



Office of the City Auditor



**City and County of
Honolulu
State of Hawai`i**

**Report to the Mayor
and the
City Council of Honolulu**

Audit of the City's Recycling Program

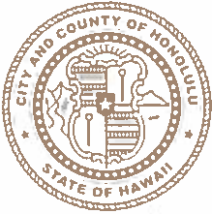
**Report No. 17-06
October 2017**

Audit of the City's Recycling Program

A Report to the
Mayor
and the
City Council
of Honolulu

Submitted by

THE CITY AUDITOR
CITY AND COUNTY
OF HONOLULU
STATE OF HAWAII



**OFFICE OF THE CITY AUDITOR
CITY AND COUNTY OF HONOLULU**

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EDWIN S.W. YOUNG
CITY AUDITOR

October 24, 2017

The Honorable Ron Menor, Chair
and Members
Honolulu City Council
530 S. King Street, Room 202
Honolulu, Hawai'i 96813

Dear Chair Menor and Councilmembers:

A copy of our final report, *Audit of the City's Recycling Program*, is attached. This audit was conducted pursuant to City Council Resolution 15-315, which requested a performance of the city's recycling program. The resolution addressed the effectiveness of the city's recycling efforts; and the effectiveness of specific recycling programs such as the *white bin* program.

The resolution requested the city auditor to (1) evaluate the efficiency of the Refuse Division of the Department of Environmental Services in its recycling efforts; (2) determine the percentage of waste that is recyclable and not sent to H-POWER; and (3) determine the percentage of waste that is recyclable, but sent to H-POWER. The resolution further requested that the audit (4) assess the feasibility of expanding the City's recycling program to include areas or businesses where collection is not currently provided; (5) assess the viability of the community recycling ("white bin") program; and (6) assess the comparative costs and benefits of recycling versus burning of recyclable materials by the City.

Background

The Department of Environmental Services (ENV) (the department) is responsible for the city's recycling programs. The ENV Division of Refuse Collection and Disposal is responsible for planning and administering the City and County of Honolulu's municipal solid waste (MSW) management program. The program includes solid waste reduction and recycling programs; collecting and transporting solid waste from single family homes; maintaining waste facilities (such as drop-off convenience centers, transfer stations, landfills, and collection operations yards); and managing the City's H-POWER waste-to-energy facility.

Audit Results

The market for selling and buying recycled waste has declined. As a result, revenues from the sale of solid waste are insufficient to offset the costs of processing the collected recycled waste.

The city has been effective in its efforts to divert municipal solid waste and recycling has contributed significantly to landfill diversion. Solid waste disposal costs can be reduced by diverting recycled waste

The Honorable Ron Menor, Chair
and Members
October 24, 2017
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to the H-POWER waste to energy facility. Based on contract obligations for delivering solid waste to H-POWER, we estimate the city could have reduced solid waste disposal costs by \$7 million dollars and could have generated about \$29.5 million dollars in electric revenues by diverting recycled waste to the H-POWER facility. Reducing waste at its source (source reduction) can further reduce the amount of waste generated.

Initially, community recycling was a cost-efficient way to collect mixed recyclables. Cost-efficiency declined after the 2008 service contract due to increased collection costs; incorrect cost and collection estimates; optimistic versus actual collections; and the start of island-wide curbside recycling collections. As a result, the community recycling (*white bin*) program is no longer viable.

We would like to express our sincere appreciation for the cooperation and assistance provided us by the managers and staff of the Department of Environmental Services, its Recycling Branch, and the many others who assisted us during this review. We are available to meet with you and your staff to discuss the review results and to provide more information. If you have any questions regarding the audit report, please call the auditor-in-charge, Wayne Kawamura or me at 768-3134.

Sincerely,


Edwin S.W. Young
City Auditor

c: Kirk Caldwell, Mayor
Roy Amemiya, Jr., Managing Director
Lori Kahikina, Director, Department of Environmental Services
Nelson Koyanagi, Jr., Director, Department of Budget and Fiscal Services
Wayne Kawamura, Senior Auditor

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Chapter 1

Introduction and Background

This audit was conducted pursuant to City Council Resolution 15-315, which requested a performance audit of the city's recycling program. The resolution addressed the effectiveness of the city's recycling efforts; and the effectiveness of specific recycling programs such as the *white bin* program.

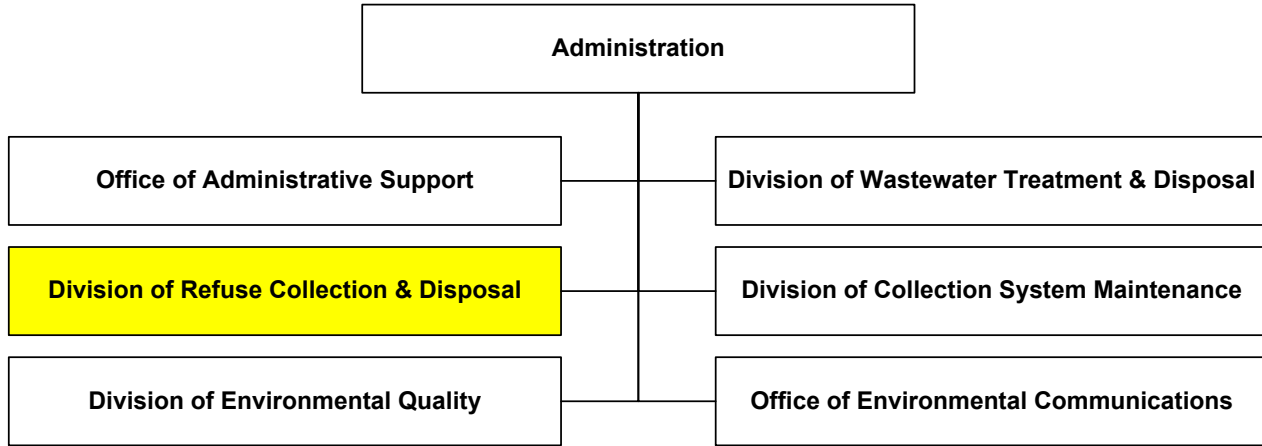
This audit was included in the *Office of the City Auditor's Proposed Annual Work Plan for FY2016-17* and performed in accordance with generally accepted government auditing standards from May 2016 to July 2017.

Background

The Department of Environmental Services (ENV) (the department) is responsible for the city's recycling programs. The ENV Division of Refuse Collection and Disposal is responsible for planning and administering the City and County of Honolulu's municipal solid waste (MSW) management program. The program includes solid waste reduction and recycling programs; collecting and transporting solid waste from single family homes; maintaining waste facilities (such as drop-off convenience centers, transfer stations, landfills, and collection operations yards); and the managing the City's H-POWER waste-to-energy facility.

The following organizational charts show the Department of Environmental Services and its Division of Refuse Collection and Disposal.

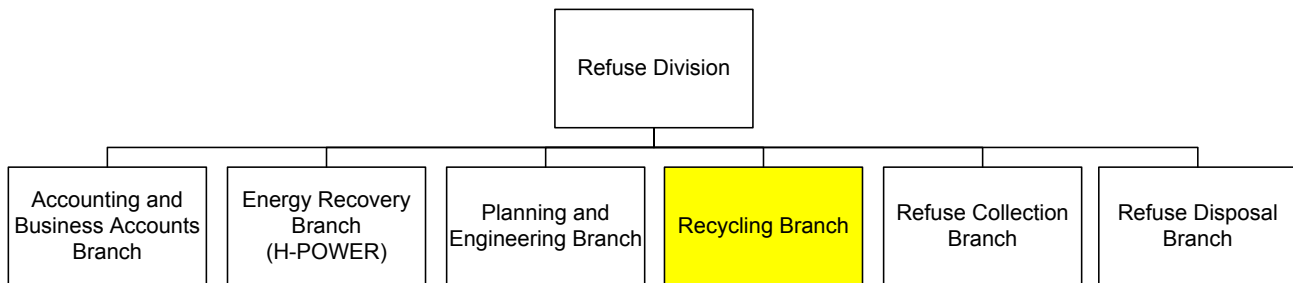
**Exhibit 1.1
Organizational Chart – Department of Environmental Services**



Source: Department of Environmental Services

In FY 2016, ENV operating expenditures totaled \$233.5 million, revenues totaled \$565.2 million, and authorized staffing totaled 1,041 full-time equivalents (FTE)¹. In FY 2016, the ENV refuse collection and disposal division operating expenditures totaled \$143.1 million.

**Exhibit 1.2
Organizational Chart – ENV Refuse Division**



Source: Department of Environmental Services

¹ Vacancies in FY 2016 totaled 194 full-time equivalents.

The refuse division handles recycling; collection, disposal, and management of municipal solid waste; municipal landfills; and H-POWER, the city's waste-to-energy plant. The refuse division is subdivided into six branches as shown in Exhibit 1.2.

Recycling Branch. Within the Refuse Division, the Recycling Branch has six full-time FTEs: a branch chief who is the city's recycling coordinator, and five recycling specialists. The branch is responsible for establishing and implementing recycling programs, education, and promotion of recycling by the city. It also monitors and enforces the mandatory recycling laws and restrictions.

The recycling branch staff continually monitors compliance with city recycling laws and enforce restrictions at city disposal facilities. Each year, the branch staff mail businesses a packet which contains an annual compliance form and an informational brochure. Businesses are instructed to complete and return the form and branch staff follow-up throughout the year with on-site inspections. The branch staff assist and promote effective recycling in their compliance and inspection operations rather than penalize for non-compliance.

Recycling history

In 1989, the city council passed three ordinances to establish recycling operations within the city.

- One authorized the creation of a city recycling coordinator with staff who now make up the Recycling Branch. The branch is responsible for establishing and implementing recycling programs, education, and promotion of recycling.
- Other subsequent recycling ordinances pertained to businesses and material bans that support recycling and promote diversion of waste from the landfill.

Recycling is a major component of the city's solid waste management program to divert waste from the landfill. More specifically:

- General material recycling increased from approximately 75,000 tons in 1988 to more than 430,000 tons in CY 2016. Since 1996, the city has diverted 24 to 40 percent of municipal solid waste annually.

- The city organized curbside collection of mixed recyclables and green waste to promote convenience and residential recycling. The city also has a mandatory agency recycling program, which mirrors requirements placed on commercial offices.
- For 2016, total municipal solid waste was 1,211,876 tons. Of this amount, general material recycling totaled 430,831 tons, or 35.6 percent of the total municipal waste generated. The city's annual average exceeded the national recycling rate of 34 percent.
- Total municipal solid waste diverted from the landfill, including H-POWER, totaled 954,714 tons - a landfill diversion rate of 78.8 percent² in 2016.

Audit Objectives, Scope and Methodology

This audit was conducted pursuant to City Council Resolution 15-315, which requested the city auditor to perform an audit of the city's recycling program. The audit objectives were to evaluate the effectiveness of the city's recycling efforts; and the effectiveness of specific recycling programs such as the *white bin* program.

Audit sub-objectives included: (1) evaluating the efficiency of the refuse division of the Department of Environmental Services in its recycling efforts; (2) determining the percentage of waste that is recyclable and not sent to H-POWER; and (3) determining the percentage of waste that is recyclable, but sent to H-POWER. Other sub-objectives were to assess: (4) the feasibility of expanding the city's recycling program to include areas or businesses where collection is not currently provided; (5) the viability of the community recycling (*white bin*) program; and (6) the comparative costs and benefits of recycling versus burning of recyclable materials by the city.

For the audit, we reviewed the city charter, ordinances, policies and procedures, and reports and plans related to the city's recycling program. We assessed internal controls related to the program. We reviewed operational procedures for the city's recycling program.

² Updated data is available at the ENV website, <http://www.Opala.org>.

Our review focused on the operations, costs, and the results of the recycling program. We reviewed project files held by the department and the Department of Budget and Fiscal Services to assess the efficiency and effectiveness of the city's recycling program. We reviewed city ordinances, policies, procedures, rules, practices and contracts to determine operational, monitoring, reporting, and evaluation requirements pertaining to the program. We performed an assessment of continuing feasibility and cost benefit. We also reviewed contract terms and agreements for performance criteria, and departmental planning documents for goals, objectives, and management criteria.

We assessed the Department of Environmental Services' efforts to implement and report on the performance of the recycling program in accordance with its own planning goals and objectives. We used spreadsheets to compile and analyze the data obtained. We also assessed the department's planning and project management; its effectiveness in controlling the costs and promoting effective recycling results; and determined if planned goals and objectives were attained. We also reviewed selected performance, contract, and cost data relating to H-POWER to generally review the cost benefit of recycling, energy generation, and recycling municipal solid waste. In addition to document reviews, we interviewed pertinent department and consultant staff to obtain information on the recycling programs.

The Office of the City Auditor issued an *Audit of the City's Synagro Contract* (Report No. 08-03) in August 2008. The audit focused on sludge reuse from the city's wastewater treatment plant located on Sand Island. The audit found that the ENV bioconversion facility project at the waste water treatment plant experienced construction delays and costly change orders; non-compliance with the 1995 consent decree penalties could cost the city millions; and challenges remain in completing the bio-solid reuse requirements.

The Office of the City Auditor also issued an *Audit of the Department of Environmental Services' H-POWER Contracts and Procurement Practices* (Report No. 15-04) in December 2015. This audit focused on the city's waste-to-energy facility (H-POWER) project and recommended improvements for procurement, contract administration, and payment review practices.

The Office of the City Auditor audited the Refuse Division's Bulky Item Collection Program. Although this audit was within the same division, the audits covered different subject matters and separate operations. This audit was released in August 2017.

The audit was performed in accordance with generally accepted government auditing standards from May 2016 to July 2017. Those standards require that we plan and perform the audit to obtain sufficient and appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Audit Results

The market for selling and buying recycled waste has declined. As a result, revenues from the sale of solid waste are insufficient to offset the costs of processing the recycled waste collected.

The city has been effective in its efforts to divert municipal solid waste and recycling has contributed significantly to landfill diversion.

Solid waste disposal costs can be reduced by diverting recyclable waste to the H-POWER waste to energy facility. Based on contract obligations for delivering solid waste to H-POWER, we estimate the city could have reduced solid waste disposal costs by \$7 million dollars and could have generated about \$29.5 million dollars in electric revenues if the city had diverted recyclable waste to the H-POWER facility. Reducing waste at its source (source reduction) can further reduce the amount of waste generated.

Initially, community recycling was a cost-efficient way to collect mixed recyclables. Cost-efficiency declined after the 2008 service contract due to increased collection costs and the start of island-wide curbside recycling collections which impacted the original cost and collection estimates and reduced the actual collections. As a result, the community recycling (*white bin*) program is no longer viable.

Chapter 2

The Market For Recycled Waste Has Declined

Highlights

- More than 75 percent of municipal solid waste (MSW) has been diverted annually since 2012.
- Processing costs are rising due to markets and regulations.

The recycling program has successfully diverted material from the landfill. The market for selling and buying recycled waste has declined, as a result, revenues from the sale of recyclable waste are insufficient to offset the costs of collecting the recycled waste. Ending the recycling program and sending recycled materials to H-POWER could save the city millions.

Background

In September 1989, Oahu's only landfill, Waimanalo Gulch, opened for the disposal of municipal solid waste. In October 1989, a city council ordinance set goals for the diversion of solid wastes and recycling of solid waste. The goals were to recycle, reuse, compost, or divert from the landfill at least 90 percent of the municipal solid waste by 2015. The city has successfully diverted more than 75 percent of the municipal solid waste annually since 2012.

The city's waste-to-energy Honolulu Program of Waste Energy Recovery (H-POWER) facility and recycling resulted in reducing the amount of solid waste sent to the landfill. Exhibit 2.1 shows recycled municipal solid waste increased 28,080 tons from 2006 to 2015 and solid waste sent to the landfill declined 222,739 tons during the same period.

Exhibit 2.1**Comparing 2006 and 2015 Amounts of Municipal Waste Disposed (tons)¹**

	MSW Recycled	MSW Incinerated	H-POWER Ash & Residue (Landfill)	MSW Landfilled	Total
2006	421,072	454,068	191,800	286,842	1,353,782
2015	449,152	514,820	203,698	64,103	1,231,773
Difference	28,080	60,752	11,898	-222,739	-122,009







Source: Department of Environmental Services

Certain materials are required to be recycled or composted by law, so that they could be diverted from city disposal sites. The following lists the materials that are restricted from disposal to promote recycling or composting by certain commercial and government entities.

¹ Additional data for 2016 is available at the ENV website, <http://www.Opala.org>.

Exhibit 2.2

List of Materials and Restrictions

Material	Regulation/Restriction
Glass 	Bars and restaurants are required to recycle their HI-5 beverage deposit containers. As of June 1, 2014, the city suspended the requirement for recycling of non-deposit glass due to insufficient state funding
Office Paper Newspaper Cardboard 	Office buildings of 20,000 square feet or more of office space are required to recycle office paper, newspaper, and cardboard
Food Waste 	Hotels, restaurants, grocery stores, food courts, food manufacturers/processors and hospitals of a certain size must recycle their food waste
Green waste (yard trimmings) 	Commercial and government generators restricted from disposing green waste. Trucks limited to a maximum of 10% per load at H-POWER and transfer stations. Banned from landfill
Tires Auto Batteries White Goods Scrap Metal 	All of these are banned from city disposal sites due to applicable state and federal laws. In 2014, the city received a state variance to enable city collected tires to be processed at H-POWER.
Electronic Waste 	Banned from disposal. Commercial and government e-waste must be processed through e-waste recycling companies
Mixed Recyclables: Newspaper Cardboard Office Paper Aluminum Glass Plastics	All city agencies required to recycle these items through the city's mandatory recycling program
Recycled Paper Products	City is required to purchase these items to support the recycled paper market. Items include toilet tissue, paper towels, copier and computer paper with recycled content

Source: Department of Environmental Services

The market for recycled materials has changed

The restrictions on disposal of selected recyclable materials have had a positive effect on recycling rates. Recycling of four of the five restricted materials have increased at least 48% per year and the amount of diverted wastes totaled nearly 4.9 million tons.²

The economic downturn of 2009, however, adversely affected the market for recycled materials. For example, the prices for plastics, cardboard, newspapers, and other items nationally have dropped since 2009, and have not recovered to earlier levels. Only the price of aluminum has rebounded strongly. The exhibit below quantifies some of the price changes in recycled materials.

Exhibit 2.3 Prices for Recycled Materials

Recycled Material	Price (2008)	Price (2009)	One Year Difference in Value	Price (2016)
Aluminum cans	\$1100	\$340	-69%	\$1500
Plastic bottles	\$300	\$40	-87%	\$172
Newspapers	\$90	\$0	-100%	\$59
Cardboard	\$100	\$25	-75%	\$71

Source: National Recycling Coalition

Besides the changes in the global economy, the city's costs to process recycled materials increased. For example, the city costs increased 141 percent after China implemented *Operation Green Fence* in 2014 which made China more selective in the recyclables accepted. Recycling experts think it is unlikely that China will resume absorbing foreign recyclables because its local industries now supply sufficient amounts of recyclable materials.

² Mandatory recycling affects specific types of businesses: glass recycling for bars and restaurants; paper recycling for office buildings; food waste recycling for hotels, grocery stores, food manufacturers and processors, food courts and hospitals. There are disposal bans and restrictions on high volume recyclable materials, including green waste, cardboard, tires, auto batteries, white goods, and scrap metals. These are enforced at the city's disposal sites.

Locally, the State Department of Health set regulations requiring processors to sort out HI-5 deposit beverage containers from other mixed recyclables. This increased the difficulty of sorting and the cost was passed on to the city and others as a processing cost increase.³

As a result, according to ENV, the city revenues from recycled materials have been insufficient to cover the processing costs for recycled materials. For example, the city received negative net revenues in 2015 and 2016 from recycled materials and spent over \$3 million annually to support the processing of the recycled materials collected.

In contrast, the city revenues exceeded the cost of the processing from 2010 to 2014. The table below compares the city revenues versus the cost of processing the recycled materials.

Exhibit 2.4
Annual Mixed Recyclables Processing Costs and Revenues

	Tons	Processing Charge	Net Charge/ Net Revenue
FY 2009	7,827	\$327,909	(\$178)
FY 2010	15,771	\$717,555	\$8,528
FY 2011	20,971	\$1,046,270	\$1,484,211
FY 2012	20,941	\$1,081,253	\$1,482,579
FY 2013	21,483	\$1,149,777	\$1,088,376
FY 2014	22,487	\$1,360,666	\$891,913
FY 2015	22,699	\$3,223,232	(\$767,737)
FY 2016	23,159	\$3,288,519	(\$997,203)
Total	155,337	\$12,195,182	\$3,190,489

Source: Department of Environmental Services

³ ENV states that this occurred if the processor was intent on redeeming the HI-5 containers. ENV stated it did require the processor to collect the revenue from HI-5 containers and was allowed to calculate the number of HI-5 containers based on average weights.

Despite the market changes, total municipal solid waste collected has been steady

Over the past ten years, annual municipal solid waste collected has ranged from 1.2 to 1.3 million tons for a total of 12.6 million tons. Annual recycling ranged from 421,000 to 490,000 tons per year and totaled approximately 4.6 million tons. Overall, 36.3 percent of all the municipal solid waste was recycled during this period. Recycling percentages increased 5.4 percent, and diversion of municipal solid waste from the landfill increased from 64.6 percent to 78.3 percent during the ten-year period. The recycling data is shown in Exhibit 2.5.

**Exhibit 2.5
Ten Year Municipal Solid Waste (MSW) Recycling Collections⁴**

	MSW Recycling	Total MSW Collected (Tons)	Percentage of MSW Recycled
2006	421,072	1,353,782	31.1%
2007	453,372	1,345,632	33.7%
2008	456,876	1,313,253	34.8%
2009	426,947	1,212,760	35.2%
2010	448,639	1,210,416	37.1%
2011	490,061	1,251,775	39.1%
2012	487,157	1,231,425	39.6%
2013	477,011	1,237,389	38.5%
2014	475,953	1,243,255	38.3%
2015	449,152	1,231,773	36.5%
Total	4,586,240	12,631,640	36.3%

Source: Department of Environmental Services

⁴Updated data is available at the ENV website, <http://www.Opala.org>.

For some materials, the collections have increased. These were the effects of disposal restrictions and enforcement, and the residential collection of green waste. The table below shows the increases in some recycled collections.

Exhibit 2.6
Changes in Material Collections after Disposal Restrictions (Tons)

Recycled Material	1996 (tons)	2015 (tons)	Percent Change
Green Waste	22,400	108,712	385%
Cardboard	24,600	46,619	90%
Office Recycling (paper, newspaper, cardboard)	48,800	73,159	50%
Glass	10,100	19,087	89%
Food Waste	52,500	40,188	-23%
Total	158,400	287,765	82%

Source: Department of Environmental Services

Although the recycling program has been successful, the changes in the market for the sale and purchase of recycled materials have increased costs and reduced the potential for city revenues. Continuing to process the materials collected by the recycling program could cost the city over \$3 million per year. As discussed in the next chapter, diverting the recycled materials to H-POWER could result in savings to the city and additional revenues.

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Chapter 3

Solid Waste Costs Can Be Reduced By Diverting Collections to H-POWER

Highlights

- The city's programs collected over 771,000 tons of recyclable materials since 2006.
- Solid waste costs can be reduced and electrical revenue increased by diverting recycled materials to H-POWER.

The city has been effective in its efforts to divert municipal solid waste and recycling has contributed significantly to landfill diversion. Solid waste disposal costs can be reduced by diverting recyclable waste that is burnable to the H-POWER waste to energy facility. Based on the contract obligations for delivering solid waste to H-POWER, we estimate the city could have reduced solid waste disposal costs by \$7 million dollars and could have generated about \$29.5 million dollars in electricity generation revenues by diverting recycled waste to the H-POWER facility. Reducing waste at its source (source reduction) could further reduce the amount of waste generated.

Background

The city's H-POWER waste to energy facility converts solid waste into electricity that is sold to Hawaiian Electric Company, the island's primary electric utility. In FY 2016, H-POWER generated and sold 379,592 megawatt hours of electricity which generated \$66.7 million in electrical energy revenues. The department conducted two studies to identify the percentage of recycled waste that was sent to H-POWER.

2006 study

The 2006 Waste Characterization Study estimated that 30.0% of the 756,000 tons of solid waste sent to H-POWER was recyclable waste. The types and quantities of materials in the H-POWER waste streams included recyclable paper, plastics, metals, glass, and green waste that totaled over 227,000 tons. The types and weight of recyclable materials and the solid waste stream are shown on the next page.

Exhibit 3.1
Waste Stream Composition for H-POWER

Material	Percent of Material at H-POWER	Annual Weight (Tons)
Paper	36.7%	277,570
Plastics	14.0%	105,749
Metals	3.5%	26,517
Glass	2.0%	15,201
Other Inorganics	2.7%	20,322
Other Waste	3.8%	28,424
Green Waste	10.1%	76,048
Wood	3.0%	22,363
Other Organics	24.1%	181,937
Household Hazardous Waste	0.3%	2,190
Total	100.0%	756,321

Source: Department of Environmental Services

The 2006 study further segregated the recyclable waste into specific types as shown in Exhibit 3.2.

Exhibit 3.2
2006 Collected Recyclable Materials¹ Sent to H-POWER

Recyclable Material	Percent of Recyclable Material at H-POWER	Annual Weight (Tons)
<u>Recyclable Paper:</u> Corrugated Cardboard: 6.1% Newspaper High-grade Paper	14.7%	111,318
<u>Recyclable Plastics:</u> PET Bottles/Containers (Deposit) PET Bottles/Containers (Non-Deposit) HDPE Bottles/Containers	1.8%	13,803
<u>Recyclable Metals:</u> Aluminum Cans (Deposit) Aluminum Cans (Non-Deposit) Tin Cans	1.4%	10,896
<u>Recyclable Glass:</u> HI-5 Glass Bottles/Containers	2.0%	15,201
Green Waste	10.1%	76,048
Total Recyclable Materials	30.0%	227,266

Source: Department of Environmental Services

2011 study

The 2011 Curbside Recycling Program Evaluation and Strategic Planning, Phase 1 reported that the amount of recyclable waste was 16.5 percent (32,864 tons) of all the waste sent to H-POWER. This study characterized the residential waste collected by the city in carts used to collect refuse (gray cart), recycling (blue cart), and green waste (green cart). Exhibit 3.3 details the categories of materials found in the carts.

¹ Green waste includes grass, tree and hedge trimmings, garden fruits, vegetables, and Christmas trees (no ornaments or flocking). Mixed Recyclables include newspaper, corrugated cardboard, white and colored office paper, paper bags, glass bottles and jars, all metal cans, and plastic containers #1 and #2 plastics.

Exhibit 3.3**2011 Waste Stream Collected in Gray Bins During Curbside Study**

Material Collected	Percent of Materials Collected	Tons
Recyclables	8.6%	17,159
Newspaper	2.7%	5,410
Corrugated Cardboard	2.2%	4,472
Glass Bottles and Jars	1.5%	3,082
Aluminum Containers	0.4%	845
Bi-Metal HI-5 Beverage Containers	0.0%	22
#1 PET Plastic Containers	0.9%	1,868
#2 HDPE Plastic Containers	0.7%	1,460
Green Waste	7.9%	15,705
Green Waste	7.9%	15,705
Food Waste	15.8%	31,455
Food-Fruit and Vegetable Peelings	6.2%	12,311
Food-Post Consumer	9.6%	19,144
Refuse Materials	67.7%	134,640
Refuse Materials	67.7%	134,640
Mixed Recyclable Collections	16.5%	32,864
Total Collections		198,959

Source: Department of Environmental Services

The two studies indicated that the H-POWER waste stream contained recyclable waste and opportunities existed to reduce waste by maximizing recycling opportunities.

Diverting Recycled Collections to H-POWER Could Save the City Millions

Under the H-POWER contracts, the city guaranteed the amount of waste it would deliver to the H-POWER facility. The city also agreed to compensate the H-POWER contractor for any electric power revenues lost due to any shortages. Based on the contract obligations, we estimated the city could have reduced its penalty payments by \$7 million dollars if recycled materials, including green waste, had been diverted to the H-POWER facility.²

² According to the department, the diversion of all recycled materials to H-POWER requires changes in laws, contracts, and permits to enable the diversion.

City guarantees annual tonnage of waste sent to H-POWER

Prior to 2013, the city guaranteed to deliver 561,600 tons of waste to H-POWER each year. This amount was increased after the amount of waste sent to the landfill in 2006 and 2007 indicated a need to increase H-POWER's operating capacity.

More specifically, the city estimated the waste sent to the landfill in 2006 (287,000 tons) and 2007 (307,000 tons) indicated a need for increased processing at H-POWER. The city subsequently added a third boiler, which increased the H-POWER processing capacity to 840,000 tons of solid waste.

Under the contract, if the city failed to deliver the guaranteed amount of solid waste, the city had to pay the contractor (Covanta) for any shortage in waste delivered to H-POWER and to compensate Covanta for any lost electrical revenues. The difference between the guaranteed amount and the amount delivered to H-POWER was the processing costs.

City paid for lost electrical revenues

Under the H-POWER agreement, the city also had to pay the H-POWER contractor for any lost electrical revenues. By not delivering the guaranteed amount of waste to H-POWER, the city had to pay the contractor over \$6.2 million from CY 2013 to 2016, for the lost electrical revenues.³

Exhibit 3.4 shows the estimated contractor share of lost electrical revenues. We estimated the city owed the contractor between \$1 million to \$2 million dollars annually for lost electrical revenues. Our estimates were based on the guaranteed electrical conversion rates and the contract minimum of 533 kilowatt hours of electricity per ton generated by the H-POWER facility. The city's waste shortages ranged from 50,000 to 121,000 tons. The department attributed the shortages to the effects of the economic downturn.

³ When the city fails to deliver 800,000 tons of waste, the city must pay the H-POWER contractor (Covanta) for any lost electrical revenues. The H-POWER contractor is paid 18.5% of electrical revenues, up to a maximum of 16.5 cents per kilowatt hour. From 2013 through 2016, the city did not meet its guaranteed tonnage of 800,000 tons per year.

Exhibit 3.4 Estimated Lost Electrical Revenues

Year	MSW Disposal at H-POWER (Tons)	Tons Short of 800,000 Ton Put	Electricity Per Ton (kWh)	Electricity Not Realized (kWh)	Cap Price (kWh)	Lost Electrical Energy Revenues (\$)
CY 2013	678,389	(121,611)	533	(64,818,663)	\$0.165	-\$1,978,590
CY 2014	686,279	(113,721)	533	(60,613,293)	\$0.165	-\$1,850,221
CY 2015	718,518	(81,482)	533	(43,429,906)	\$0.165	-\$1,325,698
CY 2016	733,965	(66,035)	533	(35,196,655)	\$0.165	-\$1,074,378
Total	2,817,151	(382,849)		(204,058,517)		-\$6,228,866

Source: Department of Environmental Services

Additional potential revenues totaled about \$29.5 million

In 2012, H-POWER increased its service capacity with the addition of a third boiler which increased the H-POWER service capacity from nearly 562,000 tons to 840,000 tons of waste. The 800,000 tons of waste guarantee in the contract has not been changed even though it was never attained.

We estimate the four major recycling programs collected a total of 770,755 tons of recyclable materials. The city could have reduced the amount owed to the H-POWER contractor for any shortages if the city had been able to divert recyclable materials to H-POWER. The exhibit below shows the amount of waste generated by the city recycling programs from 2006-2015.

Exhibit 3.5
2006-2015 Amount of Waste Diverted by City Recycling Programs⁴ (Tons)

Year	Community Recycling	Curbside Recycling	Green Waste	Office Paper
2006	12,334	-	29,395	154
2007	12,077	-	37,633	91
2008	11,633	-	42,791	111
2009	8,899	7,827	45,784	177
2010	5,780	15,771	58,236	68
2011	4,704	20,971	70,481	60
2012	4,359	20,941	70,858	80
2013	-	21,483	69,173	105
2014	-	22,487	79,696	119
2015	-	22,699	74,051	135
Total	59,786	132,178	578,098	1,100

Source: Department of Environmental Services

Continuing the curbside mixed recycling program may not be practical

The city faces unique challenges in marketing collected mixed recyclables that most other municipalities do not have. Hawai'i's remoteness, the shipping market, small economy for recyclables, and the high cost of business make recycling very expensive and provide less returns for the amounts recycled. More specifically:

- 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.

⁴ Updated data is available at the ENV website, <http://www.Opala.org>. ENV stated that some diversions may require legal and permit changes.

- 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.

Processing costs are increasing

From 2009 to 2016, the city collected 155,337 tons of mixed recyclables through its residential curbside blue bin collection program. The processing costs totaled almost \$12.2 million dollars. The city received about \$3.2 million dollars in net shared recycling revenue.

Within the past two years, the revenues were insufficient to cover the cost of processing the recyclables collected. That is, the residential curbside collection processing costs totaled \$3.2 million in 2015 and \$3.3 million in 2016.

In 2009, the processing cost per ton for mixed recycled materials was \$45 per ton. As of 2016, the processing cost for mixed recycled materials had increased to \$142 per ton. As a result, the city cost for processing the curbside collection increased from \$327,909 in 2009 to \$3.3 million in 2016. The city received no net revenues from their recycling collection in 2015 and 2016.⁵

The city currently has several service contracts for processing recyclable materials. These contractors process mixed recyclables and green waste from residential curbside collections; office paper from the mandatory city department recycling program; bulky items such as tires and white goods (such as electric appliances); and hazardous wastes such as batteries and gas cylinders). Except for the mixed recyclables contract, the city does not recapture or generate offsetting revenues to cover the cost of processing the recycled materials.

⁵ ENV supplied additional data that there was some gross revenue in 2015 and 2016. However, the amounts did not exceed processing costs so there was no net revenue for those years.

Only one contract had a revenue sharing provision in the mixed recyclables processing contract. This contract splits the revenues remaining after processing costs with the city, and the city reimburses the general excise tax paid on HI-5 deposit containers. The city receives no net revenues if the material sales proceeds do not exceed the processing costs.⁶

Source Reduction Can Save Waste Processing Costs

Source reduction. Source reduction activities are designed to reduce the volume, mass, or toxicity of products throughout the life cycle. It includes the design, manufacture, use, and disposal of products with minimum toxic content, minimum volume of material, and/or a longer useful life. An example of source reduction is the use of a reusable shopping bag at the grocery store.

State of Hawai'i priorities. The State of Hawai'i has established priorities for managing and processing solid waste.

HRS § 342G-2(b) states, "In implementing this chapter (Ch. 342G, Integrated Solid Waste Management), the department and each county shall *consider* the following solid waste management practices and processing methods in their order of priority: HRS §342G-3(a) states, in part: "It is the goal of the State to reduce the solid waste stream prior to disposal by ... fifty per cent (50%) by January 1, 2000 ... through source reduction, recycling, and bioconversion..."

The amount of waste processed by H-POWER grew by 11% over the past ten years while the amount of waste recycled grew by 7%. Reducing the origination of waste at the source could reduce the amount of waste generated and the subsequent need to process and dispose of waste.

The city does not have the ability to dictate the design of consumer products and packaging. So the city must use education to reduce the amount of waste produced at the source.

⁶ According to ENV, all of the revenue generated from the sale or redemption of the recyclables delivered to the contractor is credited to the contractor's processing fee. Any amount of revenue that exceeds the processing cost is split 50-50 between the city and the contractor. Revenue includes \$.05 deposits + \$.01 handling fees on all HI-5 containers, which the contractor receives from the state upon redeeming the HI-5 containers.

Source reduction through education

Source reduction educational methods include websites, printed materials, and promoting composting (such as grass and backyard green waste). Other methods include supporting city procurement of products made from recycled materials; encouraging the manufacture of recycled products; and encouraging the use of reusable bags. For example:

Websites. This is the primary method used to encourage residents and businesses to reduce the amount of solid waste they produce. The city can promote the importance of source reduction and reuse on its website; provide a comprehensive listing of charitable organizations that accept donations of household items, furniture, appliances and electronics for reuse; and provide a guide for reducing food.

Grass and backyard composting. The city can continue to encourage and promote grass and backyard composting; provide material on reducing green waste and enriching lawns; or encourage residents to leave mowed grass clippings on the lawn as a nutrient-rich addition to the lawn in lieu of fertilizer.

Waste prevention guide. The city can provide information to businesses about producing less waste and dealing with excess waste. Businesses produce a large amount of waste in daily operations and may benefit from reducing less waste. For example, reducing food waste could result in savings in food purchases, disposal, and recycling costs.

Procure products made from recycled materials. The city could develop a formal procurement policy that specifically promotes products made from recycled materials, or support waste reduction at the source. For example, the Department of Budget and Fiscal Services encourages the reuse of surplus City furniture and equipment by posting available items on the city intranet site. Materials of value are offered through public auction. The city could serve as a role model by emphasizing 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 that result in reduced prices. The city could promote incentives for city departments to select products that conform to the State Procurement Code HRS, Sect. 103D-1005, which gives preferences for recycled products.

Encourage the manufacture of recycled products and encourage the use of reusable bags. The city could work collaboratively with other counties and the state to rescind laws that discourage recycling and encourage the manufacture of products made from

recycled materials. The city initiative to ban plastic bags should continue.

Minimizing disposal at the landfill and exploring disposal options. As the landfill option diminishes, the city needs disposal alternatives. The city needs to find processing alternatives for 21 percent of the municipal solid waste generated in 2016. Fifteen of the 21 percent is ash and residue from the H-POWER process.⁷

Surveys. The city surveys businesses annually to determine what materials are being recycled and the amounts recycled. The data is used to determine the progress made in diverting waste, to identify where more effort is needed, and is published on ENV's website.

The city does not have a formal source reduction program. In its solid waste management plan, the city prioritizes energy recycling as its primary method to manage solid waste. The city needs to develop a source reduction program that educates and encourages residents and businesses to reduce waste at the source.⁸

Recommendations

We recommend that the Managing Director direct ENV to:

1. Initiate changes to city and state laws and/or permits to allow the city to divert recyclable materials to H-POWER.
2. Evaluate the long-term financial cost of city recycling programs and the ability of those costs to be offset by revenue or cost recapture provisions in recycling processing contracts.
3. Establish contract specifications that would allow for periodic adjustments to contract rates and guaranteed volumes based on changes in market conditions, price indexes, and material recovery volume.

⁷ ENV states, while it is a city goal to not have a daily use landfill, the landfill option has not diminished as it is still a legal and environmental option.

⁸ A successful source reduction program is possible. For example, the city surveys businesses on the level of their reuse of waste materials. Since reuse has been measured by the city, 336,712 tons of materials has been reused rather than disposed of as waste. The amount of reuse reported has increased 115% in the past twenty years.

4. Amend or re-bid recycling processing contracts that are cost unfavorable in either rates or volume guarantees if such action prior to the expiration of a contract would result in an overall cost savings.
5. Modify or cancel contracts that guarantee specific amounts of waste and guarantee electrical revenues to contractors.
6. Reduce city payments to contractors for waste that was never processed by modifying or cancelling contracts for recycled materials.
7. Encourage efforts toward source reduction through community education and support of legislative change to affect the amount of solid waste generated, reduce the volume to be recycled or otherwise disposed of, and which decrease overall collection and disposal costs.
8. Pursue changes to state law, solid waste permits, and city ordinance that would encourage the most cost and environmentally effective reuse of recyclable materials including, but not limited to, conversion to energy through processing at the H-POWER waste-to-energy facility.
9. Continue working with community groups on educational programs to promote source reduction and recycling.

Chapter 4

Community Recycling White Bin Program Is No Longer Viable

Highlights

- Prior to 2008, the school/community recycling program was cost-effective.
- \$10 million could have been saved if white bin program was discontinued in 2008.

Initially, community recycling was a cost-efficient way to collect mixed recyclables. Cost-efficiency declined after the 2008 service contract was expanded, due to factors such as increased collection costs and the start of island-wide curbside recycling collections. The island-wide curbside recycling collections impacted the original cost and collection estimates and reduced the actual collections. As a result, the community recycling (*white bin*) program was no longer viable.

Background

The city implemented recycling programs at 20 school sites around the island beginning in November and December 1990. The program was designed to develop a strong educational component for recycling, and establish recycling centers for O`ahu communities. The city supplied the selected schools with a large, campus, recycling roll-off container divided into four compartments for the deposit of glass, newspaper, plastic, and aluminum cans.

Early Community Recycling Program Appeared Promising

In October 1991, the city reported on all of its recycling efforts. The report, *Pilot Phase Evaluation and Recommendations Recycling Report*, stated that the educational benefits and cost-efficiency of the School/Community Recycling Program were worth continuing and expanding. It concluded that 25 to 30 strategically located school recycling centers could service O`ahu residents while residential curbside collection underwent further investigation and development. The department reported that the school program could supplement a future island-wide, once-a-month recycling curbside collection system. Exhibits 4.1 and 4.2 detail the initial cost efficiency of the program, and cost comparisons with other collection methods.

Exhibit 4.1 Initial Cost Efficiency of the School/Community Recycling Program

Period	Overall Program Costs Per Ton	School Cost Range Per Ton
November 1990 – April 1991	\$191/ton	\$78/ton to \$811/ton
May 1991 – August 1991	\$136/ton	\$68/ton to \$518/ton

Source: Department of Environmental Services

Exhibit 4.2 Initial Cost Comparison between Collection Methods

Collection Type	Cost Per Ton
School/Community Recycling	\$136
Refuse Collection, Including Transfer	\$147
1990-91 Curbside Recycling Pilot Program	\$470

Source: Department of Environmental Services

At the time of the 1991 evaluation, the School/Community recycling program indicated a greater cost-efficiency existed than curbside collection of recyclables. The department believed that fine tuning the container design would allow for further cost reductions and increased levels of recovered materials. The overall cost efficiency was \$136 per ton for the school recycling program, which was less than the \$147 per ton cost to collect, transfer, and dispose of refuse.

Initial Expansion of the Community Drop-Bin Program Was Cost-Efficient

After beginning the program in 1990, the City expanded the program from 20 locations to approximately 75 locations where residents could recycle newspaper, cardboard, office paper, glass, aluminum, and plastic containers. Proceeds from the sale of these recyclables went to the participating schools. By 2005, the program had 110 recycling bins, which were allocated as follows: 75 bins assigned to sites; 10 bins in rotation; and 25 bins unplaced. The program recycled a total of 12,216 tons of mixed materials in 2005.

The recycled total included 10,271 tons of paper and 1,945 tons of mixed containers. Exhibit 4.3 shows the 2005 costs for the School / Community Recycling Program.

Exhibit 4.3
2005 Cost of the School Community Recycling Program

Cost Item	Amount	Description
Annual Bin Lease	\$153,120	Monthly Per Bin Lease Cost: \$116 per bin
Annual Hauling Charges	\$792,241	Variable Cost Per Haul: Haul A: \$139.22 Haul B: \$38.66
Bin Maintenance	\$0	No charge
Materials Processing Charge	\$0	No charge
Total Cost	\$945,541	12,216 tons collected Cost per ton: \$78

Source: Department of Environmental Services

From 2005 to 2007, the actual collections exceeded the projected estimates and actual processing costs per ton were less than estimated in the contract. Exhibit 4.4 shows the estimated recycling and costs.

Exhibit 4.4
2005-2007 Estimated Processing Cost Per Ton

Year	Estimated Amount of Community Recycling (Tons)	Estimated Processing Cost (Per Ton)	Annual Processing Cost
2005	11,436	\$82.68	\$945,541
2006	11,436	\$83.48	\$954,674
2007	11,436	\$133.07	\$1,521,702

Source: Department of Environmental Services

Exhibit 4.5 shows the actual collections, cost per ton, and annual processing costs for 2005-2007. In 2005, the city’s cost to lease and haul the recycling bins was \$945,541, or less than \$78 per ton of recyclable materials collected. Under this contract, the city was not charged for bin maintenance or for processing the collected recyclable materials. So the cost- benefits were considered acceptable.

**Exhibit 4.5
2005-2007 Actual Processing Cost Per Ton**

Year	Actual Collection Community Recycling (Tons)	Actual Processing Cost (Per Ton)	Annual Processing Cost
2005	12,216	\$77.40	\$945,541
2006	12,334	\$77.40	\$954,674
2007	12,077	\$126.00	\$1,521,702

Source: Department of Environmental Services

The 2008 Contract Further Expanded the Program¹

By 2008, the department expanded the community recycling program to 145 bins. Of these, 120 bins were assigned to sites; 15 bins were rotated during bin servicing; and 10 were special HI-5² recycling bins used to support fundraising and collection events at the school sites.

¹ In March 2008, the service contract expanded the community recycling program, the number of school sites, and number of collection bins. The contract effectively made the School/ Community Recycling Program the city’s primary recycling effort and occurred even though a city ordinance and city charter designated the curbside recycling collection as the city’s primary recycling collection method.

To answer a City Council query about how the program expansion would affect costs and the planned curbside recycling program, the department reported the expanded program would significantly increase the amount of recyclables collected. The report was released even though the curbside recycling program would collect the same kinds of mixed recyclable items as the School/ Community recycling program. The department indicated in its 2008 *Report on Community Recycling Bin Program* the two programs were complementary and that the community recycling program would be monitored and adjusted to maintain collection efficiency and convenience to the community.

² HI-5 is the State of Hawai’i redemption program for recycling cans, bottles, and other containers. Redemption value is about 5 cents per container.

In a 2008 report prepared for the City Council, the department indicated the following projected benefits for the expansion:

- Increased convenience to recycle in communities
- More multi-material recycling bins for mixed recyclables and paper (40 locations added)
- More opportunities to donate HI-5 containers (10 HI-5 bins rotating weekly to collection events)
- Increased recovery of recyclable materials by 8,000 tons annually
- Increased revenue to schools (\$1 million)

The department estimated an increase in program recycling to a total of 19,560 tons of mixed materials under the new contract. These included 16,440 tons of paper; 3,120 tons of mixed containers; and 1,002 tons of HI-5 containers.

Increased Program Costs and Estimates Were Inaccurate

Under the new 2008 contract, the city's contract costs were estimated to increase from \$78 per ton to \$152 per ton. The following exhibit lists the estimated cost increases for the School/Community Recycling Program.

Exhibit 4.6**2008 ENV Cost Estimates of the School/Community Recycling Program**

Cost Item	Amount	Description
Annual Bin Lease	\$318,420	Monthly Per Bin Lease Cost: \$183 per bin
Annual Hauling Charges	\$1,667,080	Cost per Haul: \$178
Bin Maintenance	\$34,780	For painting, halfway through contract and vandalism
Materials Processing Charge	\$2,053,200	<u>Mixed Containers:</u> \$500/550 ton Mixed Containers Est. Charge: \$1,560,000 <u>Paper:</u> \$30/ton Paper Est. Charge: \$493,200
Total Contract Costs	\$4,073,480	
Estimated Revenue to City	\$951,900	HI-5: \$950/ton 1,002 tons
Net Cost Estimate	\$3,121,580	19,560 tons collected Estimated Cost per ton: \$159.59 Reported as \$152/ton.

Source: Department of Environmental Services

The department reported:

- The projected increase of \$74 per ton was still cheaper than the annual cost per ton of collecting and disposing of refuse.
- The increased costs were related to the increased unit prices for leasing the bins which rose from \$116 per month per bin to \$183 per month per bin.
- Increased standard hauling charges to \$178 per haul. Previously there were variable charges per haul of \$139.22 and \$38.66.
- The over \$2 million in processing charges were to be offset by revenue to the schools of \$1.1 million and \$951,900 to the city.

We found that none of these reported estimates were accurate. Our review indicated the following:

- The cost per ton as estimated should have been nearly \$160 per ton rather than \$152 per ton. The latter was the result of dividing the estimated net cost by the estimated tons to be processed.
- The 2005 cost per ton of \$78 was calculated from total cost. In 2008, if the same method were used, the estimated cost per ton of recyclables collected should have been \$208 per ton.
- In 2008, the total cost was expected to be offset by anticipated revenues. That is, the total cost of \$208 less \$48 in anticipated revenues produced the \$160 per ton net cost used in the report. However, in FY 2009 and 2010, no net revenues were received, so there was no offset to the total cost of \$208 per ton.
- In 2005, there was no charge for maintaining the bins. In 2008, a new bin maintenance charge of \$34,780 per year was added.
- The new materials processing charges added an estimated \$2 million in costs.
- Ultimately, the costs per ton were higher than anticipated because the city did not collect the projected 19,560 tons per year.³

Exhibit 4.7 shows the cost comparisons using cost per ton for the contracts and the refuse collection methods. The 2008 contract costs show the increases over the previous contract.

³ FY 2009 actual collections totaled 8,870 tons and FY 2010 collections were 5,780 tons.

**Exhibit 4.7
Cost Comparison between Contracts and Refuse Collection**

Collection Type	Cost Per Ton
2008 School/Community Recycling Estimate (Increase from \$78 per ton in 2005)	\$152
2008 Estimate of New Contract for Community Recycling Bin Program (Net of revenue estimates)	\$160
2008 Refuse Collection and Disposal	\$176
2008 Estimate of New Contract for Community Recycling Bin Program (No reduction by revenue)	\$208

Source: Department of Environmental Services

Estimate of Tons Collected Was Incorrect

For the 2005 contract, the department estimated collecting 12,216 tons of recycled materials, and projected 13,643 tons of recycled materials would be collected under the 2008 services contract. The department’s figures reported to the City Council were inaccurate and incorrectly estimated 19,560 tons of recyclable materials would be collected.⁴ See Exhibit 4.8.

⁴ ENV estimated 19,560 tons of recyclable materials would be collected (3,120 tons of mixed containers and 16,440 tons of paper including 1,002 tons of HI-5 containers) based on the 2005 estimates. The formula used was tons per bin (163 tons per bin) x the number of containers at the sites (120 containers). Under the 2008 service contract, the city projected collections totaling 13,643 tons of mixed recyclables (2,729 tons of mixed containers, 10,914 tons of paper, including 2,167 tons of HI-5 cans) from the 120 collection bins. These were based on the actual 2005 collections of 12,216 tons. The contract numbers differed from the 19,560 tons estimate reported to the City Council.

Exhibit 4.8 2008 Estimated Collections Compared to 2005 Collections

Collection	Mixed Recyclables Collected in Tons	Anticipated Percentage Increase Over 2005 Collections	Tons Per Bin
2005 Program Collections	12,216	-	163 (75 bins)
2008 Contract Collections Estimate	13,643	12%	114 (120 bins)
City Collections Report Estimate	19,560	60%	163 (120 bins)

Source: Department of Environmental Services

The formula used was based on the 2005 contract as shown below.

ENV Formula for Expected Collections from the Community Recycling Program

163 collected tons per bin X 120 container bins = 19,560 tons of mixed recyclables

Exhibit 4.9 shows the difference between the 2008 contract collection estimates, and the estimates reported to the City Council.

Exhibit 4.9 Difference Between 2008 Contract Collection Estimate and Reported Collection Estimate

Material Type	2008 Contract - Estimated Collection Amount (Tons)	Reported to City Council – Estimated Collection Amount (Tons)	Difference (Tons)
Mixed Containers	2,729	3,120	391
Paper	10,914	16,440	5,526
Total	13,643	19,560	5,917

Source: Department of Environmental Services

The estimated collection levels were optimistic

As shown below, the actual collections under the 2008 contract were much less than the estimate of 19,560 tons and also less than the 13,642 tons projected in the 2008 contract. The tons per bin estimates were also inaccurate.

Exhibit 4.10
2008-2012 Mixed Recyclables Actual Collections Compared to Estimates (Tons)

Year	Contract Recycling Estimate (Tons)	Actual Recycling Collected (Tons)	Difference (Tons)	Reported Recycling Estimate (Tons)	Actual Recycling Collected (Tons)	Difference (Tons)
2008	13,643	11,633	-2,010	19,560	11,633	-7,927
2009	13,643	8,899	-4,744	19,560	8,899	-10,661
2010	13,643	5,780	-7,863	19,560	5,780	-13,780
2011	13,643	4,704	-8,939	19,560	4,704	-14,856
2012	13,643	4,359	-9,284	19,560	4,359	-15,201
Total	68,215	35,375	-32,840	97,800	35,375	-62,425

Source: Department of Environmental Services

Exhibit 4.11
2008-2012 Estimated Tons Per Bin and Actual Results

Year	Contract Estimated (Tons Per Bin)	Actual Collected (Tons Per Bin)	Difference (Tons Per Bin)	Reported Estimated (Tons Per Bin)	Actual Collected (Tons Per Bin)	Difference (Tons Per Bin)
2008	113.69	96.94	-16.75	163	96.94	-66.06
2009	113.69	74.16	-39.53	163	74.16	-88.84
2010	113.69	48.17	-65.52	163	48.17	-114.83
2011	113.69	39.20	-74.49	163	39.20	-123.80
2012	113.69	36.33	-77.37	163	36.33	-126.68

Source: Department of Environmental Services

Increasing costs and declining collections made continuing the program impractical

In March 2006, the City Council passed an ordinance directing the ENV department to establish an island-wide program for the curbside collection of recyclable materials.

The implementation was to start in stages, but had to collect at least two types of recyclable materials, by July 1, 2007, and expand by two more types of recyclable materials by July 1, 2008. The collection would be conducted by the city's refuse collection system.⁵ The city council based its decision on the success of a previous pilot project and the need to reduce the amount of solid waste going to the landfill.

The island-wide curbside recycling collections impacted the School/Community Recycling Program, its original cost and collection estimates, and reduced the actual collections. That is, actual collections were lower and resulted in much higher costs per ton and per bin. As a result, the community recycling program declined soon after the 2008 service contract was signed.

Costs per bin and per ton increased as the program declined

As the program declined and the collection amounts dropped, the costs of the collected materials made the new contract expensive and continuation of the community recycling program was costly. The start of the 2008 processing contract proved to be very costly. In 2008, the department was increasing both the number of sites and bins in the School/Community Recycling program, and the processing costs increased. The new service contract assumed that the annual collection of mixed recyclable materials would be 13,643 tons per year for five years. The processing cost per ton would have varied from \$171.16 to \$187.92 if the estimated tons were collected.

Exhibit 4.12 shows the estimated processing costs per ton and annual processing costs.

⁵ The previous administration opposed the bill in its original form with its aggressive timetable for implementing a complete curbside recycling program. The new administration accepted the phased-in, slower implementation of curbside recycling, and the mayor approved the amended bill. Eight months later, in November 2006, 74.8% of the Honolulu voters approved a charter amendment that expanded the duties of ENV to include developing and administering a comprehensive curbside recycling system.

Exhibit 4.12
2008-2012 Estimated Processing Cost Per Ton

Year	Estimated Amount of Community Recycling (Tons)	Processing Cost Per Ton	Annual Processing Cost
2008	13,643	\$171.16	\$2,335,138
2009	13,643	\$179.69	\$2,451,538
2010	13,643	\$183.44	\$2,502,661
2011	13,643	\$184.64	\$2,519,057
2012	13,643	\$187.92	\$2,563,781
Total	68,215	Avg. \$181.37	\$12,372,175

Source: Department of Environmental Services

School/Community Collections Costs Exceeded Curbside Collection Costs

Based on our review of the ENV reports, our calculations indicated the average processing cost during the contract was \$321.47 per ton. Depending on the amount of recycled materials collected, our calculations indicated the actual collection costs for the School/ Community Recycling Program ranged from \$155.73 per ton to \$485.76 per ton more than the curbside recycling collections even though the same materials were collected.

Exhibit 4.13 shows the cost per ton for the mixed-recyclable collection curbside program (MRC) was less than the School/ Community Recycling Program (SCRCP).

Exhibit 4.13
Curbside Versus School/ Community Recycling Program
Costs (2008-2012)

Year	MRC Processing Cost Per Ton	SCRP Processing Cost Per Ton	SCRP Paid More Per Ton (\$ Difference)	Price Difference Per Ton (% Percent)
2008	\$45.00	\$200.73	\$155.73	346%
2009	\$45.00	\$275.48	\$230.48	512%
2010	\$45.00	\$432.99	\$387.99	862%
2011	\$49.75	\$535.51	\$485.76	976%
2012	\$51.46	\$358.75	\$307.29	597%

Source: Department of Environmental Services

As the School/ Community Recycling Program collections declined, the program became costly. The School/ Community service contract cost nearly \$11.4 million dollars to collect around 35,000 tons of recyclables, or \$321.47 per ton (See Exhibits 4.14 and 4.15). In comparison, the resident curbside collections totaled nearly 66,000 tons of recyclables and averaged about \$49 per ton.

For the five year period of 2008 to 2012, the annual costs of collecting recycled materials could have been reduced by \$10 million if the city had used the residential curbside collection program, instead of the School/ Community recycling program for collecting recycled materials.⁶ Exhibit 4.14 estimates the potential cost savings if curbside collecting were used in lieu of the School/ Community collections.

⁶ The city's processor was contracted to process an estimated 22,000 tons when curbside collection was implemented. The level of processing could absorb nearly all the actual collections of both programs. In 2012, the curbside recycling cost was \$51.46 per ton. In 2014, the city paid about \$54.59 per ton for processing curbside collections. The curbside recycling costs were cheaper than the cost of the School/Community bin contract.

Exhibit 4.14**Estimate of Potential Cost Savings School/Community Recycling Program (SCRP) Versus Municipal Residential Curbside Collections (MRC) (2008 – 2012)**

Year	Community Recycling (Tons)	SCRP Processing Cost Per Ton	SCRP Annual Processing Cost	MRC Processing Cost Per Ton	MRC Estimated Annual Processing Cost	Estimated Cost Savings
2008	11,633	\$200.73	\$2,335,138	\$45.00	\$523,485	\$1,811,653
2009	8,899	\$275.48	\$2,451,538	\$45.00	\$400,455	\$2,051,083
2010	5,780	\$432.99	\$2,502,661	\$45.00	\$260,100	\$2,242,561
2011	4,704	\$535.51	\$2,519,057	\$49.75	\$234,024	\$2,285,033
2012	4,359	\$358.75	\$1,563,781	\$51.46	\$224,314	\$1,339,467
	35,375		\$11,372,175		\$1,348,645	\$10,023,530

Source: Department of Environmental Services

The city paid around \$14.6 million dollars to support the School/Community and curbside recycling programs. The cost per ton for the combined collections was \$144.27 per ton.

Exhibit 4.15 quantifies the cost and collection differences between both programs and shows the curbside collection program is more cost efficient than the School/Community recycling program. More specifically the city paid \$8.2 million dollars more for its community recycling program, even though it collected around 30,000 tons less than the curbside program. Consequently, we determined the community recycling program was no longer a cost-efficient or effective program.

Exhibit 4.15**Costs Per Ton for SCRP and MRC Recycling Programs (2008-2012)**

Year	Tons Collected	Contract Costs	Cost Per Ton
Community Recycling Program	35,375	\$11,372,175	\$321.47
Curbside Recycling Program	65,511	\$3,182,886	\$48.59
Totals	100,886	\$14,555,061	\$144.27

Source: Department of Environmental Services

Other Factors Contributed to School/ Community Program Demise

Lack of convenience limited community participation and contributed to the program decline

The department reported that community participation in the program was limited by the lack of convenience of its school site drop-off system. Over its history, the program added more sites and increased financial incentives to schools in order to increase the recovery rates, but the department stated the number of individuals willing to make the effort to collect and drop-off their recyclables declined.

Higher revenue returns were designed to motivate community support, but it had no effect on increasing recovery rates. The expansion instead resulted in greater distribution of the tonnage per bin rather than bin-for-bin increases. While the 75 sites in 2005 collected 12,216 tons of material (163 tons/bin), the 120 sites in 2008 only collected 11,633 tons (97 tons/bin)⁷.

⁷ If the 12,216 tons were collected with 120 sites, the increase in sites would reduce tonnage per bin to 102 tons per bin. The department reported collection rates in the program were staying at 10,000 to 12,000 tons annually in the years prior to starting the residential curbside collections. It would have been better to distribute the total collections over the increased number of bins and reduce the per bin collections. Instead, the department increased both the number of bins and the collections per bin.

Reduced participation resulted in steep annual rises in cost per ton

The community recycling program actually collected less recyclable materials than estimated for 2008 through 2012. The program collected 32,840 tons less than expected. This resulted in an increase of cost per ton from \$126 per ton (2007) to \$200.73 per ton (2008); and increased from \$275.48 (2009) to \$535.51 per ton (2011). (See Exhibit 4.13)⁸.

Recommendations

We recommend that the Managing Director direct ENV to:

10. Not renew or continue the School/Community Recycling (white bin) Program.

⁸ According to ENV, the actual cost of processing a ton would not change, but the cost per ton became higher due to the contract structure.

Chapter 5

Conclusions and Recommendations

The city has a long history of using recycling to effectively divert municipal solid waste from landfills. The city has been recycling its municipal solid waste at a rate of between 24% and 40% over the past 20 years. This effectiveness has been promoted by creative recycling programs and laws and regulations to promote increased recycling.

One of the most effective, long lasting city recycling programs was the School/ Community bin recycling program, better known as the *white bin* program. The community recycling bin program was once a cost-effective way to collect mixed recyclables. The *white bin* program began its decline about the same time the city started its island-wide curbside recycling and collection program. As the program declined, there was not enough actions taken to offset the failing costs and declining participation.

Although a city ordinance and charter amendment in 2006 mandated curbside recycling, the delay¹ in implementing the curbside recycling resulted in both programs collecting the same kinds of recyclables and incurring duplicate costs. More specifically, the last contract for the *white bin* community recycling was in 2008, two years after the city council and the voter's authorized curbside recycling. The slow implementation of curbside recycling resulted in costs that were avoidable and the city missing revenue opportunities that were available through the marketing of the collected recyclables. Similarly, the city is incurring high costs and missing revenue opportunities that exist under the current recycling and waste-to energy H-POWER programs.

Although the city's recycling programs and ENV branch operations have successfully allowed the city to effectively divert and dispose of municipal solid waste, the city needs to do more to explore the state recommended practice of source reduction. By reducing the source of solid waste, the city can decrease the amount of future waste, reduce processing needs, and mitigate the impacts of waste before it enters the waste stream.

¹ According to ENV, the delay in implementing the program resulted from several factors, including discussions related to implementing the curbside program, the procurement of bins, negotiations with the union, a pilot program done to determine its effectiveness, and other actions needed prior to actual implementation of the program.

In the short term, the city must address issues such as the high cost of recycling; using H-POWER to reduce costs and generate more revenue; and exploiting potential revenues that can be used to offset the cost of collecting and recycling solid waste. For example, H-POWER contract amendments could be used to provide the city additional capacity to dispose of solid waste and to reduce solid waste and recycling costs. We estimated that these could save the city about \$7 million dollars in disposal costs and generate around \$29.5 million dollars in potential revenues. The changes may require modifications to state laws and permits.

Recommendations

We recommend that the Managing Director direct ENV to:

1. Initiate changes to city and state laws and/or permits to allow the city to divert recyclable materials to H-POWER.
2. Evaluate the long-term financial cost of city recycling programs and the ability of those costs to be offset by revenue or cost recapture provisions in recycling processing contracts.
3. Establish contract specifications that would allow for periodic adjustments to contract rates and guaranteed volumes based on changes in market conditions, price indexes, and material recovery volume.
4. Amend or re-bid recycling processing contracts that are cost unfavorable in either rates or volume guarantees if such action prior to the expiration of a contract would result in an overall cost savings.
5. Modify or cancel contracts that guarantee specific amounts of waste and guarantee electrical revenues to contractors.
6. Reduce city payments to contractors for waste that was never processed by modifying or cancelling contracts for recycled materials.
7. Encourage efforts toward source reduction through community education and support of legislative change to affect the amount of solid waste generated, reduce the volume to be recycled or otherwise disposed of, and which decrease overall collection and disposal costs.
8. Pursue changes to state law, solid waste permits, and city ordinance that would encourage the most cost and environmentally effective reuse of recyclable materials

including, but not limited to, conversion to energy through processing at the H-POWER waste-to-energy facility.

9. Continue working with community groups on educational programs to promote source reduction and recycling.
10. Not renew the School/Community Recycling (white bin) Program.

Management Response

The Department of Environmental Services (ENV) through the Managing Director concurred with the audit recommendations. ENV will pursue changes in city and state laws to give flexibility in sending recycled materials to H-POWER and to maximize the recycling of materials based on environmental and economic benefits. ENV will continue to amend or terminate unfavorable contracts terms; avoid waste guarantees in future contracts; address paying for waste that was never processed; and use public information programs to reduce waste at the source.

For Exhibit 2.4, ENV provided supplemental information that gross revenues during the audit period totaled \$20.8 million which was credited to the city's \$12.2 million processing costs. After sharing revenues with the contractor and taxes, the city realized \$3.2 million in net revenues. In our opinion, the ENV figures are too simplistic and may be misleading. During the sample period, different formulas were used to quantify the gross revenues and revenue sharing with the contractor. We therefore believe net revenue is more indicative of the program performance and a better way to show the program costs and revenues.

Nominal changes and edits were made to this report to enhance the report format and to better communicate the audit results. The substance of the findings and recommendations remain substantively unchanged. A copy of the Department of Environmental Services management response through the Managing Director is provided on page 46.

DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU

1000 ULUOHIA STREET, SUITE 308, KAPOLEI, HAWAII 96707
TELEPHONE: (808) 768-3486 • FAX: (808) 768-3487 • WEBSITE: <http://envhondolulu.org>

KIRK CALDWELL
MAYOR



October 23, 2017

LORI M.K. KAHIKINA, P.E.
DIRECTOR

TIMOTHY A. HOUGHTON
DEPUTY DIRECTOR

ROSS S. TANIMOTO, P.E.
DEPUTY DIRECTOR

IN REPLY REFER TO:
RR 17-018

Mr. Edwin S.W. Young
City Auditor
Office of the City Auditor
1001 Kamokila Boulevard, Suite 215
Kapolei, Hawaii 96707

Dear Mr. Young:

SUBJECT: Management Response to Final Draft Report dated
September 22, 2017, Audit of the City's Recycling Program

Thank you for the opportunity to provide comments on the Final Draft Report. We appreciate the opportunities for the Department of Environmental Services (ENV) to meet with the staff of the City Auditor's Office throughout this audit and to provide information pursuant to its development. The recommendations in the comprehensive and informative report will receive thorough consideration as we continue to work to implement improvements to the City's refuse collection and bulky item service.

ENV has reviewed the Final Draft Report and responds to the recommendations as follows:

Recommendations: The Managing Director should direct ENV to:

1. Initiate changes to city and state laws and/or permits to allow the city to divert recyclable materials to H-POWER.

ENV Response: ENV concurs with this recommendation and plans to pursue changes in City and State laws that will give it the flexibility to send materials to recycling or H-POWER based on environmental and economic considerations.

2. Evaluate the long-term financial cost of city recycling programs and the ability of those costs to be offset by revenue or cost recapture provisions in recycling processing contracts.

ENV Response: ENV concurs with this recommendation. ENV plans to pursue changes to City and State laws that will allow it to maximize the recycling of materials where recycling has the greatest environmental and economic benefit,

Mr. Edwin S.W. Young
October 23, 2017
Page 2

and send other materials to H-POWER where that provides the greatest environmental and economic benefit through generating renewable energy and revenue for the City.

3. Establish contract specifications that would allow for periodic adjustments to contract rates and guaranteed volumes based on changes in market conditions, price indexes, and material recovery volume.

ENV Response: ENV concurs with this recommendation. ENV's most recent, November 1, 2016, contract with its curbside mixed recyclables processor does this by allowing the service fee to be adjusted biannually based on a national recyclable commodity pricing index. This has resulted in ENV successfully reducing the contract service fee by about 25%.

4. Amend or re-bid recycling processing contracts that are cost unfavorable in either rates or volume guarantees if such action prior to the expiration of a contract would result in an overall cost savings.

ENV Response: ENV concurs with this recommendation. Recently, ENV terminated its curbside mixed recyclables processing early due to unfavorable terms, modified those terms, and re-solicited bids for the service. ENV will continue to pursue this approach with all of its recycling and solid waste management contracts.

5. Modify or cancel contracts that guarantee specific amounts of waste and guarantee electrical revenues to contractors.

ENV Response: ENV generally concurs with this recommendation. ENV currently has three contracts that include a waste guarantee but intends to avoid waste guarantees in future contracts. Future contracts to generate electricity will consider the best methods to identify the appropriate recipients of electrical revenue and provide the best benefit to the City. Minimum tonnage guarantee contracts are a common industry practice for recycling contracts. Recycling companies rely on consistent material throughput to sustain marketing agreements and ultimately business operations. This model reflects the need for contract service providers to cover the costs of their investment in facilities and the operating costs that do not vary based on volume.

6. Reduce city payments to contractors for waste that was never processed by modifying or cancelling contracts for recycled materials.

ENV Response: ENV concurs with this recommendation, to the extent it is permitted under the contract and by procurement code. It is best to address the issue of paying for waste that was never processed in the development of the contract specifications and during procurement.

Mr. Edwin S.W. Young
October 23, 2017
Page 3

7. Encourage efforts toward source reduction through community education and support of legislative change to affect the amount of solid waste generated so that volume to be recycled or otherwise disposed of is reduced which should decrease overall collection and disposal costs.

ENV Response: ENV concurs that source reduction, which is the elimination of waste before it is created, is a major component of waste management. Source reduction occurs upstream and involves the design, manufacturing and use of material in a way that eliminates waste. The City's ability to mandate source reduction is limited. However, through its public information programs and platforms, ENV can and will promote residential and commercial waste reduction, and encourage residents and businesses to pursue environmentally and economically cost effective strategies to reduce the waste sources.

8. Pursue changes to state law, solid waste permits, and city ordinance that would encourage the most cost and environmentally effective reuse of recyclable materials including, but not limited to, conversion to energy through processing at the H-POWER waste-to-energy facility.

ENV Response: ENV concurs with this recommendation and will encourage and propose such changes.

9. Continue working with community groups on educational programs to promote source reduction and recycling.

ENV Response: ENV concurs with this recommendation. ENV will continue to educate the public on effective solid waste management strategies, including source reduction and recycling, consistent with available funding.

10. The School/Community Recycling Program (white bin) should not be renewed.

ENV Response: ENV concurs with this recommendation and has no plans to revive this program.

ENV would like to supplement the information presented in Exhibit 2.4, Annual Mixed Recyclables Processing Costs and Revenues. The contract invoices provided showed total processing costs, total gross revenue generated from the curbside recyclables and total net revenue to the City for the eight year period of fiscal year 2009-2016. The analysis in subsection Processing Costs Are Increasing (page 22) states that processing costs for these eight years totaled almost \$12.2 million and the City received about \$3.2 million in net shared recycling revenue. Gross revenue for this period, including revenue from recyclable commodity sales, HI-5 container redemption deposits and handling fees, and non-deposit glass recycling subsidy payments, totaled approximately \$20.8 million. This gross revenue was credited to paying the City's \$12.2 million processing costs, and after sharing revenue with the contractor and taxes, the City realized the \$3.2 million in net revenue.

Mr. Edwin S.W. Young
October 23, 2017
Page 4

We appreciate that this audit was conducted in a collaborative manner between the City Auditor's office and the Department of Environmental Services. As indicated, we agree that many of the recommendations can have positive impacts on the City's recycling program. ENV staff will continue to look at ways to improve the environmental and financial efficacy of its recycling programs and looks forward to working with you as we explore these recommendations.

Sincerely,



Lori M.K. Kahikina, P.E.
Director

APPROVED:



Roy K. Amemiya, Jr.
Managing Director

cc: Nelson H. Koyanagi, Jr., Director
Department of Budget & Fiscal Services

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Appendix A

City Council Resolution 15-315



CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

No. 15-315

RESOLUTION

REQUESTING THE CITY AUDITOR TO CONDUCT A PERFORMANCE AUDIT OF THE CITY'S RECYCLING PROGRAM.

WHEREAS, in recognition of the need to conserve energy and natural resources and assist in preserving the natural beauty of Hawaii, as well as the shortage of appropriate landfill sites on Oahu, the City has a longstanding commitment to the recycling and reuse of waste materials; and

WHEREAS, Council Resolution 88-448, adopted on February 15, 1989, established a city policy to support the safe and efficient recycling of solid waste, including paper, glass, and metals; and

WHEREAS, Resolution 88-448 also requested the City administration to recycle solid waste to the extent feasible and encourage and promote recycling of solid waste by the public; and

WHEREAS, City ordinance addresses the recycling of discarded materials, including aluminum cans, batteries, corrugated cardboard, food waste, glass containers, green waste, and metal scraps; and

WHEREAS, the City has demonstrated its commitment to recycling by initiating programs such as island-wide curbside recycling, mandatory business recycling, mandatory city agency recycling, recyclable material drop-off facilities, and various public awareness and educational programs; and

WHEREAS, the City has in the past provided pick-up of recyclable materials dropped off by the public in white bins located at Oahu schools ("white bin program"), but this program has been severely curtailed or canceled by the City Administration; and

WHEREAS, recent media reports indicate, however, that there is interest among City officials for diverting recyclable materials to H-POWER (Honolulu Program of Waste and Energy Recovery) due in part to cost factors and certain inefficiencies regarding the recycling process; and

WHEREAS, the Council desires to receive information relating the City's recycling program, including the performance of the City agency administering the recycling program, the general effectiveness of the City's recycling efforts, and the effectiveness of specific City recycling programs such as the white bin program; now, therefore,



CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

No. 15-315

RESOLUTION

BE IT RESOLVED by the Council of the City and County of Honolulu that the City Auditor is requested to conduct a performance audit of the City's recycling program; and

BE IT FURTHER RESOLVED that the audit include but not be limited to the following:

- Evaluating the efficiency of the Refuse Division of the Department of Environmental Services in its recycling efforts,
- Determining the percentage of waste that is recyclable and not sent to HPOWER,
- Determining the percentage of waste that is recyclable but sent to HPOWER,
- Assessing the feasibility of expanding the City's recycling program to include areas or businesses where collection is not currently provided,
- Assessing the viability of the community recycling ("white bin") program, and
- Assessing the comparative costs and benefits of recycling versus burning of recyclable materials by the City;

and



CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII

No. 15-315

RESOLUTION

BE IT FINALLY RESOLVED that copies of this Resolution be transmitted to the City Auditor, the Mayor, the Managing Director, and the Director of Environmental Services.

RECEIVED
CITY CLERK
NOV 13 10:51 AM
HONOLULU, HI

INTRODUCED BY:

Ann Kobayashi

DATE OF INTRODUCTION:

NOV 13 2015
Honolulu, Hawaii

Councilmembers

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII
CERTIFICATE

RESOLUTION 15-315

Introduced: 11/13/15 By: ANN KOBAYASHI


Committee: PUBLIC WORKS,
INFRASTRUCTURE AND
SUSTAINABILITY

Title: RESOLUTION REQUESTING THE CITY AUDITOR TO CONDUCT A PERFORMANCE AUDIT OF THE CITY'S RECYCLING PROGRAM.

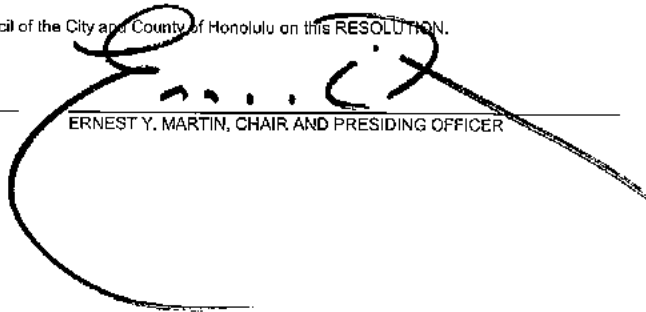
Voting Legend: * = Aye w/Reservations

11/19/15	PUBLIC WORKS, INFRASTRUCTURE AND SUSTAINABILITY	CR-443 – RESOLUTION REPORTED OUT OF COMMITTEE FOR ADOPTION.
12/09/15	COUNCIL	CR-443 AND RESOLUTION 15-315 WERE ADOPTED. 9 AYES: ANDERSON, ELEFANTE, FUKUNAGA, KOBAYASHI, MANAHAN, MARTIN, MENOR, OZAWA, PINE.

I hereby certify that the above is a true record of action by the Council of the City and County of Honolulu on this RESOLUTION.



GLEN I. TAKAHASHI, CITY CLERK



ERNEST Y. MARTIN, CHAIR AND PRESIDING OFFICER