available or people actually going out and cleaning the streets, and also, a lot of the bulk pick-up that sits on the streets for -- sits on the sidewalks for who knows how long.

MR. PITZLER: Three ways I can address this, and maybe Josh can fill in, too. The City, as you know, has bulky waste collection. Part of those routes do pick up just trash. If they see trash, they pick it up, generally.

Secondly, one of the things I mentioned briefly -- one of the initiatives was to get more public recycling containers in public spaces, so perhaps some additional trash cans, as well, really focus on the recycling element, trying to get that done.

And the third thing was one of the issues brought up in the advisory committee is the beach cleanups. There are a lot of organizations that are doing that. It's difficult -- what do you do with that stuff once they've collected it? And there's some constraints that the City has right now with their permits. They're trying to work on a solution to make it easier for those groups. So, there's a couple of things the City is exploring.

There's three things I can think of. Josh, anything else to add?

MR. NAGASHIMA: The only thing I'd just add is, you know, if you're concerned about a certain area, just notify your Council member or the Mayor. We always get those kind of e-mails and we try to address them. You know, especially with the bulky appointment system now, we've become really keen to those kind of things.

MR. PITZLER: I think you were next.

Q. Yeah. So, just to clarify -- the organic section is the biggest one, and the plan doesn't mention composting. So, the barrier to composting is not -- is a funding issue or -- I think you touched on it earlier, about the research about if we could be making money off of composting the same way that we make money off of H-POWER. So, what was the barrier to not doing composting?

MR. PITZLER: Well, I'll be frank. The research I've seen in most communities is that it's not a money-maker when you start composting food. The costs generally overwhelm the revenue side. I think you can look at a whole host of facilities on the mainland where that's been the case. So, it does typically -- it costs more money than you're going to get from the sales coming out. So, it's, where's the money to do it. And when the City looked at it some time ago and negotiated a bit with Hawaiian Earth Products, Hawaiian Earth Recycling, it was costly enough that it didn't go forward at that time.

MR. NAGASHIMA: I don't want to give too many details, but when we were looking at it back then -- you know, composting requires a large facility, a lot of infrastructure. We spent tens of millions of dollars on facility and infrastructure. And then like I was saying about recycling, it's really cost prohibitive. So, we pay somewhere around $80 a ton to recycle green waste.

Q. So, my question follows up on both of these ladies' questions. So, as Nicole said, the greenhouse gas emissions from H-POWER is not great, and so you said, okay, well, we need to look at the difference between land filling versus burning, because if we can't burn it, then we have to put it away. But like Tenaiya just said, it's 35 percent organic. So, if we look at composting, even if it's not necessarily a revenue generator, could it help us reduce the greenhouse gas emissions, improve the soil for the entire state, create a revenue- generating product and also just eliminate all sorts of other problems?

So, the other thing is that it doesn't have to be a large facility. So, I learned this from Rafael the other night, so I hope he doesn't mind that I'm saying this, but there are lots of other ways to compost. So, yes, people can do it in their back yard.

I have a one-year lease. I'm not going to set up a compost bin and have to break it down. That's going to be weird -- and for people that live in apartments and thing like that -- but there are lots of new innovative solutions that we could look at that don't require a million/billion dollar facility. Why can't we integrate some pilot projects into this to look at reducing that 35 percent to 30 percent or 20 percent, and say, okay, maybe Hawaiian Earth can't do it, what other companies can do it, who else can take this on, how can we create some sort of pilot projects to reduce that number?

There's so many other things that compost brings; not only will it help reduce greenhouse gas emissions, not only will it help reduce the loads that people are taking, and thus reduce the fuel that the cars are burning; lots of other things. It's a truly beneficial product. Even if it doesn't necessarily pan out on the spreadsheets, it's beneficial overall.

MR. PITZLER: First, let me clarify. There's quite a bit of composting that is being done on the food side, particularly in the commercial waste sector. So, all the food that is required to be managed in ways other than the landfill or H-POWER on the commercial side, there's a series of companies that are doing really innovative things with that. So, there's quite a bit going on besides just Hawaiian Earth Recycling. So, there is a lot being done. I'm not saying we couldn't do more.

I think pilot projects are a great idea. We didn't come up with one in this plan, but if there are some good ideas out there, no reason we couldn't put them in.

MR. NAGASHIMA: I would just suggest that you send the comment in, you know, give us some ideas and we'll listen to them. We'll try to implement them if it's feasible.

MR. PITZLER: One thing I've seen in some other locales is partnerships with universities. I've seen some pretty innovative stuff going on at universities where they partner with a city or a county and, you know, get some pilot work going on, see what happens. You can test different blends -- there's things that are being done.

Q. I just had a quick follow-up comment. I read a study on a city in Denver where they compared the cost to start composting to the cost of getting more space for the landfill, and they were also about ten or so years out from their landfills being at capacity, and they found that it was cheaper actually to compost by -- I think it was between 12 and 16 million for the compost facility, versus twenty to 60 million for the additional landfill space.

So, I don't know if that is something that you guys have already considered. Eventually -- I mean, obviously, Hawaii has expensive land. Eventually, we're going to need more landfill space. And what is that eventually going to cost, versus options?

Q. I have multiple questions. I'm just going to ask one and let other people talk.

MR. PITZLER: We'll come back to you.

Q. One question I had is if you guys can honestly answer how much the quota, the 800,000 ton minimum for H-POWER, how much does that affect the City's ability and willingness to tackle reduction and diversion? And if it is a barrier, which I suspect it is, why is that not enough of an instigation or why is that not enough evidence to instigate a renegotiation of the contract, rather than waiting for the source reduction working group to achieve a certain level of source reduction? Why is it not enough to renegotiate now that quota?

MR. PITZLER: Josh, do you want to --

MR. NAGASHIMA: I think we kind of mentioned in one of the prior meetings that, you know, the contract was negotiated with an inflection point of about 15 years into the contract -- or a midpoint to the contract, where we thought that waste -- before that inflection point, the waste was going to be below that 800,000 threshold, and then afterward, it would be over that threshold and we wouldn't have to pay any additional in addition to whatever waste we were taking there. And that overall forecast was kind of what allowed the contract to land where it is on the pricing.

Q. I don't feel that answered my question. But it would be better if you could address it directly. Like does it get in the way? Why not renegotiate sooner given that you haven't been able to make the quota given that your calculations were incorrect? No fault of the City, but that you haven't been able to meet it and it is costing money, so why not renegotiate ahead of that, given that source reduction is such a huge priority in the plan with the City and the State?

MR. SADRI: I can add a couple more thoughts on the H-POWER put or pay. It's 800,000 tons a year. It may have been more of an issue early -- in the early contract years, but what that turned into is an opportunity to divert more waste from the landfill. So, it helped incentivize more waste going from the landfill to H-POWER. We're talking about sewage sludge, food waste and some different things that had been landfilled up to that point -- bulky waste -- and then looking at other waste like -- there's a sludge from Island Commodities, other -- there's a private wastewater treatment plant, and we're also looking at being able to burn auto shredder fluff at H-POWER.

The put or pay is less of an issue now because it either has been met or very close to being met. And we are a little bit -- a few years before the halfway point of the end of the H-POWER contract. And I just can't remember whether it's ten years out or 15 years out.

And then just to tie back to the landfill diversion side -- ten years ago, in two thousand -- more than that -- in 2007, about 300,000 tons went to the landfill that year. For the year ending July 1st, the past year, only 50,000 tons of MSW have gone to the landfill. So, we've seen about an 80, 82 percent landfill diversion in 12 years. A lot of that success has been made possible by H-POWER and the technologies that H-POWER has brought to bear when the unit three started up in 2012. I hope that helps answer some of those questions.

Q. I just -- thank you for your answer. I just want to emphasize that land filling and incineration are on the same level of least good on the hierarchy, so I don't really see that as a big thing to celebrate. Although I appreciate the effort to divert from landfills, which I think is important. But I think it's important to consider alternatives to land filling that's not incineration but just an end-of-life system. So, I think that's why a lot us are here today.

MR. NAGASHIMA: I would just like to say that I think we think waste to energy is -- or incineration is a little higher on the hierarchy than land filling. I mean, especially when you consider the economics of it.

MR. PITZLER: Secondly, the location and the land use issues related to landfills.

Q. I just want to clarify, because I didn't really understand the answer. I thought what she was asking was about is there a conflict of interest in that because we have a contract to produce a certain amount of waste to H-POWER, are we then not planning to reduce enough waste because we've -- that's what I heard out of the question.

MR. NAGASHIMA: Well, if you want to answer that question, then I think -- you know, they're not going to impede each other, because we see other gains that we can get out of source reduction, such as decreased overtime. So, we'll recover in other ways, you know. And overall, source reduction is more important than meeting this put or pay.

MR. PITZLER: For what's it's worth, as a consultant here, I haven't had one conversation or heard one person say, We don't want to do that because it's a good idea. This is not something that was discussed, at least when I was working on the development of this plan. But I'm not dismissing -- when you have big capital-intensive facilities, those are very important issues to manage.

So, let's say we're really successful in five years or ten years; what are you going to do? You've got H-POWER out there. You have to kind of, quote, feed the beast. There's things you can do to renegotiate. You can say, Oh, we're not going to use all three, we're going to use two. You can be a little bit more nuanced as to how you proceed. But at the time they set the agreement up, that seemed like the best deal for both parties. It's an issue, but it is never something that was discussed as a constraint on source reduction.

Yes?

Q. Aloha. My name is Harvey. I believe we need an entirely different world view on waste, and I think that's why a lot of us are here today, and so I propose and submit to the City an improvement to our world view. So, please, if you'll bear with me -- I'm going to read a little bit.

I'm simple. I'm a student. In the 243 years since the inception of this country, we've experienced 12 wars and 17 recessions. The association of waste, war, and economics are heavily intertwined.

I recently visited a local scrap yard called Ace Iron Recycling, where a gentleman named Sebastian educated me on the identification of older homes in Hawaii by the fact that they use yellow brass in the plumbing, which later became disincentivized and was adjusted to the use of copper instead.

Yellow brass is what you make bullets out of. Yellow brass, Sebastian explained to me, was a liability to have in the public's hands. Sebastian went on to express how badly the price of scrap and therefore his business was affected by the Trump administration.

So, the reason I share this experience is because it highlights the principle of the importance of our world view on waste management. According to the current world view, since 2015, the price of scrap has been going down, making room for raw mineral extraction. Although industrial process of raw mineral extraction creates many jobs and is good for the economy in the short term, it is bad for the environment, the air we breathe, the water we drink, and spreading war across the land, which we are not separate from.

So, understandably, scrap metal is only one category of special waste among the many waste streams that we have to deal with. And I propose and submit this improved world view, which is -- that I received from a Hawaiian elder and teacher. He expressed to me his genealogical connection to a prominent historical Hawaiian high priest, Kaopulupulu. The word pulupulu I recently referenced out of a Hawaiian proverb: If wood burns slowly, add more tinder. And separately, ho'opulupulu means to make compost.

So, I implore you to help set the precedent across the world and use the tradition and knowledge to manage more appropriately our waste, which is better understood as the carbon cycle, as we already understand through the organics and the very graph you have on the -- the pie chart you have up currently, which is that waste is a resource, which is what many of us here believe and what we're trying to get -- is the message we're trying to get through.

So, that is what I propose, is that waste is an incredible resource that we are neglecting through the current solid waste management plan. Thank you.

Q. Thanks. Here's to a new world view on waste and resources. Yeah. Thanks. I'm Quinn, Reuse Hawaii. We work on construction waste diversion. And I wanted to see is anyone from PVT here? Probably not, yeah? Did you guys go out to PVT to learn more about their recycling? Because I see that in the plan there's a lot of information about all the C&D diversion happening, which is great. We're doing it, Habitat Restore is, and, of course, Hawaiian Earth Products and West Oahu Aggregate.

And I was just wondering if you understood fully what was going on out there, because they have a really great pick-line set up. They're pulling mainly wood waste that could be potentially used for gasification or something like that, and they're putting it in a separate landfill cell and they're kind of going over and above, too. They're lining it, doing all the things that you would do to protect and keep the leachate from getting out.

But they don't have an end user yet. So, they've been working on it for seven years, and I keep talking to Steve and his engineer, Billy, about it, just in the hopes that somebody will have a use for this stuff, because they're accumulating a lot of it, and as it is now, it's in the landfill and there's no end user yet.

So, I'm just concerned about saying it's diverted when it's -- there's no end user and it's still in the landfill. I just kind of wanted to see what you folks had to say about that.

MR. NAGASHIMA: I certainly don't want to speak on behalf of PVT, but a few of us have been there, not directly in relation to this plan. But the last I heard from Steve was that they were going to build a gasification facility on their own property and use that waste in that gasification facility under their own purview, rather than another company.

Q. Okay. I was thinking -- we are a huge military state, whether I really want to admit that or not, but we are. There's a lot of military bases. There's a lot of equipment. There's a lot of everything going on with that. And I'm wondering if their trash and their vehicles and their everything are incorporated in this pie chart and considered, because they -- it's a known fact they bring a lot of waste. It happens with everything. So, I'm just wondering if their numbers are considered into all of this.

MR. NAGASHIMA: So, these numbers come from the waste composition study which was done at H-POWER. So, that includes all commercial-collected waste and city-collected waste. So, I believe that military waste is collected commercially and brought to H-POWER, in most cases.

Q. Okay. And are there limits of how much waste you produce as a big company or a big organization or anything? Are there limits of how much you can dispose of and be charged for if you're over that limit?

MR. NAGASHIMA: No. There's no limit right now. Some companies can be really huge -- like West Oahu Aggregate, you see them around, the bigger companies that bring in probably a majority of the 400,000 commercial tons that we get every year. But we don't put a cap on it. They all pay a tip fee coming onto the scale.

MR. SADRI: Sorry. Just to add to that a little bit -- so the City accepts waste from the military housing, so it would all be residential-type waste. I think it's, for the most part, contracted out to private refuse haulers. So, this is residential-type trash. Also, I guess, their bulky items set out would be disposed at H-POWER or a city facility.

As far as their special waste, like sludge or any kind of hazardous stuff -- and the list goes on -- they have their own landfill. They have some of their own disposal sites on base. I know that the marine corps base has a landfill, for example. Pearl Harbor/Hickam has been piloting gasification technology, so they have some of that going on, too.

Q. Thank you for that. Based on that -- you know, they have helicopters. They have planes. They have huge trucks. They have all that. And I know you mentioned a huge cost is vehicles and breaking them down and the components left over from that. So, I guess I'm just suggesting maybe at some point that be looked at. Because the vehicles are probably ending up with our stuff -- or do they take care of their own old vehicles and everything?

MR. SADRI: As far as I know, they're taking care of their own vehicles, you know, auctioning them off to metal recycling type folks.

Q. All right. Just a consideration, you know, if it is ending up in ours and it's an overabundance, then maybe you could get some money out of them for that.

Q. Josh, you were mentioning that H-POWER is taking the ASR, but it's my understanding from Schnitzer Steel that they're producing about 70 tons per day that Covanta is not accepting.

MR. NAGASHIMA: Sorry if I had said something like that. But no, no ASR goes to H-POWER.

Q. No ASR? Okay.

MR. NAGASHIMA: It all goes to the landfill. And about how much --

MR. SADRI: I think 70 tons a day is about right. I think for the whole year they're sending 25- or 30,000 tons a year to the landfill. ASR is actually the largest waste stream on the MSW side still going to the landfill.

MR. PITZLER: Auto shredder residue.

Q. And Covanta cannot process that; correct?

MR. NAGASHIMA: Yep. They cannot.

Q. And the second thing -- can you just remind us of what percentage of the waste ends up as sludge that then gets diverted to the landfill?

MR. SADRI: So, H-POWER burns the rubbish. They're left with -- they do the 90 percent volume reduction by combusting the waste. They're left with two waste streams. Ash that's left over from combustion, that's about ten percent by volume. And they also have a smaller process residue stream. On the older side of H-POWER, the original refuse derived fuel technology, the waste is processed. Part of the process are trommel screens that have one inch holes. And the goal is to get out inert materials like sand, glass, rocks, those kinds of things that don't burn very well. That goes to the landfill as a process residue stream.

All combined, I think it's a big chunk of what the landfill is still getting. So, we're looking at ash reuse and recycling technologies to help reduce the amount of ash going to the landfill and to find a beneficial end use for it.

So, one example would be to clean up the ash more and be able to use the clean material in construction applications like roads and concrete.

Q. So, the ash is ten percent, but the process residue stream is what percent?

MR. SADRI: So, I guess tonnages are better. The volume reduction is 90 percent overall. On the tonnage side, ash is about, I want to say, 150,000 tons a year going to the landfill. And the process residue is lower than it's ever been. H-POWER just went through some technology changes that cut their residue production in half. And that's about 30, 35,000 tons a year still going to the landfill.

Q. When was that? When was that improvement made to reduce it by half?

MR. SADRI: That was done late in 2017, as part of the original plant's rehab and renovation project. They changed the trommel screen technology to a larger size trommel that -- basically, it's larger and there's more time for the waste to process and the holes are smaller, so you're getting more of the inert stuff coming out, but the quality is better, if that makes sense. Overall, the tonnage has gone down because H-POWER and Covanta are doing a better job of hanging onto the combustible stuff and then land filling the non- burnable stuff.

Q. Thank you.

MR. PITZLER: Excuse me. Could I just do a process check with our group? So, what we have left to do is give people an opportunity to make statements about the plan, and I think this question and answer period is flowing nicely. I don't want to cut it off. But can I get a show of hands perhaps on who might want to make just a three-minute public comment for the plan?

So, I'm just guessing that we can probably go another ten, 15 minutes and then we should probably break and move to that. So, can I ask, does anyone have a question that hasn't asked one yet?

MR. NAGASHIMA: I'm sorry. I just wanted to add one more thing to what was said about the ash and residue, related to Doorae's question.

You know, source reduction -- if we reduce the things that are going into H-POWER, we also reduce the ash residue coming out of it. So, based on the ash and residue that Ahmad had mentioned, we have a 20-year life in the landfill. But if we were to reduce that overall, we could increase the life of the landfill by that much more.

MR. PITZLER: Yes.

Q. Hi. My name is Annie. I have three questions, if I remember them all. The first two are pertaining to questions that have already been asked.

The first was, you guys said that you were changing out to electric vehicles in 2045. And I guess I'm just wondering where 2045 came from, how that year was selected and why 26 years away.

MR. NAGASHIMA: That was a commitment made by the Mayor. So, we have to fall in line with our commitment, so that's where that year came from. But as Dan mentioned --

Q. You could also beat it.

MR. NAGASHIMA: We could. But as Dan also mentioned, refuse collection vehicles have not been developed yet that are electric, because of the capacity required.

Q. Wouldn't that make us a bunch of money, if we R and D'd that? No. I'm kidding.

The next question was in regards to what Doorae had been asking regarding the conflict of interest. And I understand you guys saying that wasn't really discussed. But in one of the answers that you gave -- I'm sorry. I forgot your name -- Josh -- you mentioned that kind of when that plant was first negotiated, that it was understood that we were going to come in under the quota for a long time and that that was going to allow us some cushioning to come in over the quota after that halfway point, right, if I understood correctly?

So, from that logic, it sounds like we wouldn't have been fined for being under quota, because we were building ourselves a cushion for the future. But if I understand correctly, we have been fined -- the City and County has been fined and taxpayers -- in regards to not meeting the quota. So, I guess I'm wondering are we going to get fined for when we're over the quota, even though the negotiation was built with that in mind?

MR. NAGASHIMA: I wouldn't really call it a fine. It's more of an additional operating expense for tonnage that we didn't deliver to H-POWER.

Q. Are we going to also suffer that additional tonnage expense when we're over the quota, even though it was understood that this is how it was gonna happen?

MR. NAGASHIMA: We will pay for every ton that is delivered to H-POWER over the quota at the current rate.

Q. So, we're getting fined on both ends, even though -- and we can take the word fined out, but we're getting charged on both ends, even though that's the way the plan was negotiated to happen?

MR. NAGASHIMA: Yes, we're charged on both ends.

Q. Thank you.

MR. NAGASHIMA: But the overall operational cost is what was considered.

Q. Okay. And then my third question is about reuse and a lack of any kind of even broad attempt to put reuse in the plan, specifically -- and I can get into this more with my testimony, but my particular interest is with DOH regulations and working with them -- obviously, we need to protect our health, but also maybe we need to employ some new technology that does protect our health while establishing new protocol to reuse certain things.

FEMALE VOICE: Are you talking about containers?

Q. Containers for restaurants, bottles, glass, grease, everything.

MR. PITZLER: I think there are definitely other things that can be done. I think this plan did mention a number of things related to reuse. It's not perfect. More ideas, the better. If you have them, let us know.

Q. All right. Thank you.

MR. PITZLER: A couple more -- anybody else that hasn't had a question or a comment?

Q. So, my name is Leane. I came in a little bit late, but I wanted to comment on your great point about composting facilities and your point that it hasn't -- there's been a barrier in terms of cost or whatever just doesn't make sense. But that there's an opportunity to submit pilot programs or ideas. And you're all, obviously, very invested and very smart, but have not come up with the right thing yet. I'm just wondering what are the greatest barriers for that. There's an opportunity here for all of the community to come up with good ideas that could be supported. So, what are the greatest barriers and how could a pilot program address those?

MR. PITZLER: Some of the barriers I've seen, working around North America, are the standard approach is you build a big facility, make it so it meets all the regulations, it's really expensive. So, then you go small scale. Once you get out of the back yard -- people that don't have yards -- you can do worm farms. That next level, there are things that are done like at the supermarket level; you include portable anaerobic digesters. There are a whole host of things that are being done. It's just difficult from a solid waste plan basis to say let's go that direction if you're not going to build the big one, which is really expensive.

So, I'm not disputing at all that there's opportunities out there. What they are and where to get them, at some point it gets kind of beyond the scope of what's easily addressed in the plan. But you folks in this room have ideas. Let's get some -- the City's interested. Let's just do the best we can.

Okay. A couple more questions and we're going to have to break. Let's do this one and maybe one more.

Q. Thanks. You had mentioned in the plan about there's an intention to reduce the number of curbside recycling pickups to once a month. I'm curious how far did you guys investigate like the pushback from that, because I suspect a lot of people are going to be pretty pissed off about that, and it's going to incentivize people to just throw a lot of recyclables away. I think we have a struggle with getting people to recycle as it is. And I wonder if that's not considered a big deterrent because the City is trying to get recyclables to H-POWER anyway. So, I'm curious the feedback you guys are expecting about that.

MR. NAGASHIMA: I think in certain areas we're expecting a lot of feedback, because our analysis was based on set-up rates and how full the carts were. So, in certain areas where they recycle more heavily, we're expecting a lot more pushback.

But as far as that initiative goes -- we kinda tried to have it pass the last time we went through negotiation with the driver's union, but it didn't pan out anyway. So, I'm not sure if we're going to broach it again next time, but it's something that might still be in the process.

I'm not sure if we're going to pilot it first, as well. You know, then we can see the feedback, similar to the bulky item collection program, and that might probably be the smarter thing to do.

Q. So, I have just a quick follow-up to that, because I get why we'd want to reduce it if it's only half full. Then, of course, we don't want to waste the gas and the time and the people power to move that stuff around. But when you did the study showing that the bins were only half full, did you also look in the gray bins next to it and see laundry containers and milk jugs and cardboard and things like that? Was that a simultaneous study? Because my guess is that if people are filling up their gray bins, a good percentage of that gray bin stuff should be in the blue bin and they just don't know.

And I know this goes back to the educational component and all of that. And I know that different regions of the island are going to have different understandings of what recycling is and how to do it. But in different neighborhoods I've lived in over -- across the Oahu, I've seen a pretty big difference, and I know that I've seen recycle bins filled with rubbish and rubbish bins filled with laundry containers and milk jugs.

So, I'm just wondering if that was also studied at the same time that you saw the half-empty blue bins.

MR. NAGASHIMA: To be honest, we didn't study them in tandem.

Q. Yeah. Like there's a new study coming.

MR. NAGASHIMA: Yeah. Maybe we have to look at that first. I know we get a lot of requests for additional gray carts and we reject people when they have recyclables in their gray cart. We don't give them an additional gray cart if they're not recycling properly. And that happens, you know, 95 percent of the time. So, maybe that is something we definitely need to look at before we implement the reduction in blue cart service.

MR. PITZLER: One last question. I don't think I've heard you talk.

Q. Sorry. Thank you. This relates to the recycling, as well. Josh, I think you mentioned earlier the residential user fees and how you attempted in the past to charge per recycling bin, $5 a bin, something like that.

MR. NAGASHIMA: I'm sorry. I think I misspoke. I think it was $5 for the trash bin and any additional bins would have a cost associated, as well.

MR. PITZLER: Additional trash bins.

Q. Trash bins. So, there's never been a cost for recycling?

MR. NAGASHIMA: If people added additional recycling bins, I'm not sure -- I don't believe that we were going to charge them for it.

Q. It just sounded -- if it was a cost for recycling, of course, that would be disincentivizing to people. If it's free to recycle but it costs you to dispose, I mean, that seems like a pretty easy solution. Is any study being done on that possibility?

MR. NAGASHIMA: I think we were just planning to make it free. I think that's -- yeah. Sorry. It's been a while since the last iteration of the bill. But yeah, I think our plan was to make the recycling free.

Q. When was that last bill?

MR. NAGASHIMA: I want to say roughly about six months ago.

Q. But it got shot down; yeah?

MR. NAGASHIMA: Yeah, it did.

Q. There's a new Council member, so that may make a difference.

MR. PITZLER: Okay. Thank you all for the questions. I know we've been going for a while, but we do want to allow people the opportunity to make statements for the plan.

Appendix D
Draft Plan Public Hearing: Participant Statements and Responses

Appendix D. Draft Plan Public Hearing: Participant Statements and Responses

A Public Hearing was held July 31, 2019 from 5:00 p.m. to 8:00 p.m. at Kapolei Hale to gather public feeback on the City and County of Honolulu (City) 2019 Integrated Solid Waste Management Plan (Plan) Update. This appendix documents statements made by members of the public during the Public Hearing and closing remarks from City staff (Mr. Nagashima) and staff from Jacobs, the consulting firm assisting the City with development of the Plan (Mr. Pitzler). The statements are as recorded by a stenographer hired by the City with minor changes to improve the readability of the discussion.

MR. PITZLER: Okay. Let's get started. Okay. I've got an announcement to make. So this is the public statement sign-up list, so if you would like to make a statement, we're going to go first on, first making statements, and we'll go through the list until we're done. If you'd like to make a statement and your name is not on this list, please come and grab it and sign up.

The first one -- I apologize if I don't get the name right -- Tenanya Brookfield?

MS. BROOKFIELD: Tenaiya.

MR. PITZLER: Tenaiya. That's right. Tenaiya. There you go.

MS. BROOKFIELD: That's okay.

MR. PITZLER: So Elizabeth's got the timer here. She'll help you out when you've got one minute left, and there's time at the end of it, so -- there you go.

FEMALE VOICE: Two or three minutes?

MR. PITZLER: Three minutes, but you'll get a warning when you have one minute left.

MS. BROOKFIELD: One minute will be me stating my name. My full name is actually Tenaiya Kapua Lehua Ona Pali Kahilakaala Brookfield. And now we can begin.

Did you get all that? Are you ready?

MR. PITZLER: Yes, please.

MS. BROOKFIELD: So hi. My name is Tenaiya, and as an apartment dweller, I've been trying to get my building to do composting. I know there's a lot of multi-family housing across Oahu, and right now, as it stands, it's almost impossible for me to do so. The permit process is something like 200- or 300-pages long. It's very difficult to find facilities who are willing to accept non-refrigerated or non-frozen waste like a restaurant would have.

And so if we can't create a facility for the islands, maybe what we could do is edit the permit process so that we can do smaller-scale composting, and also, change the ban for food waste to include houses, multi-family buildings and small businesses, so that we can start participating in that regard.

And the second point that I wanted to make was that when I go to businesses -- I'm a foodie, and I like to ask them for alternatives to plastic food containers. They do know about compostable products, but they say, What's the point of using the compostable products when we know it goes to the landfill?

So I know there's businesses that are ready and willing to switch and they have consumers that are requesting it, but they don't have assistance, be it funding for the City to provide smaller scale operations for them. And so I would like to just basically make a statement that I think we can do things beyond statewide composting, if that's a financial restriction, that would help people, especially in businesses and

homes who don't have the skill -- thank you -- who don't have the skill to do composting inside their apartment complexes and other similar housing situations. That's it. Thank you so much.

MR. PITZLER: Thank you very much. Well, done. Rachael?

MS. RAEUL: My name is Rachael Raeul. I run a waste management program and I deal with trash and sorting all of it by hand, and I have a lot of experience with working with events all over the islands and I know exactly what the composition is of things that go in certain waste bins.

I think we are wasting a very valuable resource when we are not composting. We have the ability and the technology and the willpower to create small scale composting facilities and create a valuable resource, which is soil.

Soil, when it's made properly through composting, sequesters carbon; whereas a facility like H-POWER produces greenhouse gases. I understand that H-POWER does not want food waste, and I think that we have the opportunity to create this valuable soil that can benefit the community and benefit our environment vastly.

And farmers aren't able to access rich soil that is made here on island, because it is not available. What comes from Hawaiian Earth Products is not very nutrient rich and does not really sequester carbon in the same way that soil made from food waste does.

I think there's a lot of potential to do it small scale, and I don't think that creating this very expensive, large facility is necessarily the only way to do it. Thank you.

MR. PITZLER: Andrea?

MS. BERTOLI: That's me. I commented on her email, so I know where my name is on the list. So my name is Andrea Bertoli. I work in renewable energy. I'm a journalist and I have also been a farmer and I'm a gardener.

And I went to City Mill this weekend and I spent $15 on soil that had no nutrition in it and on compost that repels water at first touch. It's really disappointing. I like City Mill. I want to support them. And this was the New Valley brand, but I only bought that because I've tried the Menehune Magic and it doesn't work in my garden.

So there's another greenhouse store down on Sand Island, called Ohana Farm House Organics, or something like that, and they have thousands of dollars of inventory of organic products that is soil and compost and a lot of it is fish meal and bone meal -- and blood meal, which I don't use -- but a lot of it is just organic fertilizer.

So as Rafael mentioned earlier, there is revenue to be generated here for farmers and for gardeners who want to buy local products. So whether that's a diversion on food waste or a better diversion of green waste -- not only does this create a viable functional product for home gardeners and farmers and all of that, but this is also one of the most important things we can do for climate change.

So I understand that a large scale facility isn't necessarily in the budget. But there are lots of other options to look at, and there is so much more than the money at stake here.

We are talking about burning this landfill waste at H-POWER to create greenhouse gas emissions, when, in fact, healthy soils, and compost specifically, are incredibly potent carbon draw-down. Our three carbon sinks are the atmosphere, the ocean and the soil. We have saturated the atmosphere and we're getting very close to saturating the oceans. If we can improve our soils locally and globally, this can deeply impact Hawaii's impact on the planet and also the global situation.

So I encourage you to think, as we've spoken about earlier, the sustainable development goals and all of these other things are at stake here beyond just the finances. And also, compost is great. It makes your

vegetables more delicious. It's makes them healthier and it's better for the bugs and it's better for the veggies and it's better for the humans, both in the short-term and in the long term.

So again, it's not just about -- I know that it's about money, but I wish that it was about more than the money and looking beyond that and seeing what we cannot do just from now until 2025. What's going to happen in 2030 and 2040? Can we make a plan that includes all of these things for the future? Thank you.

MR. PITZLER: Thank you. Kim Coco Iwamoto.

MS. IWAMOTO: Thank you. Kim Coco Iwamoto. First of all, thank you so much to all of the individuals who participated in this draft plan. I really appreciate all the time that you all have invested.

You know, as I mentioned earlier, I was kind of thrown off maybe a bit by the executive summary and its references to the United Nations Paris Climate Agreement and the 17 developmental goals. So it set me up to think that that's where the whole report was kind of aiming to and would be aligned with, because that was some of the language in that very first paragraph. So either not cite those UN documents, because then it -- if there is going to be no alignment to that. Or if you do cite it, then have that lens in what you commit to in the plan.

Because one of the things I researched in the United Nations is that renewable energy sources does not include -- and this is the UN's definition of renewable energy sources -- it does not include, quote, municipal solid waste incineration. So that's not -- so it cannot even be considered renewable.

However, if your executive summary cited the United States Environmental Protection Agency's definition of renewable, then that would be a different story. Right? But you guys cite the United Nations document, so I think that's -- I think we need to have some kind of alliance with that language.

Also, I was a little confused in reading some of the comments about -- in one section, you cite the City's goal to eliminate carbon based and plastics and polystyrene from the waste stream going to H-POWER and landfill by 2030, and then right a few paragraphs below that you mention curbside recyclables, like mixed paper and plastics could be combusted at H-POWER. I'm like, Whoa, wait, which way are we going here. Because it feels like you're mentioning two totally different directions, and so it's confusing to the average person.

Another thing to think about is the -- I was also researching the tires -- you mentioned special waste like tires. And within the tire industry, they are moving towards hundred percent reuse of tires to produce tires. So instead of incinerating them, it may be worth actually putting them in containers, and starting with retailers like Costco, that bring in tons of containers full of items likes tires and then they ship the containers back empty, but they pay for those containers going back empty. It's embedded in the cost of shipping goods to Hawaii -- so to make sure we use that item.

So in conclusion, the United Nations Paris Climate Agreement uses the term ambition and ambitious 16 times throughout their 32-page document. And so as you're thinking about what to keep in and what to leave out, I'd just ask that you compare that use of the term ambition and compare it to its antonym, which could be lazy, half-hearted or cowering. And so when you make these decisions, err on the side of ambition and ambitious and, you know, go full hog in that direction and avoid things that could be seen as not ambitious. Thank you so much.

MR. PITZLER: Jennifer Milholen?

MS. MILHOLEN: Hello, everyone. My name is Jennifer Milholen. I work as a waste reduction coordinator for a local non-profit, Kokua Hawaii Foundation. I just want to start off by thanking all of you involved in the process. It's been a long couple of years and you guys have always been very receptive to ideas and open. I want to thank you for that, because I know it's a lot of work listening to all of us.

I do want to just start off by echoing the sentiments that given the urgency of our situation with the climate crisis, this is a huge opportunity to be bold and act with urgency and be ambitious. So I would want to greatly encourage all of the suggestions that have been made on the side of having grand plans and planning for draw-downs and planning for drastic source reduction, that those be very specifically considered.

Sorry if I mention a lot about how a lot of us feel about the importance of having commercial large composting. But I also want to -- so I want to just support that and move on to a couple of other topics.

But I will say that a lot of the things that a lot of us want to work towards, they aren't necessarily happening at the county level. They're regulations happening at the state level. So we recognize that.

But we do want to say that it would be worth mentioning even more aggressively in the plan how the county will bolster and support our efforts to work with the Department of Health on certain regulations, whether it be container regulations or composting permitting, because those are big things that we need to address and we need the county's help so we're not just seen as like more environmentalists trying to get these things. So I would love to hear that addressed in the plan heavily.

Additionally, something that hasn't come up yet is electronics recycling. One thing we do in our organization is we do two recycling drives a month for schools. And what we're seeing is that -- this is just speaking of schools -- is they're literally -- they're holding on to decades worth of computers, because they don't feel like they understand where it should go or what to do with it. So I think this ties into the need for an education specialist, like the plan actually dedicating, saying, We will absolutely hire a specialist -- not consider it -- we will hire an education specialist, because so much is tied in to education -- but would also ask for the City to consider extended producer responsibility, roles which, again, is at the state level, but could be greatly bolstered by the county's position.

And one last comment, since I'm running out of time -- I have to hurry -- is just a comment. From the tone, the entire discussion around H-POWER, frankly, it reads like a love letter to H-POWER and it reads like it doesn't accurately portray the downsides and the highly negative consequences that this county has to consider when dealing with H-POWER.

So I would ask that when discussing H-POWER, that the plan give a more accurate representation of the negatives, the consequences that we have to deal with. Thank you.

MR. PITZLER: One comment -- I've heard a lot of really good suggestions. If you have time to send a comment in to the plan website -- some specifics you'd like to see related to legislation or whatever; the more specific, the better -- some things that they can absorb and weigh.

MS. MILHOLEN: Definitely. It's coming your way.

MR. PITZLER: Sorry. Lauren Watanabe?

MS. WATANABE: Hello, everyone. My name is Lauren Watanabe and I'm with the Sierra Club. I'm grant manager for Oahu. Again, thank you. I want to thank the people that are here in this room, but also, I didn't know you guys started in 2017 to do the study, so I know it's been a long process for you, as well, and I very much am grateful that you've included us in the process and that's very important.

A couple of things I'd like to mention, because we are in support of the spirit of the waste management plan that you have proposed, there are just some general concerns that have been shared in this room already through the questions, but that we'd like to echo through our testimony and also like to say that we do plan to give written testimony. And I know there's more eyes and minds on this, not just me for the Sierra Club, for sure.

So one big thing, when we think of the burning of recyclables and the ash that it would create, we would like to see more said about the potential hazards that could be in the community surrounding that, because it's an environmental concern, and also just what we learned in other facilities -- thinking of Red

Hill -- we really want to think of the equity issue around that and how much that is prioritized and how you're looking at that as a solution.

Another big thing is the 25 percent per capita reduction and the one percent reduction you had for reduced carbon -- although I get it can be feasible, again, it's been shared with the urgency of the crisis now, the context that we're living with climate change. We feel that there should be more aggressive or ambitious goals set. Right? 2045 is not enough. It's not soon enough for us. It should be 2030 or 2025. We should do as much as we can. So I just urge you to think in that mindset. I know you guys have a lot to factor in with that, but that's kind of where we're coming from, and something that we can offer because we believe the source reduction group is vital, you know, so that more community does have voice. I don't know how many people in this room are on that, but I know we were part of that in the beginning.

So that being said -- you mentioned City Council level policies to be suggested. I know for us, we commit to like showing up and giving testimony. But if you guys were to suggest more aggressive policies, we would be there to help support that, because we want nature-based solutions, as composting was suggested, and we definitely don't want to give more power to H-POWER, just to clarify that for us.

So thank you for your time, and again, energy on this, and we look forward to continued dialogue and collaboration.

MR. PITZLER: Quinn?

MR. VITTUM: Thanks. Quinn Vittum, Reuse Hawaii. Thanks, again. I'm was going to try and stand so folks can see me. I'm good here. Thanks. I'm not that courageous. So I'm really excited to see parts of the plan talk about construction waste, because in the past the City has kind of said, Oh, that's like a State thing and PVT handles it, and I just always felt kind of weird because the city issues, the demo permits and they're within the city. So it's just such an important part of our waste stream. About 30 percent of our waste comes from all this construction and demolition material.

And one of things that we've been talking about is every year on Oahu alone there's 400 houses that are demolished every year, and Reuse Hawaii deconstructs ten percent of them. So there's a lot more to be done around construction waste diversion.

And for anyone that's been to the Reuse Hawaii warehouse in Kakaako, you can see how much valuable material is just there in these buildings that are being demolished, and all we have to do is deconstruct them as an alternative to conventional demolition.

And there's some great examples in other cities. Like in Portland, Oregon, and of course, Seattle, too -- leave it to the northwest -- they've created some mandates around deconstruction. And in Portland, in particular -- it's really quite cool -- there's a whole industry that's come up out of the mandate and they're keeping so much material out of the landfill. And then it becomes an affordable community resource, just a kind of no-brainer all around. So I want to reinforce all that, those actions.

I love the technical support part that's part of the table for the ideas for the source reduction working group. And I want to offer Reuse Hawaii and my expertise to help in any way in that process.

And then last thing -- show and tell. This is a piece of Douglas Fir, true dimension. It's basically a rafter from an old house. Since we started 12 years ago, we've kept two million lineal feet of this material out of the landfill. It's just incredible stuff, so -- and it's milled from trees that are in protected forests now; right? So once you throw it out, it's gone forever, so -- thanks.

MR. PITZLER: April?

MS. BULLES: My name is April Bulles. I'm currently working with the Honolulu Habitat for Humanity ReStore. We partner with a lot of non-profits, like the Kokua Hawaii Foundation, and participate in recycling events around the island throughout the year with the schools.

And I do believe that education is the basis for this program to be successful. I think some of the challenges that we're seeing firsthand at ReStore with the new bulky item pick-up is the lack of understanding from the community and the campaign that didn't seem to really happen enough or given enough lead time for the community to act properly.

I think people do innately want to do the right thing, but if they don't know how to do it, they simply won't. So that public education coordinator program, let me know if it's posted.

You had mentioned that the composting seems to take a large scale facility to do it. There's a pretty new thing happening on the north shore, North Shore Community Compost Movement -- if anybody's familiar. You can pay a fee where they will come and pick up a bucket of compost from you, which I think is wonderful. Is that something the City and County could do? We're doing recycling bins. Is there a possibility to do it on a small scale?

Because what we really need right now -- the urgency is these small compounding actions. I mean, it would be nice if we could pull the emergency brake on a lot of things, but at the end of the day, let's be honest, it's about these small decisions that should be easily made available to the community that wants to do the right thing.

And looking at the pie chart and seeing that of the seven categories listed green waste represented more than one-third of that chart, it's astounding to me that that's not the number one area that is being addressed and that it's an area that wasn't part of the plan, so to speak. So I really encourage that that be kind of reconsidered, because it seems like such a great opportunity.

Gosh. What else? Yeah. Land is a premium here in Hawaii. Working with Habitat for Humanity, we deal with challenges every day of trying to get people into housing, but there's not the land to build it on. Or when they approach us to try to repair their homes, it's in such disarray that it needs to be completely demolitioned, full abatement, and it doesn't get to the point where it could be reused.

So with the military occupying, oh, about, 20 percent acreage of this island, it would seem to me that while this is a City and County issue, it might need to be on a bigger state scale that -- I hate to call it out -- but Hawaii island has more space. Maybe these large scale compost facilities need to be considered in that area that we could also use. And really, you know, deconstruction versus demolition -- recycling is not the answer. Really, the reduction is and making that the focus I hope will be the biggest priority here. Thank you so much.

MR. PITZLER: Thank you. Doorae Shin, Surfrider?

MS. SHIN: Hey, guys. My name is Doorae. I'm the Oahu chapter coordinator for Surfrider Foundation. I want to start by saying thank you so much for having this and for giving -- including a source reduction working group to continue this conversation. I think that's crucial. We really appreciate you guys adding that on so late in process.

And I also want to emphasize as a young person -- I'm 27 years old -- and many people have already mentioned the urgency of the climate crisis. Many of you probably know, but we're at 415 parts per million as of May, and so the world has never -- we've never known a world like this, and I really appreciate that you guys included climate change in your executive summary. I would urge you to keep it, and instead of removing that, changing your plan to align better with how urgent the climate crisis is and making the plan stronger and more ambitious and giving it more teeth, more encouragement towards better actions, rather than feasibility.

So one thing to note is in Project Drawdown, which is a book that is the most comprehensive plan to solve global warming, compiling hundreds of scientists across the world's best science. It's shown that out of about 100 solutions, food waste is the number two solution. So I think it's really important that you guys acknowledge this and address it, you know, even if there are some initial investments or challenges that you might face.

And I also want to say we need to increase incentives on recycling, as well as reuse and refill programs, especially for glass, which is such a high quality material. We can increase incentives that allow pilot programs or community programs to begin, so it doesn't have to fall on the City, but it at least creates a pathway for citizens or people to, you know, reach these goals you guys are trying to make -- and an increase of a fee on bottles and cans. I've seen, I think, Germany has about a 40 cent per bottle fee -- so something like that. Ours is only five cents, and increasing it would lead to a huge increase in recovery.

Obviously, I'm passionate about reevaluating and renegotiating the contract with H-POWER for all the reasons already discussed.

There's a lot of signals to the plastic bag ban in the reduction and other sections, and it's kind of celebrated as one of the successes, but it's just informational, and I would suggest adding an additional section in that area to signal to do more, because you're celebrating this thing that a lot of the people in this room advocated for that helps you reach your goals of source reduction, and there's so many opportunities beyond plastic bags at the grocery check-out line: other single-use plastics, other sources of waste we're aware of. So if you can just signal stronger to that, that would really help us help you when we're advocating for policies moving forward.

So I think in conclusion, just more signals to mandates, commitments and supporting our work would be hugely helpful, and I think we can work together a lot more moving forward.

Thank you so much.

MR. PITZLER: Thank you. Miranda?

MS. GALLEGOS: Hi, everyone. My name is Miranda. I'm going to go off what Doorae said. I wanted to start mine with my favorite activist's quote, and she said that we spend so much time thinking that we don't have the power to change the world, but the power to change someone's life is always in our hands. Change making does not belong to one group of people. It belongs to all of us. We don't have to call ourselves activists, wear a cape or be elected to participate. We just have to be brave enough to care.

And I think that's why we're all in this room today, because we all care in our very passionate ways. And so the reason that I was in this room by myself here today is a year ago I was on the beach in Kauai and I was -- the way that the currents hit the beach, there was -- I make no exaggeration when I say that my friend and I literally found laundry baskets on the beach and so much plastic and so much bottles and toothbrushes, and it blew my mind about how much was there.

And as we were cleaning up this plastic and just this trash and everything that was on the beach, like fishing nets, I was realizing, Wow, what if one of these came all the way from Oahu and I was responsible for it. And at that moment, I kind of had this turning point in my head that said, Wow, trash has a history after we throw it away, and where does it go?

So I started investigating once I got back. And so I think Robert Swan says: The biggest threat to our planet is thinking that somebody else is going to save it. And Watson says that we can be so careful about creating a better world by just what we consume.

And so I started looking at what I was consuming and where it was going, and I started with plastics. And nine percent of our plastics are actually getting recycled and 60 percent of them are getting thrown out, which is one of the biggest reasons why China isn't really accepting our plastics anymore, because it was so contaminated.

And so I just wanted to highlight that education piece that Doorae talked about and why that's so important. Because we can't change things that we don't know are even a problem. And so simple things like knowing how to recycle, what to do with it, but having that community educator would be so important, because our community doesn't know their kuleana if they don't even know that our waste is an issue.

Thank you.

MR. PITZLER: Nicole?

MS. CHATTERSON: Nicole Chatterson, Zero Waste Oahu. I, too, wanted to start by saying thank you. I've worked for consulting firms, writing plans and compiled public comment spreadsheets, and I also worked for the State, so I get bureaucracy and I get this work, and I know that this work comes with limits to how we perceive what we're supposed to do. We're following policy and we're following procedure.

And I think we've done a great job in moving that policy and procedure with this plan towards a space of being a little more idealistic, and I think that's important. We now have source reduction goals. We have a source reduction working group. I think they can be strengthened. I think the source reduction working group could have a mandate to produce a zero waste plan and that would give it some more teeth.

I'm also aware that there's a lot more we can do to think outside of the box with this plan. I know the process isn't set up to do that, but I don't think we have the choice. This plan is a ten-year plan, and ten years is the same amount of time we have to reverse the planet crisis, and that we're not using all of our energy and our creativity to turn this plan into something that could address that worries me. Because 50 years from now or a hundred years from now, our children, our children's children, aren't going to care very much that it was a difficult economic decision for us to make to do a composting unit or that it was complicated or the policies weren't set. That answer is not going to be okay. They're going to be suffering from the choices we make today if we don't make the right ones. And we all have the ability to do that, even within the constraints of the policy and process.

I echo everything that was said before. I wanted to flag the ability of the County to coordinate with the State on some of the policy changes. Like Jen mentioned, it's mentioned in the plan that the County is willing to negotiate on revising the definition of recyclables in order to allow them to be burned. So can the County also commit in the plan to negotiating with the State on how do we prevent the influx of plastic onto our island, how do we make reusable containers safe for people to bring? I would love to see that in there, as well.

And the entire source reduction plan right now hinges on education, and I don't think it's enough to say that we're going to study the feasibility of an education coordinator. We have to figure that out.

An idea that came up the other day is a $1 tax for every tourist that comes in. There's multiple millions of tourists coming in per day. That could fund many education positions. I know that's complicated to figure out, too, and we're here to help.

So mahalo.

MR. PITZLER: Rafael?

MR. BERGSTROM: Aloha. I'm Rafael Bergstrom, the director for Sustainable Coastlines Hawaii. I used to be with Surfrider when we were in this room before. Yeah. Thank you guys so much.

I know it's been a long year and a half and I just want to recall the last meeting that we walked out of. It was really cool. Like all of us in that room -- there was a lot of camaraderie, I think, that had actually been generated throughout a year of the process and really thinking about new ways of going.

And I left that room and I started thinking about this future of this place that we're living in, and I thought about walking on a beach that wasn't covered in plastic. I thought about all of these ag lands that have been destroyed from a century of monocropping. Look at Lanai and the sedimentation that that's caused and thinking we can reverse that. This plan has the opportunity to set out a ten-year goal of let's create compost that regenerates soil and slows erosion, slows runoff.

I thought about the carbon that it takes -- the CO2 that it takes to get everything here that we're using. I thought about a world where we're not bringing things here anymore, and that H-POWER was something

that in ten years we're like, Remember when we used to have that on every day? And then we're like, Oh, no, we're just going to flip the switch on, because there's a few things that we don't know how to get rid of with all these other mechanisms.

With all respect, this plan does not get us to that future. I don't think that it has the ambition and the ingenuity and the innovation in it to get us to that place like Nicole was talking about that your kids and our kids' kids are going to want us to have done. And so all of these things, these collective comments that we've been talking about in here are really getting to that point of this has to be a place where we say, Yes, we don't know exactly how to get there, but we have to go this way, so let's innovate.

And there's ways to do that in composting. There's a place called Green Mountain Technologies in Washington that has small scale composting systems. We'll put that into the written report. We could start with pilot projects that don't cost a billion dollars. They cost like what it costs to pour one cement piling on the rail project. And we start by micro-gridding and by thinking about all these networks of farms that we have all over that could use those things and could start there.

Same thing with glass reuse -- we could look to Portland, where the breweries there are partnering with the state to say, We are going to wash these and reuse them or redistribute them and have the same bottles.

Those things are all out there, and I think that putting it into this plan going forward is going to help our decision makers say, We have to go there, too. The source reduction working group is great, but we don't need an economic study to say that we need to reduce plastics. The economy is there. It is destroying our world right now, and that is a global understanding.

We don't need to say, Oh -- I mean, the only economic study that we can say on that is that it is okay to give businesses the power to continue doing what they're doing, destroying the world? That's what we're saying by saying let's do an economic study. Is it okay for them to keep doing the wrong thing because they might lose money?

I just want to conclude -- it's what Kim Coco was saying; it's let's innovate and let's go forward with ambition in this plan.

Thank you.

MR. PITZLER: Leane?

MS. HORTON: Hi. My name is Leane Horton. I am a real estate agent by day, and by night I'm a co-founder of a non-profit foundation established in 2016 called Changing Tides Foundation. We're a Hawaii and California based non-profit and established in 2016.

Our main goal has been sustainability and environmentalism, but not necessarily food waste diversion. It's only in the last year that we've run onto that train, because of the importance that we've seen the research shows in diverting food waste specifically from the landfills and using it as a resource, rather than seeing it as trash. So as a co-founder of Changing Tides Foundation, we've thankfully hopped on the coattails of these amazing people who have been apparently part of this process since 2017 with you guys. So thank you all for laying the foundation.

And I just want to say and report that in the short time that we've been doing educational events and hosting volunteer days and getting involved in the community, specifically the north shore community, there is interest that members of Hawaii, of Oahu are interested in participating, in learning, and paying for a resource that can divert food waste from our landfills.

There's so much research -- the Soil Health Institute has produced about -- I mean, you've already heard it from our friends here that reducing the carbon in the atmosphere is the bigger issue.

I have not read this great plan that should be better, according to Rafael, but I do know that if we can work towards reducing our greenhouse gas emissions, we can reverse some of the effects of climate change, and that's of utmost importance.

So thank you.

MR. PITZLER: Thank you. Anne Weber?

MS. WEBER: Hello. Thank you. I'm Anne Weber. I'm the community director at Impact Hub. We're a small business in Kakaako.

And I'm also -- I'm also a former educator. I taught with DOE, so that's what I want to talk about, the education portion. It is the main tactic for public awareness and public outreach. So I think that it needs to be addressed in more -- more strategically.

It addresses a lot of tactics and methods and current efforts, but it doesn't actually talk about any success criteria. So a successful education coordinator needs to have an understanding of what does success look like, how much of the public will be aware, what -- you know, having some clear, definitive answers there. Any educator will tell you that if they're not clear on the expectations, then it's a recipe for failure.

The last thing I'm going to say is that the City of Phoenix has a waste -- a zero waste education team, and that's a model that you could look to. There's a five-person team, and they actually have a lot of resources about their strategy. So that's there, as well.

Thank you very much.

MR. PITZLER: Thank you. Anny Barlow?

MS. BARLOW: Hi, everybody. My name is Anny Barlow. I am a co-coordinator for Ocean Friendly Restaurants, which is a Surfrider campaign, and we basically work with restaurants on how they can lower their environmental footprint.

And sometimes that is very small, easy steps, and sometimes it's a lot harder steps, and not because they don't want to and -- cost is, obviously, always a barrier, but that's also sometimes not the biggest barrier. Department of Health tends to be a really large barrier, and they're doing a great job of protecting our health. I mean, I don't want them to stop. I don't want any of us getting diseases, of course. But we need to look at how we can work with them.

And my suggestion, I guess, for the plan would be to write in something about working with the Department of Health on how we cannot decrease regulations, but rather change process, change protocol, so that we all remain healthy but that we can bring our reusable containers into restaurants to get filled for to-go.

We always say reduce, reuse, recycle. What we don't say, and probably should have been saying all these years is: Refuse, reduce, reuse, recycle. Because even when we take the compostable containers, even if we got a place to compost those compostable containers, we don't actually even need to create them or use them if we can bring our Tupperware into restaurants to be filled for to-go.

But right now, a lot of restaurants won't accept them because of DOH regulations. And that's just one example. There's actually a lot of examples between how DOH regulates business within a restaurant, and we need to stay healthy, but we also need to go back to the drawing board. So I would just ask that a piece be added to the plan about aligning with DOH and working specifically with them on certain aspects, which I volunteer to totally help with.

The second thing I have to say, which is going to piggyback on what Anne said, was about this education coordinator piece. I think we're all in agreement on this side of the room that we need one. There needs to be a position. We need to find funding for it. We can fund it.

It needs someone to be a specialist. But like what Anne was saying, they need to be able to measure success. And so I would think that that position would also entail a certain amount of marketing specialist -- specialty, mostly because change is hard and a lot of people want to change, but actually putting it into practice is hard and they have to be motivated and so you can give them all the education you want, but what's going to guarantee that they listen? So by having a professional marketing aspect to the educational campaign and making it more of a marketing educational campaign, then we're actually finding what drives those people and their motivation to listen to the educational component.

That's all I have to say. Thank you.

MR. PITZLER: Thank you. Carlos?

Mr. HACIAS: Hello. Thank you, everybody. I didn't have anything planned to say. I wasn't going to come. At the last minute, I decided to come. So right now what I want to do is just look at you guys and charge myself up so I can continue doing what I've been doing for a while, this energy. You guys took time, gas. You're at it, swimming against the current. Great spirit, aye-aye-aye. Thank you, guys.

You guys have spirit, too. Let it come in.

We need fire. Every night we lit up a fire and we're trying to look for fire. But we're burning too much. Reduce -- wow. You order something; what am I going to do with this packaging? Let's burn it. That's what they do in Nicaragua; three trucks every week full of plastic bottles and wrappers and candy and all kinds of shit food. Never a truck goes in to pick it up. What do they do? They throw it on the ground. They burn it. It goes in the ocean.

Wow. Bring it in. You guys have it in your power. I'm nobody. I don't have the answers. I just know that I'm privileged -- I'm privileged, because when I was born I was able to taste the salt water. That's one of the oldest memories in my mind, the taste of salt water, and the feel of the sand in my feet. I just -- I mean, I must have been a week old. That's the memory that I have.

And what's going to happen to my grandkids, what legacy? You guys -- I don't know -- kids -- maybe somebody's got grandkids. I don't care who pays your bills. It's not about the money. It's about what are we doing. What are we -- it's crazy, crazy. They clean the street. You drive by two days later, where did this shit come from?

I was a barge captain in Fort Lauderdale, and I wept on the barge in the mornings going out the river after it rained. What are we doing? Well, let's burn it. Now they get it. Let's burn it all. I don't know.

Reduce, reduce -- let's rethink. I just want to charge myself so I can continue forward, because sometimes I just feel like giving up, honest to God. It's like, wow, you know.

I'm done. Thank you. Thank you so much.

MR. PITZLER: And Harvey.

MR. KING: I'm Harvey, a student, Windward Community College. I'm a resident of Manoa. I'm a member of the Sustainability Hui, the student club, the Surfrider Foundation, the outreach chair of the Society for Conversation Biology. I just want to say thank you. The goal of 70 percent waste reduction by 2030 was profound to me. It was like the first thing actually, personally, that like was anywhere near a mark. You know, it's anything -- everything is like 2045, at least, let alone 70 percent by 2030. So thank you.

In the spirit of what's happening on Mauna Kea, what would you receive if you asked a Hawaiian elder what to do with all this trash? Brah, no waste nothing. May the life of the land be perpetuated by the righteousness of its servants, and that's us.

The scale references between the small scale and the industrial scale models require the populace to make dramatic behavior change, as well as we have to make profound commercial models that are

completely different. It's true. And it's okay to be afraid of dramatic change, just like we can jump in the deep blue sea and learn how to surf, learn how to navigate.

Too often has the scope of waste management been what the best way to pass the buck really is, like we can just burn our responsibility. So the punchline of this plan, between the green waste and the food waste especially, should be agriculture, and I think that's something that's been lacking across all of the world views.

So this is my comment, in addition to my previous comment on my proposition to the City to change its world view, and in summary, along with my proposition is my recommendation to look at the maps through the U.S. Park Service. It's an incredible resource for including your inputs to what their resources are currently for the mutual benefit of meeting these challenges.

Mahalo.

MR. PITZLER: Well, thank you all. Those are some very impassioned pleas, a lot of good ideas, a lot of good energy. So we appreciate you all coming out, giving us, the team and the City, a lot to think about.

As I mentioned, at this stage we're going to -- thank you, by the way, Sue.

MR. PITZLER: I can also say I've done a few plans in my day; this has been probably the best, most energized, willing-to-help group, positive. You've got your critiques and things you don't like, but positive vibes coming out. So we appreciate that. We want to hear your ideas. We want to hear your suggestions, and we'll ponder them all and we'll huddle and do our best to push the ball a little bit further up the hill.

FEMALE VOICE: We appreciate you appreciating us.

FEMALE VOICE: Could I just thank Josh? Because, bless his heart; he's like taking the brunt of all of this on behalf of the City.

And I just want to say, Josh, through this whole process, you've just been really fantastic and awesome to work with. And your whole team -- I know you guys are all really passionate about taking care of the environment. Unfortunately, you're in the position where you're the buffer, but I just want to thank each and every one of you for what you do on a daily basis for our county.

MR. PITZLER: They do an amazing amount with -- really challenging on the resource side. I've seen it. I've seen the numbers and what they're trying to do.

Again, I think that the spirit here is really good. There's a way to energize and find things that the City could help make a difference as part of the solution and not dealing with lots of money. So what things can the City do. So if you upload comments, be as specific as you can with ideas and suggestions, and they'll take the best ones and we'll make modifications as we can.

Josh, do you have anything to add in closing?

MR. NAGASHIMA: Yeah. I just want to thank everybody for coming here and giving your comments. Sorry if some of the changes we're doing aren't as strong as you might like. But I hope that you get the feeling that we're open to your suggestions and we're very willing to accept them and at least consider them moving forward.

And I would like this process -- you know, it's every ten years, mandated every ten years, but I would like to keep this process ongoing, and I think the source reduction working group, as many of you mentioned, is a step in that direction. So I think I'd like, moving forward, that the plan be a little bit more living and that we continue to get your ideas along the way.

So thank you very much.

MR. PITZLER: That will do it. Thanks again. We're, I think, officially done. Thank you.

(Meeting concluded at 7:55 p.m.)