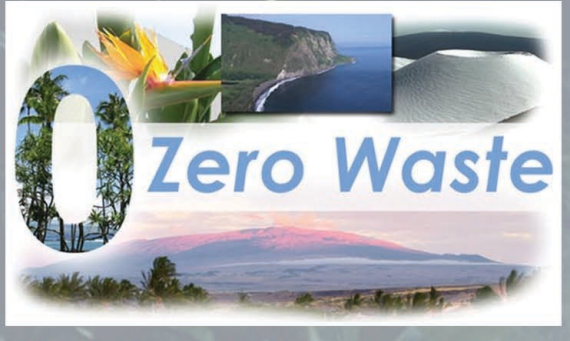
Final - December 2009

County of Hawai`i Integrated Resources and Solid Waste Management Plan Update

The Path to Zero Waste



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Acknowledgements

This document was prepared over many months with guidance and direction from County elected officials, tireless contributions from County staff, and input from stakeholders. In particular, the County gratefully acknowledges the contributions of the volunteer members of the Solid Waste Advisory Committee who helped shape and guide the development of this Integrated Resources and Solid Waste Management Plan update.

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Acronyms and Abbreviations

ACM	asbestos-containing material
AES	AES Hawai`i, Inc.
ARSC	Art of Recycling School Competition
BYOB	bring-your-own-bag
C&D	construction and demolition
CATI	computer-assisted telephone interviewing
CFR	*Code of Federal Regulations*
CRC	Certified Redemption Center
CRT	cathode ray tubes
°F	degrees Fahrenheit
DEM	Department of Environmental Management
DIY	do-it-yourself
DSD	Duales System Deutschland
E&P	education and promotion
EPA	U.S. Environmental Protection Agency
EPR	extended producer responsibility
FOG	fat, oil, and grease
ft^2	square feet
FTE	full-time equivalent
FY	fiscal year
GO	general obligation
HAR	Hawai`i Administrative Rule
HCPD	Hawai`i County Police Department
HDOH	Hawai`i Department of Health
HIEDB	Hawai`i Island Economic Development Board
HHW	household hazardous waste
HRS	Hawai`i Revised Statutes
HWS	Hawaiian Waste Systems
IRSWMP	Integrated Resources and Solid Waste Management Plan

KRRC	Kea`au Recycling & Reuse Center
LED	light emitting diode
MBT	mechanical-biological treatment
MMSU	mixed municipal solid waste
MRF	material recycling facilities
MSW	municipal solid waste
PAD	predictive auto dialer
PAYT	pay-as-you-throw
PCS	petroleum-contaminated soil
PRO	producer responsibility organizations
PVC	polyvinyl chloride
RBRC	Rechargeable Battery Recycling Corporation
RCRA	Resource Conservation and Recovery Act
RDF	refuse-derived fuel
RFP	request for proposal
RRC	recycling and reuse center
SHSL	South Hilo Sanitary Landfill
SWAC	Solid Waste Advisory Committee
SWD	Solid Waste Division
tpd	tons per day
UPW	United Public Workers
USDA	United States Department of Agriculture
VOC	volatile organic compound
WEEE	waste electrical and electronic equipment
WHCBF	West Hawai`i Compost and Biodiesel Facility
WHSL	West Hawai`i Sanitary Landfill
WTE	waste-to-energy

Executive Summary

Executive Summary

ES.1 Introduction

The 2009 County of Hawai`i Integrated Resources and Solid Waste Management Plan (IRSWMP or Plan) Update has been prepared in compliance with the Hawai`i Revised Statutes (HRS) Chapter 342G, which requires counties in Hawai`i to update and revise their solid waste management plans every five (5) years. The last update to the Plan was completed during 2002. Work on this revision of the Plan began in early 2008, and involved the participation of a Solid Waste Advisory Committee (SWAC), the County of Hawai`i (County) Environmental Management Commission, the public, the business community, the County of Hawai`i Department of Environmental Management (DEM), the Office of the Mayor, the Solid Waste Division (SWD), the County Council, and numerous other stakeholders.

This IRSWMP update includes an evaluation of waste management practices in the County, including waste reduction practices and programs, opportunities for implementation of zero waste policies and practices, the status of both active and closed landfills, and potential options for expanding and extending the capacity of the South Hilo Sanitary Landfill (SHSL). The results are organized by section in accordance with HRS 342G. Each section contains a description of the existing conditions, a summary of the 2002 Integrated Solid Waste Management Plan (ISWMP) update recommendations and status of implementation of those recommendations, a description of options available to the County for improvement of the solid waste management program, and recommendations for implementation of selected options.

ES.2 The Path to Zero Waste

In December 2007, the County Council adopted resolution 356-07 to "embrace and adopt the principles of zero waste as a long-term goal for Hawai`i County." The zero waste philosophy promotes the efficient use of materials to eliminate waste and pollution by emphasizing a closed-loop system of production and consumption, and moving in logical increments toward the goal of zero waste.

Concurrent with the development of this IRSWMP update, the County contracted with a consultant to develop a zero waste implementation plan[1]. The recommendations of that study were considered by SWAC and other stakeholders during the

[1] Recycle Hawai`i and Richard Anthony Associates. 2009. *Zero Waste Implementation Plan for the County of Hawai`i.*

development of this Plan. This IRSWMP update includes a number of specific recommendations from that study intended to keep the County moving forward on its path to zero waste.

The recommendations in this Plan are projected to increase the County's current recycling rate of 29 percent to a rate of 44 percent by the end of the planning period (FY 14-15).

ES.3 IRSWMP Update Process

Development of this IRSWMP update was guided by a 12-member SWAC, appointed by the Mayor. SWAC members participated in 13 meetings at which they reviewed draft plan sections, debated key issues, developed plan goals (provided in Section 1), and shaped recommendations. Presentations to the County Council's Environmental Management Committee were made on a monthly basis to solicit feedback from County Council members and the public on issues and options. In addition, input was requested from the public in a variety of forums including a series of public meetings, periodic meetings with community organizations, and routine posting of all draft documents and meeting minutes on the IRSWMP page of the County's Website (http://co.Hawai`i.hi.us/env_mng/iswmp.htm).

The key recommendations included in this IRSWMP update have consensus support from the SWAC and are intended to balance the many interests of the various stakeholders within the County. The recommendations developed during this process have been organized into a 5-year implementation plan. This IRSWMP update includes each of the plan sections covering various waste management topics, and the draft implementation plan. It includes responses to comments received from the State of Hawai`i Department of Health (HDOH), and is being submitted by the Mayor to the County Council for adoption, and then will be presented to HDOH for final approval. Final approval by HDOH is anticipated by the first quarter of 2010.

A summary of the IRSWMP recommendations and the draft implementation plan are presented below.

ES.4 Transitions from the 2002 ISWMP Update

The County's initial ISWMP, as required by state law (HRS 342G) was adopted on October 5, 1994. An update to that original plan was completed by the County and approved by the State of Hawai`i in December 31, 2002. A key issue addressed in the 2002 plan update was the pending closure of the SHSL, which was expected to reach capacity in the summer of 2004. The 2002 update included the following key recommendations:

- Construct no new landfills in East Hawai`i
- Emphasize the recovery of recyclable materials at the planned East Hawai`i Regional Sort Station, possibly by incorporating features of a material recovery facility (MRF)
- Procure a waste reduction facility for the East Hawai`i waste stream using either waste-to-energy, thermal gasification, or anaerobic digestion technology. (See Appendix A for a chronology of waste reduction study and procurement activities in Hawai`i County.)

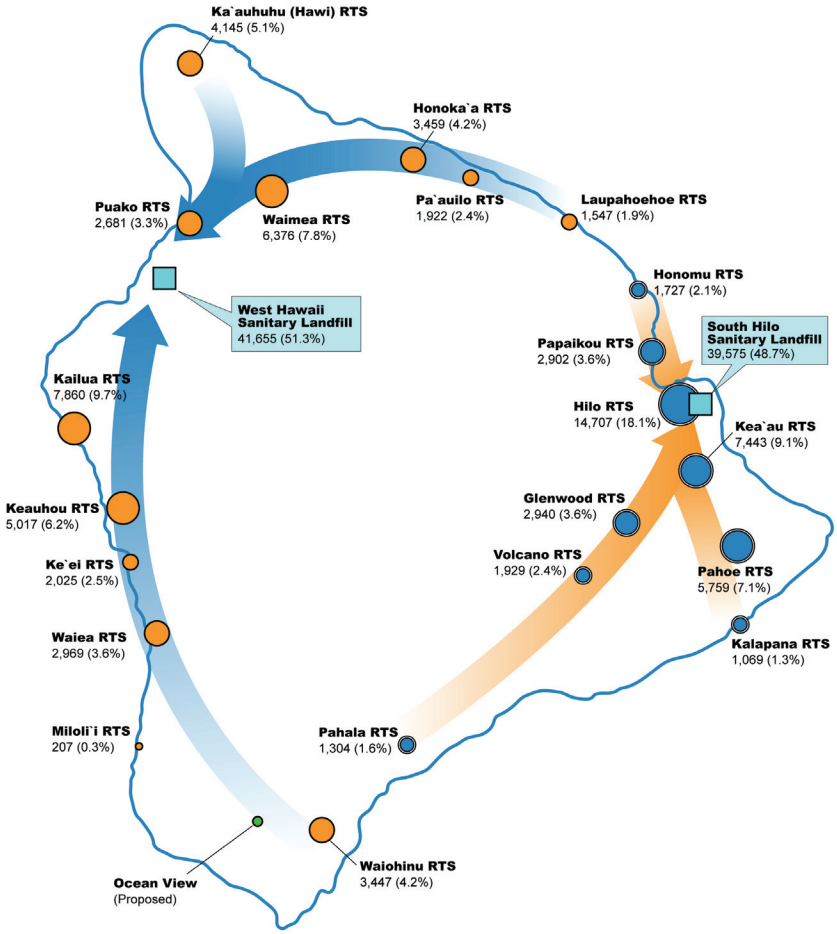
- Establish a County recycling program with a long list of elements that have the potential to increase waste diversion significantly

After adopting the 2002 ISWMP update, the County took steps toward implementing these recommendations, as follows:

- Expanding the number and scope of its recycling programs, which increased its recycling rate from 15 percent in FY 01-02 to 29 percent in FY 07-08
- Initiating development of elements of the East Hawai`i Regional Sort Station (now nearing completion) that could potentially serve a number of strategic waste management functions
- Issuing two (2) requests for proposals (RFPs) for construction of a waste reduction facility. The first RFP was cancelled by the County. The second procurement process resulted in a proposal for a 230-ton-per-day mass-burn waste-to-energy facility to be located at the SHSL. In 2008, the County Council rejected the recommended proposal, in part because the construction and operation costs were higher than anticipated.

Since 2006, the County has taken three (3) other important actions related to its solid waste management system:

1. It completed a comprehensive engineering evaluation of its twenty-one (21) recycling and transfer stations; this evaluation concluded that thirteen (13) have serious failures requiring reconstruction to correct, and another six (6) have serious problems that could be corrected without complete reconstruction.
2. It extended the capacity of the SHSL through innovative engineering solutions, such as creating a sliver fill and utilizing additional airspace resulting from creation of the sliver fill.
3. It prepared an expansion feasibility study and capital cost estimate to assess whether undertaking a seven (7) acre landfill expansion immediately adjacent to the SHSL would



be less expensive than long-hauling waste to the County's West Hawai`i Sanitary Landfill (WHSL) in Pu`uanahulu. The feasibility study did not support the seven (7) acre expansion and this option has been removed from further consideration.

In response to these developments, a key focus of this Plan update was evaluating a series of potential options for managing residuals that remain after source reduction, reuse, and recycling. After SWAC and stakeholder consideration of potential options, this Plan recommends the following residuals management strategy:

- Conduct a series of activities necessary to confirm the feasibility and cost-effectiveness of undertaking development of a new landfill within the quarry adjacent to the SHSL site.
- Update the feasibility of trucking waste to the WHSL site including further analysis of the Reload Facility and associated hauling operations, haul routes, traffic issues, and equipment acquisition plans.
- If construction of a new landfill within the quarry adjacent to the SHSL proves to be feasible and cost effective, then consider development of the new landfill. If not, truck waste to the WHSL site through the East Hawai`i Regional Sort Station Reload Facility while the SHSL is still active. If trucking waste to the WHSL is the more feasible option, the County may begin that activity while the SHSL is still active.
- Do not issue an RFP for waste reduction technology during this Plan's 5-year life cycle. During each subsequent solid waste management plan review period, evaluate whether new technology advances or other circumstances have occurred to warrant issuing an RFP for a conversion technology for part, or all, of the County residuals management stream.

In addition to activities associated with handling residual wastes, this Plan presents a series of recommendations geared towards taking the next steps on the path to zero waste including expanded programs targeted toward reducing the volume of landfill-bound waste and improving existing infrastructure. It also recommends reconstructing and upgrading one or more County recycling and transfer stations each year.

ES.5 Consequences of Inaction

This IRSWMP update outlines a series of recommendations for action during the County's next 5-year implementation period. Some of these programs will be controversial because they require changes to ingrained behaviors and increase costs in the short term. However, the status quo is not sustainable for the long term because of a series of challenges related to the County's existing system, demands from the public for increased services, and aging infrastructure. Should the County elect to maintain the status quo and not proceed with the Plan recommendations, some consequences of inaction could include the following:

- As evidenced by the recent failure of a retaining wall at the Pahoa Recycling and Transfer Station, the County's recycling and transfer stations would continue to deteriorate resulting in reduced service and potential public safety concerns.
- No further progress would be made in providing additional waste reduction, recycling, or reuse services that are desired by many County residents.

- No significant progress would be made in further reducing waste sent to landfills, thus resulting in a missed opportunity to maximize available landfill airspace, reduce greenhouse gas emissions and reduce the toxicity of waste materials sent to County landfills.
- The County's landfills would fill up faster, including the existing SHSL that, based on current waste generation and airspace consumption calculations, has an estimated five (5) to eight (8) years of remaining capacity.

Further, this Plan's proposed strategy of aggressively pursuing zero waste with continued local landfilling of the residuals is likely to be less expensive than investing in new conversion technologies.

ES.6 Summary of Recommendations

The following is a summary of the recommendations developed during the IRSWMP update.

Implementing a series of programs to reduce the volume of waste entering the landfills including:

- Ordinances requiring mandatory recycling/source separation of certain types of materials (i.e., implementation of landfill bans for select recyclables)
- Expanding the availability and increasing the convenience of reuse and recycling opportunities available to both residents and businesses

- Implementing a Pay-As-You-Throw (PAYT) system for delivery of waste materials at County recycling and transfer stations as currently practiced in more than 7,000 communities in the United States, and/or other revenue sources such as user fees, increased property taxes for solid waste management, or landfill tipping fee increases
- Implementing programs that firmly establish the path to zero waste within the County
- Implementing a variety of on-site composting programs, supplemented by a certified master composter program
- Improving and expanding the scope of educational programs within the County to increase public awareness of waste reduction and sustainable waste management practices
- Implementing programs within County departments to improve waste reduction practices

Making improvements to existing infrastructure to accommodate new waste reduction programs including:

- Reconstructing one or more recycling and transfer stations each year

- Restructuring operations of existing recycling and transfer stations and landfills including adding full-time transfer station attendants, reducing transfer station operating days and hours, and potentially closing selected transfer stations
- Completing improvements to all recycling and transfer stations to accommodate mandatory recycling/source separation and a PAYT system
- Completing upgrades to selected recycling and transfer stations to create additional reuse centers
- Siting, designing and constructing a MRF at the WHSL, and re-configuring the East Hawai`i Regional Sort Station Reload Facility to convert it to a MRF while the SHSL is active
- Acquisition of green waste composting operations at the WHSL or other sites
- Processing green waste at select recycling and transfer stations with a mobile tub grinder; material would be ground on-site and made available to residents as mulch

Conducting More In-Depth Evaluations of Two Options to Address the Need for Long-Term Capacity for Residuals Needing Disposal:

The SHSL is estimated to have between five (5) and eight (8) years of remaining capacity, and the County should act quickly to identify replacement treatment or disposal capacity. After analysis of many treatment and disposal options, this IRSWMP update recommends further evaluation of the following two options for providing long-term residuals management for East Hawai'i:

1. Re-configuring the Reload Facility at the SHSL, and trucking waste to West Hawai`i
2. Developing a new lined landfill in the existing quarry site adjacent to the current SHSL that would provide an estimated fifty (50) or more years of additional disposal capacity

The result of preliminary cost estimates prepared for this IRSWMP update are as follows, and a more detailed discussion of each option is provided in Section 9:

	Per-ton Cost (2009$)	
Landfill Options	**Low**	**High**
Transfer waste from East Hawai`i to the WHSL	$82	
Expand SHSL into quarries	$69	$73

While the preliminary analysis conducted to date indicates that the landfill expansion appears to be the less costly option, there are many risks associated with a new landfill that would not be present with the trucking option. Thus, further studies should be conducted to determine the feasibility, costs, risks, timelines, and social and environmental impacts associated with these options. For example, assessing the feasibility of the expanded landfill option will require consultation with HDOH, and preliminary engineering, environmental review, land use, and permitting activities. Updating the feasibility of the trucking option should including further analysis of the Reload Facility and associated hauling operations, haul routes, traffic issues, and equipment acquisition plans.

After these studies are complete, the County will be able to decide whether trucking waste from the Reload Facility to the WHSL or construction and operation of a new landfill within the quarry site adjacent to the SHSL is the preferred solution for managing the County's waste stream.

In addition to these two primary options, during each subsequent solid waste management plan review period, the County should continue to evaluate whether or not to issue an RFP for a conversion technology for part, or all, of the County's residuals management stream.

ES.7 Potential Future Directions

This Plan outlines the future direction for County programs during a 5-year implementation period. It is expected that other opportunities will no doubt arise that the County may find advantageous to pursue. One such opportunity currently in the preliminary planning stages is partnering with other counties to implement collaborative programs that may result in improved efficiency and benefits not available through each county's current waste management systems. Other Big Island projects may develop that would provide opportunities to process organic materials and convert them into soil products that could be used to support land development (including commercial projects and County projects such as regional parks), especially in West Hawai`i. It is important that the County continue to consider future long-term options that may have synergy with other County needs and opportunities.

ES.8 Draft Implementation Plan

This section provides a draft implementation plan for the County of Hawai`i IRSWMP update. During preparation of this Plan, the County has become immersed in a fiscal crisis resulting from the current worldwide economic recession. The County general fund has shrunk considerably affecting all County services, including solid waste management. In this environment, the funding and implementation of both existing services and the new initiatives outlined in this Plan are in question. Thus, the implementation plan that follows will be modified as the County works its way through this fiscal crisis. The DEM will make every effort to implement programs as shown below, but fiscal realities are likely to slow and alter the implementation plan outlined in this document. Further, the County may elect to use any and all funding methods that become available, rather than relying on a PAYT system.

The implementation plan includes a series of recommendations by Plan topic, and includes estimated expenditures for each recommendation during each year of the 5-year planning cycle. Implementation plan recommendations are grouped by funding mechanism into two categories: 1) those that would be implemented and funded through the County's solid waste fund (operations), and 2) those that would be implemented and funded through the County's capital improvement program (CIP). The draft implementation plan for operations is shown in Exhibit ES-1; the draft CIP is shown in Exhibit ES-2. The expenses are organized by Plan section, with a page number reference to indicate where the recommendation is discussed in the Plan. Programs that SWAC felt were of a high priority for implementing

early in the 5-year planning cycle are denoted with an "H" in the High Priority column of the exhibits.

A summary of solid waste fund revenues and expenses is shown in Exhibit ES-3. This information relies on cost projections for ongoing programs made by the County Solid Waste Division through FY 09-10, with the addition of the new programs recommended in this Plan. The net revenues shown are estimated revenues minus estimated expenses. Based on these estimates, the County will require additional funding beyond revenues projected from the PAYT system. The Plan recommends making up the shortfall using a combination of property tax and/or tipping fee increases. For reference purposes, if no property tax funds were used, a tipping fee increase of approximately $25 per ton (to about $110 per ton) would result in projected revenues equaling expenses throughout the 5-year implementation period. The exact mix of property taxes and tipping fee increases would be determined during the course of Plan implementation.

Since the last ISWMP update in 2002, the County of Hawai`i has made significant progress towards updating and improving its waste management practices. With the adoption of the zero waste philosophy and the cooperation of the various stakeholders within the County to implement the recommendations of this IRSWMP, the County is positioned to become a leading example of innovative waste management practices in the State. It should be noted that the County has adopted a resolution that encourages all Hawai`i counties to form a partnership and pursue collaborative solid waste solutions. Thus, this Plan also recommends maintaining flexibility to examine opportunities for cooperating with other counties to increase economies of scale and improve overall waste management practices for all State residents.

EXHIBIT ES-1
Implementation Plan for Operations

Program	Page No.	High Priority	Year 0 FY 09-10	Year 1 FY 10-11	Year 2 FY 11-12	Year 3 FY 12-13	Year 4 FY 13-14	Year 5 FY 14-15
Source Reduction								
Ordinance: waste reduction plans for building permits	3-17	H	$0	$0	$11,000	$0	$0	$0
Develop Extended Producer Responsibility (EPR) policy	3-17		$0	$0	$0	$0	$32,000	$0
EPR for difficult-to-recycle campaign	3-17		$0	$0	$0	$0	$0	$32,000
County government source reduction program	3-17	H	$0	$0	$32,000	$0	$0	$0
Business waste audit and education program	3-18		$0	$0	$0	$33,000	$34,000	$35,000
Visitor industry education and promotion	3-18		$0	$0	$0	$33,000	$0	$0
Pay-As-You-Throw at Recycling/Transfer Stations	3-17	H						
Program design			$51,000	$0	$0	$0	$0	$0
Education and outreach campaign			$103,000	$105,000	$108,000	$110,000	$55,000	$55,000
Outreach to retail businesses			$53,000	$53,000	$0	$0	$0	$0
Purchase and deliver bags/tags			$0	$784,000	$1,567,000	$1,607,000	$1,647,000	$1,688,000
Pilot program (free bags/tags, implement and evaluate)			$0	$53,000	$0	$0	$0	$0
Staff training			$0	$53,000	$0	$0	$0	$0
Implementation, monitoring and evaluation			$0	$0	$220,000	$100,000	$50,000	$50,000
Reuse								
Expand reuse facilities – more services; more facilities	3-18	H	$0	$0	$94,000	$193,000	$198,000	$203,000
Reuse education, outreach, and public awareness	3-18	H	$0	$0	$27,000	$0	$0	$0
Public-private partnership with organizations (e.g., Goodwill)	3-18		$0	$0	$0	$28,000	$0	$0
Education, Outreach, and Public Awareness								
3-year education and social marketing plan	5-11	H	$0	$79,000	$0	$0	$85,000	$0
Zero waste education and public awareness coordinator	5-11		$0	$0	$54,000	$55,000	$57,000	$58,000
Implement communitywide social marketing plan	5-11	H	$0	$0	$0	$83,000	$85,000	$87,000
Recycling								
Establish differential tip fee ordinance	4-32	H	$0	$0	$27,000	$0	$0	$0
Establish mandatory source separation and recycling ordinance	4-32	H	$0	$0	$27,000	$0	$0	$0

EXHIBIT ES-1
Implementation Plan for Operations

Program	Page No.	High Priority	Year 0 FY 09-10	Year 1 FY 10-11	Year 2 FY 11-12	Year 3 FY 12-13	Year 4 FY 13-14	Year 5 FY 14-15
Establish opportunity to recycle legislation	4-32	H	$0	$0	$27,000	$0	$0	$0
Establish County "buy recycled" policy	4-32	H	$0	$0	$0	$54,000	$0	$0
Explore State/Regional zero waste marketing and public policy	4-32		$0	$0	$0	$28,000	$0	$0
State, outreach: change school collection contracts to add recycling	4-32	H						No added cost
Recycle art campaign	4-33		$0	$0	$0	$9,000	$9,000	$9,000
Commercial recycling	4-33							
Commercial recycling specialist			$0	$0	$0	$55,000	$57,000	$58,000
Education, outreach and awareness			$0	$0	$27,000	$28,000	$28,000	$29,000
Added recycling at recycling/transfer stations (mandatory recycling)	4-32	H						
Improved signage			$0	$0	$108,000	$110,000	$0	$0
Education, outreach and awareness			$0	$0	$27,000	$28,000	$28,000	$29,000
Increased recyclable transportation, processing, and sales (less avoided cost)			$0	$0	$0	$2,245,000	$3,068,000	$4,716,000
Materials recovery facility for East Hawai`i (using existing re-load facility)	4-33	H						
Operations, labor (2 added FTE - County or private)			$0	$0	$0	$110,000	$113,000	$116,000
Maintenance and miscellaneous supplies			$0	$0	$0	$22,000	$23,000	$23,000
Materials recovery facility (baling/storage) for West Hawai`i	4-33	H						
Operations, labor (3 added FTE - County or private)			$0	$0	$0	$0	$170,000	$174,000
Maintenance and miscellaneous supplies			$0	$0	$0	$0	$45,000	$46,000
County park and public place recycling	4-33	H						
Planning			$0	$0	$0	$0	$34,000	$0
Bins			$0	$0	$0	$0	$20,000	$0
Operations			$0	$0	$0	$0	$0	$696,000
Event recycling	4-33	H	$0	$0	$0	$11,000	$11,000	$12,000
Organics								
Modify zoning rules/County code	4-34	H	$0	$32,000	$0	$0	$0	$0
Organics ban implementation study	4-34		$0	$79,000	$0	$0	$0	$0

EXHIBIT ES-1
Implementation Plan for Operations

Program	Page No.	High Priority	Year 0 FY 09-10	Year 1 FY 10-11	Year 2 FY 11-12	Year 3 FY 12-13	Year 4 FY 13-14	Year 5 FY 14-15
Organics coordinator	4-34	H	$0	$0	$54,000	$55,000	$57,000	$58,000
On-site composting program (subsidized bins and distribution)	4-34	H						
Planning			$0	$32,000	$32,000	$0	$0	$0
Residences - dist. and education (3,000 units/yr, 25% penetration)			$0	$0	$0	$217,000	$334,000	$342,000
Businesses (similar level of effort to residential)			$0	$0	$0	$217,000	$334,000	$342,000
Certified master composter program	4-34							
Planning			$0	$0	$0	$33,000	$0	$0
Implementation			$0	$0	$0	$0	$28,000	$29,000
Training program and guides for farmers	4-34		$0	$0	$0	$0	$68,000	$70,000
Stop wasting food - program with local food banks	4-34		$0	$0	$0	$22,000	$23,000	$23,000
Add green waste dropoff locations at recycling/transfer stations	4-34	H	$0	$0	$108,000	$110,000	$0	$0
Partner to help establish compost demonstration gardens	4-34		$0	$0	$0	$37,000	$38,000	$0
Mobile tub grinder for recycling/transfer stations (contract or County)	4-35	H	$0	$0	$269,000	$276,000	$283,000	$290,000
Conduct pilot food waste composting project	4-35			$0	$108,000	$110,000	$0	$0
Upgrade mulch facility to organics composting facility for West Hawai`i	4-35	H	$0	$0	$1,093,000	$1,120,000	$1,148,000	$1,177,000
Collection and Transfer								
Licensing and recycling requirements for residential collection firms	8-30		$0	$0	$0	$33,000	$0	$0
Change permits to allow small commercial recycling at stations (<1 ton)	8-30	H			In progress - no added cost			
Full-time staffing and reduced operating hours	8-29	H			No added cost			
Operational efficiency analysis	8-30		$0	$131,000	$0	$0	$0	$0
Household Hazardous Waste (HHW) / Electronic Waste (E-Waste)								
Hire HHW / E-waste Specialist	6-9		$0	$0	$0	$55,000	$57,000	$58,000
HHW/ e-waste education, outreach, and public awareness	6-9		$0	$0	$0	$28,000	$28,000	$29,000
Explore e-waste take back programs with State and manufacturers/sellers	6-9		$0	$0	$0	$33,000	$0	$0
Develop e-scrap campaign (anything with a plug)	6-10		$0	$0	$0	$33,000	$0	$0

EXHIBIT ES-1
Implementation Plan for Operations

Program	Page No.	High Priority	Year 0 FY 09-10	Year 1 FY 10-11	Year 2 FY 11-12	Year 3 FY 12-13	Year 4 FY 13-14	Year 5 FY 14-15
Explore legislative actions for takeback of hazardous products and packaging	6-10		$0	$0	$0	$33,000	$0	$0
Additional HHW collection events (10 to 12 additional per year)	6-10	H	$0	$0	$215,000	$442,000	$453,000	$464,000
Residuals Management								
Engage in dialog with State/Counties about joint solutions	9-32		$0	$32,000	$0	$0	$0	$0
Feasibility study of reclaiming old Kona landfill	9-32		$0	$0	$0	$135,000	$0	$0
Master plan for West Hawai`i Sanitary Landfill	9-32	H	$0	$0	$130,000	$0	$0	$0
Master plan for South Hilo Sanitary Landfill	9-32	H	$0	$0	$130,000	$0	$0	$0
Administration and Funding								
Illegal dumping program	10-10	H						
Research and enhanced education program				$0	$0	$54,000	$55,000	$57,000
Signage			$0	$0	$108,000	$110,000	$0	$0
Change enforcement structure					Staff time, no added cost			
Total			**$207,000**	**$1,433,000**	**$4,657,000**	**$8,096,000**	**$8,757,000**	**$11,056,000**

Note: Assumes 2.5 percent annual inflation.

EXHIBIT ES-2
Implementation Plan for Capital Improvement Program (CIP)

CIP Costs in Year of Expenditure Dollars	Page No.	High Priority	Year 0 FY 09-10	Year 1 FY 10-11	Year 2 FY 11-12	Year 3 FY 12-13	Year 4 FY 13-14	Year 5 FY 14-15
Recycling								
Materials recovery facility for East Hawai`i (using existing re-load facility)	4-33	H						
Equipment (baler, bobcat, chassis)			$0	$0	$400,000	$0	$0	$0
Materials recovery facility for West Hawai`i	4-33	H	$0	$0	$7,000,000	$0	$0	$0
Collection and Transfer								
Reconstruct one station per year	8-29	H	$0	$0	$0	$5,000,000	$5,500,000	$6,000,000
South Kona - Ocean View Recycling/ Transfer Station	8-29		$0	$0	$5,000,000	$0	$0	$0
Hilo baseyard facilities	8-30	H	$0	$0	$2,000,000	$0	$0	$0
Equipment maintenance facility	8-30	H	$0	$0	$1,000,000	$8,000,000	$0	$0
Residuals Management								
Quarry Expansion	9-31	H						
Geotechnical investigation			$0	$200,000	$0	$0	$0	$0
Groundwater monitoring plan			$0	$250,000	$0	$0	$0	$0
Design, permitting, cost estimates			$170,000	$170,000	$180,000	$190,000	$210,000	
Environmental review			$62,000	$105,000	$151,000	$0	$0	$0
Land use approvals			$51,000	$53,000	$54,000	$55,000	$0	$0
Old Kona Scrap Metal Yard Remediation	9-32	H	$0	$0	$1,800,000	$0	$0	$0
Old Closed Kailua Landfill Remediation	9-32		$0	$0	$10,000,000	$0	$0	$0
South Hilo Sanitary Landfill Closure			$0	$0	$0	$0	$0	Beyond 2015
Total			**$283,000**	**$778,000**	**$15,785,000**	**$25,045,000**	**$5,710,000**	**$6,000,000**

Note: Assumes 2.5 percent annual inflation.

EXHIBIT ES-3
Implementation Plan – County Operating Revenues and Expenses

	Actual FY 07-08	FY 08-09	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15
Solid Waste (Operating) Fund								
Revenues								
Federal Grants	$27,260	$0	$0	$0	$0	$0	$0	$0
State Grants								
Glass Recycling Program	$0	$155,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000
Used Oil Collection/Disposal	$0	$67,500	$59,390	$59,390	$59,390	$59,390	$59,390	$59,390
Beverage Container Deposit Program	$423,934	$940,809	$996,108	$996,108	$996,108	$996,108	$996,108	$996,108
Landfill Tipping Fees and Permit Fees	$9,213,574	$7,564,000	$7,456,000	$8,281,000	$8,444,000	$8,314,000	$8,247,000	$8,170,000
Pay-as-You-Throw at Transfer Stations	$0	$0	$0	$3,757,000	$10,720,000	$10,555,000	$10,470,000	$10,372,000
General Fund								
General Fund Balance From Previous Year	$0	$3,046,293	$0	$0	$0	$0	$0	$0
Transfer from General Fund	$17,352,726	$19,147,721	$16,083,604	$16,154,401	$16,938,697	$19,938,697	$21,938,697	$21,938,697
Miscellaneous Revenue	$3,482	$0	$0	$0	$0	$0	$0	$0
Additional Tip Fee or Property Taxes	($1,234,654)	$1,356,677	$2,709,898	$62,101	$174,805	$1,726,805	$1,379,805	$4,713,805
Total Solid Waste Fund	**$25,786,323**	**$32,278,000**	**$27,360,000**	**$29,365,000**	**$37,388,000**	**$41,645,000**	**$43,146,000**	**$46,305,000**
Expenses								
Administration	$1,226,555	$956,000	$968,000	$1,024,000	$1,179,000	$1,207,000	$1,125,000	$1,153,000
Reduction, Reuse, Recycling	$4,297,674	$7,488,000	$5,382,000	$6,624,000	$11,773,000	$15,489,000	$16,619,000	$19,115,000
Recycling and Transfer Stations	$8,797,808	$10,249,000	$7,126,000	$7,485,000	$9,588,000	$9,861,000	$10,074,000	$10,326,000
South Hilo Sanitary Landfill	$3,556,342	$4,738,000	$4,667,000	$4,784,000	$5,034,000	$5,027,000	$5,153,000	$5,282,000
West Hawai`i Sanitary Landfill	$7,657,945	$8,377,000	$8,712,000	$8,930,000	$9,283,000	$9,382,000	$9,617,000	$9,857,000
Closed Landfills	$250,000	$470,000	$505,000	$518,000	$531,000	$679,000	$558,000	$572,000
Total Operating Expenses	**$25,786,323**	**$32,278,000**	**$27,360,000**	**$29,365,000**	**$37,388,000**	**$41,645,000**	**$43,146,000**	**$46,305,000**
Net Operating Revenues	$0	$0	$0	$0	$0	$0	$0	$0

Based on Solid Waste Division forecasts for ongoing programs through FY 09-10, and Plan implementation. Assumes 2.5 percent annual inflation.

SECTION 1

Introduction

1.0 Introduction

This update to the Hawai`i County solid waste management plan (the Plan) presents an evaluation of the County's existing waste management practices and programs, explores opportunities for implementation of zero waste policies and practices, and outlines potential options for improving the waste management program. In addition, the Plan presents information on the status of active and closed landfills, historical information regarding the County's evaluation of waste reduction technology alternatives during the past decade, and potential options for expanding and extending the capacity of the South Hilo Sanitary Landfill (SHSL). The County of Hawai`i produced this plan in accordance with the requirements of HRS 342G.

The information in the Plan is organized by section according to HRS 342G. Each section contains a description of the existing waste management practices and conditions, a brief summary of previous plan recommendations along with the status of implementation of those recommendations, a description of options available to the County for improvement of the waste management program, and recommendations for implementation.

Development of this IRSWMP update was guided by a 12-member Solid Waste Advisory Committee (SWAC), appointed by the Mayor. SWAC members participated in 13 meetings at which they reviewed draft plan sections, debated key issues, developed plan goals (provided in Section 1), and shaped recommendations. Presentations to the County Council Environmental Management Committee were made on a monthly basis to solicit feedback from County Council members and the public on issues and options. In addition, input was requested from the public in a variety of forums including a series of public meetings, periodic meetings with community organizations, and routine posting of all draft documents and meeting minutes on the IRSWMP page of the County's website (http://co.Hawai`i.hi.us/env_mng/iswmp.htm).

The key recommendations included in this IRSWMP update have consensus support from the SWAC and are intended to balance the many interests of the various stakeholders within the County. The recommendations developed during this process have been organized into a 5-year implementation plan. This IRSWMP update includes each of the plan sections covering various waste management topics, and the draft implementation plan. It includes responses to comments received from the State of Hawai`i Department of Health (HDOH), and is being submitted by the Mayor to the County Council for adoption. After adoption by the Council, the Plan will be presented to HDOH for final approval. Final approval by HDOH is anticipated by the first quarter of 2010.

1.1 On the Path to Zero Waste

Historically, waste management in many areas including Hawai`i County consisted of collection, transfer, and disposal of garbage with a primary focus on protecting public health. Modern waste management practices must consider multiple driving factors, including protecting public health and the environment on both a local and global scale. The

paradigm for waste management during the first part of the 21st century has shifted away from the concept of garbage being simply considered as "waste". The zero waste philosophy, waste reduction, recycling, sustainability, and product stewardship are key concepts that drive contemporary approaches to waste management.

Many municipalities in the U.S. and elsewhere are incorporating these concepts into their waste management programs and realizing significant benefits. Concurrent with the development of this IRSWMP update, the County contracted with a consultant to develop a zero waste implementation plan[1]. The recommendations of that study were considered by SWAC and other stakeholders during the development of this plan. This IRSWMP update includes a number of specific recommendations from that study that will keep the County moving forward on its journey toward zero waste.

The County of Hawai`i has made significant progress towards implementation of updated waste management practices, and with the adoption of the zero waste philosophy, and completion of this IRSWMP, is positioned to become a leading example of innovative waste management practices in the State.

1.2 Goals of the Integrated Resources and Solid Waste Management Plan Update

This IRSWMP presents not only recommendations for the short-term, but a vision for solid waste management within Hawai`i County for the next few decades. Consideration was given to the current state of waste management technology in the U.S. and internationally, the history of waste management practices in the County, and an assessment of what waste management practices are being used successfully in other jurisdictions. The objective was to develop county-wide solutions for both the near- and long-term, that take into account the desires of the many stakeholders, while balancing the fiscal realities of operating the selected programs. It was recognized that selected programs must be both implementable and sustainable in order to be successful.

The following goal statement and the individual goals that follow were developed during a series of meetings and adopted unanimously by members of the County's SWAC.

"The people of the County of Hawai`i understand they are a part of the global community and can create a model for others. They value the environment, healthy social relationships, fiscal prudence, and long-term goals coupled with specific, local accomplishments. The following long-term goals will guide us as we develop an implementable Plan."

The goals presented below were used to guide the development of waste management options and the resulting recommendations of this IRSWMP update.

- Sustainability – To ensure that programs and actions meet the environmental, economic, and social equity needs of the present without compromising the ability of future generations to meet their own needs.

[1] Recycle Hawaii and Richard Anthony Associates. March 14, 2009. *Zero Waste Implementation Plan for County of Hawai`i.*

- Make Progress Toward Zero Waste - To act in a consistent manner with the zero waste concept. This ongoing process views waste as an inefficient use of resources, and seeks to eliminate all discards to landfills by reducing waste, reuse (and repair) of still good stuff, and recycling/composting by all County residents, visitors, businesses, and institutions.
- Efficient and Affordable – To balance funds available for managing solid waste with other County priorities. The Plan will identify programs that get the best value (bang for the buck) for County ratepayers and taxpayers.
- Minimize Environmental Pollution – To improve the environment and reduce our greenhouse gas emissions, the Plan will emphasize transportation efficiencies, support material reuse and recycling, and minimize organic materials sent to landfill.
- Litter-free – To eliminate illegal dumping on public and private lands. The Plan will include legislation, education, and outreach programs.
- Sound Finances with Appropriate Incentives – To include financial incentives that will speed us down the path towards zero waste, such as pay-as-you-throw (PAYT), while ensuring that the Division has sufficient funds to pay for the services it provides.
- Customer Service – To share aloha as well as information.

The goals listed above are intended to support all aspects of plan implementation including the following:

- Policy – In County legislation and support for State legislation
- Funding – Move towards PAYT as well as other funding sources (grants)
- Operations – Reuse and recycling, household hazardous waste collection, residuals management, recycling and transfer stations, and special events
- Regulatory/Legal – Consistency and compliance with all federal, state, and county requirements
- Education and Outreach – For County employees, residents, visitors, businesses, and institutions
- Management and Employee Safety – Working in partnership with the unions (the United Public Workers Union and the Hawai`i Government Employees Association)

The integrated approach to solid waste management developed during this Plan update will be challenging and require a significant amount of public education and stakeholder participation in order to ultimately be successful. The goals were developed to address the overarching waste management goals of the community, in order to foster collaboration between the various stakeholders during implementation of the Plan recommendations.

1.3 Draft Implementation Plan

The draft implementation plan for the County of Hawai`i IRSWMP Update includes a series of recommendations, with estimates of the required annual operations expenditures, and capital improvement funds required for their implementation. These recommendations are provided in Section 10. An initial draft implementation plan was distributed to stakeholders in March 2009 for comment, and a final draft was made available to the public for a two-month public comment period during September and October 2009. The draft plan was then modified based on subsequent meetings with the SWAC and the County Council Environmental Management Committee, comments received at public hearings during November 2009, and written comments received during the two-month public comment period.

1.4 Organization of this Document

The remainder of this IRSWMP is organized into the sections listed below. As noted previously, each section contains a summary of the existing conditions and waste management practices related to the specific topic covered, potential issues or concerns, and options that the County may consider to improve the program. Each section concludes with recommendations for implementation during the next five years.

- Section 2.0, Waste Stream Assessment, provides an assessment of the Hawai`i County waste stream including background information about population and employment, historical and forecast waste generation, recycling, and disposal, and information about waste composition.
- Section 3.0, Source Reduction, discusses existing source reduction activities within Hawai`i County, identifies current issues and concerns with respect to current source reduction practices, and presents options and recommendations for achieving further source reduction.
- Section 4.0, Recycling, Bioconversion, and Markets, describes existing recycling and bioconversion activities within Hawai`i County, identifies current issues and concerns with respect to current recycling, bioconversion, and marketing practices, and presents options and recommendations for achieving the County's recycling and bioconversion goals.
- Section 5.0, Public Education and Information, contains existing public education activities within Hawai`i County, identifies current issues and concerns with respect to public education, and presents options and recommendations that will help enhance educational opportunities.
- Section 6.0, Household Hazardous Waste & Electronic Waste, describes the current status of the household hazardous waste (HHW) and electronic waste (e-waste) collection and disposal system within Hawai`i County, identifies current issues and concerns, and presents options and recommendations for achieving the County's HHW and e-waste goals.

- Section 7.0, Special Waste, defines special wastes and describes existing conditions, potential improvements, and recommendations for specials wastes including asbestos, used oil, petroleum-contaminated soil, used batteries, sewage sludge, agricultural and farm-generated waste, medical waste, used tires, white goods, and derelict vehicles.
- Section 8.0, Collection and Transfer, describes current conditions of the existing solid waste collection and transfer system within Hawai`i County, identifies current issues and concerns, and presents options and recommendations for achieving the County's solid waste collection and transfer goals.
- Section 9.0, Residuals Management, provides current conditions of the existing residuals management system within Hawai`i County, identifies current issues and concerns, and presents options and recommendations for managing the residuals remaining after source reduction, reuse, and recycling.
- Section 10.0, Administration, Funding, and Implementation, discusses current conditions of the existing administration and funding within Hawai`i County, identifies current issues and concerns, presents options currently under consideration by the County, and presents the implementation plan for this IRSWMP update.

SECTION 2

Waste Stream Assessment

2.0 Waste Stream Assessment

2.1 Introduction

This section provides an assessment of the Hawai`i County waste stream including background information about population and employment, historical and forecast waste generation, recycling, and disposal, and information about waste composition. The waste stream projections provided in this section include the effects of recommended reduction, re-use, and recycling programs outlined in this IRSWMP update.

2.2 Population and Employment

This section provides historical and forecast information about population and employment. These variables, along with other factors such as increases in tourism and construction activity, are factors that contribute to increase waste generation within Hawai`i County.

Historical resident and de facto population for Hawai`i County is shown in Exhibit 2-1. The de facto population is a measure used by the State of Hawaii to account for the effects of tourism[1]. As shown, the population of Hawai`i County was 173,057 in 2007. The County population increased at an average annual rate of 2.7 percent during the 1980s, and has increased at an average annual rate of 2.2 percent since that time. The de facto population has increased somewhat more rapidly than the resident population.

Exhibit 2-2 provides a forecast of Hawai`i County resident population growth through the year 2030 in each of the County's nine council districts, and summaries for West Hawai`i and East Hawai`i. As shown, future population growth is projected to be slower than in the County's recent past, with more rapid growth expected in West Hawai`i than in East Hawai`i.

EXHIBIT 2-1
Historical Population, Hawai`i County

	Persons		Average Annual Growth		Ratio De Facto/ Resident
Year	Resident	De Facto	Resident	De Facto	
1980	92,053	98,588			1.07
1990	120,317	133,202	2.7%	3.1%	1.11
2000	148,677	167,063	2.1%	2.3%	1.12
2006	169,419	191,733	2.2%	2.3%	1.13
2007	173,057	not available	-	-	-

Source: Hawai`i Department of Business, Economic Development, and Tourism. 2008. Hawai`i County Data Book, Table 1.1 last modified 4/16/08. Accessed at: http://www.co.Hawai`i.hi.us/databook_current/section01.htm

[1] De facto population is defined 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.

EXHIBIT 2-2
Resident Population Forecast by District, Hawai`i County

District	2000	2005	2010	2015	2020	2025	2030
Population							
Puna	31,458	37,054	42,546	48,361	54,322	57,827	61,452
South Hilo	47,572	47,168	47,427	47,209	46,437	49,432	52,531
North Hilo	1,727	1,675	1,718	1,746	1,752	1,865	1,982
Hamakua	6,132	6,316	6,554	6,733	6,834	7,275	7,731
North Kohala	6,062	6,750	7,909	9,173	10,514	11,192	11,893
South Kohala	13,183	15,962	18,165	20,463	22,780	24,250	25,770
North Kona	28,655	31,056	33,988	36,826	39,427	41,971	44,602
South Kona	8,623	10,451	11,402	12,314	13,143	13,991	14,868
Ka'u	5,850	6,568	7,043	7,475	7,842	8,347	8,871
Total	**149,261**	**163,000**	**176,750**	**190,300**	**203,050**	**216,150**	**229,700**
West Hawai`i	56,522	64,220	71,463	78,776	85,863	91,403	97,133
East Hawai`i	92,739	98,780	105,287	111,524	117,187	124,747	132,567
Annual Growth Rate							
West Hawai`i		2.6%	2.2%	2.0%	1.7%	1.3%	1.2%
East Hawai`i		1.3%	1.3%	1.2%	1.0%	1.3%	1.2%

Sources: The proportion of residents in each District in each year is from the County of Hawai`i General Plan 2005 (Amended December 2006), Table 2-2. Source: Economic Assessment, PFK Hawai`i, January 2000.

Those proportions were multiplied by County total forecast total resident population in each year from Hawai`i Department of Business, Economic Development, and Tourism. 2008. Population and Economic Projections for the State of Hawai`i to 2035, DBEDT 2035 Series. Accessed at: http://Hawai`i.gov/dbedt/info/economic/data_reports/2035LongRangeSeries/2035_Long_Range_Series_Report1.pdf

Historical employment in Hawai`i County is shown in Exhibit 2-3. Employment has grown substantially in recent years, from 40,850 in 1980 to 81,300 in 2006, which corresponds to an average annual growth rate of 2.7 percent over that period.

Forecast employment for Hawai`i County is shown in Exhibit 2-4. Employment is forecast to increase at an annual rate of 2.3 percent between 2006 and 2010, at an annual rate of 1.8 percent between 2011 and 2015, and at an annual rate of 1.5 percent thereafter. As noted in the table, the state of Hawai`i's employment forecast is based on information from a source that differs from the historical data reported in Exhibit 2-3.

EXHIBIT 2-3
Historical Employment, Hawai`i County

Year	Employment	Average Annual Growth
1980	40,850	
1990	55,200	3.1%
2000	65,450	1.7%
2006	81,300	3.7%
1980 - 2006		2.7%

Source: Civilian employment from County of Hawai`i Data Book Section 11: Labor Force, Employment & Earnings, Table 11.4. Accessed at: http://www.Hawai`i-county.com/databook_current/Table%2011/11.4.pdf

EXHIBIT 2-4
Forecast Employment, Hawai`i County

	2005	2010	2015	2020	2025	2030
Civilian Jobs	92,400	103,400	113,100	122,000	131,700	141,600
Annual Growth Rate		2.3%	1.8%	1.5%	1.5%	1.5%

Note: This forecast is based on data from the Bureau of Economic Analysis, which differs from the historical information provided in Exhibit 2-3 which is from the Bureau of Labor Statistics (personal communication with Yang-Seon Kim, Economist, DBEDT on August 12, 2008).

Source: Hawai`i Department of Business, Economic Development, and Tourism. 2008. Population and Economic Projections for the State of Hawai'i to 2035, DBEDT 2035 Series. Available at: http://Hawai'i.gov/dbedt/info/economic/

2.3 Generation, Disposal, and Recycling

2.3.1 Historical

Historical generation, recycling, disposal for Hawai`i County, and the resulting diversion rates are shown in Exhibits 2-5 and 2-6. Generation is the sum of recycling and disposal. As shown, estimated fiscal year[2] (FY) 07-08 generation was 296,473 tons, 29.2 percent of which was recycled (86,443 tons) with the remainder (210,030 tons) going into landfills for disposal.

Since FY 00-01, both recycling and disposal in the County have increased substantially. Recycling has increased from 26,416 tons in FY 00-01 to 86,443 tons in FY 07-08, and disposal has increased from 163,825 to 210,030 over the same period. These increases correspond to average annual growth rates of 18.5 percent and 3.6 percent, respectively.

Particularly strong growth was experienced in FY 03-04 and FY 04-05, which can be attributed, in part, to the effects of storm debris. The County's estimated diversion rate has

[2] The County fiscal year is from July 1 to June 30.

more than doubled in the past seven years increasing from 13.9 percent in FY 00-01 to 29.2 percent in FY 07-08[3].

EXHIBIT 2-5
Historical Generation, Recycling, and Disposal and Estimated Diversion Rate, Hawai`i County

	Generation	Recycling	Disposal	Diversion Rate
Tons				
FY 00-01	190,241	26,416	163,825	13.9%
FY 01-02	190,764	24,139	166,625	12.7%
FY 02-03	200,300	30,991	169,309	15.5%
FY 03-04	239,217	37,375	201,842	15.6%
FY 04-05	281,855	56,422	225,433	20.0%
FY 05-06	300,121	77,734	222,387	25.9%
FY 06-07	290,865	69,117	221,748	23.8%
FY 07-08	296,473	86,443	210,030	29.2%
Percent Change FY 00-01 – FY 07-08				
Total	156%	327%	128%	
Average Annual	6.5%	18.5%	3.6%	

Source: Hawai`i County Department of Environmental Management.

Exhibit 2-7 reports waste generation on a per-capita basis and compares Hawai`i County's per-capita generation to that of other Hawai`i counties, a reported U.S. average, Seattle, Washington, and Vancouver, British Columbia. For Hawai`i counties, the data are shown using both resident and de facto population. As shown, Hawai`i County's per-capita generation is less than that of the other counties in the state, excepting Kauai's when calculated on a de facto basis.

The estimates shown in Exhibit 2-7 are much higher than the 4.6 pound-per-capita-per-day U.S. average reported by the U.S. Environmental Protection Agency (EPA)[4]. This may be the result of the EPA using a different methodology for calculating generation, and because the EPA estimate excludes construction and demolition debris, which is included in the Hawai`i data.

[3] Quantifying recycling is challenging because of the number of entities involved and the corresponding lack of a centralized location for data reporting. While the County exerts considerable effort obtaining data from the many recyclers in the County to compile recycled quantity data, it is likely that some materials are recycled that are not included in the data reported in Exhibit 2-5. Thus, the County's actual recycling rate may be higher than what is shown.

[4] United States Environmental Protection Agency, 2008. *Municipal Solid Waste in the United States, 2006. Facts and Figures*. Accessed at: http://www.epa.gov/msw/facts-text.htm

EXHIBIT 2-6
Historical Generation, Recycling, and Disposal, Hawai`i County

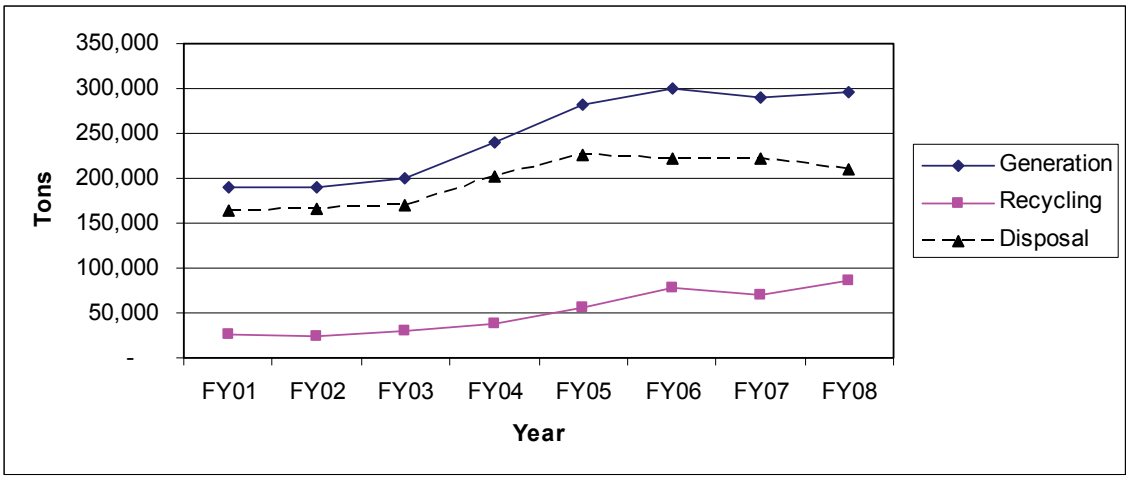


EXHIBIT 2-7
Per-capita Generation Comparison

Jurisdiction	Pounds/Capita/Day
Resident Population Basis	
Hawai`i County FY 07-08[a]	9.4
Honolulu County, 2004[b]	9.5
Maui County FY 05-06[c]	14.2
Kaua`i County 2005[b]	10.0
Seattle, 2006[d]	9.8
Metro Vancouver, B.C.[e]	8.6
De Facto Population Basis	
Hawai`i County FY 07-08[a]	8.3
Honolulu County, 2004[b]	8.7
Maui County FY 05-06[c]	10.8
Kaua`i County 2005[b]	7.4

[a]Exhibits 2-1 and 2-5.

[b]Draft IRSWMP, Kaua`i County, Section 2 and Hawai`i data book.

[c]Draft IRSWMP, Maui County, Table 2-4, and Hawai`i data book.

[d]Calculated based on information in City of Seattle. 2008. *Recycling Rate 2007 Update*, and population from the Greater Seattle Data sheet. Assumes 10%construction and demolition debris recycling rate.

[e]Calculated based on information in Metro Vancouver. 2005. *GVRD Solid Waste Management 2004 Annual Report*. Includes demolition, land clearing, and construction waste.

Exhibit 2-8 provides a breakdown of total waste discarded at County recycling and transfer stations and total commercial waste delivered directly to landfills between 2001 and 2008 for West and East Hawai`i. As shown, disposal at recycling and transfer stations has grown slightly faster in East Hawai`i than in West Hawai`i during this period. Commercial disposal growth in West Hawai`i has been particularly strong, increasing 53 percent in 7 years for an average annual rate of 6.3 percent. Commercial waste comprises approximately 61 percent, while waste from recycling and transfer stations comprise approximately 39 percent of the total disposed waste countywide. Commercial waste accounts for a larger share of the total in West Hawai`i (68 percent) than in East Hawai`i (51 percent).

EXHIBIT 2-8
Historical Disposal at Recycling and Transfer Stations and Commercial Customers for West and East Hawai`i

	West Hawai`i		East Hawai`i		Total County	
	Recycling/ Transfer Stations	Commercial	Recycling/ Transfer Stations	Commercial	Recycling/ Transfer Stations	Commercial
Tons						
FY 00-01	35,757	56,745	33,302	38,021	69,059	94,766
FY 01-02	37,721	58,593	34,278	36,033	71,999	94,626
FY 02-03	37,789	63,582	32,765	35,173	70,554	98,755
FY 03-04	44,699	81,759	37,756	37,628	82,455	119,387
FY 04-05	47,072	95,007	40,456	42,898	87,528	137,905
FY 05-06	45,230	93,501	40,400	43,257	85,629	136,758
FY 06-07	44,131	94,208	40,586	42,823	84,717	137,031
FY 07-08	41,655	86,888	39,575	41,912	81,230	128,800
Percent Change FY 00-01 – FY 07-08						
Total	16.0%	53.0%	19.0%	10.0%	18.0%	36.0%
Average Annual	2.2%	6.3%	2.5%	1.4%	2.3%	4.5%
Percent of Total	**32%**	**68%**	**49%**	**51%**	**39%**	**61%**

Commercial includes waste delivered directly to landfills by commercial haulers, and some businesses, institutions, and residents.

Source: Hawai`i County Department of Environmental Management.

FY 07-08 disposal totals broken down by recycling and transfer station are shown in Exhibit 2-9. Total disposal during 2008 at recycling and transfer stations ranged from a low of 207 tons at the Miloli`i station, to a high of 14,707 tons at the Hilo station.

EXHIBIT 2-9
FY 07-08 Disposal by Recycling and Transfer Station

West Hawai`i	Tons	Percent of Subtotal	Percent of Total
Kailua	7,860	23.3%	10.7%
Keahou	5,017	14.8%	6.8%
Ke`ei	2,025	6.0%	2.8%
Waiea	2,968	8.8%	4.0%
Miloli`i	207	0.6%	0.3%
Ka`u	3,447	10.2%	4.7%
Waimea	6,376	18.9%	8.7%
Puako	2,681	7.9%	3.7%
Kohala	4,145	12.3%	5.6%
Honoka`a	3,459	10.2%	4.7%
Pa`auilo	1,922	5.7%	2.6%
Laupahoehoe	1,547	4.6%	2.1%
Subtotal	33,795	100.0%	46.1%
East Hawai`i			
Hilo	14,707	37.2%	20.0%
Kea`au	7,443	18.8%	10.1%
Pahoa	5,759	14.6%	7.8%
Kalapana	1,069	2.7%	1.5%
Glenwood	2,940	7.4%	4.0%
Volcano	1,929	4.9%	2.6%
Pahala	1,304	3.3%	1.8%
Papaikou	2,563	6.5%	3.5%
Honomu	1,727	4.4%	2.4%
Other	135	0.3%	0.2%
Subtotal	39,575	100.0%	53.9%
Total Recycling and Transfer Stations	**73,370**		**100.0%**

Source: Hawai`i County Department of Environmental Management.

2.3.2 Forecast

Tons per person-employee (persons + employment) is a metric that is useful for projecting future generation because it considers factors that tend to influence both residential and commercial waste. The generation forecast was prepared by examining forecast population and employment, past generation trends, and potential changes to those trends.

Historical generation in tons, pounds per-capita per-day, tons per person-employee, population, and employment are shown in Exhibit 2-10. As shown, the overall trend over the past seven years through FY 07-08 had been for strong growth in all of these variables, including more than 4-percent annual growth in per-capita and per person-employee generation. However, the slowdown in the world economy resulted in a substantial decline in waste generation in Hawaii County during FY 08-09. During the first eight months of the fiscal year, disposal was down 17 percent from the first eight months of FY 07-08.

EXHIBIT 2-10
Historical Generation Trends, Hawai`i County

	Tons				
Year	Generation (tons)	Population	Employment	Pounds/ capita/day	Tons/person-employee
FY 00-01	190,241	149,261	214,711	7.0	0.52
FY 01-02	190,764	150,860	218,160	6.9	0.52
FY 02-03	200,300	153,162	219,312	7.2	0.54
FY 03-04	239,217	156,320	230,370	8.4	0.62
FY 04-05	281,855	160,129	235,629	9.6	0.71
FY 05-06	300,121	164,770	243,420	10.0	0.74
FY 06-07	290,865	169,419	250,719	9.4	0.69
FY 07-08	296,473	173,057	256,207	9.4	0.69
FY 08-09 est.	254,920				
Average Annual Percent Change	6.5%	2.1%	2.6%	4.3%	4.1%

The forecasts shown in Exhibits 2-11 through 2-13 assume 0-percent growth in generation per person-employee in FY 08-09, 5 percent per year in FY 09-10 – FY 11-12 (as the economy improves from recession), and 1-percent growth thereafter. The reasons for these assumptions include the following:

- The severe worldwide recession has resulted in a dramatic (17 percent) decline in disposal during the first eight months of the 2009 fiscal year (compared to the first eight months of FY 07-08). It is likely that it will take some time for construction and underlying waste generation to approach the levels that existed prior to the recession.
- Waste generation (per person-employee) did not change significantly between FY 04-05 and FY 05-06 and has declined thereafter: FY 07-08 tons per person-employee is about 7 percent lower than what it was in FY 05-06.
- The strong growth in FY 03-04 and FY 04-05 was in part related to booming construction and disposal of large quantities of storm debris.

- The County's record-keeping practices have steadily improved over the period, particularly in recycling. Thus, actual increases in generation in the early years may have been less than shown in Exhibit 2-10.
- The recent slowdown in the economy has the potential to moderate per-capita waste generation for a period of time.
- Ongoing efforts by the County and local residents, businesses, and institutions to reduce waste may help moderate waste generation in the future.
- Most jurisdictions in the U.S. report little change in per-capita generation in recent years. Nationwide, the EPA reports long-term per-capita waste generation growth of 1.2 percent per year from 1960 to 2006, with per-capita generation being essentially unchanged since 1990.

Forecast generation, recycling, and disposal are shown in Exhibits 2-11 and 2-12. As shown, assuming planned increases in the County's diversion rate, disposal is projected to increase from 210,030 in FY 07-08 to 253,085 by FY 27-28.

Forecast disposal for recycling and transfer stations and commercial customers in both East and West Hawai`i are presented in Exhibit 2-13.

EXHIBIT 2-11
Forecast Generation, Recycling, and Disposal and Recycling Rate, Hawai`i County

Year	Generation	Recycling	Disposal	Recycling Rate
FY 07-08	296,473	86,443	210,030	29.2%
FY 12-13	315,881	126,352	189,529	40.0%
FY 17-18	357,759	157,414	200,345	44.0%
FY 22-23	402,442	177,075	225,368	44.0%
FY 27-28	451,937	198,852	253,085	44.0%
Average Annual Growth Rate				
FY 07-08 – 12-13	1.3%	7.9%	-2.0%	
FY 12-13 – 17-18	2.5%	4.5%	1.1%	
FY 17-18 – 22-23	2.4%	2.4%	2.4%	
FY 22-23 – 27-28	2.3%	2.3%	2.3%	

Assumes diversion rate ramps up from 29.2 percent in FY 07-08 to 44 percent by the end of the 5-year planning cycle (FY 14-15). In order to be conservative for the purposes of estimating remaining capacity at County landfills, the diversion rate is assumed to remain at 44 percent throughout the forecast period. Future recycling programs would hopefully reduce waste going to landfills further.

Assumes 0-percent growth in generation per person-employee in FY 08-09, 5 percent per year in FY 09-10 – FY 11-12 (as the economy improves from recession), and 1-percent growth thereafter.

EXHIBIT 2-12
Generation, Recycling, and Disposal Forecast, Hawai`i County

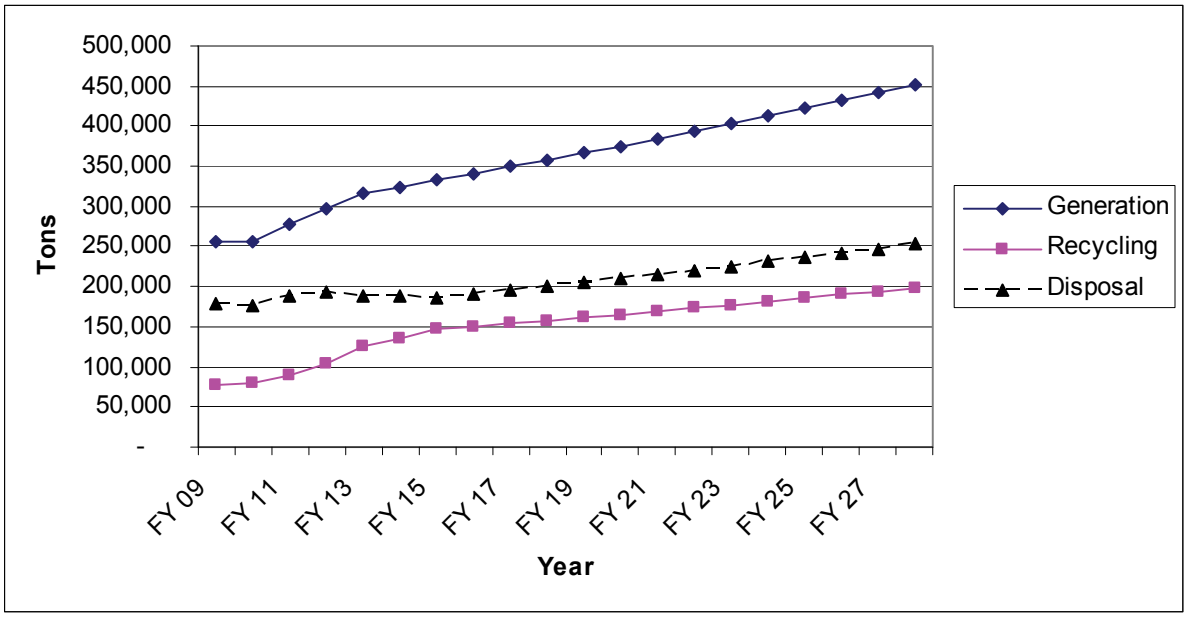


EXHIBIT 2-13
Disposal Forecast, Hawai`i County (tons)

	West Hawaii		East Hawaii		Total		
Year	Recycling/ Transfer Stations	Commercial	Recycling/ Transfer Stations	Commercial	Recycling/ Transfer Stations	Commercial	Total County
FY 07-08	41,655	86,888	39,575	41,912	81,230	128,800	210,030
FY 12-13	36,547	77,535	36,755	38,692	73,301	116,227	189,529
FY 17-18	39,214	81,039	38,270	41,822	77,485	122,861	200,345
FY 22-23	44,562	90,124	42,600	48,082	87,162	138,205	225,368
FY 27-28	49,922	100,044	47,960	55,159	97,882	155,203	253,085

Assumes diversion rate ramps up from 29.2 percent in FY 07-08 to 44 percent by the end of the 5-year planning cycle (FY 15). In order to be conservative for the purposes of estimating remaining capacity at County landfills, the diversion rate is assumed to remain at 44 percent throughout the forecast period. Future recycling programs would hopefully reduce waste going to landfills further.

Assumes 0-percent growth in generation per person-employee in FY 09, 5 percent per year in FY 09-10 – FY 11-12 (as the economy improves from recession), and 1-percent growth thereafter.

2.4 Waste Composition

A waste composition study was recently conducted for Hawai`i County and is included as Appendix B. That report includes composition estimates, both for the overall waste stream and broken down by recycling/transfer station, commercial, and self-haul wastes[5] disposed at the landfill. The results are based on samples taken at the WHSL during May of 2008. A

[5] Self-haul refers to waste delivered directly to the landfill (as opposed to a transfer station).

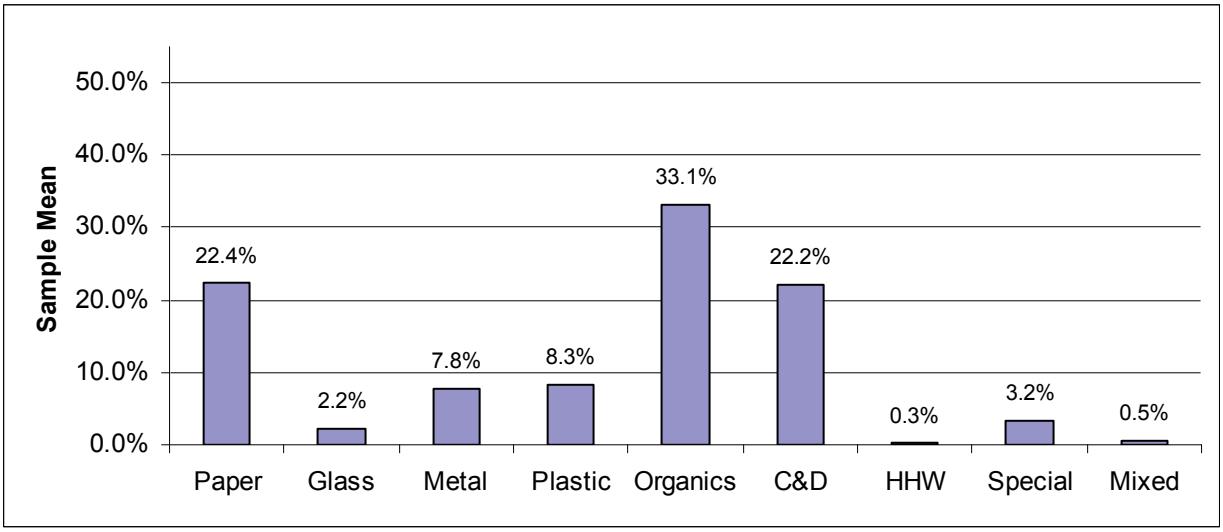
similar study was performed at the SHSL in 2001[6]. We have used the results of the 2001 study and current County disposal data to estimate the composition of waste that enters the East Hawai`i landfill. The results are combined to provide waste composition estimates for total County disposal.

Exhibits 2-14, 2-15, and 2-16 show disposed composition estimates for nine waste categories for the entire County, for West Hawai`i, and for East Hawai`i, respectively. When combined, organics and paper comprise more than half of the waste stream. The organics category contains such components as food, green waste, and textiles. Construction and demolition waste accounts for another 22 percent by weight. The construction and demolition category includes such components as clean lumber and gypsum scrap.

The composition of waste disposed in West Hawai`i is similar to the composition of disposed waste in East Hawai`i. Two differences that merit mention include: there are more organics disposed of in West Hawai`i (35.3 percent) than in East Hawai`i (29.6 percent); and there is more special waste disposed of in East Hawai`i (5.2 percent) than in West Hawai`i (1.9 percent). The majority of the special wastes disposed of in East Hawai`i consist of industrial sludge, bulky items, and tires.

The waste stream assessment developed data for the amount of waste disposed of for 58 different types of waste. Countywide composition estimates for all 58 waste components evaluated during the study are shown in Exhibit 2-17.

EXHIBIT 2-14
Disposed Composition Estimates by Waste Category: Total County



6 Cascadia Consulting Group, 2001. *Waste Composition Study, South Hilo Landfill, County of Hawai`i.*

EXHIBIT 2-15
Disposed Composition Estimates by Waste Category: West Hawai`i

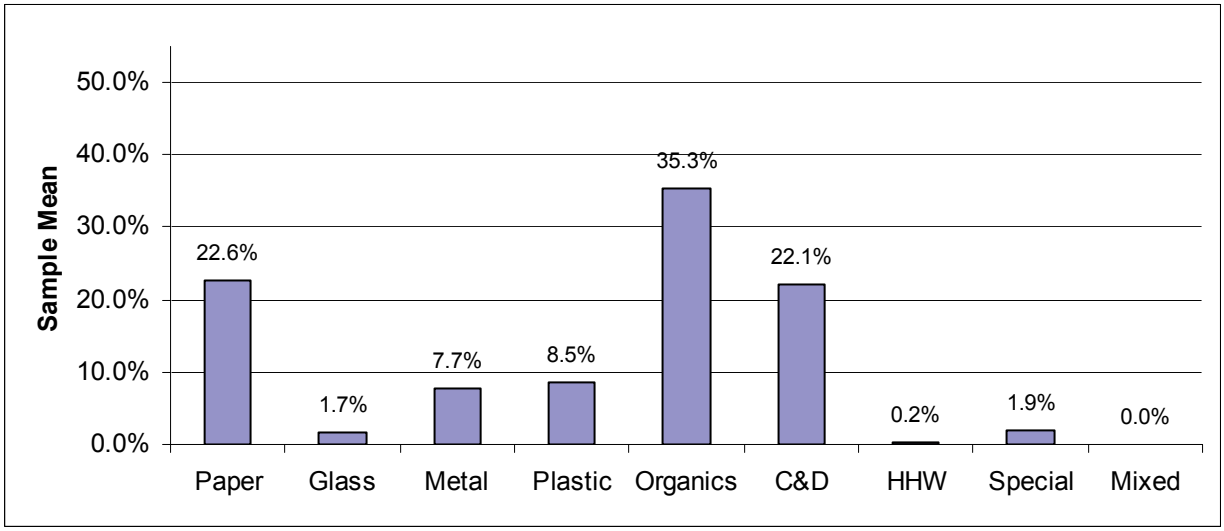


EXHIBIT 2-16
Disposed Composition Estimates by Waste Category: East Hawai`i

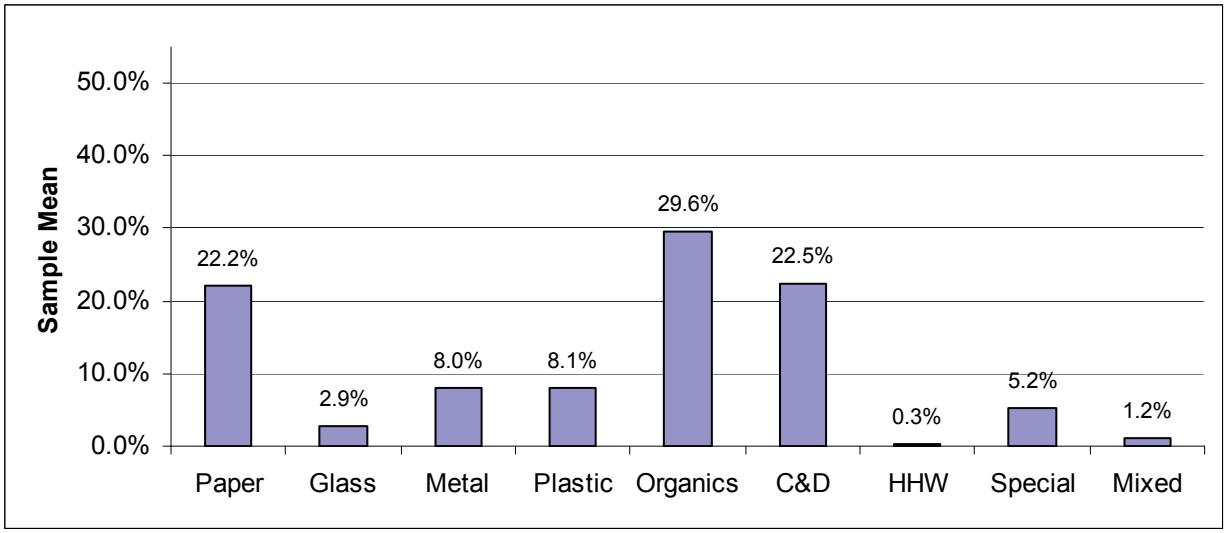


EXHIBIT 2-17
Disposed Composition Estimates: Total County

	Tons Disposed	Percent of Total		Tons Disposed	Percent of Total
Paper	**47,130**	**22.4%**	**Construction and Demolition**	**46,702**	**22.2%**
Cardboard	16,182	7.7%	Concrete	5,128	2.4%
Bags	723	0.3%	Asphalt Paving	2,212	1.1%
Newspaper	4,193	2.0%	Asphalt Roofing	381	0.2%
White Ledger	1,540	0.7%	Clean and Treated Lumber	22,984	10.9%
Colored Ledger	280	0.1%	Gypsum Board	1,471	0.7%
Computer	92	0.0%	Rocks and Soil	1,707	0.8%
Office	1,510	0.7%	R/C Demo	12,819	6.1%
Magazines	2,424	1.2%	**Household Hazardous**	**527**	**0.3%**
Directories	109	0.1%	Paint	171	0.1%
Miscellaneous	8,634	4.1%	Vehicle Fluids	20	0.0%
R/C Paper	11,443	5.4%	Oil	54	0.0%
Glass	**4,592**	**2.2%**	Batteries	117	0.1%
Clear Containers	1,476	0.7%	R/C Hazardous	165	0.1%
Green Containers	1,296	0.6%	**Special**	**6,762**	**3.2%**
Brown Containers	1,024	0.5%	Ash	93	0.0%
Other Containers	307	0.1%	Sewage Sludge	0	0.0%
Flat Glass	160	0.1%	Industrial Sludge	2,826	1.3%
R/C Glass	329	0.2%	Treated Medical	139	0.1%
Metal	**16,388**	**7.8%**	Bulky Items	2,177	1.0%
Aluminum Cans	565	0.3%	Tires	1,124	0.5%
Tin Cans	1,525	0.7%	R/C Special	404	0.2%
Ferrous	7,441	3.5%	**Mixed**	**997**	**0.5%**
Nonferrous	504	0.2%	Mixed Residue	997	0.5%
White Goods	742	0.4%			
R/C Metal	5,611	2.7%			
Plastic	**17,482**	**8.3%**			
#1 Containers	1,067	0.5%			
#2 Containers	882	0.4%			
Other Containers	818	0.4%			
Film	6,170	2.9%			
Durable	4,002	1.9%			
R/C Plastic	4,543	2.2%			
Organics	**69,448**	**33.1%**			
Food	34,230	16.3%			
Textiles	5,485	2.6%			
Leaves and Grass	6,160	2.9%			
Prunings	7,057	3.4%			
Stumps	2,637	1.3%			
Crop Residue	3	0.0%			
Manure	0	0.0%			
R/C Organic	13,875	6.6%			
Total Tons	210,030				
Sample Count	100				

An estimated diversion rate for the nine waste categories is shown in Exhibit 2-18. The results suggest that more than half of the metal and glass generated in the County is recycled (60 and 58 percent, respectively). Conversely, only 15 percent of paper is recycled and there is very little construction and demolition debris currently being recycled.

EXHIBIT 2-18
FY 07-08 Diversion Rate by Waste Category

	Tons			
	Generation	**Recycling**	**Disposal**	**Diversion Rate**
Paper	55,296	8,166	47,130	14.8%
Glass	10,872	6,280	4,592	57.8%
Metal	40,784	24,395	16,388	59.8%
Plastic	18,730	1,248	17,482	6.7%
Organics	115,248	45,799	69,448	39.7%
C&D	46,738	35	46,702	0.1%
HHW	698	171	527	24.5%
Special	7,111	349	6,762	4.9%
Mixed	997	0	997	0.0%
Total	**296,473**	**86,443**	**210,030**	**29.2%**

Recycling composition from Hawai`i County Department of Environmental Management with some additional allocations by CH2M HILL. Disposal composition from CH2M HILL, 2008. *Draft Waste Composition Study*, County of Hawai`i.

SECTION 3

Source Reduction

3.0 Source Reduction

3.1 Introduction

Source reduction is the adoption of practices that generate less waste. Source reduction approaches include changes in product design and packaging, reduction of consumer purchases, and the reuse of materials or goods. By decreasing the amount of waste that must be disposed of, waste reduction programs decrease the environmental issues associated with waste disposal. Reusing a grocery bag, buying materials in bulk, and reselling unwanted but still useable materials or products are typical examples of waste reduction.

This section describes existing source reduction activities within Hawai`i County, identifies current issues and concerns with respect to current source reduction practices, and presents options for achieving further source reduction.

3.2 Background

3.2.1 Regulatory Context

As described in the Hawai`i Integrated Solid Waste Management Act (Hawai`i Revised Statutes [HRS] Chapter 342G-2), each county is required to consider solid waste management practices and processing methods in the following order of priority:

1. Source reduction
2. Recycling and bioconversion (including composting)
3. Landfilling and incineration

HRS 342G-3 established a 25-percent waste reduction goal by 1995, and a 50-percent goal by 2000. Hawai`i County's 5-year management plan (developed following the 2002 IRSWMP Update) established a 50-percent goal by 2008.

3.2.2 Resolution 356-07 (Zero Waste)

In 2007, the County of Hawai`i adopted Resolution 356-07, "A Resolution to Embrace and Adopt the Principles of Zero Waste as a Long-term Goal for Hawai`i County." The resolution embraces the zero waste philosophy of solid waste management and commits to taking the necessary steps to incorporate the zero waste philosophy into legislation, policies, and actions.

The zero waste philosophy is based on the concept that current standards of waste management are inefficient and unsustainable, and that waste can be virtually eliminated by emulating sustainable natural cycles, where all discarded materials are treated as resources that can effectively be reused. It is a whole-system approach that emphasizes a closed-loop production and consumption system by (1) reducing the volume and toxicity of waste through product and packaging redesign strategies, (2) reusing materials and products for

alternative uses, as well as for their original intended use, and (3) recycling and composting all remaining materials for their best use. Within the zero waste framework, materials that cannot be easily and conveniently reduced, reused, recycled or composted are returned to the manufacturer, who is ultimately responsible for product disposal. The zero waste approach includes aggressive education of public and private entities, as consumer choices are considered to be the driving force in changing consumption and disposal patterns.

With a focus on eliminating waste at the source, one of the fundamental principles of zero waste is redesigning products and packaging, by taking into account the entire life-cycle of a product. In contrast to the current emphasis on disposability, products and packaging within the zero waste framework are designed with an emphasis on minimal use of materials, use of recycled and benign resources, longer product lives, and maximum potential for every product to be repaired, reused, or recycled. Critical to this principle is the concept of extended producer responsibility (EPR), a policy tool in which manufacturers are held legally and financially responsible for the waste and environmental impact associated with their product and packaging, rather than passing that responsibility on to the consumer. Under EPR, manufacturers are mandated to 'take back' their end-of-life products and create closed looped systems. As a result, EPR enforces design, production and packaging strategies that take into account the quantity and type of materials required for production, product lifespan, and the ability with which products can be disassembled and recycled.

In addition, zero waste emphasizes an aggressive combination of reuse, recycling and composting. Within the zero waste framework, all organic materials, including yard trimmings and food scraps are composted and treated as "biological nutrients" rather than being disposed of in landfills where they can potentially contribute to future environmental liabilities. Instead of using revenues generated through the tax base or other financial resources to build new landfills or incinerators, the zero waste approach advocates for investment in recycling, composting, and reuse facilities, especially those that accommodate the entire spectrum of reuse and recycling activities (for example, resource recovery parks). By supporting the reuse and recycling of discarded products and materials, the zero waste approach creates jobs and stimulates local economies. According to the Institute for Local Self Reliance's report Wasting and Recycling in the United States 2000, "On a per-ton basis, sorting and processing recyclables alone sustains ten times more jobs than landfilling or incineration." The report concludes, "each recycling step a community takes locally means more jobs, more business expenditures on supplies and services, and more money circulating in the local economy through spending and tax payments."

A Zero Waste Implementation Plan developed for the County of Hawai`i[1] during 2008 outlines suggested changes to the way that solid waste is handled within the County. As stated in Resolution 356-07, the County of Hawai`i recognizes "that zero waste is a long-term goal and that in the interim, programs may need to be implemented that may be counter to the zero waste philosophy but are necessary to reach the long-term goal of zero waste and that such programs should not be prohibited by the embracing and adoption of the long-term goal of zero waste." To this end, the components of the Zero Waste Implementation Plan which can be realistically achieved during the life span of this

[1] Recycle Hawai`i and Richard Anthony Associates. 2009. *Zero Waste Implementation Plan for the County of Hawai`i.*

IRSWMP have been incorporated into this Plan. The remaining components are expected to be implemented over the longer term, as part of the County's effort to take incremental steps toward achieving zero waste.

3.2.3 Review of 2002 IRSWMP

Following is a summary of the recommendations put forth in the 2002 IRSWMP relative to source reduction, and a description of the actions taken to achieve each recommendation.

2002 IRSWMP Recommendation	Status
Source Reduction and Reuse	
Hire County Recycling Coordinator	The County hired a full-time Recycling Coordinator in mid-2003 who is responsible for directing other County staff and vendors engaged in waste reduction and recycling efforts.
Ban Yard Trimmings at Recycling and Transfer Stations and Landfills	No ban has been established to date. In order to establish such a ban it is necessary to provide an alternative process for disposal of yard trimmings. The County has issued a request for proposals to determine if there are vendors interested in operating a yard trimmings disposal facility.
Establish County Policy to Restrain Disposal of Recyclable Materials	In 2007 the Solid Waste Division drafted a resolution that would mandate recycling at County offices. This has not yet been implemented.
Increase Tipping Fees at Landfills	The County has incrementally increased the landfill tipping fees from $35/ton in 2002 to the currently approved rate of $85/ton in 2007. Increasing the tipping fee provides incentive to generate less waste.
Enhance Construction and Demolition (C&D) Waste Recovery	The County opened the Kea`au Recycling and Reuse Center, as well as two smaller reuse centers at the Laupahoehoe and Keauhou Recycling and Transfer Stations, each of which collects limited C&D materials for reuse.
Increase Incentives for Diversion of Clean C&D Wastes	The County is encouraging demolition permit applicants to include a re-use component in demolition plans for larger projects.
Phase-in Landfill Bans on Recyclable C&D Wastes	The County is currently focused on Public Education and facilitating private entities that can create programs or facilities that provide incentives for diversion of clean C&D wastes. In 2007 Arc of Hilo opened a C&D waste re-use center and is promoting this to local contractors.
Institute New Fee System for Waste Management	Not implemented yet.

3.3 Existing Conditions

The current status of source reduction efforts in Hawai`i County is described below. This discussion includes (1) a description of County operated or sponsored programs, (2) an overview of County waste reduction staffing levels, (3) a description of other programs conducted by private entities, and (4) recent or pending legislative efforts.

3.3.1 Hawai`i County Waste Reduction Programs

3.3.1.1 Backyard Composting

Using funding received from the County of Hawai`i, Recycle Hawai`i (and subcontractor Hawai`i Rainbow Worms) conducts a minimum of 12 composting workshops across the island on an ongoing basis. In addition, they distribute Earth Machine backyard composters to both workshop attendees and schools. In 2005, they distributed approximately 336 composters, 43 of which were provided to schools across the island.

3.3.1.2 Reuse Centers

The Kea`au Recycling & Reuse Center (KRRC) is located at the Kea`au Recycling and Transfer Station. It was initially funded as part of an Environmental Protection Agency (EPA) grant to the County of Hawai`i, Department of Environmental Management (DEM) and Hawai`i Island Economic Development Board (HIEDB). Recycle Hawai`i manages operations at this site under a contract with the County of Hawai`i. KRCC provides a designated area for drop-off and pick-up of useable materials such as toys, clothing, house wares, and small appliances. KRCC also includes an area dedicated to home remodeling materials (for example, reusable toilets, pipes, gutters, doors, windows, and so forth). Items are available for free or sold at a modest price, and the money is used to help fund operations and education outreach programs. In addition, reusable latex paint collected at designated household waste collection events and at KRRC is sorted and mixed and is available for purchase at a discount over the retail price of new paint. KRCC also serves as a location for the composing workshops, and is used for school tours.

Kea'au Recycling & Reuse Center located at the Kea'au Transfer Station

KRRC serves as a model for creating similar recycling and reuse centers at other recycling and transfer stations around the County of Hawai`i. Two smaller limited reuse centers have been opened at the Laupahoehoe and Keauhou Recycling and Transfer Stations. Each of these locations includes an unstaffed, but regularly monitored, designated drop-off area

near the transfer chute. The County of Hawai`i intends to open approximately nine additional Recycling and Reuse Centers at other recycling and transfer stations around the island.

3.3.1.3 Reduction and Reuse Education

The County of Hawai`i has a well-developed education program targeting waste reduction and reuse. Its main education initiatives include:

- Information provided via the internet
- Recycling infoline
- Newspaper, radio, and television advertising
- Brochures
- Community outreach
- Community events
- School programs
- Business education
- Awards program

More information about these initiatives is provided in Section 5.0, Public Education and Information.

3.3.1.4 Landfill Disposal Fees

In July 2007, the County of Hawai`i increased landfill disposal fees to $85 per ton. Rates by vehicle size and volume, which apply when weights cannot be obtained, were increased to $51 per vehicle for light trucks, $96 for medium trucks and $153 for large trucks. For all other vehicles, disposal fees were increased to $27 per cubic yard for compacted material, and $17 per cubic yard for non-compacted material.

3.3.1.5 Procurement Policies

Public sector procurement can help reduce waste, foster reuse of products and stimulate markets for recyclable materials and compost. In addition, these procurement policies can serve as a model for other entities, including private sector businesses and institutions.

Pursuant to HRS 342G-41-44, the County has a policy to "give preference to vendors who utilize products with recycled content," when purchasing paper and plastic materials (for example, office paper, printed materials, plastic bags, and so forth), and has a policy to make double-sided copying standard practice at County offices.

3.3.1.6 Elimination of Tires from Landfills

In December 2007, the County of Hawai`i approved Bill 189, which amends the Hawai`i County Code, and prohibits the disposal of whole, cut, sliced, chipped or shredded tires in the island's landfills.

3.3.1.7 E-Waste Producer "Take-Back" Program

http://www.recycleHawai`i.org/images/stories/documents/Ewaste_Flyer.pdf

The County of Hawai`i contracts with Recycle Hawai`i to operate two permanent electronic waste (e-waste) collection locations. This program allows residents and businesses to recycle their entertainment electronics (TVs, VCRs, DVD players, radios), computers, computer monitors and peripherals, cell phones, telephones, microwaves, fax machines, copiers, digital cameras, printers, and laptops. Kona and Hilo drop off locations are available for the residents and selected non-profit organizations to drop off used items at no charge; businesses and other government agencies are assessed a recycling fee. Recycle Hawai`i ships the used e-waste to California for recycling, which is being conducted by E-World Recyclers. Recycle Hawai`i has also partnered with various foundations and the Sony Corp/Waste Management Inc.'s Take Back Recycling Program to expand the program this year to include the permanent drop-off sites. To date more than 400 tons of e-waste has been shipped off-island for recycling.

Hawai`i State legislation enacted during 2008 will require development of take back programs by manufacturers of certain types of electronic equipment (primarily nonmedical, stand-alone equipment containing CRTs, liquid crystal, or plasma display screens). The purpose of the legislation is to establish, conduct, and manage a program for the collection, transportation, and recycling of certain types of electronic devices sold in the State. More information about this program is provided in Section 6.

Recycle Hawai`i also operates year-round collection sites for cell phones, ink, and toner cartridges. See:
http://www.recycleHawai`i.org/images/stories/documents/Ewaste_Flyer.pdf

Several private businesses also operate programs designed to promote recycling of e-waste, including Long's Drugs and Home Depot. Long's Drugs operates collection bins for used batteries and small electronic devices.

During 2007 the County approved Resolution 30-07 "Requesting that the Mayor issue a Directive to Implement Recycling Programs at all County Agencies and Departments." The drafted directive has not been issued to date.

3.3.1.8 Private Reuse Programs

In addition to the KRRC, there are several privately operated reuse facilities including the Habitat for Humanity Restore and Laulima Hana (The Arc of Hilo). The Habitat for Humanity Restore is located in Kona, and is primarily focused on reusable building materials, as well as products returned to local big-box stores, such as Wal-Mart. The Laulima Enterprise is a non-profit enterprise of the Arc of Hilo and is a reuse store for construction and demolition (C&D) materials donated by contractors and home-owners. In addition to these facilities, there are a variety of other reuse businesses, including thrift shops and used book stores, located around the island that sell used merchandise, such as furniture, clothing, house wares and books.

3.3.1.9 Product Bans

Several counties in the State of Hawai`i have attempted to ban a variety of products, including plastic bags, styrofoam food containers and incandescent light bulbs; however, to date, none of these bans have been successfully implemented in Hawai`i County. On July 22, 2008, the County Council's Environmental Management Committee voted in support of

Bill 326, which would ban plastic bags at the point of retail purchase, however, the legislation was not ultimately adopted by the Council.

3.3.2 Hawai`i County Staffing Levels

Successful delivery of local government waste reduction programs requires devoting an appropriate amount of resources including staffing. Hawai`i County has demonstrated its commitment to waste reduction by assigning the following staff to County waste reduction and recycling programs:

- One full-time recycling coordinator
- Two full-time equivalent (FTE) recycling specialists for the HI-5 recycling program
- Two FTE recycling specialists
- One part-time student helper

In addition, using funds provided by the County of Hawai`i, Recycle Hawai`i employs three full-time education specialists, who are responsible for educating the public about waste reduction and recycling programs on the north, west and east portions of the island, respectively. Recycle Hawai`i also has other personnel that conduct educational programs at KRRC and other various workshops & community events.

3.4 Issues and Concerns

As described above, a number of source reduction activities have been recently conducted in the County of Hawai`i, including programs and initiatives by both the County as well as other organizations. In spite of these efforts, the County recycling rate is just under 30 percent, which is well below its 2008 target of 50 percent. There is more that could be done by the County and waste generators to promote changed behaviors that would ultimately reduce the quantity of materials entering the waste stream. The need to implement additional programs and policies is further established by the County's commitment to zero waste.

3.5 Options for Improvement

Pursuant to HRS 342G-26, an overview of various measures that could be implemented to increase source reduction is provided below. These options were developed based on successful initiatives implemented in other jurisdictions that may be applicable and appropriate for Hawai`i County. Note that the options focus on waste reduction and reuse; education, recycling, and composting programs are discussed in other sections of the IRSWMP update.

3.5.1 County Source Reduction Practices

The County of Hawai`i has an opportunity to serve as a model for the entire island and demonstrate their commitment to the zero waste approach by implementing comprehensive source reduction policies for all County operations. The County could make a more pronounced commitment to environmentally preferable products. This effort could include an evaluation of current practices at all County offices and buildings, and identification of

opportunities for increased source reduction. All County employees could be provided with documents providing information about the County's commitment to zero waste, and ideas of how each employee and department can reduce their waste.

Specific policies and activities that the County could adopt include the following:

- Adopt and implement an environmentally preferable purchasing policy and additional environmentally preferable procurement guidelines. Set environmentally preferable purchasing and recycled content as "defaults" for departments to use in departmental purchases of supplies and equipment not centrally procured.
- Establish a Zero Waste Purchasing Committee with a mandate to develop the County's purchasing policy.
- Include measurable zero waste goals in job descriptions and annual performance evaluations.
- Establish a Green Building Policy and evaluate the extent to which those policies can be encouraged or required for new private construction and major renovation projects.
- Use electronic mail, document storage and retrieval systems to achieve a "paperless office."
- Accept electronic submittal of all applications and required submittals.
- Provide incentives for staff members who develop and implement new initiatives that reduce waste.
- Promote and encourage in-house composting programs.
- Encourage or mandate the use of re-usable mugs, plates, and silverware and install dishwashers in County facilities where feasible.
- Publish major accomplishments and progress of each department on the County Web site.

The federal government has undertaken various initiatives to include the environment in its purchasing decisions. The County could consider EPA's Comprehensive Procurement Guideline program as a model for helping its employees purchase products that use materials recovered through recycling.[2] The EPA has already designated or is proposing to develop recycled-content recommendations for a series of products.

Estimated Cost: There are many County actions that could be accomplished at little or no cost. The initial review of purchasing policies would require staff resources throughout many departments but should not require additional staff. Green-building policies will increase the cost of construction somewhat: estimates on the extent of likely increases differ, but many jurisdictions have successfully implemented such policies. Purchasing policies can increase the cost of materials somewhat. The net result would probably be a small percentage increase in costs for many County activities and material purchases.

[2] U.S. Environmental Protection Agency. Comprehensive Procurement Guidelines. Available at: www.epa.gov/cpg.

3.5.2 Business Waste Audits and Reduction Plans

The County currently produces the Hawai`i Island Business Recycling Guide and Workbook, which provides local businesses with information on how to conduct a waste audit and establish a waste reduction and recycling program. This effort could be expanded into a program that includes County staff increasing the extent of the technical assistance provided to local businesses to conduct waste audits and help them implement sustainable best business practices to minimize waste, with an emphasis on zero waste principles.

As part of the County's effort to work with local businesses to reduce waste, the County could encourage retailers and their suppliers to take-back products and packaging that are currently difficult to reuse, recycle or compost. Potential take-back programs could be publicized by posting all cooperating retailers on the County's Web site and publishing frequent articles and/or ads in the local newspaper and County newsletter.

The County could develop a program to work cooperatively with local businesses to emphasize building deconstruction and support local initiatives for adaptive reuse of materials generated during deconstruction projects.

A more aggressive stance that has been adopted by some communities would be to require that all new building permits in the county above a particular size threshold include a Waste Reduction Plan, perhaps with a monetary deposit, to address waste associated with construction or demolition projects. To be effective, this type of policy must be accompanied by good opportunities for recycling of construction and demolition materials. Thus, these requirements would need to be structured in a manner that it is consistent with available reuse and recycling opportunities.

Estimated Cost: The cost of this option would differ depending on the speed of implementation. It could be implemented slowly with existing staff and resources or more rapidly if additional resources were provided. At least initially, there would be some added cost to businesses to conduct audits and change existing material management methods.

3.5.3 Visitor Industry

Because tourism is one of the largest industries in Hawai`i County, hotels, motels and other lodging facilities contribute a significant portion of the County's waste. There are a variety of basic measures that these facilities can implement to reduce their waste stream, including:

- Replace disposable products with reusable products (utensils, dishes, cleaning supplies).
- Buy in bulk, when possible.
- Offer newspapers only upon request.
- Change linens only upon request.
- Utilize soap and shampoo dispensers rather than disposable containers.
- Utilize air hand dryers or reusable napkins in public restrooms, rather than disposable.
- Change lighting fixtures from incandescent to fluorescent bulbs or light emitting diodes (LEDs).

- Practice grasscycling.
- Implement onsite composting.
- Donate or sell lightly used furniture or appliances instead of landfilling.

This program could be implemented as a sub-element of a broader business waste audit and reduction program (see Chapter 3.5.2), or as a stand-alone program. The County could seek partner businesses and organizations within the visitor industry to build on existing waste reduction efforts by industry. At least initially, there would be some added cost to businesses to change existing material management methods.

Estimated Cost: The cost of this option would differ depending on the speed of implementation. It could be implemented slowly with existing staff and resources or more rapidly if additional resources were provided.

3.5.4 Expanded Reuse Facilities

The County currently operates the KRRC, as well as two smaller reuse centers at the Laupahoehoe and Keauhou Recycling and Transfer Stations, all of which have been successful at diverting both household products and C&D materials from the landfill. Recently, the County has selected a vendor to develop reuse centers at other recycling and transfer stations. Additional facilities could be added to the other recycling and transfer stations around the island, to increase the number of residents with nearby access to a reuse facility. In addition, the County could develop and communicate to residents and businesses a list of the highest priority materials to be reused, and coordinate with private and non-profit reuse centers to maximize the type and quantity of materials that can be accepted.

Estimated Cost: The cost of this option would depend on the number of facilities implemented, site specific design considerations, and the resources devoted to staffing and outreach at each facility. For planning purposes, a new reuse center can be established for somewhere in the range of $20,000 to $80,000 depending on site specific conditions. Each new facility would probably require an additional $30,000 to $70,000 per year in annual staffing costs.

3.5.5 Establish Pay-As-You-Throw System for Residential Discards

Implementing a PAYT system creates a financial incentive for residents and businesses to reduce their waste. As reported in a recent EPA co-sponsored publication[3], PAYT systems, also known as variable rates programs or user pay, ask households to pay more if they put out more garbage for collection. This simple concept – akin to paying a water or electricity bill – has been embraced by almost 7,100 communities in the United States, and has led to the diversion of perhaps 6.5 million tons of municipal solid waste (MSW) per year that would otherwise have been landfilled. It provides a powerful financial incentive for residents to reduce waste discards.

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3 *Pay as you Throw (PAYT) In the US: 2006 Update and Analyses, Final Report*. 2006. Co-Sponsored by: EPA Office of Solid Waste, Jan Canterbury, Washington DC Skumatz Economic Research Associates, Inc., Superior, CO, Prepared by Skumatz Economic Research Associates, Inc.

In Hawai`i County, this program could be implemented in one of two ways:

- By charging residents on a volume or weight basis for garbage delivered to County recycling and transfer stations while allowing drop-off of recyclable or compostable materials at no-charge.
- By implementing universal collection of garbage for all households in the County.

Both options have the additional benefit of eliminating misuse of the residential-only recycling and transfer stations by non-residential generators. A discussion of each option follows. These options will be investigated in greater detail in Section 8.0, Collection and Transfer.

3.5.5.1 PAYT at County Recycling and Transfer Stations

PAYT could be implemented at County recycling and transfer stations by establishing volume-based rates that would be charged for discarding materials at each station. Typical volume rates include some combination of per-bag and per-vehicle fees. Because the County would prefer to avoid security and other issues relating to collection of fees at transfer stations, this system could be implemented using pre-purchased bags and tags, eliminating the need to collect fees at the recycling and transfer stations. Residents would be provided a pre-determined number of County-approved garbage bags, and tags that can be used for disposing of larger items. Additional bags and tags could be purchased from the County or through local retail outlets.

To implement this option, all recycling and transfer stations would need to have a full-time attendant to monitor residential disposal. In addition, the program would need the following:

- Adequate bins for dropping off readily-recyclable materials at, or nearby, the recycling and transfer stations.
- A small building or other structure for an attendant to use while monitoring incoming loads.
- Adequate space to allow for vehicle queuing at the recycling and transfer stations.
- An agreement with retail stores to sell pre-approved bags or tags on behalf of the County.

It is possible that not all recycling and transfer stations would have the physical space to accommodate the infrastructure needs for a PAYT system. Thus, it is possible that some stations would need to be closed, relocated, or substantially modified in order to implement this program.

Implementation of this option would require implementation of an aggressive public education and information campaign to ensure that residents understand the rationale for implementing the PAYT program. The County would need to modify its financial systems to account for the new revenue source.

Estimated Cost: Estimating the initial infrastructure costs for this option would require conceptual designs at each of the County's 21 recycling and transfer stations. The

infrastructure cost could vary considerably depending on site-specific conditions and the extent to which modifications are feasible at each station. For planning purposes, the initial infrastructure requirements would probably cost somewhere between $1 million and $2 million. The annual cost of operating the system would probably be between $1.5 million and $2 million.

3.5.5.2 Universal Collection with PAYT Rates

While not unprecedented, the County's current system of providing recycling and transfer stations distributed throughout the county is a relatively uncommon way of providing garbage collection services to residents. PAYT rates could be implemented as part of a move to provide universal garbage, recycling, and perhaps organics collection services to all County residents. Elsewhere in the United States, residential collection services typically are either provided by local government or by the private sector under a contract or franchise arrangement. The Hawai`i Supreme Court's "Konno decision" affirmed the rights of the United Public Workers (UPW) union to perform work that "customarily and historically" has been performed by government workers. However, subsequent to that ruling, the Hawai`i Legislature in HRS 46-36 provided for a "managed competition" process in which local government and the private sector would compete on the basis of efficiency, effectiveness, and price for new government services. Additional research would be needed to decide the best way to proceed with universal collection should this be an option the County would like to implement.

PAYT collection rates can take many forms including using a variable can, metered bag or metered tag system. The key aspect of this system is to charge a progressive rate for each additional garbage unit collected above the basic service level (for example, one can per week).

Like PAYT at County recycling and transfer stations, implementation of this option would require implementation of an aggressive public education and information campaign to ensure that residents understand the rationale for implementing the PAYT program. Significant up-front planning would be required to assess a wide range of implementation details. The County would need to establish billing systems, a customer service organization, and modify its financial systems to accommodate this new service. The County could elect to assess the potential for reducing property taxes as an offset to the new revenue source.

Estimated Cost: Garbage collection rates in Hawai`i County (where available by subscription) typically range from $20 to 30 per household per month. On the mainland, rates can vary from $10 to $30 or more per household per month depending on disposal fees and the type of service provided (e.g., including separate collection of recyclables and/or yard and/or food waste).

3.5.6 Expanded Home Composting Program

The County has an ongoing backyard composting program, including educational workshops, that has distributed more than 300 composting machines to residents and schools. The County has indicated their intent to continue this program, which could be expanded to reach a wider audience. The program could include an aggressive promotion

campaign and a target penetration rate of at least 25 percent of single-family households within five years.

Estimated cost: It would cost the County approximately $75 to $100 per unit for purchase, storage and delivery of each unit. Thus, if the County were to target delivering approximately 2,000 households per year, it would reach a 25 percent penetration rate in 4 to 5 years at a cost of $150 to $200,000 per year. Existing staff resources would need to be used to develop the plan for how best to distribute the units and to provide suitable promotion and user education.

3.5.7 Expanded Reusable Bag Program

As part of their educational outreach program, the County has conducted Bring-Your-Own Bag (BYOB) promotional events at local grocery stores and at various community events such as Earth Day, during which reusable grocery bags are given to interested residents. To expand this program, the County could significantly increase the number of reusable bags that are distributed to residents, and increase its outreach to encourage participating grocery stores to increase the financial discount for using reusable bags.

Estimated cost: This option would require additional staff time and $10,000 to $30,000 annually for additional materials.

3.5.8 Expand Source Reduction Education

A key to the success of reuse programs is the education of the staff (government, private for-profit, and non-profit) who operate the facilities within the program. Once staff have been trained on the basics of how these programs work, they will need to develop systems to implement programs for the public. The methods for providing materials to markets include retail sales, dismantling for recycling, and ensuring materials reach markets accessible to the public.

A series of enhancements to the County's education and promotion programs are suggested in Section 5.0, Public Education and Information.

3.5.9 Establish Extended Producer Responsibility Policy

As previously described, EPR is a policy tool that extends manufacturer's responsibilities to include responsibility for life cycle costs of their products and associated packaging. This approach has been successfully implemented in various communities throughout Europe and Canada, as well as parts of the United States. A brief discussion of some international and United States EPR experience, as documented in a recent report[4], follows.

The first EPR program was put in place in Germany in 1991 with the advent of the German Packaging Ordinance, also referred to as the Green Dot program. The Packaging Ordinance held producers responsible for managing packaging waste. The Packaging Ordinance resulted in the Duales System Deutschland (DSD), a non-profit company, which licenses its

[4] Van Rossem, C., Tojo, N., Lindhqvist, T. 2006. ***Extended Producer Responsibility*** *An examination of its impact on innovation and greening products.* Report commissioned by Greenpeace International, Friends of the Earth and the European Environmental Bureau (EEB).

logo - the green dot - for a fee. Packages bearing the symbol are collected, sorted, and directed to recyclers by DSD. Fees are based on the material and weight of the package and are paid by the "filler" - usually the owner of the product brand name. Germany has shifted full responsibility for managing packaging waste to industry.

Because take back and recycling of packaging by each individual producer is not always practical, EPR policies usually permit producers to form "producer responsibility organizations" (PROs) which enable them to fulfill their responsibilities collectively. There are presently more than 250 PROs established to meet EPR obligations in Europe. These organizations license their logos for a fee and use the revenues to finance collection and recycling. It is important that the fee structures imposed by PROs reward companies that choose to design less wasteful and more economically recyclable products. PROs include the DSD in Germany, Eco-Emballages in France, Alstoff Recycling in Austria, Fost Plus in Belgium, VALPAK in the United Kingdom and the Rechargeable Battery Recycling Corporation (RBRC) in the United States.

Canada has widely embraced the EPR principle, referred to there as 'Product Stewardship' or 'Industry Product Stewardship' by governments and producers. All ten provinces have developed mandatory EPR programs for a wide array of product groups. Products that are covered by mandatory programs in some or all provinces include packaging materials, newsprint and fine paper, household hazardous wastes (HHW) such as paint, motor oil, tires, lead-acid batteries and waste electrical and electronic equipment (WEEE). There are also a number of nationwide voluntary programs, namely for rechargeable consumer batteries, agricultural pesticide containers and beer containers.

British Columbia sets itself apart from other provinces by its approach to Product Stewardship, where there are currently nine industry groups in B.C. operating recycling programs for electronics, paint, oil, beverage containers, tires, pharmaceuticals, pesticides, gasoline, solvents and flammable liquids. In April, 2008, British Columbia announced plans to add mercury-containing products such as light bulbs and thermostats to its product stewardship program, and expanding its list of covered electronics to include products such as stereos, cell phones, and other hand-held devices.

There are also a wide variety of EPR programs in Japan, Taiwan, Korea, Australia, New Zealand and other countries that span the full range of voluntary and mandatory programs.

Although there are no nationwide mandatory EPR programs in the US, there are several US-wide voluntary programs, namely for batteries, cars and carpets. The RBRC was established to manage a program for the recovery and recycling of Ni–Cd batteries. RBRC launched the first industry-wide voluntary take-back program in the US (and Canada) and set a goal of 70 percent Ni–Cd battery collection by 2001. Attempts to create national programs for drink containers and electronics (the "NEPSI process" from 2001 to 2004) did not come to fruition.

At the state level, especially for electronics, there are a number of proposed and operational regulations in place that employ various elements of EPR. The State of Hawai`i's pending e-waste take back program is a good example. Other examples include California, Maine, Maryland, and Washington that have either implemented or proposed regulations requiring the collection and recycling of certain categories of WEEE. Although the Californian and Maryland programs incorporate few or no elements of EPR, the Maine and Washington

legal texts have proposed a framework that encourages elements of individual responsibility to be incorporated in any operational programs that are developed.

A good example of how local governments can work together to promote EPR is the California Product Stewardship Council (http://www.caproductstewardship.org/). It is an organization of local governments from throughout California who aim to shift California's product waste management system from one focused on government funded and ratepayer financed waste diversion to one that relies on producer responsibility in order to reduce public costs and drive improvements in product design that promote environmental sustainability. Its function includes the following:

- Build capacity and knowledge among local governments, and build relationships with stakeholders, to bring about producer financed and managed systems for product discards, including, but not restricted to, products covered by the Universal Waste Ban.
- Provide a forum for the exchange of information regarding existing and proposed EPR programs.
- Develop and recommend practical local and statewide EPR policy and educational tools such as model ordinances and legislation, newsletters, articles, policy briefings, and so forth
- Provide effective leadership on EPR initiatives in California and develop a prioritized list, with timelines, of future EPR programs.
- Educate elected and appointed officials and other decision makers on the benefits to local government of EPR.

At the local level, New York City has tabled its own law on the take-back and recycling of certain WEEE categories. This sentiment for a fundamental shift in the financial burden of dealing with end-of-life products from municipalities to producers and consumers seems to be gaining momentum in the U.S., as highlighted by the recent resolution by the San Francisco Board of Supervisors that supports state-wide legislation and local initiatives requiring manufacturers to take responsibility for collecting and recycling their products at the end of their useful life. Many other municipalities are preparing EPR plans and working with industry and state and federal EPR advocates to advance EPR programs.

Although the County of Hawai`i has some limited programs that resemble EPR, such as the HI-5 program in which qualified containers can be returned to Certified Redemption Centers for a rebate, significant progress would be required to implement a fully-functional EPR program. Given its relatively small size and geographic isolation, it would be difficult for Hawai`i County to effectively implement an EPR program on its own. However, the County could prepare and adopt resolutions stating its support for EPR, and could work to lobby state and federal lawmakers to advance EPR initiatives. It could collect and review various city/county resolutions related to EPR and state its strong support for EPR to its citizens and state and federal officials.

Some policy statements the County may want to consider include the following:

- Express support for state and federal policies to eliminate subsidies, internalize externalities for virgin material production and wasting, and involve producers in

taking physical and/or financial responsibility for their products and packaging through reuse, repair, or recycling them back into nature or the marketplace.

- Express support for state and county agencies to support product stewardship, by creating a state/counties coalition to work towards EPR, along with other active states.
- Express support for policies designed to relieve local taxpayers from the burden of managing wastes they have no control over. This could include identifying specific product categories that have the greatest impact on local programs.
- Express support for mandatory recycled content, as well as "cradle-to-cradle" product take-back and recycling services. Insist that the cost of the programs be paid by manufacturers and internalized into the cost of their products.

Examples of EPR framework policy and legislation from California, Oregon, Washington, and Minnesota can be found at http://www.productstewardship.net/policies.html.

Estimated cost: To implement this option, the County would need to invest some ongoing staff time and perhaps $30,000 to $70,000 of consulting assistance for research, policy analysis, and drafting legislation. The price of some products affected by EPR programs could increase depending on exactly how EPR was implemented.

3.5.10 Create a Zero Waste Fund

In order to encourage local innovation and participation, the County could fund community zero waste initiatives with fees levied on landfill disposal. This funding could include leveraging private sector investments by adopting supportive policies and providing technical assistance and support letters for independent financing and/or grants. The more that non-profits and private companies invest in expansion of reuse, recycling and composting programs, the less the City needs to invest. The County could also identify and support proposals for state, federal and foundation grants and loans for local zero waste businesses and service providers.

Estimated cost: The cost of this option would depend on the extent to which the County elects to fund this program. For planning purposes, initial seed funding could be budgeted in the range of $50,000 to $200,000 per year. Some added staff time would be necessary to develop and administer the program.

3.5.11 Public-Private Partnerships with Community Based Organizations

The reuse industry on the island should be surveyed. In Austin, Texas, Goodwill Industries has developed a dismantling program, with the backing of Dell Computers (also based in Austin). There may be other non-profits or businesses interested in participating in reuse programs within the County. The County could convene a meeting of interested parties to determine the level of interest, evaluate what challenges such a program would face, and identify potential mechanisms to assist with initiation of the program.

Independent community-based organizations (CBOs) may see this as an opportunity for their clients. From sheltered workshops to social enterprises, these CBOs are potentially available to take on repair and refurbishing as well as dismantling of discarded items into recyclable commodities.

Reusable items delivered to drop-off centers and landfills could either be sold from ReStores at these locations or picked up in covered box trucks or bins and taken to an offsite ReStore. Providing available and convenient drop-off locations is key to the success of this program. Companies with sheltered workshops could bid for individual products such as appliances, electronic discards, and furniture repair or for collecting all the reusables received at a designated site.

3.6 Recommendations

On the basis of the analysis presented above, the results of the zero waste study, and discussions with stakeholders, the Plan recommends the following to improve source reduction. Implementation of these recommendations will likely be slower than initially anticipated because of the impact that the worldwide economic recession has had on County finances.

1. **Develop County policies or ordinances that mandate certain actions be taken to reduce the source of waste currently entering landfills, including:**

   – Develop County ordinances requiring that a waste reduction plan be submitted to obtain commercial or residential building permits. Coordinate implementation with the Department of Planning and Permitting.

   – Develop EPR policy statements or resolutions expressing strong support for initiatives that require manufacturers of certain products or materials to take responsibility for the life cycle costs of their products.

   – As a component of the EPR policy, implement a campaign to develop EPR for difficult to recycle products, and lobby state and federal lawmakers to advance EPR initiatives.

   – Implement a County government source reduction program, by implementing policies, procedures, and incentive programs that will reduce waste streams currently being generated within various County departments and agencies.

2. **Implement a PAYT program or other funding method.** A critical element of the County waste management program is to provide incentives for the public to participate in source reduction and other programs to reduce waste going to landfills. PAYT programs have proven to be a highly successful and cost-effective method of reducing waste going to landfills in many similar communities nationwide. After considerable deliberation by SWAC about its advantages and disadvantages, this Plan update recommends implementing PAYT at County recycling and transfer stations. Due to the County's current fiscal crisis, the County may elect to use any and all funding methods (such as user fees, increased property taxes, and landfill tipping fees) that become available, rather than relying on a PAYT program.

   If the County chooses to implement a PAYT program, the implementation steps recommended for the PAYT program include the following:

   – Designing a program that can be effectively implemented at the County's recycling and transfer stations, and that is convenient and cost-effective for the public.

- Conducting an education and public outreach campaign prior to implementation of the PAYT program.
- Conducting outreach to retail businesses in order to facilitate their participation in the program.
- Purchasing and delivering the PAYT bags and tags.
- Developing and implementing a pilot program at no cost to the public to introduce the program and identify ways in which the program can be implemented most effectively.
- Training County staff who will participate in implementing the program and public outreach campaign.
- Implementing the PAYT program in phases over several years. A component of implementation will include monitoring and evaluation of program results and participation.

3. **Expand the current reuse program.** One of the most popular existing waste reduction programs among County stakeholders is the operation of reuse facilities where unwanted products that are still useful can be made available to others rather than discarded. Several recommendations relating to expanding the current reuse program include the following:
   - Expand reuse facilities, including improving and expanding services at the existing facilities located at Kea`au, Lapahoehoe, and Keauhou, and construction of new reuse facilities at other recycling and transfer stations.
   - Develop public-private partnerships with organizations such as Goodwill Industries to develop reuse centers at existing outlets within the County.
4. **Expand and improve public education and awareness programs.** Stakeholders agreed that education was a key element of implementing source reduction programs within the County. The following are recommendations regarding development of educational programs:
   - Develop a business waste audit and education program to foster source reduction within the local business community.
   - Develop a visitor industry waste reduction education program that includes promotional events or advertisements targeting specific sectors of the visitor industry.
   - Develop a reuse education, outreach, and public awareness campaign to encourage public participation and use of the reuse centers.

SECTION 4

Recycling, Bioconversion, and Markets

4.0 Recycling, Bioconversion, and Markets

4.1 Introduction

Recycling and bioconversion involves taking materials that would have otherwise been disposed of as solid waste, and instead, reprocesses the materials into new and marketable products. Common recycled materials include beverage containers, paper products, scrap metal, and green waste. Bioconversion consists of processing organic materials such as grass, leaves, branches, untreated wood, or food to produce new products, such as compost and fertilizer, using biological means.

This section describes existing recycling and bioconversion activities within Hawai`i County, identifies current issues and concerns with respect to current recycling and bioconversion practices, and presents options for achieving the County's recycling and bioconversion goals.

4.2 Background

As discussed in Section 3.0, Source Reduction, the State of Hawai`i prioritizes solid waste management practices and processing methods for each county as per Chapter 342G-2 of the Hawai`i Revised Statutes. The second priority, as discussed in this chapter, consists of recycling and bioconversion (including composting). Recycling and bioconversion practices were first detailed in the original Integrated Solid Waste Management plan created in 1993 and in the subsequent updated plan drafted in 2002. In 2003, the County of Hawai`i passed a resolution with a goal to divert 50 percent of the solid waste from landfills by 2008 and 80 percent by 2013.

4.2.1 Zero Waste

In 2007, the County of Hawai`i further enhanced solid waste practices and concepts by adopting Resolution 356-07, a zero waste philosophy toward solid waste management, and in 2008 contracted through Recycle Hawai`i to have a zero waste implementation study conducted. The purpose of that study was to evaluate recycling options that may help the County achieve its waste reduction goals.

The zero waste implementation study included public meetings held in September 2008 at multiple locations in the County to present zero waste concepts, and receive input from local residents and business owners about ways to turn currently-discarded materials into resources.

The recommendations of the zero waste study have been incorporated to this IRSWMP update where applicable based on consensus of the SWAC, Solid Waste Division staff, and other stakeholders.

4.2.2 Review of 2002 Plan Update

The following is a summary of the recommendations put forth in the 2002 Plan update relative to recycling, bioconversion, and marketing, and a description of the actions taken to achieve each recommendation.

2002 Plan Update Recommendation	Status
Recycling	
Hire County Recycling Coordinator	The County hired a full-time Recycling Coordinator in mid 2003 responsible for directing other County staff and vendors engaged in waste reduction and recycling efforts.
Increase Budget for Promotion and Education	Substantial budget increase for Promotion and Education.
Ban Yard Trimmings at Recycling and Transfer Stations and Landfills	No ban has been established to date. In order to establish such a ban, it is necessary to provide an alternative process for disposal of yard trimmings. The County has established green waste facilities in Hilo, Kona, and Kea`au with plans to expand to other sites through a request for proposals. Additionally, a request for proposal will be issued for compost and biodiesel.
Establish Dropoff Centers at Transfer Stations for Source-Separated Recyclable Materials	All Transfer stations contain a two-bin system, one bin for glass and the other bin with mixed recyclables (paper, plastic, and metal).
Establish Dropoff Centers at Locations Other Than Transfer Stations (Shopping and Community Centers, Schools)	There are HI-5 Certified Redemption Centers at some transfer stations and private facilities conveniently located to shopping areas. Other recycling dropoff centers outside of transfer stations have not been implemented.
Reconfigure Transfer Stations to Emphasize Recycling	The County is currently in the process of re-designing the transfer stations to enhance recycling efforts, provide better signage, and allow commercial recycled materials.
Increase Funding for the Existing Diversion Grant Program	No longer a grant program – now done using request for proposals. Increased funding underway.
Establish a County Policy that Restrains Disposal of Recyclable Materials	In 2007, City Council passed a resolution to request Mayor Harry Kim to issue a directive mandating recycling at County offices recycling. The Mayor has not issued a directive to date.
Increase the Tipping Fee at Landfills	The tipping fee has been increased to $85/ton at the landfills.
Enhance C&D Waste Recovery	Kea`au Transfer Station has accepted construction debris (residential only). Private contractors are also providing assistance with C&D waste recovery.
Emphasize Recycling in the Design of Sort Station	Designed but not implemented.
Increase the Incentives for Alternatives to Disposal of C&D Waste	Not implemented.
Phase-in Landfill Bans on Recyclable C&D Wastes	The County is currently focused on Public Education and facilitating private entities that can create programs or facilities that provide incentives for diversion of clean C&D wastes. In 2007 Arc of Hilo opened a C&D waste re-use center and is promoting this to local contractors.

2002 Plan Update Recommendation	Status
Institute New Fee System for Waste Management	Not implemented yet.
Bioconversion	
No Recommendation(s) Addressed	In 2008, a request for proposal was issued for potential contractors to furnish and implement an organics diversion program at the future West Hawai`i Compost and Biodiesel Facility.
Marketing	
Enhance Local Markets for Recyclable Materials	The County encourages state or on-island reuse and end-markets for recycled materials. Currently, green waste, glass, paper, and tires are used locally.

4.3 Existing Conditions

According to the County Department of Environmental Management (DEM), the waste diversion rate, signifying the quantity of recycled materials taken as a percentage of total waste generation, has more than doubled from approximately 14 percent in FY 00-01 to more than 29 percent in FY 07-08. Exhibit 4-1 provides yearly data of waste generation, recycling, and disposal activities.

EXHIBIT 4-1
Diversion Rate Trends in Hawai`i County

	Tons			
Year	Generation	Recycling	Disposal	Diversion Rate
FY 00-01	190,241	26,416	163,825	13.9%
FY 01-02	190,764	24,139	166,625	12.7%
FY 02-03	200,300	30,991	169,309	15.5%
FY 03-04	239,217	37,375	201,842	15.6%
FY 04-05	281,855	56,422	225,433	20.0%
FY 05-06	300,121	77,734	222,387	25.9%
FY 06-07	290,865	69,117	221,748	23.8%
FY 07-08	296,473	86,443	210,030	29.2%
Percent Change FY 00-01 – FY 07-08				
Total	56%	227%	28%	
Average Annual	6.5%	18.5%	3.6%	

Source: Hawai`i County Department of Environmental Management.

The 2008 diversion rate may be divided into categories to characterize the amount of recycling and disposal by material. The two highest waste diversion rates occur in glass and metal recycling, at 57.8 and 59.8 percent, respectively, which may be due to the HI-5

Beverage Container Deposit Program instituted by the State of Hawai`i. Exhibit 2-18 presents the 2008 diversion rate by waste category.

Although the current diversion rate is more than 29 percent, there is a large amount of recycling being conducted independently by private businesses that is presently not being tracked or measured by the County. These recycling efforts from the private sector significantly increase the overall diversion rate, especially in the paper and plastic waste categories. The current status of recycling, bioconversion, and marketing efforts in Hawai`i County is described below.

4.3.1 Hawai`i County/State of Hawai`i Programs

Hawai`i County offers recycling services through various state and county programs. The County utilizes recycling and transfer stations as collection points for the majority of recycled material from residents. Recycled material accepted at these locations includes paper products, green waste, scrap metal, glass, and redeemable beverage containers through the State of Hawai`i Beverage Container Deposit Program. The County has also initiated programs for tire disposal, disposal of fats, oils, and greases (FOGs), and composting.

To encourage recycling and bioconversion activities, Hawai`i County provides public education and awareness programs for residents. These education programs are discussed in Section 5.0, Public Education and Information. Another part of recycling involves proper diversion of household hazardous wastes and household appliances and electronics. Household hazardous waste and electronics recycling programs will be discussed in Section 6.0, Household Hazardous Waste and Electronic Waste.

4.3.1.1 County Recycling and Transfer Stations

The County operates 21 recycling and transfer stations for residents to drop off recyclable materials and garbage. A new recycling and transfer station is currently being proposed for Ocean View near the southern end of the island. Most of the recycling and transfer stations currently have a Two-Bin Recycling Area which consists of dropoff bins for mixed recyclables (paper, plastic, and metal), and a separate bin for glass. Some of these recycling and transfer stations also serve as collection points for other types of recyclable materials. Exhibit 4-2 lists the recycling and transfer stations and the type of recyclable materials accepted at each location.

The County is presently expanding recycling activities at the recycling and transfer stations by creating recycling and reuse centers (RRCs). The Kea`au Recycling and Transfer Station, referred to as the KRRC, was the first to be developed into a full-time recycling and reuse center. New full or part-time reuse centers will be developed at recycling and transfer stations in Hilo, Kealakehe, Pahoa, Waimea, Laupahoehoe, Keauhou, Waiohinu, Hawi, and Volcano. In addition, the County is in the process of a complete redesign of the recycling and transfer stations by reconfiguring the site area and improving signage to promote recycling activities by residents. The County is also evaluating the potential of commercial recycled material being accepted at all recycling and transfer stations.

EXHIBIT 4-2
Hawai`i County Site Characteristics for Existing Recycling and Transfer Stations

Recycling and Transfer Station	Glass	Mixed Recyclables	Scrap Metal	Green Waste	Reuse Center	HI-5 Redemption Center
East Hawai`i						
Kea`au (KRRC)	X	X	X	X	X	X
Hilo	X	X	X	X		X
Pahoa	X	X				X
Laupahoehoe	X	X			X	
Honoka`a	X	X				X
Kalapana	X	X				
Volcano	X	X				
Glenwood	X	X				
Honomu	X	X				
Papaikou	X	X				
Pa`auilo						
Pahala	X					
West Hawai`i						
Kealakehe (Kailua)	X	X	X	X		X
Keauhou	X	X			X	X
Ka`auhuhu (Hawi)	X	X				X
Puako	X	X				X
Waimea	X	X				X
Ke`ei	X	X				
Waiea	X	X				
Miloli`i						
Waiohinu	X	X				X

Note: Hilo, Kea`au, and Kealakehe Recycling and Transfer Stations contain separate bins for newspaper and cardboard

4.3.1.2 HI-5 Beverage Container Deposit Program

The State of Hawai`i enacted a new Beverage Container Deposit Program in late 2004. Otherwise known as the "Bottle Bill," a 5¢ redeemable deposit is placed on each beverage container, as defined under the law. Consumers may then return the container to redeem their 5¢ at any redemption center. Other details of the Program include the following:

- A 1¢ non-refundable container fee is assessed to support the costs of recycling and program administration.
- Redeemable containers are marked with a "HI 5¢" or "Hawai`i 5¢" label.
- The container size is limited to 68 ounces (2 liters) or smaller.
- The beverage type consists of non-alcoholic drinks (soda, water, coffee, tea, juice) and limited alcoholic drinks (beer, malt beverages, mixed spirits, and mixed wine).
- The container material includes aluminum, glass, bi-metal, and plastic (#1 and #2 only).

The annual redemption rate for the fiscal year 2008 (FY 07-08) in the state of Hawai`i (June 1, 2007 through June 30, 2008) was at 72 percent, which represents approximately 680 million recycled beverage containers. This was a 4-percent increase from the prior year rate of 68 percent. In FY 08, Hawai`i County's HI-5 estimated annual redemption rate reached an all time high of 90 percent, up from 81 percent last year[1]. Redemption Centers report that approximately 116 million containers were redeemed on the Big Island last year.

Hawai`i County provides Certified Redemption Centers (CRCs) for consumers to redeem their HI-5 beverage containers at select recycling and transfer stations (see Exhibit 4-3 for locations). Additionally, Hawai`i County offers free recycling bins for collection of HI-5 beverage containers special events. The recycling bins consist of an easy-to-transport, lightweight steel frame that uses a clear bag to hold HI-5 beverages. Reservations are required and the County makes the recycling containers available on a first come, first serve basis.

4.3.1.3 Green Waste Mulching and Dropoff Opportunities

Hawai`i County designated sites at the South Hilo Sanitary Landfill (SHSL) and Kealakehe Recycling and Transfer Station for processing green waste and untreated wood pallets. The Kea`au Recycling and Transfer Station also includes a roll-off bin for residents to deposit green waste; the green waste is then hauled to a mulching facility located at the SHSL site for processing. The County contracts with a private business to process the green waste into mulch for planting, gardening, and farming applications. Consumers, including both residents and commercial entities, may drop off their green waste and pick up mulch at the Hilo Landfill and Kealakehe locations. Currently, dropoff is free and the mulch is made available for consumers at no charge.

Future actions planned by the County involve soliciting proposals from private companies to operate island-wide green waste recycling collection sites. The proposed green waste collection sites would be conveniently located at or in close proximity to current recycling

[1] The redemption rate is estimated using data from the Department of Health on the number of deposit containers redeemed on the Big Island from July 1, 2007 to June 30, 2008 and the County's estimates on number of deposit containers sold based on defacto population.

and transfer stations. Residential green waste disposal would continue without incurring a disposal fee; however commercial green waste would be charged a fee, as set by the County or the selected contractor(s).

4.3.1.4 Home Composting

Hawai`i County promotes and educates residents on composting through Recycle Hawai`i, a tax-exempt, educational organization. Recycle Hawai`i and the County DEM initiated a program to furnish multiple Hawai`i schools and residents with composting bins called Earth Machines. Based on availability, residents may request Earth Machines for their homes; various workshops and educational programs are provided to the participants in the program.

4.3.1.5 Recent Bioconversion Requests for Proposals

The County issued two requests for proposals (RFPs) during 2008 for projects that would dramatically increase the quantity of organics diverted from landfill. The first is for a 10-acre composting and biodiesel production that has been designed by the County and is located at the West Hawai`i Sanitary Landfill (WHSL). The plan is that the selected contractor will process collected green waste, untreated wood, biosolids, and/or organic materials into mulch, compost, soil amendments and/or other landscaping products. The second is an RFP for contractors to develop dropoff facilities for green waste and possibly other organics at or near each of its 21 recycling and transfer stations. As of the second quarter of 2009, the County has not funded either of these projects. The ultimate schedule for implementation of these projects will depend on the availability of funds in upcoming budgets.

4.3.1.6 Scrap Metal

Scrap metal may be dropped off at Hilo, Kealakehe, and Kea`au Recycling and Transfer Stations. The Kea`au Recycling and Transfer Station only accepts residential scrap metal, but the Hilo and Kealakehe recycling and transfer stations accept both commercial and residential scrap metal. The scrap metal is sorted by a County-approved contractor and sold to brokers for shipment to the mainland or Asian markets.

To assist with the removal of abandoned vehicles, Hawai`i County developed an Abandoned Vehicle Removal Program. Under the program, abandoned vehicles may be hauled by a contractor to either the Hilo or Kealakehe Recycling and Transfer Stations after certain procedures have been followed by the Police and DEM.

4.3.1.7 Tire Program

Hawai`i County approved an ordinance in 2008 prohibiting all tires and parts of tires being disposed of at the SHSL and WHSL. Consumers may drop off used tires at select tire company locations, and companies generating tire waste are required to recycle. Recycling options include baling and then shipping the tires to the West Coast to be ground or crumbed, or shipping the tires to the AES power plant in O`ahu and utilized for fuel. Tire recycling contractors may also assist in tire collection and disposal.

4.3.1.8 Fats, Oils, and Grease Program

The Hilo and Kealakehe Recycling and Transfer Stations accept waste cooking oil and FOGs from permitted haulers. The waste cooking oil and FOGs are placed in 300- to 500-gallon totes and shipped to either O`ahu or Maui for processing at a biodiesel facility.

As a component of the composting request for proposal, Hawai`i County will be soliciting proposals to operate the biodiesel operation of West Hawai`i Compost and Biodiesel Facility. The biodiesel operation would accept cooking oil, FOGs, and grease trap waste from the County and other private sources. The waste would be processed into clean burning biodiesel and sold as a fuel to consumers.

4.3.2 Private Sector Programs

Many businesses in the private sector develop in-house recycling programs. These programs are often not tracked by Hawai`i County but may constitute a large percentage of recycled materials. Some larger businesses have sophisticated systems to document the amount of recycled material generated, while smaller businesses sometimes do not carefully track the amount of materials that they recycle. In general, however, most businesses are willing to document and share the data that they collect with the County.

4.3.2.1 Curbside Collection of Recyclables

Private contractors provide HI-5 beverage container redemption services at their business locations, community centers, and schools, or through mobile redemption units. Contractors and nonprofit groups also pick up paper products, such as mixed office paper, newspapers, and cardboard. The recycled materials are generally sold to brokers on the mainland.

No island wide or large-scale curbside recycling program is currently implemented in Hawai`i County. Although pilot curbside recycling programs have previously been implemented by private waste haulers, they have not been sustained due to various logistical, technical, and financial challenges.

4.3.2.2 Large Retail Business Recycling

Large retailers, such as Wal-mart, Kmart, Costco, Home Depot, and others maintain in-house recycling programs at their stores. Cardboard and plastic (plastic bags and shrink wrap) constitute the majority of the materials recycled at these large retailers. Recycling quantities may range from a couple of bales of combined cardboard and plastic per week up to twenty bales per week for the largest retailers; each bale averages approximately 800 to 1,000 pounds. Depending on the retailer, HI-5 beverage containers, mixed paper, wood pallets, batteries, and light bulbs are also recycled at the stores.

Data provided during interviews conducted with many of the retailers indicates that most of the materials, especially cardboard and plastic, are shipped either to the West Coast to third-party brokers or to the retailer's distribution center. Other recycled materials are picked up by permitted haulers.

4.3.2.3 Composting

Several private businesses operate composting facilities on the island. Generally, these facilities accept green waste from local residents at no charge, and offer mulch and compost

products to consumers. One operator is reported to process as much as 350 cubic yards of green waste per month. Some of the challenges facing such businesses include cost of operation, and lack of public education about the benefits of recycling green waste and using the resulting products. There is a significant existing and potential market for the mulch and compost products generated from such facilities.

4.3.2.4 Metals Recycling

In general, metals (ferrous and nonferrous) are recycled and sorted by a County contractor at the Hilo, Kealakehe, and Kea`au recycling and transfer stations. However, there is also a booming scrap metal business in the private sector, spurred on by the current spike in scrap metal prices. Certain contractors have obtained solid waste permits to collect and sort scrap metal at their facilities. The metal is sold to brokers for markets in the mainland and Asia.

4.3.2.5 Tires

Multiple haulers collect and bale tires and tire parts for shipment to the West Coast or O`ahu for processing into ground and crumbed materials for use as fuel at the H-Power waste to energy facility. One contractor utilizes the tires to make concrete tire blocks used in decorative walls. The contractor is currently attempting to gain approval from the State of Hawai`i to allow contractors to use the tire blocks as a component in structural walls.

4.3.3 Current Material Markets and Market Development Initiatives

Currently the primary markets for various types of recycled materials generated within Hawai`i County include local businesses, and larger manufacturing or recycling facilities in the U.S. Mainland and Asia. The majority of recycled materials generated within the County are either sold to brokers or shipped directly to buyers in the U.S. Mainland and Asia. Only a small percentage of materials are processed and reused locally. As a result, the cost of the County's recycling programs is highly dependent on remote market prices for recycled materials. In the fall of 2008, market prices paid for County recyclables fell by up to 80 percent over a two-month period, which had a profound negative impact on the cost of recycling. On the other hand, during 2007 market prices for most recyclables were well above what was projected when contracts with private recyclers were negotiated. This underscores the financial risk to the County of shipping materials off-island to remote markets, and the potential advantages of developing sustainable local markets for recyclables.

Some examples of local and mainland markets are described below.

4.3.3.1 Mulch and Compost Products

Local businesses including landscapers, contractors, and public agencies utilize mulch and composted materials produced locally. Residents use compost and mulch in both residential and agricultural applications. It is likely that 100 percent of the materials produced through recycling of green waste can be utilized locally. One local composting business reported that they are selling compost for $3 per cubic yard. The County offers mulch free to residents at the SHSL and the Kealakehe Recycling and Transfer Station.

4.3.3.2 Cooking Oil, Fats, Oils and Grease

During the past 5 years several commercial businesses in Hawai`i have been established to recycle used cooking oil and FOGs in the production of biodiesel. Several commercial ventures are currently evaluating the construction of facilities within Hawai`i County. As noted above, the County plans to contract for the operation of a biodiesel production facility at the WHSL. It is likely that a large percentage of these waste materials generated locally could eventually be utilized in the production of alternative fuels. Data were not available for the value of used FOGs; however, the biodiesel produced using such materials is currently selling at a price slightly higher than that of refined diesel fuel.

4.3.3.3 Paper

Currently much of the recycled paper and cardboard generated on the island is either shipped to the U.S. mainland or Asia for reuse. Several local businesses accept newspaper for recycling, and produce shredded paper products used primarily by the local agriculture businesses. Businesses interviewed indicated that 100 percent of the materials that they produce through recycling are purchased by local farmers for use in growing and shipping of agricultural products and flowers.

4.3.3.4 Plastics

Plastic containers (#1 and #2) are included in the HI-5 Redemption Program. Other plastics including plastic shopping bags are baled and shipped to overseas markets. There is a local business that has conducted successful pilot tests of a process that processes film plastics into growing medium for orchids.

4.3.3.5 Glass

Currently, glass is both recycled (or reused) in the county and shipped to the U.S. mainland or Asia for remanufacturing. A significant amount of glass is crushed for use in local construction projects. The County Solid Waste Division often specifies glasscrete (10 percent of aggregate is replaced with crushed glass), and uses crushed glass for backfill behind retaining walls. More could be done to use glass for County construction projects.

Several smaller businesses exist within the County that use recycled glass for the production of artistic, architectural, or educational products: the market for these products is somewhat limited.

The potential exists to develop local markets serving the construction industry that would recycle most or all of the glass containers generated in the County. Doing so would require marketing and promotion efforts, changing specifications and regulations, and developing additional processing infrastructure. Products such as glassphalt or reflective materials used in signage could potentially be produced on the island, but require development of infrastructure, equipment, and/or facilities to accommodate the manufacture of these materials.

The HDOH recently changed the handling fee paid to redemption center operators. The fee was lowered from 3 cents per container to 2 cents per container for on-island use, and was increased to 4 cents per container for remanufacturing, which translates to shipping and off-island processing because there are no glass remanufacturers on the island. County Solid

Waste Division staff believe that paying more for off-island reuse and remanufacturing than for on-island use is a barrier to developing local markets for glass. Developing local markets for glass has a number of benefits including: saving natural resources by not having to mine raw materials, eliminating diesel fuel use associated with shipping glass to off-island markets, and creating local jobs.

4.3.3.6 Metals

There are limited facilities on the Big Island for processing scrap metal. The bulk of the scrap metal generated in the County is shipped either to O`ahu for processing and subsequent shipment to the U.S. mainland of Asian markets, or shipped directly to those markets. During the last decade, scrap metal value increased steadily until the financial crisis of late 2008, at which time market prices plummeted. Due to its weight, the processing required to ship scrap metal, and distance to markets, processing and shipping costs will likely continue to impact the economics of selling scrap metal.

4.3.3.7 Market Development Initiatives

The County helps provide incentives for recycling through its diversion incentive program. In this program, the County issues requests for proposals for companies to process and market and/or collect recyclable materials. Currently, it has contracts with companies for processing paper, metals, plastics, glass, FOG, latex paint and green waste. It also contracts with a company for collecting and processing mixed recyclables and glass at its recycling and transfer stations.

4.3.4 Hawai`i County Staffing Levels

Successful delivery of local government waste reduction programs requires devoting an appropriate amount of resources including staffing. Hawai`i County has demonstrated its commitment to waste reduction and recycling by assigning the following staff to County waste reduction and recycling programs:

- One full-time recycling coordinator
- Two FTE recycling specialists for the HI-5 recycling program
- Two FTE recycling specialists
- One part-time student helper

In addition, using funds provided by the County of Hawai`i, Recycle Hawai`i employs three part-time education specialists, who are responsible for educating the public about waste reduction and recycling programs on the north, west and east portions of the island, respectively. Recycle Hawai`i also has other personnel that do education at KRRC and other various workshops and community events.

4.4 Issues and Concerns

As described above, a number of recycling, bioconversion, and marketing activities have been recently conducted in the County of Hawai`i, including programs and initiatives by both the County as well as other organizations. In spite of these efforts, the County recycling rate is just under 30 percent, which is well below its 2008 target of 50 percent. There is more that could be done by the County and waste generators to treat materials as resources and

further reduce landfill garbage. The need to implement additional programs and policies is further established by the County's commitment to zero waste.

4.5 Options for Improvement

Pursuant to HRS 342G-26, an overview of various options that could be implemented to improve recycling and bioconversion and solidify markets follows. These options were developed based on successful initiatives implemented in other jurisdictions that may be applicable and appropriate for Hawai`i County. Note that the options focus on recycling and bioconversion; waste reduction and reuse are discussed in Section 3.0, Source Reduction, and public education is discussed in Section 5.0, Public Education and Information.

4.5.1 Increase Green Waste Drop-off Opportunities at Recycling and Transfer Stations

As discussed above, green waste can be dropped off at the Hilo, Kealakehe, and Kea`au recycling and transfer stations. The County plans to issue a request for proposals for private firms to provide green waste collection sites for materials at or near each of the other 18 recycling and transfer stations.

Diversion Potential. Using results from the County's 2008 waste composition study, assuming 50 percent of the green waste currently being disposed at recycling and transfer stations could be diverted through a drop off program, this green waste collection program might result in additional recycling of 4,900 tons. This estimate assumes no green waste curbside collection program is implemented and recycling and transfer stations remain open legally only to residents. Additional quantities could be captured with rigorous enforcement of a green waste disposal ban and/or by allowing small commercial customers to participate in the program.

Estimated Cost. The current cost of green waste processing is approximately $37 per ton. Extending the program to all stations that are further from County mulching facilities and that have less frequent traffic would probably increase this cost by 20 to 40 percent for a total annual cost increase of approximately $650,000 to $800,000.

4.5.2 Residential Curbside Collection and Processing of Recyclables

In this option, the County would collect recyclables from single family residents or contract with a private collection firm for the service. There is a wide variety of curbside recycling programs in use in North America today. They can generally be grouped into two types: multi-stream and single stream systems. A third type, co-collection, in which bags of garbage and recycling are collected in a single vehicle, is becoming less popular because of contamination concerns and low participation rates. A brief discussion of multi-stream and single stream recycling and some other important considerations follows.

4.5.2.1 Multi-Stream Recycling

With multi-stream systems, households place recyclables into rectangular containers, bags, or bundles and place them at the curb. The collector lifts materials by hand into multiple compartments on the collection vehicle. Glass is often separated from other materials in order to avoid high contamination of fiber and fiber processing difficulties that can result when broken glass is present. Most programs sort materials into two or three types of commodities, but five to seven materials sorts are done in some programs.

Advantages

- More thoroughly separating differing types of materials generally results in higher recycled material quality and market prices.
- Can reinforce zero waste principles by raising consumer awareness that sorted materials are valuable resources.

Disadvantages

- Requires more effort by householders to sort materials.
- Requires a higher level of effort by haulers, resulting in higher collection costs.

4.5.2.2 Single-Stream Recycling

In recent years, there has been a movement towards single-stream recycling systems in which all dry recyclables are placed into a single rolling cart[2]. The cart is lifted using a hydraulic lifting arm attached to a collection vehicle. This more automated type of system lowers collection costs. The lowest cost per ton of material recycled is typically achieved by single stream recycling with fully automated collection in which a single driver can collect material from many stops without leaving the cab of the truck (see photo below).

Advantages

- Generally results in the highest rate of diversion of materials from landfill.
- Simpler system for participants to use because all materials are combined in a single bin and no sorting is necessary.
- Lower cost per ton of material recycled because of higher resident participation rates combined with automated collection efficiency (lower collection costs).

- Results in fewer injuries to collection workers and corresponding workers compensation claims because no lifting or handling of materials is required.

Disadvantages

- Higher contamination of recyclables: significant effort is required to ensure that residents maintain material quality.

[2] MSW Management Magazine (July/August 2007) reports the results of a 2005 study that indicated single stream collection was used in 27 percent of U.S. recycling programs in 2005 compared with 10 percent in 2000.

- Requires sophisticated materials processing facilities and equipment, as well as good communication with processors and end-use markets to ensure that manufacturing (raw material quality) requirements are met.
- Higher initial capital cost because of the cost of carts ($45 to $60 each on the U.S. Mainland).
- Fully automated systems require higher initial and long-term capital costs because mechanically complex trucks are needed, that have more rigorous long-term maintenance requirements.

4.5.2.3 Service Standards

Curbside collection is generally offered on a subscription basis, or made mandatory for some or all single-family residents within a jurisdiction. Hawai`i County is predominantly rural in character with relatively small urban and suburban areas in Hilo, Kona, Waimea, and a few other locations. Many of the rural areas within the County have steep, unimproved roads not suitable for collection vehicles. Thus, mandatory curbside collection for all County residents is likely to be impractical. Further, longer distances between collection stops will occur in many of the geographically dispersed small communities in the County. A voluntary subscription service, for which not all residents would sign up, would potentially make the distance between collection stops even longer. For program cost efficiency, it is recommended that this option should include designated zones where curbside service would be mandatory.

For the purpose of developing diversion and cost estimates, a rough analysis of housing units in Census Designated Places was conducted. The result was an estimate of 37,000 households that would be served by the program, which is about 73 percent of the estimated 51,300 occupied single family households in Hawai`i County[3].

Collection frequency could be weekly or bi-weekly. Weekly collection generally is more costly, but can potentially result in somewhat higher diversion from landfill. The collection frequency could be evaluated during a pilot program and determined at a later date.

4.5.2.4 Processing

The processing requirements for the collection program would need to be determined. The economics of material recovery facilities are characterized by substantial economies of scale. It is likely that the County's most cost-effective strategy to bale commingled recyclables and ship them to the U.S. Mainland for processing (as is currently done with mixed recyclables collected at County recycling and transfer stations). The resulting requirements for a County processing facility would consist of a covered building with space to store incoming materials, one or more balers for densifying materials, and equipment and facilities to load shipping containers for transportation to markets.

It is likely that one or more new processing facilities would be needed to support this program. The cost of developing and operating several smaller storage and baling facilities would need to be weighed against the costs and other impacts of trucks hauling materials

[3] Based on data from U.S. Census *2006 Selected Housing Characteristics* (single-family was counted as dwellings with 1 to 4 units), and 2000-2006 annual growth rate used to project 2008 total occupied housing units (63,347).

long distances to a central facility. The most likely potential locations for such facilities would be in East Hawai`i (Hilo), one in West Hawai`i (Kona) and one in the Waimea area.

4.5.2.5 Other Considerations

There are a number of other factors that should be considered when evaluating curbside recycling:

- Collection is typically performed through a contracting mechanism with a private service provider, although many cities and counties collect recyclables using municipal workers. This decision would need to be made with State contracting laws in mind.
- There a many different ways of organizing the collection of garbage, recyclables, and green waste/organics. The program must be integrated with other collection programs. If curbside recyclable collection were implemented in Hawai`i County, it would be costly to collect both at curbside and at all 21 of the County's recycling and transfer stations.
- Pilot programs and consumer research should be conducted prior to full-scale implementation to develop data that can be used to refine and tailor the program to the needs of the various communities within the County.
- Education and promotion of the program would be critical to success.

Diversion Potential. Curbside recycling has the potential to divert significant quantities of material from County landfills. The extent of diversion could vary significantly depending on the type of program that is instituted and other factors such as those presented in Exhibit 4-3. Some of the more successful curbside recycling programs in the United States report collection rates of 500 to 1,000 pounds of recyclable materials per participating single-family household per year. For example, Seattle reported dry recyclables collection of 876 pounds per participating household per year in 2007[4]. A 2007 analysis of 134 curbside recycling programs in Ontario found a collection rate of 339 pounds per participating household per year[5].

In FY 08, 5,557 tons of dry recyclables were collected from County recycling and transfer stations, which is approximately 175 pounds per household per year. Using results from the County's 2008 waste composition study, assuming 37,000 households would be served and material capture rates of 80 percent for most recyclables (like paper, cardboard, and containers), a recycling program would result in additional recycling of 8,800 tons, which is about 460 pounds per participating household per year, or about 635 pounds per participating household per year including materials currently being collected from County recycling and transfer stations.

[4] See http://www.seattle.gov/util/stellent/groups/public/@spu/@usm/documents/webcontent/spu01_003756.pdf

[5] Wilson, Bruce. *A Comparative Analysis of Ontario's Recycling Programs*. 2007. Proceedings, Papers, and PowerPoint presentations of the ISWA World Congress.

EXHIBIT 4-3
Factors Affecting Curbside Recycling Rates

Program Feature	Estimated Recycling Rate Impact (in percentage points)
Variable garbage collection rates	+5 to 6
Weekly recycling collection	+2 to 4
Add additional materials	+2 to 4
Commingled collection	+1 to 3

Sources: California Integrated Waste Board. 2002. *Curbside Recycling, the Next Generation: A Model for Local Government Recycling and Waste Reduction.* Accessed at http://www.ciwmb.ca.gov/publications/default.asp?pubid=969

Estimated Cost. The cost of curbside recycling ranges significantly for different programs. Factors that influence costs are similar to those that affect the amount of recycling such as:

- Costs increase with the frequency of collection (for example, weekly versus bi-weekly). One recent study estimated only a small reduction in diversion, but as much as a 40-percent reduction in collection costs by moving from weekly to bi-weekly service[6].
- Subscription versus mandatory service (mandatory collection has a higher total cost but lower cost per household because the travel distance between stops is reduced).
- If recyclable materials are separated versus commingled, more collection time is required at each stop, thus increasing costs.
- Costs are higher in more rural the service areas (because of longer distances and increased travel time between stops).
- Shipping costs increase with distance to markets.

Information about the extent to which various factors affect the cost of recycling are shown in Exhibit 4-4.

The EPA reports that typical costs for curbside recycling range from $2.75 to $5 per household per month[7]. However, costs can be considerably higher. For example, the City of Calgary, Alberta's new curbside collection program costs residents $8 per month[8]. All of these costs assume that there is a curbside garbage service in place. Should the County of Hawai`i implement curbside recycling in the absence of curbside garbage or green waste collection, costs would be relatively high because administration, billing, overhead, vehicle maintenance, training, and other costs would be applied only to recycling and would not be spread over the cost of multiple services.

6 Skumatz Economic Research Associates. 2008. *Roadmap for Moving Recycling and Diversion Forward in Colorado: Strategies, Recommendations, and Implications.*

7 http://www.epa.gov/osw/conserve/tools/localgov/economics/collection.htm

8 http://content.calgary.ca/CCA/City+Hall/Business+Units/Waste+and+Recycling+Services/City+Initiatives/Curbside+Recycling+Program/Calgary+Launches+Curbside+Recycling+Program+in+2009.htm

EXHIBIT 4-4
Factors Affecting Curbside Recycling Costs

Program Feature	Estimated Cost Increase or Decrease
Commingled collection	20 to 35% decrease
Less than weekly collection	20 to 40% decrease
Mandatory recycling	10 to 25% decrease
Long program history	10 to 25% decrease
Automating collection	5 to 15% increase
Adding variable rates	10 to 20% increase
Adding new materials	15 to 35% increase

Source: California Integrated Waste Board. 2002. *Curbside Recycling, the Next Generation: A Model for Local Government Recycling and Waste Reduction.* Accessed at http://www.ciwmb.ca.gov/publications/default.asp?pubid=969

Depending on the types of issues discussed above, the cost of curbside recycling could vary significantly. A curbside recycling only system, without garbage or yard waste, but including material processing and marketing, would require development of significant collection infrastructure and would probably cost $20 to $30 per household per month. The costs would likely be significantly less if the service was combined with curbside garbage and/or green waste collection.

4.5.3 Residential Curbside Collection and Processing of Green Waste

In this option, the County would collect green waste from single-family residents or contract with a private collection firm for the service. The choice of County collection versus private collection would need to be made with State contracting laws in mind.

In this type of program, materials are typically collected in bags or plastic bins provided by residents or the local government. While some systems are used for bulk collection without containers, these are typically only used seasonally in the fall for leaf collection[9]. Types of bags or containers and associated advantages and disadvantages of each type of container follow.

- Plastic bags. Relatively inexpensive, convenient, but a significant problem for processors because the cost of removing all plastic from the organics results either in contaminated low-quality feedstock, extremely high-cost bag removal methods, or both. Grass in plastic bags can go anaerobic and become odorous when opened at the compost facility. Most green waste collection programs now prohibit collection of green waste in plastic bags.

[9] U.S. Environmental Protection Agency. 1994. *Composting Yard Trimmings and Municipal Solid Waste.* Accessed at http://www.epa.gov/osw/conserve/rrr/composting/pubs/cytmsw.pdf

- Compostable bags. Somewhat less convenient than plastic bins and expensive over the long term for households which is likely to lower recovery rates. Bags cost $0.50 to $1.00 per bag. The bags compost well and avoid the contamination issues associated with plastic bags.
- Plastic bins. Most programs now use plastic containers provided by the local government, or in some cases by the user, and use rolling 30- to 90-gallon carts that are easier to get to the curb than non-wheeled bins. Bin contents are either loaded by hand (manual) or hydraulically (semi- or fully-automated) into the truck. Most programs use trucks equipped with hydraulic loaders to limit lifting by collection workers thus reducing injuries and workers compensation claims.

4.5.3.1 Service Standards

Like curbside collection, it is recommended that any green waste collection program should be a mandatory program for more densely populated single family neighborhoods to increase efficiency and reduce operating costs. Further, it is recommended that the program include rolling carts loaded using semi-automated of fully-automated equipment.

4.5.3.2 Processing Requirements

The County currently contracts for green waste processing (into mulch) at sites at the SHSL and the Kealakehe Recycling and Transfer Station, and it is currently in the process of contracting for development and operation of a composting facility at the WHSL. To minimize transportation costs, it would be advantageous to develop another processing facility in the Waimea area. If that facility is developed, there will be sufficient capacity to process the material. However, mulching produces a relatively low value product that is less desirable than compost or soil products made from compost. After the West Hawai`i compost facility is operational, the County should evaluate the costs and benefits of developing a similar facility in East Hawai`i and possibly in the Waimea area. This is recommended regardless of whether or not curbside green waste collection is implemented.

4.5.3.3 Other Considerations

The other considerations that apply to curbside recycling also apply to curbside green waste:

- A decision would need to be made if collection would be provided by County workers or under a contract with a private service provider consistent with State contracting laws.
- The program must be integrated with other collection programs and with the current green waste services provided at County recycling and transfer stations.
- Pilot programs and consumer research should be conducted prior to full-scale implementation to develop data that can be used to refine and tailor the program to the needs of the various communities within the County.
- Education and promotion of the program would be critical to success.

Diversion Potential. Using results from the County's 2008 waste composition study, assuming about 37,000 households would be served and a 90 percent capture rate, a green waste collection program might result in additional recycling of 5,600 tons. This estimate assumes no extra green waste from collection at recycling and transfer stations.

Estimated Cost. The factors affecting the cost of curbside recycling discussed above would also help determine the cost of green waste collection. Costs would depend on what other curbside services are provided (for example, garbage, recycling). Curbside collection of green waste including processing and material marketing would probably cost between $20 and $30 per household per month.

4.5.4 Add Food and Other Organics to a Residential Curbside Recycling and Green Waste Collection Program

Throughout the United States, Canada, and elsewhere, many large and small communities with a commitment to zero waste are modifying their waste collection programs to include food and other organics such as food-spoiled paper. Some examples of existing programs and how they are organized follow:

- San Francisco: Weekly collection of garbage, recyclables, and organics in plastic 32-gallon rolling carts. Fully-automated collection with garbage and recyclables in a dual collection truck (separate compartments for each material), organics in a separate truck. Variable rate for garbage. No curbside green waste collection.
- Seattle: Starting in 2009, service will be same as San Francisco with variable rates and can sizes for both garbage and organics. Major difference is that all streams are collected in separate trucks (no dual collection trucks).
- Toronto: Weekly collection of organics in 20-gallon rolling carts, and recyclables and garbage collected on alternating weeks in 32-gallon rolling cart. Variable rate for garbage.

These three basic types of systems have been implemented in a number of communities, both large and small. They require residents to learn new ways of managing food and other organics and program managers must clearly communicate to residents what materials must go in each bin. Most of these systems have some type of variable rate to encourage behavior that minimizes garbage. In general, after initial pilot testing and consumer research, these programs have typically been well received by residents. Current research efforts are focusing on ways to increase participation by residents: many programs report less than 30 percent of residents participate in organics recycling[10]. Implementation of aggressive pay-as-you throw rates is one method communities are using to improve participation rates.

[10] Goldstein, Nora. *Source Separated MSW Composting in the U.S.* BioCycle December 2005, Vol. 46, No. 12, p. 20

4.5.4.1 Processing

These programs require more sophisticated composting systems. Once food is added to the organics stream, composting must be done with some type of covered system with managed air flows to minimize odors and prevent unsanitary feeding by birds, rodents and other vermin. See Chapter 4.5.7 for more information about processing systems appropriate for food and other organics.

Diversion Potential. Using results from the County's 2008 waste composition study, assuming 37,000 households would be served and a 50 percent capture rate of food and wet or food-soiled paper, it is estimated that 4,400 tons of food and other organics would be collected. When combined with recyclables and green waste, the combined system is estimated to result in additional diversion of 18,800 tons, or an amount equivalent to 23 percent of the 81,300 total tons of waste delivered to transfer stations in 2008. When the 4,800 tons currently being recycled at transfer stations are included, the program would result in an increase in diversion equivalent to 27 percent of total current waste delivered to recycling and transfer stations.

Note that this is considerably lower than the 50 to 70 percent diversion rates reported by other three-stream programs. This is the result of the following two factors:

- Residents who live in multi-family dwellings and in very rural single family dwelling would not be covered by the three-stream program, but do deliver materials to the recycling and transfer stations.
- The materials arriving at County transfer stations include materials rarely set out at the curb by single-family residents on a routine basis such as construction and demolition waste, metals other than containers, textiles, and special wastes.

In order to make an equivalent comparison to other residential communities, we adjusted for these two factors. Including only the 37,000 participating households and typical curbside commodities, the three-stream system would result in the diversion of 68 percent of the wastes generated by those residents away from County landfills.

Estimated Cost. Rates for three-stream collection service depend on the size of containers residents subscribe to. As examples, San Francisco and Seattle both charge approximately $25 per month for service with 32-gallon discard and organics carts: costs are higher if larger containers are desired. These costs include disposal, processing/composting, administration, education, and other costs, including the cleanup and long-term monitoring of closed landfill sites. Based on data from the City of Seattle, it is estimated that costs for the collection portion (excluding processing or other system charges) of the residential monthly rate are perhaps one-third of total costs or about $7.50 per month[11].

It is estimated that the cost of a three-stream collection service in Hawai`i County, including and recyclables and organics processing and material marketing/sales (but excluding disposal, administration, transfer stations, and other solid waste programs), would probably range between $50 and $60 per month for each participating household.

[11] http://www.seattle.gov/util/About_SPU/Garbage_System/Garbage_Rate_Structure/FINANCING_200312020939564.asp

4.5.5 Source Separation Ordinance (Mandatory Recycling) and/or Disposal Bans with Differential Tip Fees

A growing number of local governments are adopting policies and legislation that prohibit disposal of recyclable products and/or mandate source separation and/or recycling of those materials. For example, in January 2006, the City of Seattle, Washington, began enforcing a policy that all waste generators recycle. As a result of this policy, residents can lose pickup services temporarily if their garbage contains more than 10-percent recyclable materials.

Once recycling opportunities for select materials are in place, some policies the County could consider include the following:

- Require residents and businesses to participate in recycling and composting programs. An ordinance could be developed that either requires residents and businesses to source-separate recyclables, or bans the combination of designated recyclable or compostable materials with the garbage.
- Ban readily-recyclable and reusable materials and products from landfills and/or any future energy from waste facility.
- Ban single-use disposable products from public events and festivals and as many other places as possible.

A good discussion of mandatory recycling policies recently prepared by Portland Metro (Oregon)[12] included the following lessons learned from communities that have implemented such policies:

- Required recycling programs have the potential to divert a significant portion of the waste stream and help communities meet recovery goals.
- Education and technical assistance are key factors to the implementation of mandatory recycling requirements. Virtually all of the program managers stressed the importance of education as a key element to a successful program.
- Using a cooperative approach with haulers, business owners, and community organizations can build program support for required recycling and influence participation.
- Strong commodity markets ultimately determine what is recyclable and influence participation. It is not practical to mandate materials recycling unless the markets exist for the materials. Therefore, any program mandating recycling should only include recyclables with developed and stable markets in order to avoid having to change policies in the future.
- A number of programs require the recycling of materials for which the cost of recycling is less than or equal to the costs of proper disposal at a solid waste facility.

[12] *Required Recycling and Incentive Program Survey, Summary of Findings*. 2002. Portland Metro Regional Environmental Management Department.

- Enforcement is a key component of mandatory recycling requirements and disposal bans. The most common enforcement measures used in the profiled programs include random business inspections and landfill load inspections. Penalties for noncompliance include warnings and fines that range from $25 to $10,000. The majority of the programs offer an assistance period to help businesses meet the requirements.
- Adequate resources need to be budgeted to support required recycling programs. A major impediment for communities implementing effective mandatory recycling requirements or disposal bans is sufficient resources for enforcement measures. Five of the nine programs noted lack of resources for enforcement measures as an obstacle to the program's success.
- Program managers stressed that businesses will not adhere to required recycling policies unless they fear the potential repercussions of noncompliance. In contrast, programs that have full-time enforcement officers stated that strong enforcement can boost both the quantity and quality of participation.
- Landfill bans can spur the market development for some materials. For example, landfill bans of yard debris have led to the development of composting infrastructure at the local and regional levels. In Vancouver, British Columbia, the ban on drywall has enabled recyclers and salvagers to competitively bid on the demolition of buildings, which has led to an increase in construction and demolition diversion from the local landfill.
- Disposal bans require extensive promotion and education campaigns targeting the affected parties. Durham, North Carolina, conducted a 2-year education period before enforcement of a disposal ban, although the city noted that a concentrated 6-month campaign prior to enforcement would likely be sufficient.
- Local government can influence the marketplace by the way it structures its garbage collection rates, franchise fees, and permit fees. A number of the surveyed communities utilize multiple incentives to reward recycling over disposal. Program managers indicated that one of the best voluntary incentives for businesses to recycle is an economic incentive.
- Diversion deposits provide sufficient incentive to encourage businesses to recycle. A number of communities in California have adopted diversion or recycling deposit systems to encourage the recovery of construction and demolition materials. Program approaches vary and deposits range from a flat fee based on a project's total cost to fees based on square footage and the type of project.
- The largest barrier to a diversion deposit system is the administration of the transaction and refund process. Program managers commented that the refund turn-around process is slow and managing the financial components of the program requires additional resources and time. For example, San Jose's Construction and Demolition Diversion Deposit Program's refund process takes approximately 3 weeks, which is longer than the city originally anticipated.

The County now has mixed-material and glass-only recycling bins available at all but one of its recycling and transfer stations. Thus, residents currently have ample opportunity to

recycle these materials. If the County is successful in implementing green waste collection points at or near most of its recycling and transfer stations, the situation will be similar for green waste.

These materials would be good candidates for inclusion in a source separation ordinance or disposal ban. Enforcement would be the main challenge because there is relatively little monitoring and no enforcement authority currently in place at recycling and transfer stations. Prior to enacting the ordinance, the County should conduct an extensive education and promotion program that highlights the reasons for the ordinance and the recycling options available to residents. For a period of 6 months to a year before enacting the ordinance, the County should have signage prominently displayed at each station that announces the pending ordinance and clarifies recycling options.

Once enacted, it is recommended that initial enforcement should be less stringent (that is, encourage, but not strictly enforce compliance so as to minimize conflicts and the potential for illegal dumping). More strict enforcement, such as fining those not in compliance, would require significant changes to the authority and role of environmental management or transfer station security employees, or subcontracting this function to a suitable security provider. Such changes could be considered if less stringent enforcement proves ineffective.

For the commercial sector, the County could consider a similar ordinance that would apply at its landfills to readily recyclable materials such as cardboard, green waste, and metals. At its landfills, it should make opportunities for drop-off of all banned materials. Drop-off would be free (like at the transfer stations) except the County could charge a fee for green waste and metals that is less than the fee for garbage. This would help encourage on-site use of green waste and diverting metals to private recyclers. The ordinance could be enforced by banning these materials from landfill, with a penalty of two times the regular disposal rate if loads are found containing the banned materials.

Diversion Potential. A nationwide study of recycling and green waste programs indicated that mandatory participation[13] resulted in a 4- to 5-percentage point increase in green waste diversion but no statistically significant increase in recyclables diversion. Similar results would probably result for Hawai`i County, although it may be that some increase in recycling would occur.

Estimated Cost. Costs would include a one-time cost for the education and promotion campaign and for signage at all transfer stations. This would probably cost between $30,000 and $100,000 depending on implementation details. Enforcement costs could be relatively small if little action is taken, or they could be substantial if additional staff or subcontracted security personnel are assigned to each recycling and transfer station during the initial implementation period.

4.5.6 Commercial Recycling and Green Waste Program

While there are some businesses and institutions that currently recycle, there is considerable opportunity to increase recycling from the non-residential sector. Because current markets

[13] Skumatz, Lisa. 1996. *Nationwide Diversion Rate Study, Quantifying Effects of Program Choices on Recycling and Green Waste Diversion: Beyond Case Studies.* Reason Foundation Policy Study, No. 214. Accessed at: http://www.reason.org/ps214.html

for most recyclables are in Asia or the U.S. Mainland, the cost of shipping recyclables to markets makes recycling less cost-effective for businesses than it is in most U.S. Mainland communities. Much of the non-residential recycling currently results from backhaul opportunities, or generation of large quantities of valuable materials such as metals which are currently experiencing record high prices. It is likely that in order to increase the rate of non-residential recycling, the County will need to take regulatory steps to drive the process. Regulatory measures may include the following elements:

1. **Mandatory Recycling/Source Separation Ordinance.** Adopt a mandatory recycling ordinance that requires all businesses and institutions to recycle an approved list of commodities. That list could include cardboard, metals, green waste, and perhaps other select commodities.

2. **Business Recycling at Recycling and Transfer Stations.** Mandatory recycling could be expensive for smaller firms that do not generate much waste (such as small offices or retail operations). Thus, the County should change the permits that govern its recycling and transfer stations to allow small businesses and institutions to drop off materials. Businesses would still be prohibited from disposing of waste at stations. At stations where space is available, the County should provide additional bins for source separated cardboard to accommodate small business recycling efforts.

   If accommodating small business recycling at the stations is not acceptable or feasible, the mandatory recycling ordinance should provide an exemption for businesses with less than a certain threshold number of employees (for example small businesses employing less than 20 persons).

3. **Require Collection Firms to Provide Recycling Services Through Licensure.** License all garbage collection companies with a condition of the license that stipulates they must provide an approved recycling collection service. The required service should be tied to the list of mandatory recyclables. If all firms are required to provide a recycling service, competition should lead to competitive rates for hauling both recyclables and garbage.

4. **Develop and Contract for New Processing Facilities.** As discussed above for residential recycling, the County would need to ensure that processing and marketing opportunities are available for these materials. The same processing facilities could be used for residential and non-residential recyclables. This would probably include the County issuing an RFP for these services either at County owned sites and/or allowing contractors to propose sites. Facilities would probably be needed in West Hawai`i, East Hawai`i, and possibly in the Waimea area.

4.5.6.1 Implementation Considerations

This option would require significant outreach to the business community, and a marketing and technical assistance program. The option should include a reasonable phase-in period so that collection firms can ramp up for the changed requirements. The County should consider implementing an incentive program and/or recognition program for businesses that meet the recycling requirements.

If this program is to apply to state and federal government institutions such as schools, negotiations and consultation with agencies will need to take place. For schools, collection contracts would need to be revised to allow for recycling in addition to garbage collection.

Diversion Potential. Using results from the County's 2008 waste composition study, assuming 80 percent of business and institutions would participate and a 60-percent capture rate for readily recyclable materials and green waste, this program could result in additional recycling of approximately 13,400 tons per year.

Estimated Cost. If the County continues its current policy of making incentive payments for processing and marketing materials, 13,400 tons of material would cost the County approximately $540,000 per year (assuming $40 per ton). Alternatively, this cost could be passed on directly to the businesses and institutions by charging a tipping fee at the processing facility.

The County would need to dedicate staff to draft ordinances and to follow through with the required legislative process to enact them, and set aside funds for the promotion and education of the program.

4.5.7 Bioconversion of Food and Other Organics from Businesses/ Institutions

The County's 2008 waste composition study estimated that discarded food makes up 34,000 tons, or 16 percent, of disposal at County landfills. The putrescible nature of food requires more costly and sophisticated collection and processing infrastructure than green waste; however, there are many successful examples in the U.S. and elsewhere of organics management programs that incorporate food and other organics as feedstock. This option focuses on options for collection (from non-residential sources) and processing of this waste stream (residential collection is discussed in Section 4.5.4).

As an option, the County could issue a request for proposals for development and operation of organics processing facilities designed to accept food and other organics as part of the incoming feedstock. It's likely that individual facilities would be necessary in West and East Hawai`i (and possibly in Waimea). The County would need to take the following steps to attract material to the facility:

- Price the tip fee at the facility less than the tip fee at its landfills to provide a financial incentive for businesses to separate food (perhaps $30 per ton less).
- Develop an outreach program that would work with collection firms and major food generators to encourage participation well in advance of the facility operation date.
- Be prepared to establish an ordinance preventing food from disposal at major food generators should the first two steps not be sufficient to attract material to the processing facilities.

4.5.7.1 Collection from Businesses and Institutions

Food and other organics, such as waxed cardboard or wet or food-soiled paper, could be collected from businesses and institutions that discard reasonably large quantities of food. Existing hauling routes and schedules would need to be altered to provide a separate service for food and other organics.

Businesses and institutions would need to change work practices to separate food and other organics from garbage. Other communities have found that one significant challenge for businesses and institutions has been finding space on the premises to set out a separate collection bin for organics. Addressing these challenges would require effective communication between County staff, the collection company, and businesses and institutions.

4.5.7.2 Processing

Compared to a green waste processing operation, processing food requires additional design and operational features to prevent odors and the attraction of birds, rodents and other vermin. This is typically accomplished as follows:

- Receiving collection trucks and preparing/mixing feedstocks in an enclosed building with biofilters and other features to manage air flow and prevent odors.
- Mixing and moving feedstock daily (unlike green waste where under certain circumstances material can be stored for days at a time).
- The bioconversion process requires either more sophisticated electronic controls and/or more sophisticated and meticulous daily operations. Many systems conduct this step in enclosed buildings or vessels.
- A brief overview of four commonly used bioconversion technologies for food follows.

Membrane covered system (Everett, WA.)

Covered Forced Air. Some relatively recent innovations have taken place in an attempt to lower the cost of bioconversion with food. These systems include engineered fabric buildings with aluminum frames, air control, and biofilters for receiving and feedstock preparation. The buildings typically range in size from 2,000 to 10,000 square feet.

Once feedstocks are prepared, the material is placed into outdoor windrows with a fabric membrane covers (for example, Gore or Ag-Bag) and aeration systems, or into roofed pole buildings with concrete bunkers, aeration systems, and organic covers (typically finished product). After approximately 30 days, the feedstock is cured in windrows or piles either outdoors or under a covered structure.

Bunker with Roof (Latah Co., ID.)

These systems have lower capital costs than other systems, but may require more knowledgeable, experienced operators to maintain final product quality and minimize nuisance odors.

4.5.7.3 Bays, Beds, and Tunnels

Bays, beds, and tunnel systems are normally constructed inside buildings, and are essentially a variant of a turned windrow system. The feedstock is placed either in a bay formed by two long parallel walls, or in a four-sided reactor bed. The walls of the bay or bed are generally about 6 feet high.

Bed Composting System

The material is turned down the length of the bay or bed by a machine that is suspended above or rides on rails along the top of the bay or bed. Turning aerates the material, and additional aeration may be provided by a forced air system in the floor of the bay or bed. The turning machine gradually moves the material down the length of the bay or bed, and is timed so that by the time the material reaches the end, the primary composting process is largely completed. The product is cured in turned windrows or aerated static piles. As with static piles, the mixture must be perfectly balanced when it is added, as there is no further opportunity for amendments to be added. However, odors can be easily controlled, since bays and beds are usually constructed inside buildings. Bays and bed systems typically are more expensive than turned windrows and static piles, but less expensive than in-vessel systems.

4.5.7.4 In-Vessel Systems

In-vessel systems offer the greatest degree of control over the composting environment. In-vessel systems also have the smallest land requirements, although they are the most expensive technology to design, construct and operate. An in-vessel system is defined as one in which the composting process is conducted inside some type of sealed container (the vessel) where the environment is highly controlled and access is restricted.

In-vessel system (Mariposa Co., CA.)

In-vessel systems can be either flow or batch reactors. Larger systems consist of permanent chambers installed within a building. Mechanisms are in place to load raw waste into and to remove compost from the chambers. At a minimum, the system includes monitoring systems for temperature and oxygen content and an aeration system. Smaller systems involve the use of portable containers. Modular vessels, which are similar in appearance to international shipping containers, are filled with raw organic waste, sealed, and attached to aeration manifolds and monitoring equipment. At the end of the primary composting process, the container is disconnected, emptied and the material is formed into turned

windrows or static piles to complete the composting process (curing). The vessel is then available for the next batch of feedstock.

4.5.7.5 Energy Recovery with Wet and Dry Anaerobic Digestion

Significant amounts of energy are contained in food and other organics currently sent to landfills. Recent increases in energy prices and concerns over global climate change have led to the development of anaerobic digestion systems for food and other organics. Anaerobic digestion is a proven technology that has been used in the wastewater field for years. The process converts food and other organics to biogas (that can be used to produce electricity or to power vehicles) and dewatered digestate that can be composted and sold for agricultural uses.

In a wet system, incoming materials are loaded into an enclosed building for tipping, pre-sorting, and a series of pre-processing activities to remove recyclable and non-recyclable inorganic elements from the material. Feedstocks are then fed into a hydropulper, which is designed to separate the remaining inorganics from the biodegradable elements and to convert the organics into an organic suspension. The biodegradable organic elements are pumped from the hydropulper to a grit removal system to further remove unwanted materials that may have passed through the hydropulper sieve. The grit-free suspension is then pumped to the anaerobic digester where the digestible material is converted into methane-rich biogas. Non-digestible material is segregated for final curing and stabilization into compost.

Dry systems allow solid materials to be mixed into the biomass, whereas traditional wet digesters make only minimal use of solids. In a dry system, up to 50 percent of the biomass can be solids such as green waste, wood chips, or papers. Biogas is then transformed in block-type thermal power stations into electrical energy and heat. Like the wet system, the digestate residual is cured in order to convert it into compost or other agricultural products.

Dry anaerobic system (Germany)

The dry systems have the advantage of being relatively cost-effective organics management solutions for relatively small waste streams (as small as approximately 6,000 tons per year). A key to the cost effectiveness of wet or dry systems is proximity to a power user, and/or relatively high prices paid for electricity generation or fuels. The relatively high cost of electricity in Hawai`i County provides an advantage for this technology locally compared to other areas of the country.

Wet anaerobic system (Germany)

Diversion Potential. Using results from the County's 2008 waste composition study, and assuming capture rates of 50 percent for food, 50 percent for wet- and food-soiled paper, and 10 percent for wood, this program could result in additional diversion of 21,600 tons. Additional carbon may need to be obtained from green waste, wood chips, or other sources depending on the type of processing system selected.

Estimated Cost. The cost of processing food and other organics will vary depending on the type of technology, market conditions, contract terms, permitting requirements, power purchase agreements, and other factors. Estimated cost ranges for various processing technologies in Hawai`i County are presented in Exhibit 4-5. These costs were developed using information from the construction of actual facilities in the United States and Canada, which were adjusted based on estimated construction cost differentials for Hawai`i County.

EXHIBIT 4-5
Estimated Per-ton Cost[a] Range for Food and Other Organics Processing in Hawai`i County

Technology	Low	High
Covered Forced Air	$70	$80
Bays, Beds, Tunnels	$80	$90
In-Vessel	$90	$170
Wet and Dry Anaerobic Digester	$90	$170

[a]Includes amortized capital, operations, and maintenance less product sales. Costs adjusted from U.S. Mainland to Hawai`i County using estimated construction cost differentials for Hawai`i County.
Source: CH2M HILL.

4.5.8 Establish a County "Buy Recycled" Policy

This option, also discussed in the draft source reduction section, is important to promoting markets for recycled materials. The County could change its procurement practices to require the use of recycled glass, organics, and other materials to the extent practicable. This would help support the development of local markets for readily recyclable materials. The County should work with local businesses to identify materials that can be reused and recycled as part of County operations.

Diversion Potential. Difficult to quantify: this is a program that would support additional recycling.

Estimated Cost. The County may need to pay a higher price for some recycled products, and would need to devote staff resources to refining its procurement policies.

4.5.9 Marketing Partnership with Other Hawai`i Counties

The County's geographic isolation makes it expensive to ship recyclables to most existing markets. The County could team with the other Hawai`i counties and the State government to investigate joint marketing and market development opportunities. This could include improved pricing for backhauling containers to the mainland and overseas markets, funding pilot programs for new local end uses, or joint marketing of materials to improve market prices and/or lower transportation costs.

Diversion Potential. Difficult to quantify: this is an initiative that could result in long-term benefits.

Estimated Cost. The County would need to dedicate additional staff to develop and participate in potential studies or pilot programs.

4.5.10 Establish Opportunity to Recycle Legislation

The County could consider developing new requirements for owners and managers of multi-family dwellings and multi-tenant commercial buildings that ensure that all tenants have reasonable access to recycling services and premises-based facilities comparable to single-family dwellings and small businesses. Any such requirements would be best implemented following consultation with the local building industry.

Estimated cost: There would be some cost associated with industry consultation and modifying building codes to support the new requirements. The cost of buildings affected by the legislation could increase somewhat, but after builders become familiar with the new requirements, impacts on construction project cost should be modest.

4.5.11 Maintain Active State and Regional Profile on Zero Waste Public Policy

The County could work with State and Federal legislators and encourage other communities in the region to adopt similar zero waste goals and plans. This effort could include a coordinated effort with regional cooperation, to support state and national efforts to adopt:

- Extended producer responsibility.
- Deposit programs.
- Funding of zero waste initiatives through statewide or regional landfill surcharges and product charges.
- Change school collection contracts to include recycling.
- Full cost accounting for waste disposal.
- Packaging levies (for example, on plastic bags).
- Minimum recycled content standards for additional products.
- Design for the environment programs.
- Green procurement and green building guidelines for the public sector.
- National measuring, monitoring and reporting in achieving zero waste goals.
- New mechanisms for financial assurance for post-closure liabilities for landfills.

Estimated cost: There would be little cost associated with this option beyond some staff time spent on zero waste advocacy, and modest expenses for supplies.

4.5.12 Other Potential Recycling Opportunities

There are other initiatives that the County could adopt to support recycling, including:

- **Improve Recycling Opportunities in County Parks.** The County should consider developing a program for providing recycling opportunities in all County parks. This could mirror the two-bin system used at recycling and transfer stations by placing small mixed-material bins and glass-only bins adjacent to all garbage bins at each park. The effectiveness and cost of this program should be first tested with a pilot program.

- **Improve Recycling Opportunities on Downtown Streets.** The County Public Works Department collects trash in downtown areas of communities like Hilo and Kailua-Kona. A pilot program, similar to the one suggested above for County Parks could be implemented to test the effectiveness and cost of providing recycling opportunities at all trash collection locations.
- **Expand the Promotion of Event Recycling.** The County currently provides technical assistance to event coordinators looking to recycle at major events. This program could be expanded by developing a list of major recurring events, contacting event coordinators, and working with those coordinators to develop plans to improve recycling. The County should consider providing financial assistance for recycling bins and/or developing an ordinance that requires event recycling and possibly the use of compostable or reusable cutlery. The County could also consider requiring waste reduction and recycling plans for event and facility rental permits.
- **Establish a Recycle Art Campaign.** The County could establish a "Recycle Art" campaign, similar to the Art of Recycling School Competition, with the goal of coordinating the efforts of business and public offices and schools to organize and conduct recycle art contests at various venues once per quarter. Examples of places where recycle art could be displayed include bank lobbies, grocery stores, government offices, libraries, schools, airports and museums.
- **Expand Visitor Industry Recycling.** Hotels, resorts, and other businesses that service the Hawai`i County visitor industry are major waste generators. The County could increase its efforts to work with this sector to improve recycling opportunities.
- **Explore Opportunities to Develop an Eco-Industrial Park**. Eco-industrial parks are clusters of complementary businesses that can make beneficial use of currently discarded materials and products produced by others. Candidates are organics, building deconstruction, salvage, reuse, and repair. Actions by the County could include passing favorable zoning ordinances and/or tax relief to spur on this type of activity.
- **Source Reduction Options that could Increase Recycling.** The source reduction section discussed a number of options that could also help increase recycling in addition to reducing waste. Four options discussed in Section 3.0, Source Reduction, are construction and demolition waste reduction plans, extended producer responsibility, establishing a pay-as-you-throw system, and establish a zero waste fund.

4.6 Recommendations

On the basis of the analysis presented above and discussions with stakeholders, this Plan recommends several types of actions to improve the County recycling program. The operating expenditures associated with the recommended actions would be funded by a PAYT program, property taxes, and tipping fees, and the capital expenditures would be financed by general obligation bonds.

The recommendations presented here include requiring waste collection firms to establish recycling programs as part of the licensing requirements, and establishing a marketing

partnership with other Hawai`i counties. Those two recommendations are also discussed in further detail in Section 8.0, Collection and Transfer.

The recommendations are divided into two categories, those relating to recycling of non-organic materials (Recycling) and those relating to diversion of organics from landfills (Organics). Implementation of these recommendations will likely be slower than initially anticipated because of the impact that the worldwide economic recession has had on County finances.

Recycling

1. **Develop County policies or ordinances that mandate certain actions be taken to improve recycling rates.** In many communities nationwide, experience has shown that updated policies and ordinances are necessary to support new programs designed to treat discarded materials as resources and keep them out of landfills. After reviewing various options, the following are those that appear best suited to the specific conditions in Hawai`i County:

   – Establish a differential tip fee ordinance that would encourage landfill users to recycle targeted types of materials by charging higher fees if their loads contain these recyclable materials.

   – Establish an ordinance that mandates source separation and recycling and requires all businesses and institutions to recycle selected types of materials. This could include implementing landfill bans for select recyclables.

   – Develop legislation requiring owners and managers of multi-family dwellings and multi-tenant commercial buildings to ensure that all tenants have reasonable access to recycling services and premises-based facilities comparable to single-family dwellings and small businesses.

   – Change County procurement policies to require the use of recycled glass, organics, and other materials to the extent practicable.

2. **Work with County and State legislators and encourage other communities in the region to adopt zero waste goals and plans.** The geographic separation of the counties on the main Hawaiian Islands presents constraints and opportunities not faced by Mainland counties. With a very modest expense in resources, the County could explore potential benefits from increased collaboration with other counties and the State. Two recommendations for this Plan follow:

   – Conduct research and coordinate with legislators and waste managers within Maui, Kauai, and Honolulu Counties, to evaluate the potential for combining efforts to develop a statewide zero waste strategy.

   – Lobby the State to change school waste collection contracts for schools within the County to mandate that recycling services are included.

3. **Complete capital projects to facilitate implementation of expanded recycling programs.** A common theme expressed during discussions with SWAC and other stakeholders is that the County needs additional facilities to manage recyclables.

Recommended added facilities to support new zero waste programs include the following:

- Expand recycling opportunities at recycling and transfer stations by modifying infrastructure to accommodate recycling processes.
- Improve signage at recycling and transfer stations to provide the public with comprehensive information about recycling opportunities and procedures.
- Reconfigure the East Hawai`i Regional Sort Station Reload Facility for use as a MRF while the SHSL is active.
- Construct a new materials recovery (baling and storage) facility for West Hawai`i.

4. **Expand the opportunities for commercial recycling.** The results of the waste stream assessment conducted for this Plan update (Section 2) demonstrated clearly that commercial businesses and institutions currently dispose of large quantities of potentially-recyclable materials. After deliberation with SWAC and reviewing programs implemented by other jurisdictions, the following actions are recommended to increase commercial recycling:
   - Allow small businesses (using trucks 1 ton or smaller, with a daily load limit) to use the recycling and transfer stations to recycle selected materials.
   - Work with the HDOH Solid Waste Division to modify the operating permits of the recycling and transfer stations to accommodate expanded recycling services (currently in process).
   - Hire one full-time staff member to serve as a commercial recycling specialist.
   - Expand education and outreach programs for both large and small businesses to foster participation in commercial recycling programs.
5. **Expand opportunities to recycle in public areas and during public events.** Providing recycling bins in public places and at public events is a very visible way for the County to demonstrate its commitment to zero waste and to divert materials from landfills. Recommended public area and event recycling programs follow:
   - Install recycling bins in parks and other public areas.
   - Conduct additional recycling events within the community each year.
   - Implement and expand the Recycle Art campaign in public schools.

Organics

Waste stream studies conducted previously and, as part of this project, have determined that organics comprise a relatively large fraction of the waste entering County landfills annually. Diversion of organics was identified as a priority by SWAC, and the following recommendations were developed:

1. **Promote both large- and small-scale private organics composting operations by:**
   - Modifying zoning rules and County codes to relax restrictions on, and clarify operational requirements for composting on agricultural lands.
2. **Improve education and outreach programs that promote improved management of organics.** Composting has many benefits and is one area where education and outreach has been shown to be effective at reducing the amount of organics households and businesses send to landfills. After considering various options, the following education and outreach programs are recommended for implementation:
   - Hire one full-time staff member to serve as the coordinator for the organics program.
   - Expand and further develop a master composter program.
   - Develop a training program and guidance materials for farmers.
   - Implement a "stop wasting food" program with local food banks.
   - Partner with other local groups to establish compost demonstration gardens at recycling and transfer stations or at other visible locations in the community.
3. **Initiate an on-site composting program for residents and businesses by distributing subsidized units to both residences and businesses.** Data from similar communities indicates that the lowest cost method of keeping organics out of landfills is to manage them on-site. This eliminates the need for costly collection or transfer of organics. This is particularly true for Hawai`i County with many homes in rural areas that cannot be served cost-effectively by collection truck routes. This program would fund subsidized bins for on-site composting of green waste and food waste.
4. **Conduct a study to evaluate the potential for implementation of a landfill ban on organics.**
5. **Implement added organics management facilities and equipment.** While on-site programs are beneficial, more centralized infrastructure is also needed to provide opportunities for those residents and businesses that are not interested in managing organics on-site. After reviewing many options with SWAC and other stakeholders, the following programs are recommended for implementation:
   - Add green waste dropoff locations at recycling and transfer stations where there is space to do so.

- Process green waste at select recycling and transfer stations with a mobile tub grinder. The material would be ground on-site and then made available to residents as mulch. This is less expensive than hauling waste from individual stations to a central facility and will foster community ownership of the program.
- Develop an organics composting facility at the WHSL or other sites.
- Investigate opportunities for pilot food waste demonstration projects with the potential for eventual expansion into full-scale food waste management programs.

SECTION 5

Public Education and Information

5.0 Public Education and Information

5.1 Introduction

Public education is a critical component of a successful environmental program as it informs citizens about proper solid waste management methods and ways to reduce waste, and enhances public understanding and participation in various reuse and recycling activities. Education programs also serve to inform people of the wide variety of solid waste services provided by the County and other entities.

This section describes existing public education activities within Hawai`i County, identifies current issues and concerns with respect to public education, and presents recommendations that will help enhance educational opportunities.

5.2 Background

5.2.1 Regulatory Context

In accordance with HRS 342G-26(g), the public education and information section of an Integrated Solid Waste Plan shall describe the programs that will be used to do the following:

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

5.2.2 Review of 2002 Plan Update

Following is a summary of the recommendations put forth in the 2002 Plan update relative to source reduction, and a description of the actions taken to achieve each recommendation.

2002 Plan Update Recommendation	Status
Education and Promotion	
Hire County Recycling Coordinator	The County hired a full-time Recycling Coordinator in mid 2003. The Coordinator currently has four full-time recycling specialists on staff, each of which engages in various education and promotion activities.
Increase Budget for Promotion and Education	The County budgeted nearly $400,000 on advertising and outreach education in FY 07-08, which is a substantial increase above 2002 levels.

5.3 Existing Conditions

5.3.1 Hawai`i County Waste Reduction Programs

The County of Hawai`i employs several recycling specialists, who conduct basic educational activities. In addition, the County provides funding to several business entities to coordinate and provide educational activities to the public and private schools. A portion of the funding provided by the County for public education is used by Recycle Hawai`i to support the activities of three education specialists. The County's main education initiatives include the following:

- Internet
- Recycling infoline
- Radio and television advertising
- Brochures
- Community outreach
- Community events
- School programs
- Business education
- Awards program

A brief description of each of these initiatives follows.

5.3.1.1 Internet

The County maintains a listing of information on the internet including solid waste plans and operational information at the following address: http://co.hawaii.hi.us/directory/dir_envmng.htm. This Web site is periodically updated to reflect changes in information regarding the County's waste management program and policies. The County is also in the process of researching the use of an independent external Web site dedicated to recycling, reuse and other solid waste management issues.

In addition, the County frequently submits articles and information regarding their waste reduction and recycling programs for publication in the County Newsletter, which is electronically distributed to residents around the island on a weekly basis.

Recycle Hawai`i, as part of its overall recycling education contract, provides information on recycling and reuse services via its own Web site.

5.3.1.2 Recycling Infoline

The County of Hawai`i sponsors an infoline, to provide answers to most basic solid waste and recycling questions relating to topics including green waste and mulch, the HI-5 recycling program, abandoned vehicles, disposal of used appliances, the used motor oil program, household hazardous waste events, e-waste collection dropoff sites, and the collection of used cooking oil. The infoline is an automated program that is available 24 hours a day.

The County is upgrading its infoline to provide more information and options to communicate with County Recycling or Solid Waste Division staff. With funding from the

County, Recycle Hawai`i also maintains a live telephone information line from 8:00 a.m. to 5:00 p.m. Monday through Friday, to answer waste reduction and recycling questions from the public.

5.3.1.3 Radio, Television, & Print Media Advertising

The County and its vendors engage in multiple forms of advertising including radio, television, theater, newspaper and other print media.

The County has a current contract with Out of the Sea Media Arts to develop an advertisement plan. Initial efforts have included radio and television advertisements, and development of informational signage to be posted at recycling and transfer stations. Print media advertisements have included ads in the yellow pages and various local newspapers. Through this contract the County hopes to develop a robust program to help educate the public about various waste issues and keep them informed of upcoming events.

Recycle Hawai`i assists the County by advertising for a variety of waste reduction and recycling programs, including the Christmas Treecycling, backyard composing, household hazardous waste, e-waste, and used motor oil programs. Forms of outreach include the Recycle Guide, printed media advertisements, banners, and radio spots.

5.3.1.4 Brochures

The County of Hawai`i and their vendors have prepared brochures that cover a range of waste management topics for public distribution. The brochures address various programs that are provided by the County and their vendors including green waste recycling, composting, plastics recycling, household hazardous waste, used motor oil collection, and the HI-5 recycling program. The brochures are made available to the public at community events, at the various recycling and recycling and transfer stations, and at other County solid waste facilities.

5.3.1.5 Community Outreach

Recycle Hawai`i conducts a minimum of 40 outreach presentations per year. The presentations are intended to educate the public about existing waste reduction and recycling programs and to encourage participation in those activities. The presentations are given to a wide array of organizations including schools, businesses, and at various conferences.

Recycle Hawai`i also conducts workshops on reuse of materials, proper recycling methods and composting.

5.3.1.6 Community Events

The County of Hawai`i participates in various community events throughout the year aimed at enhancing environmental awareness. The County also participates in promotional events, such as BYOB at grocery stores, which includes a give-away of reusable grocery bags. An emphasis has been placed on the HI-5 program through the installation of HI-5 recycle bins at larger community events such as the Merrie Monarch Hula festival.

In addition, with funding from the County, Recycle Hawai`i participates in a minimum of fifteen community events throughout the year, including Earth Day festivals, the Kuleana Green Business Conference, and similar events. As part of each event, educational information is distributed and recycling/reuse specialists are available to talk to members of the public. Recycle Hawai`i also participates in the annual Trash Art Exhibit at East Hawai`i Cultural Center.

5.3.1.7 School Programs

The County and its vendors organize a broad range of waste reduction and recycling programs for the local schools. The Artists and the Environment Program brings artists, resource educators, native Hawaiian cultural practitioners and community outreach staff into classrooms throughout Hawai`i Island. The two-part presentations link art and native culture with awareness and sustainable practices for our unique natural environment. Presentations range from 45 to 90 minutes depending on grade level.

The Art of Recycling School Competition (ARSC) is an educational art project that motivates youth to create art objects from recycled materials while helping to save landfill space, energy, and natural resources.

The "HI-5 Show!" is a magic show designed to raise awareness about the environmental benefits of recycling, and in particular the HI-5 Beverage Container Deposit Program. Each school performance can accommodate up to 350 students and is specifically designed to encourage students to participate in recycling of deposit beverage containers.

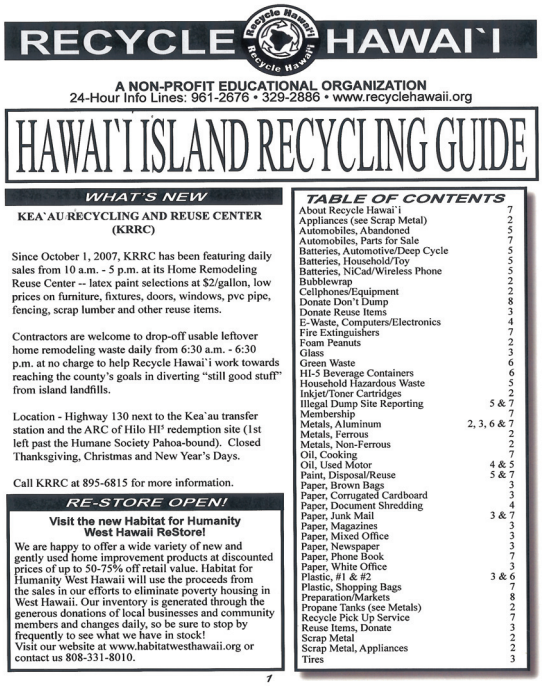
In addition, the County and Recycle Hawai`i both offer tours of the landfill, scrap metal and composting facilities, and the recycling and reuse centers for school groups on an as-requested basis.

5.3.1.8 Business Education

On request, the County will assist in the set up of new recycling businesses and provide guidance to help new businesses understand and navigate applicable laws, regulations and

rules. The County will also occasionally assist with establishing or improving recycling programs at businesses at the request of companies and business organizations.

With funding from the County, Recycle Hawai`i has produced the Hawai`i Island Business Recycling Guide and Workbook, which is provided as a membership benefit. The Workbook provides information for businesses including how to conduct a waste audit and establish a waste reduction and recycling program.



RECYCLE HAWAI`I

A NON-PROFIT EDUCATIONAL ORGANIZATION
24-Hour Info Lines: 961-2676 • 329-2886 • www.recyclehawaii.org

HAWAI`I ISLAND RECYCLING GUIDE

WHAT'S NEW

KEA`AU RECYCLING AND REUSE CENTER (KRRC)

Since October 1, 2007, KRRC has been featuring daily sales from 10 a.m. - 5 p.m. at its Home Remodeling Reuse Center -- latex paint selections at $2/gallon, low prices on furniture, fixtures, doors, windows, pvc pipe, fencing, scrap lumber and other reuse items.

Contractors are welcome to drop-off usable leftover home remodeling waste daily from 6:30 a.m. - 6:30 p.m. at no charge to help Recycle Hawai`i work towards reaching the county's goals in diverting "still good stuff" from island landfills.

Location - Highway 130 next to the Kea`au transfer station and the ARC of Hilo HI³ redemption site (1st left past the Humane Society Pahoa-bound). Closed Thanksgiving, Christmas and New Year's Days.

Call KRRC at 895-6815 for more information.

RE-STORE OPEN!

Visit the new Habitat for Humanity West Hawaii ReStore!

We are happy to offer a wide variety of new and gently used home improvement products at discounted prices of up to 50-75% off retail value. Habitat for Humanity West Hawaii will use the proceeds from the sales in our efforts to eliminate poverty housing in West Hawaii. Our inventory is generated through the generous donations of local businesses and community members and changes daily, so be sure to stop by frequently to see what we have in stock! Visit our website at www.habitatwesthawaii.org or contact us 808-331-8010.

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5.3.1.9 Award Program

Recycle Hawai`i has recently initiated an award program called Keeping it Green Hawai`i. It is an incentive-based program that provides certificates and awards to 14 businesses and schools that demonstrate leadership in at least three aspects of sustainability. The award package includes a free membership to Recycle Hawai`i, and an Earth Machine composter or recycling collector bin.

5.4 Issues and Concerns

As described above, the County currently invests considerable resources into a number of creative education and outreach programs. However, given the County's commitment to zero waste, additional effort could be expended to further reduce the quantities of materials discarded in landfills. Successful adoption of the zero waste approach is intimately linked with the ability to influence public perception and modify existing behaviors, which is the main purpose of public education and promotional programs.

It is recommended that the County consider using social marketing principles to guide the design and implementation of education programs (see the Social Marketing Institute at http://www.social-marketing.org/sm.html). Social marketing is the planning and implementation of programs designed to bring about social change using concepts from commercial marketing. Some of its key concepts include the following:

- The ultimate objective of marketing is to influence action.
- Action is undertaken whenever target audiences believe that the benefits they receive will be greater than the costs they incur.
- Programs to influence action will be more effective if they are based on an understanding of the target audience's own perceptions of the proposed exchange.
- Target audiences are seldom uniform in their perceptions and/or likely responses to marketing efforts and so should be partitioned into segments.

Marketing efforts must incorporate all of the "4 Ps," that is:

- Create an enticing *"Product"* - the package of benefits associated with the desired action.
- Minimize the *"Price"* - the target audience believes it must pay in the exchange.
- Make the exchange and its opportunities available in *"Places"* that reach the audience and fit its lifestyles.
- *Promote* the exchange opportunity with creativity and through channels and tactics that maximize desired responses.

Recommended behaviors always have competition which must be understood and addressed. Because the marketplace is constantly changing, program results must be regularly monitored and management must be prepared to rapidly alter strategies and tactics to optimize the effectiveness of the program.

Other key features of successful education programs that the County should strive to achieve include the following:

- Research different segments of the population who are targeted for programs.
- Maintain a consistent "look" for the program.
- Use a variety of communication methods.
- Keep detailed records of efforts and results.
- Evaluate the impact of education and promotion programs.
- Cross-promote solid waste management activities with other County environmental initiatives.

5.5 Options for Improvement

Substantial progress in advancing the County's zero waste objectives will require enhancements to the County's current education and promotional program. Specific programs and initiatives that could potentially be part of this expanded effort are described below. Implementation of these programs and initiatives will require added County education staff and additional funding for outreach activities. This could be achieved either directly by the County or by contracts with appropriate consultants or vendors, such as Recycle Hawai`i.

It is critical that the County allocate significant resources to education and promotion. For example, the Curbside Value Partnership, a curbside recycling advocacy group (http://www.recyclecurbside.org/), recommends spending $1 per household on curbside recycling education alone, and $2 to $3 per household when major new programs are being implemented. Considering the importance of education to the County's zero waste resolution, the County should consider hiring a zero waste education specialist who would work under the direction of the County recycling coordinator. . This person would be responsible for planning and coordinating all waste management education activities.

In addition to adding a zero waste education specialist, initial, planning-level estimates of additional costs are provided for each option. These estimates will be refined after receiving comments from stakeholders and after other sections of the plan are completed. Revised cost estimates will be presented in the draft plan in the implementation section.

5.5.1 Develop 3-Year Zero Waste Education and Social Marketing Plan

In order to maximize the effectiveness of the County's educational and promotional efforts, a 3-year plan could be developed that identifies the major goals and objectives of the County's zero waste education efforts, and specific programs and initiatives that will be implemented to obtain those goals. This plan would provide a schedule or "blueprint" of activities that will be undertaken to support waste reduction and recycling activities. It would help ensure effective use of staff time and budget as well as offering a benchmark for measuring success.

Development of the plan could include a brainstorming session attended by various stakeholders such as the Solid Waste Advisory Committee (SWAC), County Council, and recycling vendors. Specific elements of plan development could include the following:

- Identify and target specific demographic groups or geographical areas that the County would like to reach with its messaging.
- Identify and clearly state the County's key messages (broad goals and specific objectives).
- Tailor educational programs to target the specific types of materials that are easy to recycle yet are not being diverted effectively, based on the results of the waste stream assessment section of the IRSWMP update.
- Develop and implement public awareness programs that publicize current and future waste management and recycling programs.
- Develop educational and promotional activities specifically geared toward new programs and initiatives identified in this plan.
- Evaluate the benefit of providing educational and promotional materials in other languages.
- Identify how the County will measure the success of its efforts (evaluation).
- Estimate the costs of future education and promotion efforts.
- PAYT program and fee schedules for residents and businesses.

The plan should address immediate, short- and long-term actions pertaining to the following programs:

- Zero waste as an overarching County waste management policy
- Residential waste reduction and reuse
- Residential backyard composting
- School programs for waste reduction and recycling
- Residential recycling

- Visitor industry waste reduction and recycling
- Business waste audit and education programs
- Other business waste reduction and recycling
- C&D waste reduction, reuse, and recycling
- Implementation of PAYT program

Estimated Cost: To implement this option, the County would need to budget for consulting time to assist in the preparation of an education and promotion (E&P) plan and development of program identification and materials. In the first year, the County should budget for consulting costs of approximately $30,000 plus some time from existing staff. Recommendations from the plan would probably result in initiatives that would require funding in subsequent years for plan implementation. The plan should be updated every other year.

5.5.2 Develop Zero Waste Theme and Logo

To launch and implement a comprehensive educational program, it is beneficial to have a set of unified promotional materials, including a theme, slogan and/or logo. The County currently has a logo that has been effective in establishing a "brand" for County waste reduction and recycling efforts. Given the County's commitment to zero waste, the County may want to consider changing its logo to adopt a zero waste theme. The potential benefit of this approach must be weighed against the cost and potential confusion that could occur during the transition to a new theme and brand. During the development of the Plan, it was decided by consensus that a zero waste theme be incorporated to the Plan, and the title of the plan was changed to include "On the Path to Zero Waste" to reflect the County's commitment to this goal.

Estimated Cost: This option could be implemented by existing staff, with perhaps a relatively low-cost contract with an outside vendor for graphics assistance. The County could experience added costs if a zero waste theme was implemented rapidly, thus making various education and recycling materials with the existing logo obsolete.

5.5.3 Conduct Waste Management Attitude Survey

The County would benefit from conducting a market survey to assess public attitudes about waste management in the county. The survey would be used to assess perceptions, attitudes and behavior of non-users and users towards the County's programs and services. The results could be used to shape messages to target audiences in different communities.

The survey should be conducted over the telephone by a firm experienced in conducting market research. Respondents would be randomly selected from commercially available lists that are specially prepared and which provide phone numbers in the target geographic area (excluding fax numbers, business numbers and other non-residential numbers).

Because non-response tends to increase with survey length, the survey should not exceed 10 minutes in length, as this tends to be the upper limit of tolerance for surveys. Methods such as using a predictive auto dialer (PAD) and a computer assisted telephone interviewing (CATI) system should be considered to ensure randomness and survey efficiency.

Estimated Cost: A market survey of County attitudes toward waste management would probably cost in the range of $15,000 to $40,000. County staff time would be needed to further develop the survey scope and monitor its execution.

5.5.4 Expand Existing Advertising and Marketing Efforts

The County currently advertises various aspects of its waste management program, such as recycling, through television, radio, print advertising and outreach at community or special events. These efforts could be expanded to include zero waste programs and initiatives and incorporate new themes or slogans implemented by the County. Expanded television and radio advertising could include both paid advertisements, as well as promotional opportunities such as news stories, talk show interviews and additional special event outreach.

In addition, the County's Web site could be upgraded to include specific information about source reduction and recycling capabilities (for example, interactive guide with drop-down options for material type and location), a calendar of events with upcoming events, a list of businesses that participate in "take-back programs", and educational materials and reference list. The County's Web site is currently being expanded, which should improve its function as a solid waste education medium.

Increasing the number and scope of community events that the County participates in is recommended in Section 4.0, Recycling, Bioconversion, and Markets. Expanding participation in community events will create additional opportunities to distribute educational and marketing materials to both residents and businesses.

Estimated Cost: This option could be funded at a variety of levels. The specific amount of spending on added advertising and marketing should be developed as part of development of the 3-year education and promotion plan. For planning purposes, this could range from $50,000 to $100,000 per year.

5.5.5 Expand School Education Programs

The County has a well developed school education program that includes several educational initiatives being implemented in the public schools around the island. These existing educational programs could be expanded to incorporate a multi-level approach that is consistently implemented across a range of age groups over time, and should integrate zero waste concepts. Potential activities could include recycling and composting initiatives, specific curriculum, field trips, and guest speakers.

If the County is able to incorporate recycling as a requirement for the hauling contractors that service schools as recommended in Section 4.0, it could create opportunities for schools to involve students with the recycling effort on individual campuses.

Estimated Cost: This option could be funded at a variety of levels. Much of the expense would be for added staff time for County staff or contracts with its education vendors. The County may want to add an additional $10 to $20,000 annually for additional school education materials and supplies.

5.5.6 Expand Business Education Programs

The County could further encourage partnerships and sponsorships by local environmental and community groups to help them take ownership of waste management issues, and provide recognition to them for waste reduction successes. The County could expand on its program of written education information and technical assistance for individual business owners and business and trade groups, with a focus on reducing both the quantity and toxicity of commercial and industrial discards to landfill. County education staff could collaborate with other agencies that interact with businesses about environmental issues such as air, energy, water, wastewater, and disaster planning to leverage resources and avoid duplication of effort.

Key steps in expanding the County's business outreach programs could include the following:

- Identifying major generators and generating sectors.
- Developing a database of key contacts at individual businesses and organizations.
- Identifying classes of readily recyclable materials and toxics generated by businesses.
- Establishing priorities.
- Developing strategy and preparing education and outreach materials.
- Monitoring effectiveness.
- Revising and refining the program annually based on results of effectiveness analysis.

County education staff should also look to businesses that provide advertising services (such as utilities, transit, newspapers, and so forth) and search for opportunities for free advertising.

Estimated Cost: This option could be funded at a variety of levels. Much of the expense would be for added staff time. The County may want to add an additional $10 to $20,000 to its annual budget for business education materials and supplies.

5.5.7 Develop Visitor Industry Education Programs

Given the significant contribution of the visitor industry to the County's waste stream, it would be beneficial to develop focused educational and promotional programs that specifically target the visitor industry. This could include developing brochures to provide in hotels, adding recycling bins at airports, beaches and parks, and installing displays at airports. The County could also provide a list of recommended actions to hotels and resorts outlining measures that they can implement to reduce waste, and contact information for technical assistance. A good example of this and potential resource for the County is a waste reduction tip sheet prepared by the City of Austin, Texas, which can be found at: http://www.ci.austin.tx.us/sws/downloads/wrap_hotel_tips.pdf.

Estimated Cost: This option could be funded at a variety of levels. Much of the expense would be for added staff time. The County may want to add an additional $10 to $20,000 to its annual budget for visitor education and promotion materials and supplies.

5.5.8 Evaluate Effectiveness and Continue to Refine Education Programs

The long-term success of the County's education program will be dependent on the extent to which educational and promotional materials can be continually modified to respond to

changes in the program. As part of this effort, the County should conduct an on-going effort to evaluate the progress and effects of its source reduction and recycling programs. This effort should include evaluating the public's understanding of various programs, establishing benchmarks for success at current levels of effort, and evaluating the effectiveness of education and promotional campaigns.

The information needed to evaluate the effects of an E&P program might be gained through:

- Analysis of recycling rates, monthly participation rates, and capture rates
- Analysis of levels of contamination in recycling programs
- Analysis of the extent of media coverage
- Personal interviews
- Soliciting opinions at community events and meetings
- Mail, telephone, or dropoff surveys
- Focus groups
- Mail-back response cards
- Evaluation of the number of hits on the County's Web site

The County should include evaluation as part of every education and promotion program. Results should be communicated to appropriate audiences including elected officials, interest groups, and the general public.

Estimated Cost: A good rule of thumb is that approximately 10 percent of the cost of programs should be spent on evaluation.

5.6 Recommendations

On the basis of the analysis presented above, the results of the zero waste study, and discussions with stakeholders, this Plan update recommends the following improvements. It should be noted that many of the options discussed above and other education initiatives, such as those in support of residential and business recycling, the implementation of a PAYT program, visitor industry waste management practices, and organics and composting are addressed in other sections of the Plan update.

1. **Implement a 3-year zero waste education and social marketing program to educate the public and business community about zero waste initiatives and opportunities.**
2. **Hire one full-time staff position to serve as the coordinator of zero waste programs.**
3. **Implement a community-wide social marketing plan.** This plan would increase public awareness of new waste reduction and sustainable waste management programs being implemented and foster participation in the programs. The education and social marketing plan should include the elements outlined in Section 5.5.1, plus all other aspects of the County's solid waste management efforts that may benefit from focused education or promotion.

SECTION 6

Household Hazardous Waste and Electronic Waste

6.0 Household Hazardous Waste and Electronic Waste

6.1 Introduction

Used household products exhibiting corrosive, reactive, toxic, or ignitable properties are considered "household hazardous waste" (HHW), as defined by the EPA. These products, including but not limited to automotive fluids, paints, oils, cleaners, pesticides, poisons, and batteries require special handling, transport, and disposal or recycling methods. These types of wastes present special risks and disposal in landfills or via the sanitary sewer system is not permitted.

Electronic waste (e-waste) consists of any broken electronic devices, or unwanted electronic products, at or nearing the end of their useful life. Computers, VCRs, copiers, stereo equipment, televisions, cell phones, and monitors are examples of common electronic wastes. Similar to household hazardous waste, many e-wastes, such as cathode ray tubes (CRTs) from televisions and monitors, include components that are toxic and should be restricted from the landfill.

This section describes the current status of the household hazardous waste and e-waste collection and disposal system within Hawai`i County, identifies current issues and concerns, and presents options for achieving the County's HHW and e-waste goals.

6.2 Background

Household hazardous wastes are typically generated in small quantities, and as a result, are exempt from Federal and State hazardous waste regulations, per the Code of Federal Regulations (40 [*Code of Federal Regulations*] *CFR* 261.4) and the State of Hawai`i Administrative Rules (HAR 11-261-4). State and local governments often hold collection events during the year or have permanent facilities established where residents can drop off their used hazardous products for proper disposal.

Limited Federal regulations exist regarding electronic wastes; the EPA has regulations for the management of universal waste, which includes batteries used in electronics. The majority of e-waste regulation is established at the state and/or local municipality level. Some states and counties have introduced legislation to ban e-waste from landfills, imposed a fee to consumers at time of product purchase, or mandated electronics manufacturers to take back used electronics.

6.2.1 Review of 2002 IRSWMP

The 2002 IRSWMP issued recommendations for HHW including to increase one-day collection events to four per year at four different locations, and to establish a collection facility for HHW, batteries, tires, or other problem wastes as part of a recycling and reuse

center. The current 2008 HHW collection frequency includes six collections per year at four locations on the island. As described below in Chapter 6.5, the County has established collection centers at four of the existing recycling and transfer stations. There were no recommendations issued in the 2002 IRSWMP for e-waste collection.

6.3 Existing Conditions

Household hazardous waste in Hawai`i County is collected periodically on specified collection dates at select recycling and transfer stations during the year. E-waste is collected at two permanent locations in Hilo and Kona.

Hawai`i County provides public awareness and educates residents on HHW and e-waste programs through Recycle Hawai`i, a tax-exempt, educational organization. Recycle Hawai`i promotes HHW collection events and a county contractor collects the hazardous products which are then shipped to the mainland for proper disposal or treatment.

6.3.1 Household Hazardous Waste

The current 2008 county diversion rate for HHW is 24.5 percent, as depicted in Section 4.0, Recycling, Bioconversion, and Marketing. HHW collection rates have steadily increased during the past 5 years and the County of Hawai`i has increased the number of collection events in response. Exhibit 6-1 displays the type and quantities of HHW collected from FY 06 through FY 08.

EXHIBIT 6-1
Household Hazardous Waste Collection, Hawai`i County
(All data in pounds unless otherwise noted)

Material Collected	FY 06	FY 07	FY 08
Batteries (Automotive and Industrial)	172,430	146,150	113,120
Aerosol Cans	510	915	1,160
Poisons	4,900	13,100	12,300
Acids	600	230	1,350
Bases	165	70	240
Paints and Solvents (Oil Based)	12,500	19,910	24,020
Batteries (Household)	2,400	4,000	3,200
Polychlorinated Biphenyls	10	22	-
Oil and Solvents (Halogenated)	-	-	400
Mercury	75	40	45
Fluorescent Lamps/Bulbs/Ballasts	-	380	1,220
Compressed Gas Cylinders	-	-	360
Misc.	1,175	100	200
Oxidizing Material	240	195	155
Oil (gallons)	3,105	5,310	5,860

Source: Hawai`i County Department of Environmental Management, Solid Waste Division. 2008.

Until 2008, collection points for HHW were provided at the Hilo and Kealakehe recycling and transfer stations only. HHW collection points were established at the Pahoa and Waimea transfer stations in 2008. Currently, residents are allowed to drop off HHW on the following specific dates at these four stations:

- Hilo Recycling and Transfer Station – 1st Saturday of June and December
- Kealakehe (Kailua) Recycling and Transfer Station – 2nd Saturday of June and December
- Pahoa Recycling and Transfer Station – 1st Sunday of March
- Waimea Recycling and Transfer Station – 1st Saturday of March

The HHW program is free for Hawai`i County residents, and is advertised via signage at the recycling and transfer stations. Commercial entities may contact private contractors for hazardous waste storage, recycling and/or disposal.

6.3.2 Electronic Waste

Electronic waste is accepted at two permanent dropoff sites in Hilo and Kona. Both locations are open Monday through Friday from 10:00 a.m. to 2:00 p.m. and allow residents to recycle their e-waste for free. Common e-waste includes entertainment electronics (TVs, VCRs, DVD players, radios, and so forth), computers, computer monitors & peripherals, cell phones, telephones, microwaves, fax machines, copiers, digital cameras, printers, and laptops. Commercial entities may also recycle e-waste at both locations; however, businesses are charged a fee of $0.55 per pound to recycle e-waste.

Recycle Hawai`i collects e-waste from the dropoff sites in Hilo and Kona, then repairs, reuses and recycles the material. Recycle Hawai`i recycles the e-waste under a partnering agreement with Bayside Computer Shop. Some e-waste manufacturers offer various other support programs for e-waste collection, recycling, and disposal. E-waste is shipped to the U.S. mainland, and recycled by certified facilities. The mainland recyclers segregate the e-waste into glass, plastics, and metals components which are sold to waste management entities. Exhibit 6-2 presents the total quantity of e-waste collected during the 2004 to 2008 fiscal years.

EXHIBIT 6-2
Electronic Waste Collected, Hawai`i County

Fiscal Year (July 1 through June 31)	Quantity Collected (Tons)
2005	78
2006	87
2007	165
2008	77[a]

[a]The decline shown in FY 08 resulted from contracting delays. E-waste collections increased considerably in the latter months of 2008.

Source: Hawai`i County Department of Environmental Management, Solid Waste Division. 2008.

At the Kea`au Recycling and Transfer Station, a product exchange and re-use center has been established by the County that allows residents to drop off unwanted but still useful electronic appliances. Residents can then purchase the appliances for a nominal fee at the center.

In addition to services provided by the County, during 2008 the University of Hawai`i in conjunction with Apple Corporation sponsored the Hawai`i Education and Government eDisposal Day, during which residents were allowed to dispose of their personal e-waste during a single-day event at locations in Hilo and Kona. It is estimated that approximately one million pounds of e-waste was collected statewide during this event.

6.4 Issues and Concerns

6.4.1 Household Hazardous Waste

Household hazardous waste presents unique hazards to humans and the environment. Storage, handling, transport, and disposal of hazardous waste require special procedures and equipment. Currently there are a limited number of locations for residents and businesses to dispose of HHW. The distance to collection sites, and challenges associated with storage, handling, and transporting HHW may be a disincentive for residents or businesses in rural areas to properly dispose of their waste.

If County or landfill staff identify HHW, they take steps to manage it appropriately and keep it out of the landfill. County staff also respond to occasional reports of HHW discarded in remote areas of the county. However, once in a garbage bag or bin, it is very difficult (and expensive) to identify HHW in the garbage stream. In spite of the County's current efforts to keep household hazardous waste out of its landfills, the 2008 County of Hawai'i Waste Composition Study estimated that 527 tons of household hazardous waste was disposed of in County landfills in FY 08. Thus, additional education and more convenient opportunities to properly manage HHW would be beneficial. Potential opportunities for improving the existing system are presented below. The County spent about $130,000 on its HHW program in FY 08.

6.4.2 Electronic Waste

Recycle Hawai`i estimates that a container of e-waste currently costs approximately $2,250 for shipment to the Mainland, plus $675 for ground transport to selected recyclers. The County pays for the residential e-waste program through property taxes; however, there is no similar program to address e-waste generated by businesses, schools, or government entities such as the military branches. The cost of e-waste disposal is a disincentive for private businesses to recycle e-waste, and results in much of the business e-waste being sent to the landfills. A lack of staff assigned to monitoring and enforcement at recycling and transfer stations and landfills contributes to e-waste entering the landfills. Under current HDOH guidance e-waste is considered hazardous and is not allowed to be disposed of in landfills. Stronger legislation may be required in order to deter residents or businesses from disposing of e-waste in ways that result in the waste entering landfills.

The ultimate final disposition of e-waste is an important factor to consider with e-waste recycling or disposal. Disposal or recycling of e-waste by uncertified companies can

potentially result in discarded e-waste being shipped to third world countries where less desirable practices are implemented. Use of certified recyclers can increase costs of recycling or disposal. The County's current program (implemented through Recycle Hawai`i) uses recyclers that provide certificates of destruction. The average cost charged by recyclers to provide certified destruction is $0.10 per pound. The County spent about $70,000 on its e-waste recycling program in FY 08.

The design of collection facilities for e-waste and HHW must take into account special conditions within the County, including invasive species concerns, and operating conditions in areas where the facilities are established. Dangerous conditions (wet and slippery surfaces in high rain areas) and the potential for export of invasive species (such as African tree snails or coqui frogs) must be evaluated during design.

6.5 Options

An overview of various options that could be implemented to improve the management of HHW and e-waste follows. These options were developed based on successful initiatives implemented in other jurisdictions that may be applicable and appropriate for Hawai`i County.

Advocating for Extended Producer Responsibility (EPR) was an option discussed in the Source Reduction and Recycling, Bioconversion, and Markets sections. Hawai`i State legislation enacted during 2008 will require development of take back programs by manufacturers of certain types of e-waste.

Note, the following options assume that the two permanent dropoff sites for e-waste continue beyond the end of 2008 (when the contract expires). The County has published a request for proposals to continue these services in 2009.

6.5.1 Install Fixed (Permanent) Collection Facilities at Recycling and Transfer Stations

Additional, permanent collection facilities located at recycling and transfer stations would provide more opportunity for residents to properly dispose of HHW, e-waste, and some special wastes. The facilities could be incorporated into the standard layout design at selected stations. The County is currently planning to build a special waste collection facility at the Pahoa recycling and transfer station during its pending upgrade. Guidelines could be developed for both residential and business use of the facilities.

In areas with higher rainfall, facilities should be designed with safe work practices in mind for operation of equipment such as forklifts or trailers. Operational plans must be established to minimize the risk of injury to workers. Facility design should include covered or enclosed areas that incorporate measures to prevent invasive species from entering waste storage areas, or being transported off-site with waste.

Having fixed facilities would potentially reduce the amount of illegal dumping that is occurring, and would allow the County to set up a safer and more efficient system for storage, handling, transport, and eventual disposal of the wastes.

Estimated Cost: Fixed facilities for HHW can range significantly in costs depending upon their design and function. Facilities to serve West and East Hawai`i could range in cost from $500,000 to $1.5 million each. If multiple facilities are developed at recycling and transfer stations, the facilities could be smaller and would cost at the lower end of that range.

Annual operating costs would depend on how often the facilities are open and on the extent to which the programs are successful in attracting materials. Based on information provided in a recent survey of HHW programs[1], the estimated cost of operating two fixed facilities (including recycling and appropriate disposal of materials collected) would be approximately $750,000 per year. Adding household hazardous waste facilities at additional locations would not increase operating costs proportionally (that is, if two facilities cost $750,000 per year to operate, the third might cost an additional $100 to $200,000 per year).

6.5.2 Implement Additional Collection Events

Additional one-day collection events, combined with promotional campaigns could potentially increase diversion of HHW, e-waste, and special waste from the landfills. Events could be designed to target a single or multiple types of waste. Similar to the currently scheduled events, the County could sponsor events that are implemented on an island-wide basis, or community-specific events that are rotated through various geographic areas. The County could conduct such events at fixed locations, or conduct a mobile event utilizing trucks or trailers set up to transport specific types of waste. The County could also set up events that are specific to either residents, agricultural businesses, or commercial and industrial businesses.

For e-waste only, collection events could be accomplished using a trailer or container that would rotate among various recycling and transfer stations. A schedule could be published that documented the days that the service would be provided at a particular location. As an example, a trailer could get to 12 locations each year if it spent a set week every third month at a different station (that is, 2nd week of January, April, July).

Estimated Cost. Costs for conducting such events would include cost of temporary facilities to store wastes dropped off during the events, Cost for promoting the events, and additional training costs for staff who would manage the events and the storage and handling of the waste. Additional expenses would include the cost of any subcontracted waste hauling or disposal firms utilized to transport and dispose of the waste collected.

Each additional event would probably cost the County about $30 to $40,000. A single e-waste trailer or container that rotated between various recycling and transfer stations could be installed for about $100,000 per year.

6.5.3 Establish E-Waste Take Back Programs with Manufacturers or Sellers

In 2008, the State of Hawai`i passed legislation (Senate Bill 2843) that will require manufacturers of certain types of electronic equipment (primarily non-medical, stand-alone equipment containing CRTs, liquid crystal, or plasma display screens) to establish, conduct, and manage a program for the collection, transportation, and recycling of these types of

[1] Cascadia Consulting Group, prepared for Portland Metro, Oregon. 2005. *Comparison of Household Hazardous Waste Programs*.

electronic devices sold in the State. Manufacturers must develop plans to implement such programs by June 1, 2009, and by January 1, 2010, must make available to their customers information on collection services in the State. The HDOH will also maintain a Web site and toll-free phone number with current information on where specific types of electronic devices can be returned for recycling.

Electronic products manufacturers such as Apple®, Dell®, Hewlett Packard®, and others have established e-waste take back programs. Consumers in Hawai`i County could potentially take advantage of these established programs if the County provided additional information, and some type of incentive to return products to manufacturers. In many cases the manufacturers will accept used electronic equipment they originally manufactured at no charge, and many manufacturers will accept other brands of equipment for a small fee. Residents may have to pay for shipping the item back to the manufacturer if they elect to recycle their own equipment. The County could evaluate requesting grants from manufacturers or sellers that could be used to offset the costs of handling and shipment of e-waste back to manufacturers. Used electronics that are still functional are also being redistributed using the power of the internet. For example, Intel® and other manufacturers have collaborated with EBay to establish a network (Rethink Initiative) that allows consumers to sell or donate their used equipment to others.

Some of the larger electronics sellers, such as Best Buy®, have established programs allowing customers to periodically drop off unwanted electronic equipment for recycling. Often these e-waste stewardship initiatives are undertaken as one day or weekend events, and in some cases store credit is given to consumers as an incentive in exchange for donating unwanted equipment that is only lightly used and still functional. Best Buy and other sellers have also established grant programs that communities may apply for in order to fund such events. The County could potentially apply for such grants, or work directly with sellers to establish collection events.

Estimated Cost. The County could potentially incorporate information about these types of programs into their educational materials, and work in conjunction with either sellers or manufacturers to establish take back programs. It would require additional costs for the County to provide staff to initiate and manage such programs. Some costs could potentially be offset by grants provided by the manufacturers or sellers.

6.5.4 Implement Advanced Disposal Fee for E-Waste

The County could implement requirements to collect advance disposal fees on certain types of e-waste. The fee would be collected at the point of sale and would be earmarked to support the management and eventual disposal when the electronic equipment reaches the end of its useful life. Currently only California has implemented legislation requiring consumers to pay a fee upon purchase of electronic equipment. The California law applies to purchases of specific types of electronic items known to contain materials that are considered hazardous upon disposal (primarily televisions, computers, and other types of equipment that use cathode ray tubes, liquid crystal displays or plasma screens). The fee, which ranges from $6 to $10 per device, only applies when purchasing new equipment, and is utilized to recycle the types of products covered under the law. Retailers are required to implement the fee system, and are allowed to capture 3 percent of the fee to cover the costs of implementing the program.

Estimated Cost. Implementation of this type of system would require the County to invest labor costs to draft legislation supporting the requirements, and to implement a program to manage money collected. It is anticipated that implementation of such a program could potentially result in revenue that would partially offset costs the County would eventually spend to manage disposal of e-waste generated at recycling and transfer stations or during collection events. Costs would be incurred by local retailers and manufacturers to establish and administer the program. Consumers would ultimately pay any added cost associated with the fee at the point of purchase.

6.5.5 Add E-Waste Product Exchange and Re-Use Centers at Recycling and Transfer Stations

A product exchange and reuse center is currently established at the Kea`au recycling and transfer station, where residents can drop off electronic appliances that are no longer wanted, but still functional. The County is in the process of establishing additional exchange centers at selected recycling and transfer stations, which will create more opportunities for residents to drop off unwanted electronic appliances and, thus, increase diversion of this waste stream from landfills.

Estimated Cost. Construction of such centers could be incorporated into the design of permanent drop off locations for e-waste at recycling and transfer stations. Construction of exchange and re-use centers is not expected to significantly increase the cost of constructing permanent drop off locations for e-waste at recycling and transfer stations. However, additional labor costs would be incurred to staff and operate such centers, including the cost of bundling and transporting materials. Each center would likely cost between $20,000 and $100,000 per year to operate, depending on how the program is operated and the extent to which products could be re-used versus transported and recycled.

6.5.6 Explore Public-Private Partnership for Local E-scrap Campaign (anything with a plug)

The zero waste implementation study discussed the concept of hand dismantling electronic components (E-scrap) to segregate high-grade metals and segregate working parts rather than shipping materials off-island. Currently, e-waste collected on the island is shipped, typically without being pre-sorted, to the U.S. Mainland for proper disposal. An E-scrap campaign would present a potential opportunity to create value-added products, jobs, and tax revenues in the County rather than shipping E-scrap off-island to benefit another jurisdiction.

There are several ways to initiate hand dismantling of E-scrap:

- Provide financial incentives for local dismantling to a company that is currently shipping bulk E-scrap off of the island.
- Encourage a joint venture with companies that have established hand dismantling operations, or have designed their own E-scrap processing equipment and may be seeking joint ventures with non-profit organizations or for-profit businesses.
- Apply for a grant to promote green infrastructure jobs from the new Federal administration.

In this option, the County would conduct a study of different models for promoting local dismantling of electronics and convene a meeting of interested parties to determine the level of interest and what help might be needed to move forward. The County could assist them in implementing a process on their own (perhaps with some initial funding support), or issue a request for proposals to develop new services as needed.

Estimated Cost. The cost of an E-scrap campaign could vary widely depending on the extent to which the program would require County funding to initiate and sustain. The cost of an initial study and meetings to investigate opportunities would be approximately $30,000.

6.6 Recommendations

On the basis of the analysis presented above, the results of the zero waste implementation study, and the preferences of SWAC, staff, and other stakeholders, this Plan recommends the following actions to improve the management of HHW and e-waste. Proposed funding and the timing of implementation for each program is shown in Section 10 (Exhibit 10-6).

In addition to the recommendations presented below, as noted in Sections 3.0 and 6.5.5, the County is in the process of establishing more reuse centers at selected recycling and transfer stations, which will also create more opportunities for diversion of e-waste from landfills.

1. **Hire a Household Hazardous Waste/Electronics Waste specialist**. The current County staffing level is a limiting factor for the implementation of new waste management programs. Whether new programs are implemented solely by County staff or involve subcontractors, additional staff will be necessary to successfully initiate and manage new programs. To expand the HHW and e-waste programs, it is recommended that the County create and staff one full-time HHW/E-Waste specialist position.

2. **Implement HHW and e-waste public outreach and education programs**. As a component of the additional HHW and e-waste programs, advertising will need to be increased to make the public aware of the events and to encourage participation. The County should expand the existing marketing programs through:

   - Event-specific announcements or advertisements.
   - Additional signage at recycling and transfer stations.
   - Expansion of outreach programs by conducting community-based educational events at schools or other public institutions.

3. **Explore e-waste take back programs with State and manufacturers/sellers**. Take back programs by manufacturers and sellers of electronic products are a cost-effective method to divert e-waste from landfills. Such programs can reduce costs of proper disposal for consumers, make it more convenient for consumers to discard their e-waste, and ultimately, provide an incentive for manufacturers to design less toxic and more recyclable products. It is recommended that County staff:

   - Conduct research to assess what legislation may be required to mandate and manage take back programs for specific types of e-waste.

- Evaluate the elements of successful similar programs implemented in other jurisdictions during the planning process.
- Coordinate with other counties and the State to develop and implement e-waste take back programs.
- Coordinate with local retail businesses to facilitate implementation of take back programs for e-waste.
- Assess what legislative actions may be necessary to facilitate storage and handling of e-waste at various types of collection locations.
- Incorporate information about existing and new e-waste take back programs in the community outreach and education effort.

4. **Conduct additional HHW collection events**. During the development of the IRSWMP update, a consensus was expressed by both members of the public and the SWAC that periodic HHW collection events were successful and offered the best opportunity for both proper disposal of HHW and diversion of these wastes from landfills. One of the most prevalent comments was that the number and locations of collection events should be expanded to create additional opportunities for proper HHW disposal. It is recommended that the County establish ten to 12 additional HHW collection events per year.
5. **Explore legislative actions for hazardous products and packaging take back programs.** Take back programs by manufacturers and sellers of hazardous products are a cost-effective method to divert these types of waste from landfills. It is recommended that County staff:
   - Conduct research to assess what legislation may be required to mandate and manage take back programs for specific types of hazardous waste or packaging.
   - Coordinate with local retail businesses to develop and implement take back programs for hazardous products and packaging.
   - Assess what legislative actions may be necessary to facilitate storage and handling of hazardous products and packaging at various types of collection locations.
   - Incorporate information about existing and new hazardous materials and packaging take back programs in the community outreach and education effort.
6. **Explore public-private partnership for local E-scrap campaign.** It is recommended that the County initiate a study of different models for promoting local dismantling of electronics. As part of the study the County should convene a meeting of interested parties to determine the level of interest and identify ways that the County can help facilitate development of a locally-based E-scrap program. Depending on the economics of on-island dismantling, the County could then evaluate the extent to which it would provide funding to support implementation of a public-private partnership E-scrap program.

SECTION 7

Special Waste

7.0 Special Waste

7.1 Introduction

As defined in Hawai`i Administrative Rules 11-58.01-03, "Special wastes" means any solid waste which, because of its source or physical, chemical, or biological characteristics, require special consideration for its proper processing or disposal, or both. This term includes, but is not limited to, asbestos, used oil, lead acid batteries, municipal waste combustion ash, sewage sludge that is non-hazardous, medical wastes, tires, white goods, and derelict vehicles.

Special wastes typically make up a significant portion of the total waste stream for most communities.

7.2 Background

Special wastes are generated by both residents and commercial businesses, and in some cases require special handling or processing in order to comply with federal and state regulations. As shown in Exhibit 7-1, certain types of special waste are allowed to be disposed of in landfills, with varying levels of documentation depending on the type of waste. Some types of special wastes are not allowed to be disposed of in either the South Hilo or West Hawai`i sanitary landfills, and require transport to separate recycling, processing, or disposal facilities. The County manages many types of special wastes by establishing drop off or collection points, and then transporting the waste materials to either the landfill or other recycling or disposal facilities.

7.3 Existing Conditions and Recommended Improvements

A summary of current procedures for handling special wastes in Hawai`i County, and recommended improvements in those procedures, follows. The current system of handling and disposing of special waste is generally successful in diverting these materials from the landfill. However, the facilities for residents to drop off some of these wastes are limited in number and capacity; an expansion of the current system would make it more convenient for residents. With the exception of lead-acid batteries and tires, there are no current requirements for businesses that sell or produce products that eventually become such wastes to be ultimately responsible for their final disposition (recycling or disposal). In addition, programs to educate the public or businesses about procedures for proper disposal are limited in scope.

Consistent education and convenient opportunities to properly dispose of special wastes is required to prevent the disposal of these materials as garbage at existing recycling and transfer stations, in other areas, or into the sanitary sewer or cesspool systems. The County must monitor for and then manage these materials when they are left at the stations, and must respond to reports of wastes discarded in more remote areas. Wastes illegally

EXHIBIT 7-1
Special Waste Disposal Requirements

	Accepted at East Hawai`i Landfill	Accepted at West Hawai`i Landfill	Special Storage, Handling or Disposal Practices Required
Asbestos Containing Materials	No	Yes	Yes
Used Oil	No	No	N/A
Petroleum Contaminated Soil	No	Yes	Yes
Used Batteries	No	No	N/A
Sewage Sludge (non-hazardous)	Yes	Yes	Yes
Agricultural Waste	Yes	Yes	Yes (deceased livestock)
Medical Wastes	No	No	N/A
Used Tires	No	No	N/A
White Goods	No	No	N/A
Derelict Vehicles	No	No	N/A

discharged to sanitary sewer or cesspool systems can disrupt sewage treatment plant operations or directly impact soil and groundwater near cesspools. It is likely that in more rural areas, the distance to dropoff locations, and difficulties associated with transporting and handling, are disincentives for residents to properly dispose of these types of wastes. In some cases, these types of materials end up being landfilled if they are dumped into the refuse chutes at the recycling and transfer stations, and are inside bags or other containers that make it difficult for County or landfill staff to identify the wastes. Special wastes that end up being landfilled present hazards to both the landfill operations staff and individuals who transport and dump refuse at the landfill.

A discussion of individual special wastes follows, with recommendations for improving existing special waste management methods where appropriate.

7.3.1 Asbestos

Asbestos-containing materials (ACM) are currently accepted for disposal at the WHSL. ACMs are not currently accepted at the SHSL or at the County recycling and transfer stations. ACM is typically hauled to the WHSL for disposal by contractors, and placed in designated areas within the landfill that are documented for future reference.

7.3.2 Used Oil

Currently, a County and State sponsored Do-It-Yourself (DIY) Used Motor Oil Recycling Program is being implemented in Hawai`i County. The program is funded by a surcharge on oil imported to the state. Recycle Hawai`i manages the program under contract to the County. Under the program, residents are allowed to drop used motor oil off at no charge at any of seven permanent collection locations. The oil is accumulated at these collection centers, and then transported to recycling or energy recovery facilities by subcontracted

waste hauling or disposal contractors. During 2007, 5,985 gallons (22.8 tons) of motor oil were collected and either recycled or used in an energy recovery facility. During the period from January through June 2008, 2,915 gallons (11.3 tons) of used motor oil were collected.

Potential issues with used oil disposal include residents disposing of used oil into the waste stream that enters the landfills, discarding containers of used oil at the recycling and transfer stations, or discharging used oil to the ground surface.

7.3.3 Petroleum Contaminated Soil

Soil that has been impacted by releases of petroleum products is currently accepted at the WHSL, if it has been chemically profiled and determined to be non-hazardous. Petroleum contaminated soil (PCS) is not currently accepted at the SHSL. Waste Management Corporation reviews chemical profiling data for PCS entering the WHSL, and manages the placement and disposal of this material at the landfill.

7.3.4 Used Batteries

Used lead-acid batteries are typically recycled by distributors such as auto parts stores or auto service centers. Lead acid batteries are not accepted for disposal at the landfills or recycling and transfer stations. Each month, a small number of lead acid batteries are typically discarded by residents at unmonitored recycling and transfer stations. In addition, specific collection areas for batteries are set up at the Kealakehe, Hilo, and Kea`au recycling and transfer stations. The County sets batteries discarded at recycling and transfer stations aside and County employees pick them up. They are transported to their respective baseyards, and eventually to either of the two scrap metal yards or to the HHW event whichever, is more convenient. During 2007 approximately 130,025 pounds of automotive and industrial batteries were collected and recycled. During the period from January to June 2008, approximately 52,745 pounds of automotive and industrial batteries were collected and recycled.

Potential issues with used battery disposal include residents disposing of batteries into the waste stream that enters the landfills, or discarding used batteries at recycling and transfer stations or in more remote areas.

7.3.5 Sewage Sludge

Non-hazardous sewage sludge is accepted at both the SHSL and WHSL for disposal. The volume of sewage sludge entering the landfills is typically relatively small. The SHSL receives sewage sludge from the Hilo WWTP, and the WHSL receives sewage sludge from two private wastewater treatment plants. Other private facilities, including resorts and a private wastewater treatment plant located in Waimea recycle sewage sludge by composting the sludge on their properties.

7.3.6 Agricultural and Farm-Generated Waste

Agricultural wastes generated in Hawai`i County typically include dead livestock, spoiled foods, containers of herbicides, pesticides, or other agricultural chemicals, and green waste. Currently the County accepts livestock, or makes arrangements to assist the owner with proper burial of deceased large animals (smaller animals such as cats and dogs are accepted

at the landfills). Green waste produced at farms is most frequently utilized by the farm owners. Green waste is accepted for recycling at the SHSL and the Kea`au and Kealakehe recycling and transfer stations, as described in Section 4.0, Recycling, Bioconversion, and Markets.

7.3.7 Medical Wastes

Under Hawai`i County Code untreated medical wastes are considered "prohibited materials" and are not allowed to be disposed of in landfills. Medical wastes that have been pre-treated at the generating facility to remove pathogens and other hazards are permitted to be disposed of in the SHSL and WHSL.

Some businesses likely subcontract medical waste disposal to private businesses that specialize in medical waste disposal. In addition, expired pharmaceuticals are accepted during the periodic HHW disposal events. Waste disposal practices likely vary by facility or clinic, and there currently are no required standard practices or documentation procedures. The HDOH is the lead regulatory agency tasked with oversight. The 2008 County of Hawai`i Waste Composition study estimated that 139 tons of treated medical waste was disposed of at County landfills in FY 07-08.

While medical waste management practices are generally effective, County staff members have, on infrequent occasions, observed untreated medical waste at recycling and transfer stations or landfills.

7.3.8 Used Tires

State regulations exist for the storage, processing, and disposal of tires in Hawai`i. The County of Hawai`i amended the banning of whole tires in 2008 to include banning cut, sliced, chipped, or shredded tires from disposal at County of Hawai`i landfills. Both residential and commercial scrap tires are typically collected and disposed of by auto service centers, during installation of newly purchased tires. Residents can also drop off tires at several local companies that are permitted by the HDOH to conduct tire disposal facilities; these businesses charge a nominal fee to dispose of used tires. Scrap tires on abandoned vehicles are transported by the scrap metal hauler to their facility, removed from the vehicles, and then transported to a recycling or disposal facility.

Most of the used tires generated on the Big Island are shipped to O`ahu for crumbing and subsequent blending with coal at the AES Coal fired Power Plant. A smaller percentage of the used tires are recycled for use in creation of artistic or industrial products. At least one business in the County has conducted a pilot project that mixed scrap tires and concrete to create blocks for landscaping walls or fences. Nationally, markets are being increasingly developed to use recycled products from tires, including steel alloys from belted tires, rubber products such as playground surfaces or mats, and landscaping products. Local markets for scrap tires are, however, still fairly limited.

Although tires are relatively inert and do not break down quickly when discarded in the environment, discarded tires can trap rainwater and provide an environment that mosquitoes, vermin, or invasive species can thrive in, creating a public nuisance or potential public health concerns.

7.3.9 White Goods

White goods consist of used appliances that are no longer wanted or operational, including dishwashers, ranges, refrigerators, water heaters, freezers, and other similar domestic appliances. Residents can currently drop off unwanted white goods at the Pahoa, Ke`ei, Hilo, and Kealakehe recycling and transfer stations. Drop offs occur at other recycling and transfer stations to keep them from ending up in the transfer trailers, and the landfill. The County employees monitor the stockpile of white goods, and regularly load and transport the white goods from any collection points to the base yards, and eventually to the proper Scrap Metal disposal facility. At those facilities, if the white goods are undamaged, Freon is recovered and recycled in accordance with Federal law from any Freon-containing appliances such as refrigerators, freezers, and air conditioners.

Some retail outlets such as Sears will pick up used appliances and transport them to disposal centers when a new (replacement) appliance is purchased with the delivery option. However, delivery to remote areas of the island such as North Kohala or Ka`u is not offered by most retail outlets.

The difficulties associated with transporting bulky items such as white goods are potential disincentives for residents to properly dispose of these items. Illegal dumping of white goods is a potential result of limited disposal alternatives. Options to improve the white good disposal process include changing the operation permit for the convenience centers to make them transfer stations, including the dropoff of white goods; establishing additional targeted collection days and locations in order to increase the opportunity for residents to properly dispose of white goods; or mobile collection events.

7.3.10 Derelict Vehicles

Abandoned vehicles are managed by the County Abandoned Vehicle Coordinator in conjunction with the Hawai`i County Police Department. Abandoned vehicles that have been reported to the Police Department are tagged and then monitored and evaluated to assess if they are actually derelict. If after the monitoring period the vehicle has not been moved, and it is considered derelict, the vehicle is hauled by a County of Hawai`i contracted towing company to one of the two waste metal recovery facility. If the vehicle is abandoned but not considered derelict, the vehicle is impounded by the County, and an attempt is made to notify the registered owner.

7.4 Recommendations

The current program for special wastes is somewhat limited by the County recycling and transfer station infrastructure. It was agreed through consensus of stakeholders that it makes sense to include functional elements necessary for proper handling of special wastes in new facility plans or designs. Permits will have to be modified to allow the handling and temporary storage of special wastes at recycling and transfer stations, and staff will require training to implement new programs correctly. Further study will be required to develop programs that are adequately protective of human health and the environment. The following are recommendations to improve the existing system.

1. Include special waste dropoff and collection areas in the design of new or renovated recycling and transfer stations. To the extent possible, the County should seek to provide geographically dispersed collection points.
2. Continue the current effort to modify convenience center permits to allow white goods recovery at recycling and transfer stations.
3. Include information regarding the environmental benefits of properly disposing of scrap tires, and current disposal options in its education and promotion programs.

SECTION 8

Collection and Transfer

8.0 Collection and Transfer

8.1 Introduction

The County of Hawai`i currently operates a network of 21 recycling and transfer stations at which residents can drop off recyclables and waste. The County contracts with private firms to transport recyclables from the stations to privately operated processing facilities. Municipal waste is transported by the County's Solid Waste Division (SWD) staff to either the South Hilo or West Hawai`i sanitary landfills. The recycling and transfer stations provide geographically distributed collection points that are conveniently located for public users. A map of the stations that describes the relative size of each station by denoting FY 07-08 garbage received is included in Exhibit 8-1.

Currently, there is no residential curbside pickup of recyclables or garbage provided by the County, so most residents use the recycling and recycling and transfer stations as their primary means of recycling or disposing of materials. There are private collection companies in the county that offer fee-based curbside garbage collection services. These services are used by a relatively small percentage of residents on the island.

Commercial businesses are served by private firms in a competitive market. There is evidence that some non-residential customers use the recycling and transfer stations.

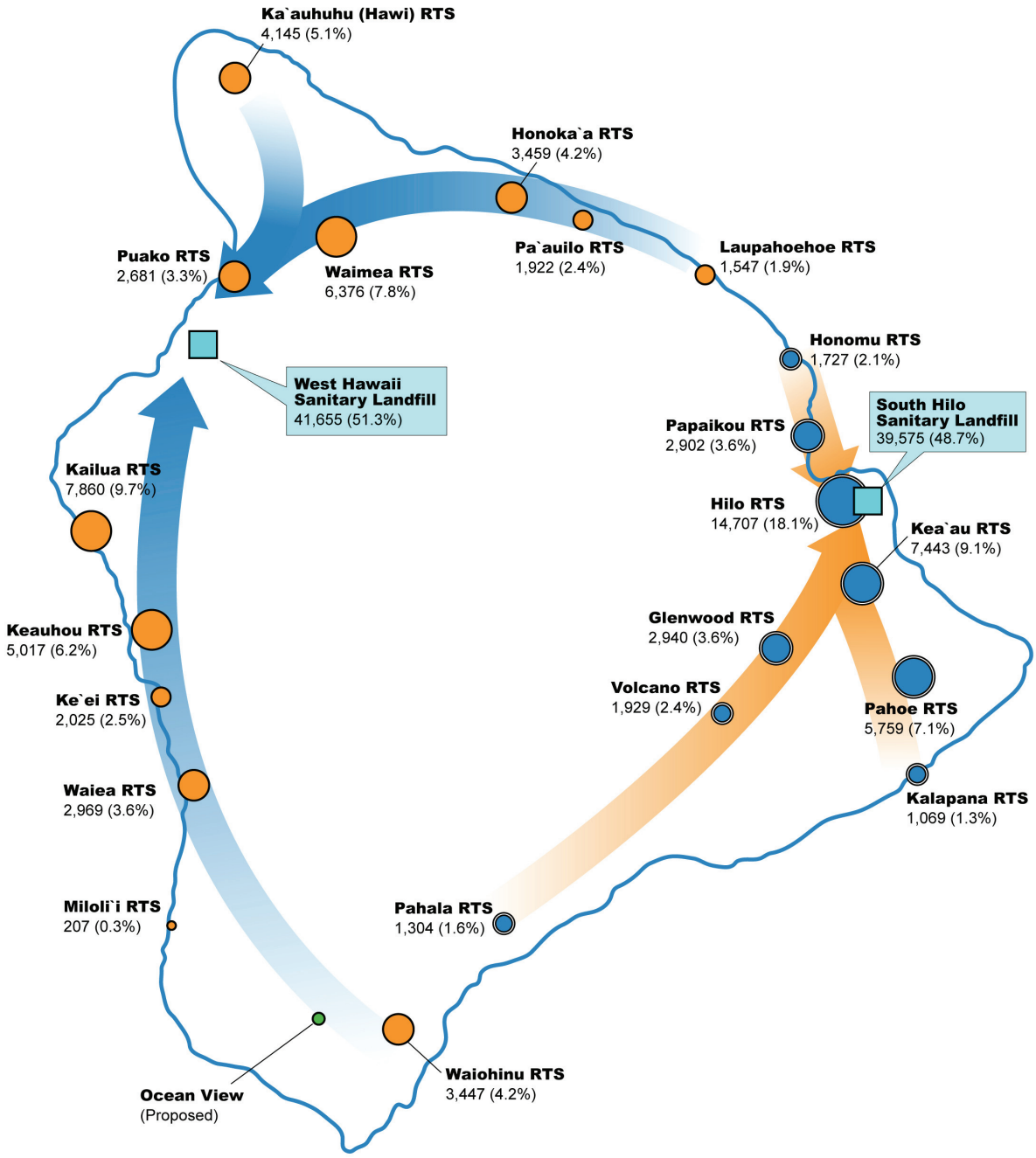
This section describes current conditions of the existing solid waste collection and transfer system within Hawai`i County, identifies current issues and concerns, and presents options for achieving the County's solid waste collection and transfer goals.

8.2 Background

The County of Hawai`i developed a recycling and transfer station system in the 1970s to provide a transition from operating local dump sites to instituting a more centralized landfill system. The recycling and transfer stations were initially constructed as inexpensive, temporary facilities to fulfill the immediate needs of residential users. The rationale behind a recycling and transfer station system is to create efficiency by consolidating many smaller residential loads into combined larger loads for transfer to landfills.

The County's Solid Waste Division, Department of Environmental Management operates and maintains the recycling and transfer stations. Twenty of the 21 recycling and transfer stations operate under Solid Waste Management Permits issued by the HDOH[1].

[1] The Miloli`i transfer station is currently not under permit.



Note: Numbers under transfer station = tons of trash hauled in FY 07-08 and percent of total for County.

Exhibit 8-1
Disposal at Hawai`i County Recycling and Transfer Stations FY 07-08

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8.3 Review of 2002 Plan Update

The following is a summary of the recommendations presented in the 2002 Plan update relative to solid waste collection and transfer, and a description of the actions taken to date to achieve each recommendation.

2002 Plan Update Recommendation	Status
Design and Construct a Sort Station in Hilo	The sort station is currently under construction and is scheduled for completion in May 2009.
Establish Recycling Dropoff Centers at All Transfer Stations	All but three recycling and transfer stations now have recycling dropoff centers.
Operate the WHSL for West Hawai`i Waste Stream and Residual from East Hawai`i Waste Stream that Cannot be Managed Otherwise	Currently, the SHSL is still operational and the proposed transfer of waste to the WHSL is not taking place.
Close SHSL	SHSL has not been closed. Its capacity has been extended using various engineered approaches.
Design and Construct Waste Reduction Facility	The County issued an RFP for construction of a waste reduction facility. The City Council rejected all proposals submitted to construct a waste reduction facility primarily because the costs of construction looked to be significantly higher than initially estimated.

8.4 Existing Conditions

Currently there is no municipal curbside recycling or garbage pickup provided by the County. Most island residents use the County recycling and transfer stations to dispose of their refuse. Private companies currently provide curbside pickup within limited geographic regions of the island for a fee. Based on residential credit information from the County[2], it is estimated that about 6,600 households currently subscribe to curbside service. This represents approximately 10.5 percent of the 63,300 estimated occupied households in Hawai`i County in 2008. Fees for curbside collection quoted by private collection firms appear to range between $20 to $30 per household per month.

There are a number of companies that collect garbage from businesses and institutions in the County. An analysis of August 2008 County scale records suggests that there are two private collection firms that deliver more than five percent of the waste delivered to County landfills: Pacific Waste (22 percent) and Business Services Hawai`i (6 percent). Companies that delivered between one and five percent of the waste to County landfills include: Atlas

[2] The County provides credit against tipping fees to collection firms that document waste that is collected from residences.

Recycling (2 percent), PFI (2 percent), CTS Earthmoving (1 percent), Superior Sanitation (1 percent), Hawai`i Dredging and Construction (1 percent), and Leo's Rubbish Service (1 percent). Collection rates charged vary by company, the type of service provided, and the distance from the collection point to the landfill. Representative rates are $180 for collection of a 3-cubic-yard bin once per week or $228 for collection of a 4-cubic-yard bin once per week.

Use of the recycling and transfer stations for the dropoff of recyclables or garbage is currently free for residents. The County recently instituted a two-bin system for recycling at transfer stations. This consists of one roll-off container for glass and another for mixed recyclables. Currently, most stations have stairs and platforms to allow reasonably convenient customer access to the recycling bins. Selected stations offer a HI-5 redemption center, reuse opportunities and/or facilities for the recycling of green waste and metals. The recycling services provided at each station are shown in Exhibit 8-2.

Several of the recycling and transfer stations are used by private recyclers or community groups for collection of recyclable materials. The County facilitates the use of the recycling and transfer stations as collection points for recyclables to the extent practical, and intends to eventually upgrade all of the recycling and transfer stations to enhance recyclable collection capabilities.

At the stations, residents deposit garbage into chutes that lead to truck-mounted, compacting containers, which are then hauled by SWD staff to the two landfills. The County operates and maintains stationary compacting units, truck mounted compacting units, and a fleet of trucks and compacting containers utilized in the operation of the recycling and transfer station system, and also provides part-time security monitoring at the busiest recycling and transfer stations.

8.4.1 Recycling and Transfer Station Characteristics

The stations vary in size, population served, tonnage of waste collected per day, types of waste accepted, and hours of operation. Site characteristics for each recycling and transfer station are presented in Exhibit 8-3.

With the exception of one station (Miloli`i) refuse is compacted at each of the recycling and transfer stations three to four times per day by roving SWD recycling and transfer station attendants. The Miloli`i recycling and transfer station has a roll-off container that is hauled twice per week to the WHSL by a private contractor. Recycling and transfer station attendants clean and maintain the stations, operate the compactors, periodically monitor refuse haulers for prohibited materials, and report any unusual activity at the stations.

The recycling and transfer stations are permitted to accept only residential refuse; commercial and hazardous wastes are prohibited at all stations. However, commercial businesses frequently use the stations because of a lack of enforcement and lack of suitable alternatives for solid waste disposal. Without adequate security measures and enforcement (for example, fences and security guards or SWD personnel to document the origin and type of waste being disposed of at the recycling and transfer stations), it is virtually impossible for the County to ensure that all permit requirements are being met. Currently, 18 of the 21 stations are gated and have part-time security guards.

EXHIBIT 8-2
Recycling Services at Recycling and Transfer Stations

Recycling and Transfer Station	Glass	Mixed Recyclables	Scrap Metal	Green Waste	Reuse Center	HI-5 Redemption Center
East Hawai`i						
Kea`au (KRRC)	X	X	X	X	X	X
Hilo	X	X	X	X		X
Pahoa	X	X				X
Laupahoehoe	X	X			X	
Honoka'a	X	X				X
Kalapana	X	X				
Volcano	X	X				
Glenwood	X	X				
Honomu	X	X				
Papaikou	X	X				
Pa`auilo						
Pahala	X					
West Hawai`i						
Kealakehe (Kailua)	X	X	X	X		X
Keauhou	X	X			X	X
Ka`auhuhu (Hawi)	X	X				X
Puako	X	X				X
Waimea	X	X				X
Ke`ei	X	X				
Waiea	X	X				
Miloli`i						
Waiohinu	X	X				X

EXHIBIT 8-3
Site Characteristics for Existing Recycling and Transfer Stations

Recycling and Transfer Station	District	Approx. Population Served	Parcel Size (Acres)	Number of Chutes	FY 07-08 Tonnage (Tons/Day)	Gated Hours of Operation (Summer)
East Hawai`i						
Kea`au	Puna	11,700	19.54	2	20.39	6:30 a.m. - 6:30 p.m.
Pahoa	Puna	9,400	3.77	2	15.78	6:30 a.m. - 6:30 p.m.
Kalapana	Puna	1,200	13.2	1	2.93	6:30 a.m. - 6:30 p.m.
Volcano	Puna	2,000	2.19	1	5.29	Not gated
Glenwood	Puna	4,300	1.97	1	8.06	6:30 a.m. - 6:30 p.m.
Hilo	S. Hilo	42,000	72.7	4	40.29	6:30 a.m. - 5:00 p.m.
Honomu	S. Hilo	3,400	0.84	1	4.73	6:30 a.m. - 6:30 p.m.
Papaikou	S. Hilo	5,800	0.57	1	7.02	6:30 a.m. - 6:30 p.m.
Laupahoehoe	N. Hilo	1,700	1.02	1	4.24	6:30 a.m. - 6:30 p.m.
Pa`auilo	Hamakua	1,800	0.85	1	5.27	6:30 a.m. - 6:30 p.m.
Honokaa	Hamakua	5,100	0.73	1	9.48	6:30 a.m. - 6:30 p.m.
Pahala	Ka'u	1,700	0.75	1	3.57	Not gated
West Hawai`i						
Ka`auhuhu (Hawi)	N. Kohala	6,000	17.28	1	11.36	6:30 a.m. - 6:30 p.m.
Puako	S. Kohala	5,600	8.9	1	7.34	6:30 a.m. - 6:30 p.m.
Waimea	S. Kohala	11,700	0.31	2	17.47	6:30 a.m. - 6:30 p.m.
Kailua (Kealakehe)	N. Kona	21,000	30.32	3	21.54	6:30 a.m. - 6:30 p.m.
Keauhou	N. Kona	8,500	5.47	2	13.75	6:30 a.m. - 6:30 p.m.
Ke`ei	S. Kona	5,600	11.6	1	5.55	6:30 a.m. - 6:30 p.m.
Waiea	S. Kona	3,300	2.28	1	8.13	6:30 a.m. - 6:30 p.m.
Miloli`i	S. Kona	700	0.17	1	0.57	Not gated
Waiohinu	Ka'u	3,000	31.65	1	9.44	6:30 a.m. - 6:30 p.m.

8.4.2 Recycling and Transfer Station Repair and Enhancement

Since the initial construction of the County's current recycling and transfer stations, there have been relatively few major repair or improvement projects conducted to maintain or upgrade the stations. Repairs and maintenance on equipment and infrastructure is currently provided by the County Department of Public Works on an emergency or time available basis. Many of the recycling and transfer stations have deteriorated and have existing engineering or structural deficiencies that require repair or complete renovation. The majority of the recycling and transfer stations have not been upgraded to accommodate population growth within nearby communities, or to effectively accommodate recycling or reuse.

In 2006, the County conducted detailed inspections of all of the recycling and transfer stations in an effort to inventory and assess the conditions of each station. Infrastructure and equipment needing repair was identified and documented, and the layout and capacity of each station were evaluated based on the needs and current population of the surrounding communities. The County then drafted the *Island Wide Transfer Stations Repair and Enhancement Plan,* which detailed the results of the inspections conducted at each recycling and transfer station and rated the condition of each facility. The condition of the recycling and transfer stations documented in the Plan is shown in Exhibit 8-4.

Major deficiencies were identified at many of the recycling and transfer stations. In order to prioritize the stations with the most pressing needs for repair and enhancement, the County rated each station in four areas: structural adequacy, functionality, safety, and regulatory compliance. Based on these ratings, the County developed a 5-year repair and upgrade plan, in which major construction projects were planned for the Volcano, Glenwood, Pahoa, and Waiohinu recycling and transfer stations between 2006 and 2011. At this time, funding has been authorized only for reconstruction of the Pahoa station.

The Solid Waste Division's planned future enhancements and upgrades at the stations include a standardized layout plan that combines the most effective layout components identified during the inspections. Uniformity at the stations will help to ensure safety and regulatory compliance, and to reduce long-term maintenance and repair costs. Repairs and upgrades to the existing stations are being planned with the intent to minimize or eliminate closure of each station during the project in order to mitigate disruption of service to residents.

Additional components that will be included in the plans for upgrades to existing recycling and transfer stations are specific recycling goals for each station, and identification of specific stations that will serve as collection points for additional waste streams including green waste, household hazardous waste, and white/bulky goods.

EXHIBIT 8-4
Island Wide Recycling and Transfer Station Condition

Recycling and Transfer Station	Minor Engineering Deficiencies – Can be Corrected While Station is in Operation	Serious Engineering Deficiencies – Correctable Without Reconstruction	Major Engineering Deficiencies – Reconstruction Required
Kea`au		X	
Pahoa			X
Kalapana		X	
Volcano			X
Glenwood			X
Hilo		X	
Honomu			X
Papaikou			X
Laupahoehoe			X
Pa`auilo			X
Honokaa			X
Pahala			X
Ka`auhuhu (Hawi)		X	
Puako			X
Waimea		X	
Kealakehe (Kailua)	X		
Keauhou	X		
Ke`ei		X	
Waiea			X
Miloli`i			X
Waiohinu			X

Source: County of Hawai`i Department of Environmental Management. *Island Wide Transfer Stations Repair and Enhancement Plan.* February 2006.

8.5 Issues and Concerns

The County's network of recycling and transfer stations provides convenient locations for most County residents to drop off recyclables and garbage. Residents who prefer to have curbside collection must make arrangements with a local business willing to provide the service. This type of system is still in effect in some rural counties in the United States, but it is uncommon, particularly for a county the size of Hawai`i with over 170,000 people. This IRSWMP update includes an evaluation of potential effects on costs or service levels if curbside service is implemented by the County.

When evaluating a curbside service program, the County should assess the need to continue operating all 21 recycling and transfer stations. Curbside service would require significant additional capital start-up and yearly operations costs, and the net cost increase could potentially be reduced by closing some of the County's existing recycling and transfer stations.

As discussed above, the County's existing transfer system was established in the 1970s and most of the stations require significant upgrades to address structural and functional deficiencies. As discussed in the recycling, bioconversion, and markets section, it would also be desirable to provide additional opportunities to divert waste from landfills. Many such opportunities would require significant and potentially expensive changes to the existing infrastructure and operations at County recycling and transfer stations.

8.6 Curbside Collection Implementation Considerations

This section provides a discussion of a variety of issues that should be considered when evaluating the merits of the County implementing a residential curbside collection service, including:

- Institutional approaches to service delivery
- Funding options
- Service levels
- Collection technologies
- Services and service frequency

It should be noted that many of these issues were also discussed in Section 4.0, Recycling, Bioconversion, and Markets. References to that section will be made as appropriate.

8.6.1 Institutional Approaches to Service Delivery

In the United States today, residential waste collection services are provided by both the private and public sectors. Although there are numerous ways to group or categorize different ways of delivering waste collection services, the four most common types of service delivery arrangements currently used in the United States follow:

1. No government-organized collection service
2. Local government owned and operated collection service
3. Noncompetitive franchise collection service with rate regulation
4. Competitive contract collection service

This section provides a brief discussion that highlights the features of each service delivery arrangement.

8.6.1.1 No Government-Organized Collection Service

This is the method of collection currently in effect in Hawai`i County, where customers either deliver their own waste to a processing or disposal facility, or select a private business to pick up recyclables and/or waste at the curb. In many communities, "going to the dump" has long been part of a routine for some local residents. Many of these individuals would

prefer to make the time to deliver waste materials on their own rather than pay for collection services.

Historically, many communities have given residents the option to either sign up for curbside collection services or to self-haul their materials. The main advantage to self-haul collection is that the (typically smaller) percentage of residents who prefer to self-haul their waste may do so without being charged for a service they do not want or need.

In most industries, having many firms compete with each other for business tends to result in efficiencies and lower costs for consumers. However, this is usually not the case for residential collection of garbage because the benefits of competition are usually overcome by the inefficiencies of having multiple haulers driving down the same street each day. Trucks must drive greater distances between stops resulting in fewer stops per collection day resulting in increased costs. In other words, residential collection service is a good example of an industry in which costs can be reduced by regulatory structures that ensure that a product or service is delivered by a single entity.

Another disadvantage of this arrangement is that billing and other overhead costs will also be higher than in service arrangements in which billing is combined with billing for other municipal services and handled by a single entity. Finally, as communities grow and housing density increases, public health and social considerations become more important: garbage should usually be removed at least once every seven days to control flies and odors.

8.6.1.2 Local Government Owned and Operated

Local government collection is most typically performed by city governments although collection is sometimes provided by counties. Advantages typically associated with local government collection include the following:

- Local governments have some inherent cost advantages over private firms, such as not having to pay income or other taxes, the ability to combine overhead costs for collection programs with other existing programs (such as water, power, or sewer), not earning profits, and lower costs of borrowing.
- Local governments may place a higher value on service to customers than private firms.
- When local government collection is provided as part of a utility structure, rate increase proposals are discussed in an open, public forum.
- Local government collection typically includes all households in a city or county allowing for increased efficiency through the economics of contiguity (the contiguous alignment of customers along a service route), and for larger jurisdictions, potential economies of scale.

While local government has some inherent cost advantages, the cost of local government collection is often higher than when collection is provided by the private sector. A comprehensive national survey of collection practices found that local government and

privately-provided service were of equal cost, on average, for smaller local governments (with a population of less than 20,000), but that privately-provided service (with exclusive collection territories) was significantly (up to 37 percent) less costly for larger jurisdictions with populations of more than 50,000[3]. Another study reported the results of a national survey of 60 communities which indicated that the average cost per household for local government collection was 32 percent greater than that of private contract collection[4].

Some of the factors that can lead to inefficiency and higher costs for local government collection include:

- Civil service requirements can hamper the ability of supervisors to motivate employees and, if necessary, fire underperforming employees.
- The lack of the profit incentive removes a powerful motivator toward efficiency.
- Work rule requirements can make it much more difficult for public sector managers to affect a flexible response to changed conditions.

While local government collection can be cost competitive with the private sector, there are many documented cases where local government has cut collection costs significantly by contracting out collection services[5]. In summary, it is likely but not certain that local government collection would be somewhat more costly than collection provided by the private sector in Hawai`i County. If the County were to establish a collection service, it would be critical to ensure good, experienced, proactive management, and the use of appropriate incentives to motivate the behavior of collection personnel.

8.6.1.3 Noncompetitive Franchise with Rate Regulation

In this type of service arrangement, collection is provided by private firms holding franchises that give them an exclusive right to collect waste from all residences within a specified geographic area. The noncompetitive aspect of the franchise means that rates are negotiated between the hauler and the state or local government. This is a common arrangement in many communities in the United States. As an example, in Washington State hauler rates are regulated by the Washington Utilities and Transportation Commission for jurisdictions that opt for this collection arrangement.

This method of providing collection service can foster a sense of partnership between the private and public sectors. It is one of the most flexible institutional arrangements, because there is usually an ongoing mechanism for negotiation between the public and private sectors. If conditions change it is often easier to make adjustments to service levels, or add additional services such as curbside recycling programs than other types of service arrangements. For example, local government collection programs are often difficult to change because of civil service agreements. Contract collection is inherently less flexible because a good contract specifies numerous details that are part of a legally binding

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[3] Stevens, Barbara J. 1980. Handbook of Municipal Waste Management Systems Planning and Practice. Van Nostrand Reinhold Company.

[4] CH2M HILL in association with Ecodata. 1995. City of Tacoma, Refuse Utility Performance Analysis.

[5] Hilke, John. *Cost Savings from Privatization: A Compilation of Study Findings.* Reason Foundation Privatization Center. March 1993.

agreement that can be complex to alter. With an exclusive franchise, the jurisdiction retains flexibility to negotiate change, and the efficiency advantage of contiguous routes.

One disadvantage associated with noncompetitive franchises is the lack of competition to establish a true, baseline cost of service. Without competition, local governments must rely on various regulatory measures, rate comparisons with similar-sized operations, auditing methods, and negotiating techniques to try and mandate that collection service providers establish reasonable pricing for services. Often, these efforts result in only modest success: thus, competitive contracting for collection services often is cheaper than a non-competitive franchise collection service. Finally, it is often difficult and costly for governments to secure the expertise to effectively regulate the rates charged by haulers.

8.6.1.4 Competitive Contract Collection Service

The competitive contract arrangement refers to a system in which a city or county goes through a competitive selection process and awards a single contract to the successful firm for the exclusive right to provide collection services in a designated area for a specified period of time. Assuming there are multiple firms competing for the business, contract collection for exclusive collection zones usually result in lower prices for residential collection services than the other institutional arrangements. This occurs because firms must keep their prices low to be competitive.

However, contract collection is not always the lowest cost institutional arrangement for collection. Higher costs can occur if local governments do not use adequate care in the development, implementation, and administration of the contractual relationship with its contractor. Three key factors that must be present for a community to ensure low cost, high quality service from a competitive contract follow:

- The procurement process must be structured to ensure that multiple firms bid on the collection zones, and that multiple firms will be willing to bid once the initial contract ends and must be rebid.
- The procurement documents, and in particular the contract, must precisely specify the services required.
- The contracting jurisdiction must devote significant resources to craft a good contract. Once the contract is in place, additional resources are needed to actively monitor and manage contractor performance.

Some disadvantages of contract collection include the following:

- There is added risk associated with contracting because it is difficult to foresee the future and to devise a contractual relationship that protects the interests of the contacting jurisdiction yet leaves the private sector the flexibility to profitably and creatively provide the requested services.
- Customer service can suffer if the contract does not clearly specify service requirements and/or if the contracting jurisdiction does not enforce contractual requirements.
- In some cases, intense competition or intra-firm marketing pressures result in firms bidding prices below the true cost of service. In such cases the local government benefits

from low prices, but there can be protracted difficulties in getting the contractor to perform in accordance with the contract.

If Hawai`i County were to implement curbside collection using competitive contracts, it would need to address many issues including the following:

- Deciding how many collection zones and contracts are appropriate to establish. In order to ensure long-term competition and economies of scale, the County would need a minimum of two zones awarded to two different contractors and probably a maximum of three or four zones.
- Developing a complex request for bids or proposals including a good contract that spells out clearly the services to be performed and penalties for non-performance.
- Communicating daily with haulers about ongoing billing, customer service, and equipment or logistical issues.
- Monitoring hauler performance.

In Hawai`i County, a recent Supreme Court decision[6] affirmed the right of public sector unions to provide services traditionally performed by the public sector. The Hawai`i State legislature has made provisions to allow for managed competition, in which both the public and private sectors could compete for the provision of public services, such as collection. However, there is no process yet established for such a competition, and it is highly likely that an attempt to enact such a process would result in litigation with an uncertain outcome.

8.6.2 Collection Technology

Curbside collection can be provided using various levels of automation. The traditional approach to refuse collection relies on crews of two to three people to manually toss refuse into collection trucks. To reduce crew sizes, some communities have implemented semi-automated or fully automated collection systems. This requires providing each household with a wheeled container that is rolled to the curb on collection day. Automated collection trucks have lifting mechanisms that empty the refuse into the truck. This section discusses the relative merits of manual, semi-automated and fully automated collection systems, and their applicability to Hawai`i County.

8.6.2.1 Manual Collection

Manual collection is the traditional method of collecting materials at curbside. Waste is typically collected by two- or three-person collection crews in rear-loaded and side-loaded collection vehicles. This arrangement is a common method of collection in the United States, although in some rural areas where the distance between stops is great, one-person crews are sometimes used. Side-loaded vehicles use compartment openings on the driver side of the vehicle rather than at the back, and therefore the driver or crew member does not have to walk as far to unload waste into the truck. For this reason, side-

[6] Supreme Court of the State of Hawaii. 2004. No. 22022. Konno et. al., vs. County of Hawaii.

loaded vehicles can be operated somewhat more efficiently than rear-load vehicles when smaller (one- or two-person) crews are used.

In an effort to reduce labor costs, many communities are modifying their solid waste collection program to add some level of automation. In one survey, most solid waste managers contacted who operate with manual collection equipment plan to transition to semi-automated or fully automated systems as soon as is practical[7]. In Hawai`i, the counties of Honolulu, Kauai, and Maui are all currently transitioning from manual collection to fully automated collection.

Automated collection vehicles reduce labor costs by allowing for smaller crews, but at the expense of higher capital investment in trucks. Therefore, automated collection is best suited to areas with relatively high labor costs, and manual collection is best suited to areas with relatively low labor costs. Insurance premiums are also higher with manual collection because many refuse workers suffer injuries to backs and shoulders by repetitively lifting waste into the truck. Thus, the appropriateness of manual versus automated collection will depend on the relative cost of labor plus associated costs versus capital costs, and the characteristics of local collection routes.

8.6.2.2 Semi-Automated Collection

In semi-automated systems, the collector wheels the container from the curb to the rear or side of the truck and attaches the container to an automated hydraulic dumping unit (tipper). These systems require special containers that are designed to be compatible with the lifting units. Virtually all of the heavy lifting associated with refuse collection is eliminated; thus worker fatigue and injury is reduced, and the vehicles can be operated by crews as small as one person. Considering that solid waste collectors have the highest injury rate of any industry nationally, the benefits associated with eliminating lifting can be significant. The reduction in lifting also makes the profession more accessible to women and older workers.

Although semi-automatic systems require more time per pickup than manual loading, service time *per crew member* can decrease because semi-automated systems usually allow for a sizable reduction in crew size. The wheeled containers used with semi-automated and fully automated systems are often perceived by the customer as a more convenient, cleaner collection system, with a resulting decrease in litter.

For rural customers with long dirt driveways, larger, wheeled containers may be a drawback as they are difficult to load into a personal vehicle to take to the set out location. In rural areas, customers could be allowed to set out smaller, 30-gallon cans to make it more convenient.

Semi-automated collection has been successful in some communities but unsuccessful and ultimately canceled in others. This type of collection service typically failed due to slower route times, overly stringent container set-out requirements, higher vehicle and container

[7] Merrill, Lynn. *Improving the Bottom Line on Curbside Collection*. MSW Management. January/ February 1996.

costs, or a perceived reduction in the incentive to recycle because of the larger can sizes. Municipalities with successful semi-automated collection programs devised ways to work around these problems. In some cases, it has been determined that despite the challenges, overall collection costs were less than manual collection because of the reduction in crew sizes, decrease in insurance premiums, and reduced injury rates.

Compared with manually loaded vehicles with two- or three-person crews, semi-automated collection results in longer route times and higher capital costs. Manually loading refuse into trucks from cans is faster than using automated loading systems. Labor costs can be reduced by reducing the size of the crew per truck, but capital costs are increased because more trucks may be required to pick up the same quantity of waste.

Semi-automated (and fully automated) collection would be challenging to implement in rural areas of Hawai`i County because of factors not conducive to automation, including:

- Unimproved roads
- Lack of curbs or sidewalks for set outs
- Steep slopes
- Dense vegetation

More study would be needed to evaluate if semi-automated or fully automated collection could be implemented effectively in Hawai`i County.

8.6.2.3 Fully Automated Collection

Although fully automated systems are not as common as semi-automated systems, the number of communities throughout the country that use fully automated collection vehicles is growing. Fully automated systems use one-person side-loading vehicles equipped with a lifting mechanism (collection arm) on the side of the vehicle. The operator pulls up to the container at the curb and controls the entire loading operation from the right-hand driver's seat. The collection arm allows the operator to grasp, empty, and return the container without leaving the truck cab. In certain cases, such as improperly positioned or obstructed containers, the operator may have to leave the cab to respond to a problem.

Fully automated systems have similar advantages to the semi-automated systems discussed in the previous section. Because virtually all lifting is eliminated, the costs associated with worker injury and fatigue are greatly reduced. In addition, there is usually an improvement in collection labor efficiency because fully automated systems use a single person on each truck and the driver does not have to get out of the truck as frequently. Benchmark fully automated collection systems can collect from more than 800 households per day per truck with a single driver. Since commercial containers compatible with fully automated systems are available up to 300 gallons, some communities have lowered collection costs by incorporating commercial accounts on residential routes.

Fully automated systems require cooperation by residents to set out containers in a prescribed way. Implementing fully automated systems presents additional physical constraints as well. Single side of the street routing is required (which will increase miles driven and drive time between accounts). Parking restrictions may need to be instituted, and obstructions (for example, trees, and utility wires) may present problems in certain areas.

Compared with manually loaded vehicles with two- or three-person crews, route times will be longer and capital costs will be greater with either semi- or fully-automated collection. However, labor costs would decline by reducing crew sizes to one (plus extra replacement drivers for sick days, vacation, and holidays). The total operational collection cost will depend on a community's labor costs and route structure. Because capital costs will be higher and route times slightly longer, the main source of savings compared to manual collection is in labor. Communities that have shifted to automated collection typically have relatively high labor costs. It should be noted that this is an important factor in case studies of automated collection that show an overall reduction in collection costs.

Compared to semi-automated collection, fully automated collection requires trucks that are more costly with higher maintenance requirements. Those costs are typically overshadowed by the cost savings that results from the reduced time per stop. Thus, in most cases, fully automated collection appears to be more advantageous than semi-automated collection.

8.6.3 Service Levels

Curbside service is generally provided in one of two ways:

- Subscription basis – where residents have the option to either subscribe to the service or not.
- Universal collection – where all residents in a jurisdiction or a sub-area of a jurisdiction are charged for curbside service regardless of whether or not they use the service.

The advantages of a subscription service are that residents are given a choice of whether or not to pay for the service. The disadvantage is that it makes collection more costly on a per-household basis by lengthening the distance between stops on a route. Universal collection has just the opposite set of advantages and disadvantages: residents no longer have a choice and are required to pay for a service, yet per-household costs are lower.

This issue was discussed in the recycling, bioconversion, and markets section. Hawai`i County is predominantly rural in character with relatively small urban and suburban areas in Hilo, Kailua-Kona, Waimea, and a few other locations. Many of the rural areas within the County have steep, unimproved roads not suitable for collection vehicles. Thus, mandatory curbside collection for all County residents is likely to be impractical. Further, longer distances between collection stops will occur in many of the geographically dispersed small communities in the County. A voluntary subscription service, for which not all residents would sign up, would potentially make the distance between collection stops even longer. While there's no binding constraint against implementing a subscription service, the fact that the County has many geographically dispersed rural communities suggests that designating specific geographic zones where curbside service would be mandatory would make more sense than mandating island-wide collection.

8.6.4 Services and Service Frequency

Most collection systems now include both garbage and recycling and many offer green waste services. Some communities are taking the next step toward zero waste and are diverting food and other organics from the garbage at curbside. Considering the County's commitment to zero waste, should the County elect to make the substantial commitment to begin offering curbside collection services, it would make sense to offer curbside collection of recyclables.

PHOTO: REHRIG

Some communities in hot and humid climates offer garbage collection service twice weekly. This is significantly more expensive than weekly collection and this practice seems to be less and less common; weekly collection of garbage is the norm in most communities.

Recyclables are typically collected either weekly or bi-weekly. Weekly collection generally is more costly, but may result in higher diversion from landfill. However, as discussed in the recycling, bioconversion, and markets section, the evidence of increased diversion from weekly collection versus bi-weekly collection is weak and is not consistent in all jurisdictions. Green waste services are offered in a wide variety of service frequencies including weekly, bi-weekly, monthly, and seasonally.

The most aggressive approach to diversion at curbside is a three-stream system in which food and other organics (which could include green waste) is collected weekly and garbage and recyclables are collected either weekly or on alternate weeks.

8.6.5 Funding Options

There are a number of ways that the County could pay for a curbside collection service, including:

- Property taxes
- Line item on property tax bill
- Direct billing
- Pay-As-You-Throw (PAYT)

8.6.5.1 Property Taxes

This is how solid waste management expenditures are currently funded. Thus, it would be relatively simple for the County to continue with this method and would potentially streamline implementation of a new service.

The main disadvantage of this funding method is that it would provide no information to customers about the cost of the program. The lack of information for consumers about program costs would indirectly eliminate one way of providing incentive to program managers to keep service costs low.

8.6.5.2 Line Item on Property Tax Bill

Many jurisdictions separate the costs of waste management services on property tax bills. This would be relatively simple for the County to implement and would provide some information to customers about the cost of curbside collection, and potentially other waste management services.

8.6.5.3 Direct Billing

The County could provide curbside collection and other waste management services in a similar fashion to utility services like water or electricity, and send bills directly to customers. This is a very common arrangement in the United States. The main advantages of this type of system are to provide better information to customers about the cost of the collection service, and to indirectly provide incentives to provide services more efficiently.

To implement this type of system, the County would need to hire personnel, establish computer-based systems for the program, and conduct considerable public education. Ongoing customer service would need to be provided to address disputes about services and billing, and for collection of unpaid bills.

8.6.5.4 Pay-As-You-Throw

As discussed in the source reduction section, PAYT can take many forms including using a variable can, metered bag, or metered tag system. The key aspect of this system is to charge a progressive rate for each additional garbage unit collected above the basic service level (for example, one can per week). In other municipalities, PAYT has proven to be a highly effective method of reducing waste and increasing the use of recycling and organics diversion programs.

The variable can system is becoming increasingly popular in the United States and integrates well with automated collection. In this approach, residents are charged more for larger can sizes. Some communities charge progressively increasing rates for a wide menu of can sizes ranging from a 12-gallon micro-can to one or more 96-gallon carts. This system requires the collector to keep a substantial inventory of different cart sizes and spare parts, and requires billing and account systems to keep track of changes in can sizes.

A metered bag program consists of charging customers on a per-bag basis. This requires the collector to keep track of how many bags are set out by each customer. It can be prone to disputes about how many bags are set out by each customer during each billing cycle.

A metered tag program requires each bag of garbage to be accompanied by a county-sanctioned tag. Tags can be sold at County offices and/or at local supermarkets. This system has the advantage of minimizing disputes about how much waste is set out each month, but places a burden on customers to remember to purchase tags.

Implementing a PAYT system for residential garbage collection service would require implementation of an aggressive public education and information campaign to ensure that residents understand the rationale for implementing the PAYT program. Significant up-front planning would be required to assess a wide range of implementation details. The County would need to establish billing systems, a customer service organization, and

modify its financial systems to accommodate this new service. The County could elect to assess the potential for reducing property taxes as an offset to the new revenue source.

8.7 Options for Improvement

The County's system of recycling and transfer stations is a unique system that has served the County well for more than 30 years. Options for improving that system follow.

8.7.1 Add Curbside Collection

The challenges associated with implementing curbside collection of recyclables (as discussed in the Recycling, Bioconversion, and Markets section) would also apply to collecting garbage. Mandatory curbside collection of garbage for all County residents is impractical because of Hawai`i County's predominantly rural character and the many areas with steep, unimproved roads not suitable for collection vehicles. Further, longer distances between collection stops will occur due to the large number of geographically dispersed small communities in the County. A voluntary subscription service, for which not all residents would sign up, would potentially make the distance between collection stops even longer. For program cost efficiency, it is recommended that this option should include designated zones where curbside service would be mandatory.

For the purpose of developing diversion and cost estimates, a rough analysis of housing units in Census Designated Places was conducted. The result was an estimate of 37,000 households that would be served by the program, which is about 73 percent of the estimated 51,300 occupied single family households in Hawai`i County[8]. Under this assumption, there would be approximately 14,000 single family households for which curbside collection would not be available. Those residents and the approximately 12,000 multi-family households would need to transport recyclables and garbage to recycling and transfer stations.

Estimated Cost. The cost of curbside collection of garbage would depend on many factors including the type of collection vehicles used (manual vs. semi-automated vs. fully automated), the number of rural households included in the program (increased distance between collection stops), and the institutional arrangement (for example, public versus private). Curbside garbage collection is likely to cost between $20 and $30 per household per month (excluding the cost of disposal), or $8.8 million to $13.3 million per year in total. Combining garbage collection with recyclables and organics would potentially cost between $40 and $60 per household per month.

The cost of curbside collection would be offset somewhat by reducing the amount of waste that would be transported from recycling and transfer stations to landfills. In FY 07-08, the County's variable costs of transporting waste from recycling and transfer stations to landfills was approximately $4 million. It would be reasonable to expect annual transportation cost savings of $1.5 million to $2.5 million per year if curbside collection were implemented. The County's full complement of transfer stations would be somewhat less necessary if curbside collection were implemented. However, it should be recognized that

[8] Based on data from U.S. Census *2006 Selected Housing Characteristics* (single-family was counted as dwellings with 1 to 4 units), and 2000-2006 annual growth rate used to project 2008 total occupied housing units (63,347).

the rural residents not easily served by curbside service are dispersed geographically throughout the island and still need convenient locations to dispose of recyclables and garbage. As shown in Option 5 above, closing 10 stations might result in $700,000 to $1.5 million per year savings in station operation costs.

8.7.1.1 Collection Sub-options

During the October 20, 2008 SWAC meeting, an in-depth discussion was held about curbside collection for single-family households, and various implementation ideas were put forth. In response, the following suboptions have been developed to further explore possible ways to implement residential curbside collection. While there are many possible methods of implementing collection service, the following suboptions are intended to reflect a number of current opportunities and constraints that exist in Hawai`i County, including:

- The County transfer system provides reasonably convenient service for all households, and there is no County-sponsored curbside service.
- About 10 percent of County households receive service from private companies that compete for customers with little County involvement.
- No companies currently provide curbside recycling for residences (in part because there are very few locations they could take the materials collected).
- Universal curbside collection of garbage for all County residents is impractical because of Hawai`i County's predominantly rural character and the many areas with steep, unimproved roads not suitable for collection vehicles.
- State law may preclude the County from engaging in franchises or contracts with private sector collection firms.

In response, the following suboptions were developed for SWAC consideration. As the options move from A to E, they provide an increasing level of change, potential benefits and costs, and implementation difficulty:

A. Retain existing system.
B. License all existing collection companies.
C. License existing collection companies and require every-other-week recycling.
D. County offer collection services using County crews.
E. Exclusive franchises for private sector collection.

Note that in all of these options, collection service would be optional for residents. A universal collection service would be more efficient than an optional service because it would result in more stops per hour of collection. However, in most areas of the County the total cost for universal collection would probably be quite high when combined with a means of providing service to the many rural residents that are spread out widely throughout the County. To serve these residents, the County would need to retain many of its existing stations (perhaps ten to 15 of the existing 21 stations) or provide an additional collection service (such as bins located on main roads where residents could dispose of their waste). It is possible that universal collection could be implemented in Hilo or in select areas on the eastern side of the County at the same time recycling and transfer stations that serve those areas could be closed. This could be evaluated at a later date, but in most areas of the

County, the sum total of universal curbside collection and maintaining recycling and transfer stations for more rural areas is likely to be cost-prohibitive compared to any advantages it might provide.

A. Retain Existing System

In this option, the existing system would be retained. Residents who would like curbside collection would make arrangements with a collection company.

This system would have the advantage of simplicity by just continuing existing practices at no cost to the County: those living in more urbanized areas of the County have the service available to them. Some disadvantages of this option include:

- Many areas of the County are currently not served because of the difficulty of profitably serving customers outside of more densely populated areas.
- The current collection system is relatively inefficient with both low route densities and the potential for multiple companies collecting from homes on the same street.
- This system is somewhat less compatible with recycling because persons receiving garbage collection still would have to go to a recycling and transfer station to drop off recyclables.
- There is currently no standardization of services and no control over the type and condition of vehicles used by haulers.

B. License All Existing Collection Companies

In this option, the County would pass an ordinance requiring all companies collecting garbage or recyclables from residents to obtain a "material collection license." The County would place certain conditions for obtaining a license such as: paying a small annual fee, obtaining a "license sticker" to be displayed on each vehicle used for collection purposes, and requiring annual safety inspections of each vehicle.

The County could then assist in the promotion of collection service by licensed haulers by listing haulers name and phone numbers on its website and in promotional material. This may help inform the public about the services available and provide some measure of sanction by the County of those providing the service.

Other than requirements associated with licensure, collection companies would be free to engage in operations as they see fit including where and when to offer service, the method of set-out, and the price of the service.

There would be a small initial cost to prepare the ordinance and develop the licensing program, then a small annual cost to license each vehicle. Part or all of the annual cost of the program could be paid for through licensing fees.

C. License All Existing Collection Companies and Require Bi-Weekly Recycling

This option is like Option B, with an additional requirement that licensed haulers also offer a bi-weekly recycling service, and submit documentation about the method of collection for County approval. Materials collected should match the list of materials accepted in the County's two-bin recycling system at its recycling and transfer stations.

To implement this option, the County would need to ensure that there are places for haulers to deliver recyclables: at a minimum, facilities would be needed on the west and east sides of the island. This could be accomplished at the South Hilo sort station, at a new facility developed by the County on the east side of the island, and or at a private facility or facilities.

This option would have the advantage of helping to increase recycling. It would, however, increase the cost of curbside service and probably result in some customers discontinuing collection service.

D. County Offer Collection Services Using County Crews

In this option, the County would establish a new department of collections, and implement weekly curbside collection of garbage and every-other-week collection of recyclables County-wide. Private sector collection from single-family residents would no longer be allowed. It is assumed that this would be an optional service available in areas of the County that could be reasonably served by a collection vehicle (initial estimates are that this would be about 70 percent of all single family households). The County would need to ensure that processing facilities are available for the west and east sides of the island.

Customers who do not sign up for collection service would continue to use the recycling and transfer stations.

This option would have significant implementation challenges, some of which include:

- Hiring a collection supervisor to oversee the operation, and hire additional staff and procure vehicles, carts, and equipment.
- Hiring consulting expertise with an individual or firm that has expertise in establishing a collection operation.
- Establishing a billing mechanism to charge customers for the service.
- Establishing base yards with basic maintenance services for vehicles and carts in two or three locations on the island.

The County would need to estimate the cost of collection service and then decide if it would be provided at cost or at a subsidized rate. Estimating the cost of serving each household at this time is difficult: it is likely to be somewhere between $30 and $50 per month.

E. Exclusive Franchises for Private Sector Collection

In this option, the County would establish two to four franchises in which a collection company would have the exclusive right to collect waste and recyclables from residential customers. Currently, it is estimated that there are only about 6,600 customers that currently subscribe to collection service. Considering that a single truck in a somewhat rural system can collect from 200 to 600 customers each day on a route (depending on route density), the franchises would be small initially. Thus, more than a few territories would be very inefficient to implement.

The service would be optional for residents, but presumably with an exclusive territory, costs would fall compared to today and the number of customers served would probably grow through time. All companies would be required to offer a similar service, ideally using

the same type of cart, with weekly collection of garbage and every-other-week collection of recyclables. The County would need to ensure that processing facilities are available for the west and east sides of the island.

It is uncertain if this could be implemented under current state law. If the County were to implement this option, the County would probably face a legal challenge from the union that serves County workers. Thus, the County would need to test the legality of this approach. It might be able to proceed by engaging in a managed competition process in which the County could also vie for franchises in competition with private collection firms. But the County would need to receive approval from the state to engage in such a process. Thus, there is some legal work to be done prior to determining if this option could be implemented.

Assuming implementing this option is legal, there are many ways that franchises could be awarded. It would be challenging to develop a method of assigning franchises that is perceived as "fair" by all existing collection companies: many (or all) of them are likely to oppose any particular franchise award method. One approach would be to have firms bid a price per month for collection service in each zone (i.e., bids would differ in each zone). The lowest price offered in a zone would be the winning bid. The County could then set a County-wide rate that all residents would pay for collection services (say $30 or $40 per month). The County would then pay (or receive a payment from) the collection firm for the difference between the bid price and the County-wide rate paid by residents for service in each franchise territory. The collection firm would bill and collect the County-wide rate from residents who elect to sign up for the service.

The County would need to establish rate review capabilities and establish a process for firms to adjust bid prices as costs change in the future. This would include reviewing the justification for any proposed rate increases. The County would continue to set the actual rate paid by residents. That rate could be set so that the County breaks even or it could subsidize the collection service as it prefers.

In this option, County recycling and transfer stations would remain open for those that prefer to not pay for curbside collection.

The main advantages of this option are providing a way of improving the efficiency of service provision (only one firm passing down a residential street), standardized services County-wide, increased recycling, and flexibility and choice for residents.

Some disadvantages of this approach include: existing collection firms would lose the ability to provide services as they see fit, and significant administration and legal expertise would be required for implementation and to regulate rates. Implementing this approach would require project management and specific expertise. It would probably take the County a year or more to put into place and would probably require hiring a project manager and/or using consultants to provide specific expertise.

The cost of this option would depend on many factors, but would probably range between $30 and $50 per month per household.

8.7.2 Change Permits to Allow Commercial Recycling at Recycling and Transfer Stations

The County is currently in the process of changing the operating permits at each station from a convenience center to a transfer station. This change eliminates a 40 cubic yard per day delivery maximum and allows non-residential customers to access the stations. The County anticipates submitting the permit changes to the State Department of Health for approval by the end of 2008.

Once the permits are changed, this option would include allowing non-residential customers to use the recycling services at each recycling and transfer station. Non-residential customers would not be allowed to deliver garbage at the stations.

This policy would provide more convenient recycling opportunities for small businesses throughout the county.

Estimated Cost. Under this option, the amount of added recyclables that would be delivered to recycling and transfer stations is uncertain. If 20 to 40 percent of current recyclables could be added by this option, the result would be approximately 1,100 to 2,200 tons per year. At 2008 prices for transportation and diversion incentive payments, this would cost the County about $200,000 to $400,000 annually. The County would also need to spend a small amount for additional signage, education, and promotion of this new policy.

8.7.3 Timely Reconstruction of Stations in Need of Major Repair

As shown in Exhibit 8-4, 13 of the County's 21 recycling and transfer stations have major engineering deficiencies requiring reconstruction, and another six have serious engineering deficiencies that can be addressed while the station is operational. The County has conducted conceptual engineering design for the replacement of the Waiohinu, Pahoa, Glenwood, and Volcano recycling and transfer stations and is currently designing the reconstruction of the Pahoa station which is scheduled to be completed in FY 09-10, most likely followed by Waiohinu. The County is also planning to develop a new recycling and transfer station in South Kona – Ocean View.

Conceptual drawings of the proposed reconstruction of those four facilities are presented in Appendix C. It is recommended that the County commit to a schedule to reconstruct one station per year. At that rate, all of the station reconstructions could be completed within the next 13 years. After that, the deficiencies not requiring reconstruction could be addressed.

Estimated Cost. The County estimates that station reconstructions will cost between $3 million and $5 million each. Assuming the County continues its current practice of funding such reconstructions with general obligation bonds, each station would add annual costs of approximately $250,000 to $400,000 assuming a 5.5-percent rate of interest and a 20-year term.

8.7.4 Add Full-Time Attendants and Reduce Operating Hours at Recycling and Transfer Stations

The County could increase recycling by having full-time attendants at each station. These attendants could encourage customers to separate recyclables and provide information

about different ways residents could reduce the amount of waste going to landfills. The stations are already partially staffed, but adding full-time staff to all stations would be a significant added cost. Thus, in this option it is proposed to reduce the number of hours that stations are open to the public. The County stations are open 12 hours per day in the summer and 11.5 hours per day in the winter (excepting Hilo, which is open 10.5 hours per day throughout the year). All stations are open 7 days per week, 362 days per year. It is common in many rural areas of the United States to have stations that are open just a few days per week and/or fewer hours per day than the County stations.

In this option, operating hours would be reduced (for example 8 a.m. to 5 p.m.) for 3 to 7 days per week depending on the size of the station – with the more heavily used stations open more frequently. One approach would be to have the six stations that accept more than 5,000 tons per year open 7 days per week (Kailua, Keauhou, Waimea, Hilo, Kea`au, Pahoa) and have all other stations open only three days per week. The 3-day-per-week schedule should be structured so that adjacent stations are open on different days and all stations are open at least one weekend day. For example, the County could have Laupahoehoe open Tuesday, Thursday, and Sunday, and Honomu open Monday, Wednesday, and Saturday. This schedule would reduce the operating hours of County stations by approximately 50 percent.

Estimated Cost. With a 50-percent reduction in operating hours, it is estimated that the County could provide full-time attendants at each station with existing staff, and there would be excess station attendant staff that could perform functions currently done by private security guards. It is estimated that this would allow the County to significantly reduce or eliminate the $800,000 it spent on private security guards in FY 07-08.

8.7.5 Add Full-Time Attendants, Reduce Operating Hours, and Implement PAYT at Recycling and Transfer Stations

This option is similar to the option discussed above in Chapter 8.6.4 with the addition of implementing a PAYT system at the recycling and transfer stations. As discussed in the source reduction section, PAYT systems provide a powerful incentive to reduce waste and increase reuse and recycling.

While there are many ways this system could be implemented, one approach would be a "bag/tag" system in which regular household garbage would be accepted only in approved pre-purchased bags, and bulky waste that doesn't fit in a bag would need to be accompanied by an approved pre-purchased tag. The bags and tags would be sold at various retail establishments throughout the county. The County would need to work with local retail establishments to ensure the availability of bags and tags. A key advantage of this system is to eliminate the need to exchange money at stations. Accepting money at stations would add substantial extra costs for security, record keeping, and potentially could result in longer wait times at stations because of the time needed to assess the fee, accept money, and make change.

The County would need to devote considerable upfront resources to educate residents about the reasons for the new program and to explain how the new program works. Further, it is recommended that this type of program be phased in with a 3- to 6-month

grace period during which bags and tags would be collected, but no one would be turned away for not using the appropriate bag or tag.

Illegal dumping is always a concern, although results from around the country have shown that long-term increases in illegal dumping from PAYT programs are rare[9]. The County may need to consider increasing enforcement authority for the DEM or other County agencies to allow them to levy fines against those caught engaging in illegal dumping practices.

Estimated Cost. At startup, a small attendant shed would need to be added to each station. With reduced operating hours at stations, this program should not cost extra money and should result in substantial increased revenues from sales of bags and tags. It is estimated that a charge of $2 per bag would result in approximately $11 million in additional revenue less the cost of program administration and purchasing and distributing bags and tags.

8.7.6 Reduce System Costs by Closing Select Stations and Reducing Operating Hours

In this option, the County would close some stations and reduce the operating hours of some stations that remain open. The money saved could be used to increase waste reduction, reuse, and recycling or used to lower the amount of money collected from property taxes for solid waste management purposes.

This option would include closing the following ten stations:

Closed Stations	Closest Remaining Station(s)
Papaikou	Hilo
Honomu	Laupahoehoe, Hilo
Pa`auilo	Honoka`a, Laupahoehoe
Puako	New facilities would be opened at the Pu`uanahulu Landfill site, Waimea
Ke`ei	Keauhou
Waiea	Keauhou, Waiohinu
Miloli`i	Keauhou, Waiohinu
Pahala	Waiohinu
Kalapana	Pahoa
Glenwood	Volcano

This option would require an aggressive public education program that stresses the reasons for closing some stations. As discussed above in the PAYT option, the County would need to educate residents and increase enforcement to prevent illegal dumping. It is likely that some residents would continue trying to drop off waste at closed transfer stations for some

[9] A good guide to preventing illegal dumping can be found in EPA. 1998. *Illegal Dumping Prevention Guidebook*. Accessed at http://www.epa.gov/reg5rcra/wptdiv/illegal_dumping/downloads/il-dmpng.pdf

time until residents become comfortable with the new arrangement. The County would need to plan for this and increase its budget for enforcement and cleanup crews.

Estimated Cost. An analysis of the County operating budget indicates that the variable cost of operating the County transfer stations in FY 07-08 (that is, excluding certain "fixed" costs and the cost of transportation) was about $2.7 million. With ten fewer stations, some reduction in operating hours, allowing for the added cost of full-time attendants, and providing some budget for increased enforcement, it is estimated that this option could save $700,000 to $1.5 million per year.

8.7.7 Lower Transportation Costs by Compacting Recyclables

In FY 07-08, the County spent about $720,000 transporting recyclables from recycling and transfer stations to processors. About $430,000 of that amount was for transporting mixed recyclables, which are transported loose in 40 cubic yard drop boxes. The transportation costs could be lessened by compacting these recyclables prior to transportation from stations. Two possible methods of compaction include:

- Converting one garbage chute to handle recyclables at larger stations with multiple garbage chutes (Kea`au, Pahoa, Hilo, Waimea, Kailua, Keauhou).
- Use compacted drop boxes at stations for mixed recyclables.

8.7.7.1 Converting One Garbage Chute to Accept Recyclables

In this option, one garbage chute at certain stations would be designated for accepting recyclables only (as shown in the adjacent example). Once dropped into the chute, materials would be compacted in the County's 75-yard compaction trailers, using the same operational methods currently used for garbage.

The Kea`au, Pahoa, Waimea, and Keauhou stations each have two chutes for garbage, the Kailua station has three, and the Hilo station has four. Where only two chutes are available, it may be difficult to devote one chute entirely to recyclables; long lines may form during peak conditions for disposal. Signage would need to be changed, public education would be needed, and a full-time attendant would need to be present on-site to ensure that only recyclables went into the chute designated for recycling. This concept might work better at the Kailua or Hilo stations where converting one chute would leave two (Kailua) or three (Hilo) chutes for garbage. Transportation cost savings from compacting at the Hilo recycling and transfer station may be small because currently mixed recyclables are processed in Hilo and the distance transported is small.

In summary, this concept appears to be feasible at the Kailua station, and might be feasible at the Kea`au, Pahoa, and Waimea stations. If the County is interested in this option, it should conduct a pilot program to test its effectiveness.

8.7.7.2 Use Compacted Drop Boxes at Stations for Mixed Recyclables

The County could increase truck payloads and lower transportation costs by installing stationary compactors at each station for recyclables. This system would include a compaction unit and a charging hopper (two cubic yards is a typical size) that residents would place their recyclables into. When the charging hopper is full, an operator would activate the compaction stroke and material would be pushed into an enclosed drop box. For safety, the hydraulic ram should be key- or code-operated so that only trained operators would be able to engage the compaction unit.

Enclosed drop boxes come in many sizes, but a 40-cubic-yard box is recommended to allow containers to stay at stations for longer periods of time before they needed to be hauled. The installation would require pouring a concrete pad to support each compactor, and building a safe and convenient platform around the charging hoppers for customers. County equipment operators (or a station attendant) would have to routinely operate the compaction units to compact recyclables as they currently do for the County's garbage trailers. In FY 07-08, the uncompacted mixed recyclables hauled from recycling and transfer stations averaged about 1.4 tons per 40-cubic-yard bin. This type of unit at County stations could probably achieve an average compaction ratio somewhere between 3:1 and 5:1 for mixed recyclables.

Estimated Cost. Converting garbage chutes to accept recyclables would probably require one additional site attendant at each station (to ensure that materials are placed in the proper chute) for an annual cost of about $100,000. There would be a small initial cost for extra signage, education, and promotion.

Compacting recyclables would cost about $30,000 for each compaction unit and about $15,000 for each enclosed 40-cubic-yard drop box. If the County were to install one compaction unit at each station and purchase 30 containers, the total initial capital cost would be about $1.1 million. Adding an additional $10,000 per station for site improvements would result in a total cost of about $1.3 million. Amortized at 5.5 percent over 5 years, this would result in an annual cost of about $300,000. When considering the added annual maintenance cost of about 5 percent of capital ($55,000), and labor costs for staff, it is uncertain if installation of compactors at all stations would be cost-effective given the current recycling rates at County recycling and transfer stations.

However, it is important to note that many options considered in the Plan update (such as mandatory recycling, PAYT, allowing non-residential recycling) would increase the quantities of mixed recyclables accepted at stations. The larger the volume of recyclable materials that is transported, the more likely compaction will be cost-effective. Another option to consider is installing the units only at selected stations. The County could adopt a "satellite" system at which compactors would be installed at selected stations that would accept uncompacted recyclables from stations more distant from processors. It would be

appropriate to revisit this option after recycling options for this IRSWMP update are more clearly defined.

8.7.8 New Baseyard and Equipment Maintenance Facilities

The County has identified a need for two new facilities to enhance ongoing operations. The first is new baseyard facilities in Hilo to provide shelter and improved working conditions for solid waste workers.

The second is a new equipment maintenance facility. The County's existing facilities are too small to allow for prompt servicing of trailers and other heavy equipment operated by the Solid Waste Division. This results in a very high percentage of out-of-service equipment and higher equipment leasing costs.

Estimated Cost. The County's current CIP budget includes $2 million for the new baseyard facilities, and $9 million for the new equipment maintenance facility.

8.8 Recommendations

On the basis of the analysis presented above and discussions with stakeholders, this Plan update recommends the improvements discussed below. Implementation issues related to these activities are discussed in Sections 3.0, 4.0, and 5.0.

1. **Retain the County's system of recycling and transfer stations.** Currently, there is no government-organized residential waste collection service in Hawai`i County. Thus, an analysis of curbside collection options was presented above in Section 8.7.1 and in Section 4.0, Recycling, Bioconversion, and Markets. Based on the outcome of SWAC and DEM staff deliberations about the cost and other advantages and disadvantages of curbside collection, it is recommended that the County maintain its existing system of recycling and transfer stations. To continue operating the stations, which are more than 30 years old, the County will need to complete upgrades to address structural deficiencies and provide expanded services to help support zero waste initiatives.

2. **Reconstruct one or more recycling and transfer stations annually.** The decision discussed above to maintain the County's recycling and transfer system will require repair and/or reconstruction of the recycling and transfer stations. After considering other County funding needs, it is recommended that the County fund at least one reconstruction each year, and develop a new South Kona recycling and transfer station at Ocean View. The County should also consider installing compaction units for recyclables at selected stations. This would include consideration of adopting a "satellite" system where compactors would be installed at selected stations, and those stations would accept uncompacted recyclables from nearby stations with no compactor.

3. **Implement full-time staffing and reduced operating hours at recycling and transfer stations, and consider closing one or more stations.** In Sections 3, 4 and 6, a number of proposed new zero waste programs are recommended for implementation at County recycling and transfer stations. It will be imperative that County staff are present during transfer station operating hours to inform users of the various recycling, reuse, organics, and other programs available. As more services are provided, it will become

prohibitively expensive to keep transfer stations open 10 to 11 hours per day, 362 days per year. Thus, it is recommended that the County reduce operating hours as needed to keep its overall staffing costs similar to what they are today. The County may want to consider closing select transfer stations if the benefits of increased services in some areas are deemed to be less than the cost of providing that service.

4. **Develop a system to license private collection firms.** As the County invests more into its recycling and transfer system and aggressively pursues zero waste programs, it is recommended that the County develop a simple licensing program for waste collection firms. In this program, all firms that collect garbage from residents or businesses would be required to register vehicles, document that the vehicles meet safety requirements, and pay a nominal licensing fee (to cover the cost of licensing). As discussed in Section 4.0, Recycling, Bioconversion, and Markets, an added requirement of the license would be that all licensed firms must offer a recycling service along with its garbage service. This would help ensure that residents and businesses that do not use the recycling and transfer stations stay in compliance with mandatory recycling requirements.

5. **Change permits to allow small commercial businesses to drop off recyclables at County recycling and transfer stations.** The County is already in the process of converting its State permits to allow commercial businesses to recycle at the recycling and transfer stations. This would make it much more convenient for small businesses in rural areas to recycle. To ensure efficient and safe operations, only trucks below a certain size threshold (for example, less than one ton) would be allowed to use the stations.

6. **Conduct an operational efficiency analysis.** It is recommended that the County continue to monitor the cost of its recycling and transfer network including contracting with a third party to conduct an efficiency analysis and identify potential opportunities to lower costs.

7. **Develop a baseyard facility and equipment maintenance facility for transfer vehicles at the South Hilo Sanitary Landfill.** Development of these facilities would help ensure adequate working conditions for County employees and provide infrastructure that would enable the County to proactively maintain its vehicles in a more cost-effective manner.

SECTION 9

Residuals Management

9.0 Residuals Management

9.1 Introduction

Residuals refer to materials remaining after source reduction, reuse, recycling, and bioconversion. Residuals management is the final treatment and/or disposal of the waste that cannot be used in any other way. The County of Hawai`i provides landfill disposal for residual materials at the West Hawai`i Sanitary Landfill (WHSL) located in Pu`uanahulu and the South Hilo Sanitary Landfill (SHSL) located in Hilo. For residents, the common forms of residual materials sent to landfill are household refuse, or municipal solid waste, and do-it-yourself construction and demolition waste. Businesses and institutions send a wide range of different non-hazardous residual materials from their daily operations.

This section describes current conditions of the existing residuals management system within Hawai`i County, identifies current issues and concerns, and presents options for managing residuals after source reduction, reuse, and recycling.

9.2 Review of 2002 Plan Update

Following is a summary of the recommendations put forth in the 2002 Plan update relative to residuals management, and a description of the actions taken since 2002 to achieve each recommendation.

2002 Plan Update Recommendation	Status
Operate the WHSL Accepting West Hawai`i Waste Stream and Residuals from East Hawai`i Waste Stream that Cannot be Managed Otherwise	Ongoing. Currently, no residuals from SHSL are being transferred to the WHSL. Residuals from some recycling and transfer stations that are located closer to the SHSL than the WHSL are being directed to the WHSL.
Recommend Construction of a Waste Reduction Facility in East Hawai`i	The County issued an RFP for construction of a waste reduction facility. The County Council rejected all proposals submitted because the costs of construction and operation were higher than anticipated.
Utilize SHSL to Maximum Currently Planned Capacity and Then Close the Landfill	SHSL capacity has been extended by implementing a “sliver fill.” The County is currently investigating the potential for additional expansion of the landfill.

9.3 Existing Conditions

Currently, residual waste from the eastern part of the County is disposed of at the SHSL, and waste from the western part of the County is disposed of at the WHSL. Residential residual waste is accepted at no charge at 21 transfer stations and transported by County Solid Waste Division staff for disposal at both landfills. Commercial disposal of residual waste generally requires a landfill disposal permit through the Department of Environmental Management and a landfill tipping fee of $85 per ton is currently being

charged for waste disposal. Per Hawai`i County Code, tipping fees may be waived when it is "in the best interest of the County," including one-time events for community organizations, non-profit organizations, or private property owners who are remediating illegal dump sites that they did not create. The current status of each landfill is described in the following sections.

9.3.1 South Hilo Sanitary Landfill

The SHSL is located in Hilo, approximately one mile east of Kanoelehua Avenue and one mile south of the Hilo International Airport. The landfill is accessed through Leilani Street and an unnamed access road. The County of Hawai`i owns and operates the SHSL, and the Department of Environment Management estimates that the landfill has been in operation since the 1970s. The landfill facility is located on approximately 40 acres, the majority of which is used for municipal solid waste disposal. The landfill is established on a former quarry and is unlined. A figure showing the existing landfill and some potential expansion areas is shown in Exhibit 9-1.

According the *SHSL Proposed Expansion Feasibility and Capital Cost Report* prepared by SWT Engineering in 2008, the established refuse footprint includes approximately 910,000 cubic yards of airspace capacity. Using forecasts from Section 2, the SHSL has an estimated 4 years of life remaining at current recycling rates (or through 2013).

9.3.2 West Hawai`i Sanitary Landfill

The WHSL is located southwest of Waikoloa at Pu`uanahulu in the North Kona District (see Exhibit 9-2). The County of Hawai`i owns the WHSL and County personnel operate the landfill. The WHSL is managed by Waste Management of Hawai`i under a contract with the County. Waste Management is currently responsible for construction and development of new landfill cells, environmental monitoring, and closure and post-closure activities.

The WHSL facility has been in operation since its construction in 1993, and is located on approximately 300 acres, of which 149 acres are currently permitted for landfill activities. The WHSL is a Resource Conservation and Recovery Act (RCRA) Subtitle-D Landfill, is lined with a geomembrane, and has an engineered leachate collection system. A landfill gas collection and control system was installed in 2006. The landfill accepts approximately 12,000 tons per months or 140,000 tons per year. The landfill has 23 cells currently permitted, of which seven have been filled, and two are active. Using forecasts developed in Section 2, (extended into the future using estimated long-term growth rates), the WHSL has an estimated 38 years of life remaining at current recycling rates.

9.3.3 The County's Recent Waste Reduction Facility Procurement

Because the SHSL was near its permitted capacity and planned closure date, in 2003 the County began a focused evaluation of potential options for future disposal of residual waste on the east side of the island. One potential component to the overall solid waste management approach was to develop waste reduction technology.

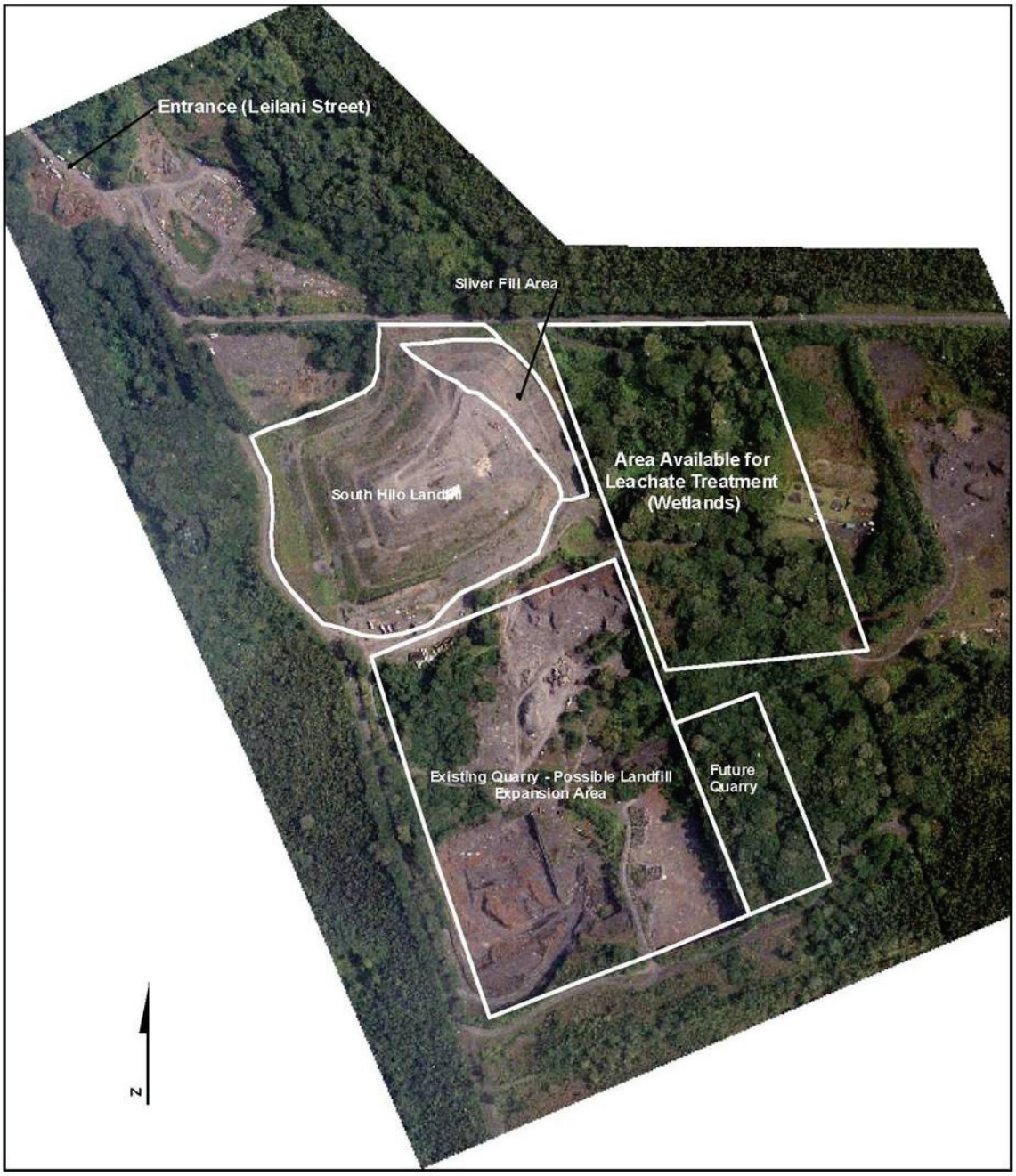
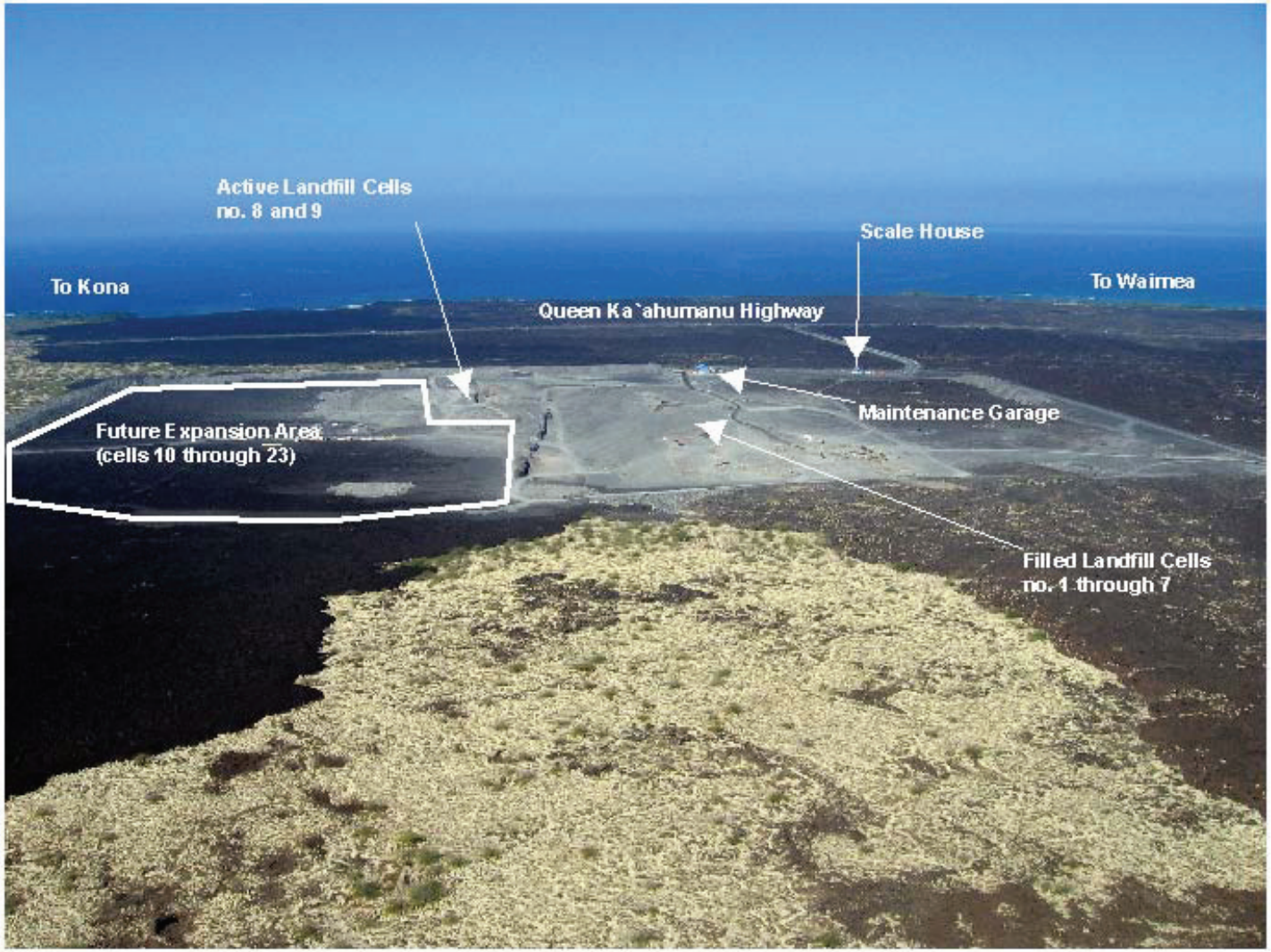


EXHIBIT 9-1
South Hilo Landfill Site Map



North

EXHIBIT 9-2

West Hawai`i Sanitary Landfill (at Pu`uanahulu)

The County initially evaluated five different waste reduction technologies: waste-to-energy (WTE; combustion), aerobic composting, thermal gasification, anaerobic digestion, and bio-refining. During the process, aerobic composting was found to be unsuitable due to the potential for offensive odors; and bio-refining was found to be unproven and may not be a commercially viable technology. In addition, R.W. Beck, a consultant to the County, concluded through a technical assessment that anaerobic digestion was not suitable "because it could only deal with a limited portion of the waste stream and did not yet have a sufficiently viable commercial track record dealing with a municipal solid waste stream like that of Hawai`i."

In 2006, the County issued RFPs to vendors who could potentially design, construct, and operate a WTE or thermal gasification facility. The County evaluated proposals submitted in response to the initial RFP and determined that a WTE facility was the most commercially and technically viable option. The WTE facility would potentially reduce the volume of processed solid waste by 90 percent, reduce weight by 70 percent, and air emissions would be lower than EPA standards.

Based on technical merits of the initial proposals, the County issued a second RFP to three potential vendors requesting additional technical and cost information. In March 2008, Wheelabrator Technologies Inc. (a wholly owned subsidiary of Waste Management) was awarded the project by the County. In response, Wheelabrator submitted a detailed cost proposal to design and construct a WTE facility to replace the SHSL.

After evaluating the Wheelabrator submittal, the County Council recently rejected the WTE proposal largely because of concerns about higher than anticipated costs for the facility. A chronology of County waste reduction technology procurement is provided in Appendix A.

9.4 Issues and Concerns

A key residuals management issue is to establish a place for disposal of residuals from East Hawai`i when the existing landfill closes in 5 to 8 years. The County is currently evaluating expansion opportunities at the SHSL site, and other available options.

Another issue to consider is whether or not the County should develop a recovery/ treatment process that would further recover materials and energy from residuals that would otherwise go to landfills. A series of recovery and treatment options are evaluated in this section.

In addition to questions about future residuals management options, the long-term management of the closed Kailua-Kona and Waimea landfills must be addressed by the County.

A policy issue that should be considered by the County surrounds the potential for private sector development of residuals management facilities without County involvement. This section considers how those facilities could affect flow control and contractual obligations with landfill management companies that are currently or may in the future be under contract to the County.

9.4.1 Closed Landfills

9.4.1.1 Kailua-Kona

The Kailua-Kona Landfill was a municipal solid waste landfill that operated from the late 1970s until it was closed in 1993. The landfill occupies approximately 20 acres and is located east of the Queen Kaahumanu Highway approximately 3 miles north of Kailua-Kona in the North Kona District. Subsurface fires from waste material have been documented at the landfill since 1991. During closure of the landfill, a final cover system of 30-mil polyvinyl chloride (PVC) geomembrane liner and 2 feet of cover soil were installed in 1993. The cover has damage resulting from the subsurface fires and intrusive investigations to evaluate options for extinguishing the fires. Temperature and gas monitoring equipment have been installed with monitoring events occurring routinely at the site.

Subsurface waste combustion continues to be a concern at the landfill. The County and its consultants are investigating the current nature and extent of the subsurface fires and developing options for subsurface fire suppression.

Long-term management options for the landfill are also being evaluated by the County. Potential options include extinguishing the subsurface fires, repairing the cover, and managing the waste in place. This option would require maintenance and periodic monitoring of site conditions, and would not eliminate potential issues such as nuisance odors or the proximity of the landfill to existing facilities and future development. Another option being considered is to excavate the landfill, remove materials that can be recycled or composted, and transfer residuals to the WHSL. This option may have the effect of reducing the estimated life of the WHSL.

9.4.1.2 Waimea

The Waimea landfill is located in Lalamilo, in the South Kohala district, and consists of a single, unlined landfill cell. The landfill was established in the late 1960s at a former quarry site, has an area of approximately 9.28 acres, and is located on land parcels owned by the State and the County. Landfilling activities reportedly ceased during 1986, and the landfill was closed in 1987. A cover consisting of several feet of soil was placed over the top of the landfill according to Hawai`i Department of Health (HDOH) records. Available records indicate that the quarry was originally excavated to an approximate depth of 30 feet, and that approximately 35 feet of refuse was landfilled at the site.

The landfill is currently being monitored for subsurface fires, and stormwater control measures are being implemented. A subsurface fire investigation was conducted in 2006 and a subsurface fire over an area of approximately 14,500 square feet was identified in the landfill. Subsequent investigations in 2008 have also indicated the presence of subsurface fires. Backfilling and grading activities have been completed over portions of the site and have extinguished subsurface fires by limiting the amount of influx of oxygen to the subsurface of the landfill. Additional cover material will be applied to the surface to seal the landfill from the atmosphere in an effort to prevent further combustion.

9.4.2 Private Facilities and Flow Control

Many jurisdictions in the United States have flow control ordinances in effect to ensure that materials flow to facilities in which they have significant capital investment and/or other

interest. They are common, for example, in communities with capital intensive WTE facilities.

In 1994, the U.S. Supreme Court ruled in the "Carbone decision[1]" that a town's flow control ordinance discriminated against interstate commerce by favoring a privately owned local facility over out-of-state private facilities. This decision put the legality of flow control ordinances affecting public facilities in question. In April 2008, this issue was resolved when the Supreme Court ruled that county ordinances directing locally generated wastes to publicly-owned waste facilities do not discriminate against interstate commerce[2]. This decision appears to establish the right of counties to establish flow control ordinances directing locally-generated wastes to publicly-owned facilities.

In Hawai`i County, a private collection firm has expressed interest in developing a relatively large recovery facility for processing the residuals it collects from County businesses and institutions. There are some reasons to believe that this may not be a desirable development for the County. A flow control ordinance would be one way that the County could ensure that residual materials flow to facilities that are County owned, or operated under contract to the County.

A flow control ordinance could protect the County against a number of risks associated with the private sector developing facilities without direct County involvement. Some of those risks include:

- Because of its relative isolation and relatively small size, the potential barriers for private collection firms who wish to establish operations on the island are perhaps higher than on the Mainland. It is possible that a single private firm with a large market share and its own recovery facility could potentially keep collection costs higher than would otherwise exist in a more competitive environment.
- Allowing a private firm to develop a large recovery facility reduces the County's flexibility to adopt various zero waste programs. County policy makers could be in the unenviable position of having a large firm facing financial losses if the County were to require aggressive recycling or bioconversion from businesses and institutions.
- The County would lose some degree of control and flexibility for choosing the recovery and disposal technology that best meets the needs of the entire County rather than the interest of a single firm.

On the other hand, there is some appeal to allowing a private business to establish a potentially-beneficial new recovery technology in the County.

At this time, the developer of the facility still has a number of issues it must resolve to secure land and permits, and the recent economic slowdown and reduction in oil prices have made its ultimate development uncertain. It is recommended that the County continue to monitor the progress of this facility. Should it appear that the developers are likely to develop the facility, it is recommended that the County evaluate if it is in its interests to

[1] C&A Carbone v. Town of Clarkstown, 511 U.S. 383

[2] United Haulers Association v. Oneida-Herkimer Solid Waste Management Authority, No. 05-1345

allow the facility to proceed, or whether it should attempt to establish a flow control ordinance to prevent it from proceeding.

9.5 Material Recovery and Treatment Options

The EPA's integrated waste management hierarchy[3] includes the following four components, listed in order of preference:

1. Source reduction (or waste prevention), including reuse of products and on-site (or backyard) composting of yard trimmings
2. Recycling, including off-site (or community) composting
3. Combustion with energy recovery
4. Disposal through landfilling

More broadly, there is an intermediate step to integrated waste management after the first "3Rs" of source reduction, reuse, and recycling (including bioconversion), the "4th R" that can be referred to as recovery or treatment. For the foreseeable future, after source separation, reuse, recycling, and bioconversion are completed, there will be residual materials that must be managed. Currently in Hawai`i County that residual material is disposed of in County landfills.

Throughout the world, there is a trend to implement additional treatment of these residual materials prior to landfill disposal using processes such as WTE or mechanical-biological treatment (MBT). Treatment consists of applying some combination of mechanical, biological, chemical, or thermal processes to the material prior to landfill disposal to recover energy and additional useful materials, and to remove organics from the residuals that are sent to landfill. The objectives and benefits of recovery and treatment include the following:

- Recovering additional materials for recycling that remain in discarded materials after the source reduction, reuse, and recycling.
- Recovering the inherent energy remaining in discarded materials after source reduction, reuse, and recycling.
- Stabilizing the organic fraction of residuals to minimize greenhouse gas emissions and other air emissions from organics that remain after source reduction, reuse, and recycling.
- Reducing the volume and toxicity of materials sent to landfill.
- Preserving land and extending the lifespan of existing landfills.

Recovery and treatment facilities (often more narrowly referred to as conversion, emerging, or alternative technologies) are in the planning stages in many U.S. jurisdictions. During the past few years, some of the jurisdictions have conducted processes to procure recovery or treatment facilities include: New York City, New York; Los Angeles County, City and

[3] http://www.epa.gov/osw/nonhaz/municipal/pubs/msw07-rpt.pdf

County of Santa Barbara, Sacramento County, and Salinas Valley, California; Taunton, Massachusetts; Broward County, Florida; and Fairbanks North Star Borough, Alaska. A recent assessment of alternative technologies proposed in recent United States procurement processes provided the following summary of emerging technologies (Exhibit 9-3).

EXHIBIT 9-3
Technologies Proposed in Recent U.S. Alternative Technology Procurements

Technology	Number of Citations
Gasification	15
Anaerobic digestion	14
Mass burn WTE	12
Pyrolysis	6
Plasma gasification	3
Thermal depolymerization	3

Note: Includes only technologies mentioned at least three times in different RFPs.

Source: Gershman, Brickner, and Bratton, Inc. 2008. *Alternative Waste Processing Technologies Assessment*. Prepared for Orange County, NC. 2008. http://www.olver.com/orangecounty/PDF%20files/Alternative_Technologies_Assessment,%20Orange%20County%20NC%208-15-08.pdf

Because of work currently underway in the United States, Europe, and elsewhere, there is a wealth of current information about recovery and treatment technologies available. Readers who wish to learn more about them are encouraged to access the references below[4].

[4] Alternative Resources Inc. October 2008. Evaluating Conversion Technology for Municipal Waste Management, presentation to California Integrated Waste Management Board, http://www.ciwmb.ca.gov/Organics/Conversion/Events/MunicipalWst/Presentation.pdf

Alternative Resources Inc. October 2007. Los Angeles County Conversion Technology Evaluation Report, Phase 2 Assessment. http://www.socalconversion.org/pdfs/LACo_Conversion_PII_Report.pdf

Bernheisel, Frank, GBB Inc. 2008. *Status of Waste-to-Energy and Conversion Technologies*. SWANA e-session. http://swanastore.stores.yahoo.net/ma20ecoreofe.html

Eunomia. 2006. *A Changing Climate for Energy from Waste?* Final Report for Friends of the Earth. http://www.foe.co.uk/resource/reports/changing_climate.pdf

GBB, Inc. 2008. *Alternative Waste Processing Technologies Assessment*. Prepared for Orange County, N.C. http://www.olver.com/orangecounty/PDF%20files/Alternative_Technologies_Assessment,%20Orange%20County%20NC%208-15-08.pdf

TBU Consultants et. al. 2003. *Cool Waste Management. A State of the Art Alternative to Incineration for Residual Municipal Waste.* Prepared for Greenpeace Environmental Trust. http://www.greenpeace.org/raw/content/australia/resources/reports/toxics/cool-waste-management.pdf

Juniper Consultancy Service. 2005. *Mechanical-Biological-Treatment: A Guide for Decision Makers, Processes, Policies, and Markets*. http://www.juniper.co.uk/Publications/mbt_report.html

Outside the United States, many other countries are implementing recovery and treatment technologies prior to landfill disposal. In the European Union, there has been a rapid recent increase in new recovery and treatment facilities resulting from the Landfill Directive which has placed strict requirements on landfilling (Council Directive 99/31/EC). In October 2007, the pre-treatment requirements of the Landfill Directive (EC 323/2007) came into effect. This directive requires the treatment of all solid waste prior to landfill disposal with a physical, thermal, chemical or biological process (which can include sorting) to change the characteristics of waste to either reduce its volume, reduce its hazardous nature, facilitate its handling, or enhance its recovery. Implementing technologies to meet these requirements is projected to significantly reduce greenhouse gas emissions from landfilling in the European Union. Recovery through thermal means is widespread in Japan and other Asian countries, and new recovery/treatment facilities are currently being developed in Canada, Australia, and New Zealand.

9.5.1 Overview and Comparison of Recovery and Treatment Options

There is a tremendous variety of possible recovery and treatment options for municipal solid waste currently in operation or under development. They range from options with a long, successful track record in the United States and elsewhere, (such as mass burn WTE facilities) to potentially promising new technologies in various stages of testing and development (such as the flash carbonization process being developed at the University of Hawai`i, Manoa). There are various different ways of grouping recovery and treatment technologies for MSW; however, this IRSWMP update classifies them into the following three groupings:

- Thermal
- MBT
- Other

The "other" technologies refer to a wide variety of different processes (and process elements) that are in various stages of development such as thermal depolymerization, hydrolysis, autoclave, and flash carbonization. At this time, there are no commercial-scale facilities processing MSW using these technologies in the United States and very few that are currently operated at a commercial scale elsewhere in the world. Thus, while these technologies could be investigated further through a pilot project or through a request for information/proposal process, they are not assessed further in this IRSWMP update.

A matrix that compares various thermal and MBT technologies is shown in Exhibit 9-4.

[4 (continued).] Kallassy et. al. 2008. *Waste Processing: The Status of Mechanical and Biological Treatment*. International Solid Waste Association Beacon Conference on Biological Treatment. http://www.iswa.it/materiali/ISWA_beacon_conference_2008/Proceedings%20Iswa%20Beacon%20Conference%202008/2%20-%20Friday%2023rd%20May%20-%202008/Session%204/Boris%20Efremenko%20(Beacon%202008%20Paper%20-%20MBT%20Status%20-%20VES).pdf

Spencer, Robert et. al. *Mixed MSW Composting in Transition*. Biocycle, November 2007. http://www.jgpress.com/archives/_free/001498.html

9.5.1.1 Thermal Technologies

As shown in Exhibit 9-4, the thermal technologies have been grouped into the following five main categories: mass-burn WTE, refuse-derived-fuel (RDF), gasification, pyrolysis, and plasma arc. A brief summary of each type of technology follows.

Mass-burn WTE. These facilities are by far the most common recovery technology currently utilized in the U.S. and around the world. In this system, residual materials are loaded from a pit into a furnace with little or no pre-processing. The materials are combusted and the heat is used to produce electricity and/or steam. As discussed above, Hawai`i County recently conducted a procurement process for a waste reduction technology to replace the SHSL and selected mass-burn WTE technology. This technology was selected mainly because of its long, successful, track record for processing MSW.

The main advantages of this technology are its proven and reliable operating history, and the environmental benefits that result when WTE output is used to displace power that would otherwise be generated by fuels such as oil or coal.

A main disadvantage of this technology is that economies of scale make it costly to develop small projects. For example, the 230 tons-per-day (tpd) proposed during the recent procurement for East Hawai`i is relatively small: WTE plants generally average around 1,000 tpd, with some being as large as 3,000 tpd. As a result, WTE plants are viewed by some as being inconsistent with the zero waste concept: it is expensive to scale down the size of these facilities – "put-or-pay" provisions are typically included in privately-financed plants to pay for the relatively high capital costs. WTE is not inherently inconsistent with zero waste; there are many jurisdictions with WTE facilities that also have high recycling rates, but plant sizing can be a challenge for municipalities or jurisdictions with relatively small waste streams.

Refuse-Derived-Fuel. RDF facilities include front-end pre-processing to recover materials and produce a fuel that is sent to a combustion unit to generate electricity and/or steam. The H-Power facility in Honolulu is a good example of this type of technology.

Compared to mass burn WTE facilities, RDF facilities can result in increased recovery of recyclable materials. On the other hand the pre-processing requirements add complexity to the system and there are more types of materials that cannot be burned in an RDF plant than in a WTE facility. In part because of these distinctions, RDF plants are somewhat less popular than WTE facilities. However, the cost, reliability, and performance of this technology is relatively similar to that of mass-burn facilities.

EXHIBIT 9-4
Summary Matrix of Residuals Recovery and Treatment Options

	Commercial-Scale Facilities (Estimated)					Likely Cost Range for East Hawai`i		
	In U.S.	**Outside U.S.**	**Residuals to Landfill (depends on markets)**	**Sizing Appropriate for East Hawai`i**	**Likelihood that Small Plants Can be as Nearly as Cost-Effective as Large Plants**	**Capital Plus Operations Less Revenues Excluding Landfill Disposal**	**Additional Cost of Landfilling Residuals (at $70 per input ton)**	**Total Cost**
Thermal								
Mass Burn (WTE)	80	725+	20-30%	Most plants much larger	Low	$110-$125/ton	$10-$20/ton	$120-$145/ton
Refuse-Derived Fuel (RDF)	10 including H-power, Oahu		20-30%	Most plants much larger	Low	$110-$125/ton	$10-$20/ton	$120-$145/ton
Gasification	0	35	1-25%	Yes	Low-Moderate	$85-$150/ton	$1-$25/ton	$85-$175/ton
Plasma Arc	0	1	1-15%	Yes	Low-Moderate	$80-$150/ton	$1-$15/ton	$80-$165/ton
Pyrolysis	One pilot plant	12	5-25%	Yes	Low-Moderate	$85-$150/ton	$3-$25/ton	$90-$175/ton
Mechanical-Biological Treatment								
Biological treatment with RDF for combustion	0	150 in Europe; 10 in Australia; unknown number in Asia	10-40%	Yes	Moderate	$85-$180/ton	$10-$40/ton	$100-$210/ton
Biological treatment with composting	5 as of 2007		20-50%	Yes	Moderate-High	$80-$160/ton	$20-$50/ton	$100-$200/ton
Anaerobic digestion	0		15-40%	Yes	Moderate	$85-180/ton	$15-$40/ton	$105-$210/ton
Other	This matrix provides an attempt to classify and describe the main recovery technologies currently being applied to MSW. There are a wide variety of different processes (and process elements) in various stages of testing that seek to provide energy and/or other beneficial uses from biomass and/or MSW such as thermal depolymerization, hydrolysis, autoclave, and flash carbonization that could be considered by the County if proposed during an RFP process.							

Sources: see references in footnote 4 of this section.

EXHIBIT 9-4
Summary Matrix of Residuals Recovery and Treatment Options

	Greenhouse Gas Emissions Compared to Landfill with No/Low Gas Recovery Including Biogenic Carbon	Reliability of Operations and Percent of Time operational	Technological/ Financial (i.e., uncertainty about potential of costly remedy to failure)	Air Pollution	Water Emissions	Markets
Thermal						
Mass Burn (WTE)	About half	High, over 90%	Very low	Nitrous oxides, dioxin/furan, mercury and other pollutants generated, but should be below regulatory limits	Landfills and processes must protect against leaching of metals and other pollutants in bottom and fly ash	Ash can sometimes be reused in road or building products, but typically is landfilled
Refuse-Derived Fuel (RDF)	About half	High, over 80%	Very low	Nitrous oxides, dioxin/furan, mercury and other pollutants generated, but should be below regulatory limits	Landfills and processes must protect against leaching of metals and other pollutants in bottom and fly ash	Ash can sometimes be reused in road or building products, but typically is landfilled
Gasification	About half	Insufficient operating history to assess	Moderate-High	Typically less than WTE, depends specific process	Liquid wastes generated from biogas cleanup requiring treatment; Potential leaching from slag uncertain	Cost and diversion from landfill **somewhat** dependent on marketability of process end-products
Plasma Arc	About half	Insufficient operating history to assess; 95%+ claimed	Moderate-High; uncertain if process would work with typical (low) East Hawai`i MSW	Typically less than WTE, depends specific process	Liquid wastes generated from biogas cleanup requiring treatment; "glassy" solid waste appears to be inert (but must be verified)	Cost and diversion from landfill **somewhat** dependent on marketability of process end-products
Pyrolysis	About half	Insufficient operating history to assess	Moderate-High	Typically less than WTE, depends specific process	Liquid wastes generated from biogas cleanup requiring treatment; Potential leaching from slag uncertain	Cost and diversion from landfill **somewhat** dependent on marketability of process end-products
Mechanical-Biological Treatment						
Biological treatment with RDF for combustion	About one-half	High, over 90%	Moderate-High; no U.S. experience	Odor is a major concern - much of the facility will require enclosed operations with air filtration; Other pollutants minor	Very low	Cost and diversion from landfill **highly** dependent on marketability of process end-products
Biological treatment with composting	About one-quarter	High, over 90%	Moderate-High; many U.S. failures in the past	Odor is a major concern - much of the facility will require enclosed operations with air filtration; Other pollutants minor	Very low	Cost and diversion from landfill **highly** dependent on marketability of process end-products
Anaerobic digestion	About one-quarter	High, over 90%	Moderate-High; no U.S. experience	Odor is a major concern - much of the facility will require enclosed operations with air filtration; Other pollutants minor	Depends on technology - some have few emissions, some have substantial water treatment requirements	Cost and diversion from landfill **highly** dependent on marketability of process end-products
Other	This matrix provides an attempt to classify and describe the main recovery technologies currently being applied to MSW. There are a wide variety of different processes (and process elements) in various stages of testing that seek to provide energy and/or other beneficial uses from biomass and/or MSW such as thermal depolymerization, hydrolysis, autoclave, and flash carbonization that could be considered by the County if proposed during an RFP process.					

Sources: see references in footnote 4 of this section.

Gasification. Gasification facilities differ from mass-burn and RDF plants because they focus on creating a synthetic gas that can be used to produce energy, and the gasification process uses very limited amounts of oxygen. Materials are first shredded and or sorted to ensure consistent sizing, and then are fed into a gasification chamber. The gasification process heats materials to very high temperatures (1,650°F to 2,200°F) where chemical reactions take place to form a synthetic gas from the organic fraction of the materials and a glass-like slag from the inorganic fraction. Some systems reclaim recyclables prior to gasification, or control the chemical process in order to produce usable products from the inorganic fraction after the gasification step. After cleaning, the gas can be burned directly in an internal combustion engine or turbine, or used to create a synthetic fuel. The gas is usually used to generate electricity or as a vehicle fuel. The process used to create the gas typically uses only enough oxygen to produce the desired temperatures.

This technology has some key advantages compared to typical WTE facilities including:

- A variety of process features provide opportunities for fewer air emissions.
- The syngas created is potentially more efficient than direct combustion of MSW because it can be combusted at higher temperatures or even in fuel cells.
- The technology appears to scale down to smaller sizes more efficiently than WTE facilities, potentially making it more applicable to smaller communities working toward a goal of zero waste.

Some disadvantages of this technology include:

- Service intervals are typically on the order of a few months for the plants, requiring frequent plant shut downs to maintain and clean the reactor.
- Lack of successful commercial demonstration in U.S. (few examples worldwide) and related uncertainties surrounding the cost and long-term effectiveness of the technology.
- Environmental permitting regulations are unclear or nonexistent.
- Public education is needed to overcome negative perceptions of thermal technologies.

Pyrolysis. Pyrolysis refers to the chemical decomposition of a substance by heating in the absence of oxygen. Pyrolysis typically occurs at temperatures ranging from 750ºF to 1,650ºF. The composition of the pyrolytic product is changed by the temperature, speed of process, and rate of heat transfer. Lower pyrolysis temperatures usually produce more liquid products and higher temperatures produce more gases. Pyrolysis is used frequently in the chemical industry, for example, to produce charcoal, activated carbon, methanol and other chemicals from wood, and to produce coke from coal. For MSW, pre-processing steps are required that include separation and screening to remove contaminants, shredding to reduce particle size, magnetic separation to remove conductors, classifying to refine, drying to increase the calorific value, and (in some systems) pelletizing to obtain homogeneity.

The products resulting from the pyrolysis process are a synthetic gas and/or liquid and a char. The gas is burned in a secondary combustion chamber, then is typically passed through a boiler for heat recovery. Although some oxygen may be used for combustion of the gas in order to destroy organics, the combustion takes place in a gaseous phase requiring much less oxygen than incineration. This results in the formation of much less nitrous oxide and soot from the power generation process.

There were many attempts in the United States to scale up this technology from pilot scale demonstration plants during the 1970s and 1980s, but none of the plants were able to overcome challenges associated with maintaining a sealed chamber to keep air out, adjusting the process to match the variability of the MSW inputs, and competition with landfills and WTE facilities. Recently, interest in this technology has increased, but it remains to be seen if it will become commercially viable in the United States.

The advantages and disadvantages cited above for gasification also generally apply to pyrolysis, with various advantages and disadvantages associated with specific processes and vendors.

Plasma Arc. Plasma arc technology, developed for use in the metals industry in the late 1900s, uses intense heat (over 7,000ºF) to break down feedstocks into elemental byproducts. Plasma is a collection of free-moving electrons and ions that is typically formed by applying a large voltage across a gas volume at reduced or atmospheric pressures. MSW is fed through this gas changing the organic fraction into elemental compounds such as hydrogen, oxygen and carbon, and the inorganic fraction into a glass-like vitrified mass that is claimed to be highly resistant to leaching.

There is one plasma arc facility currently being operated by Hitachi in Japan that uses MSW combined with automobile fluff as feedstocks. A plasma arc pilot project is currently operating in Ottawa, Ontario. The Ottawa City Council recently signed a letter of intent for Plasco Energy to build, own, and

operate a 400-tpd facility. This company also has an agreement with Red Deer County, Alberta, to build, own, and operate a somewhat smaller facility that could come on line as early as 2010. Information about these facilities is available at this Web site: http://www.zerowasteottawa.com/en/. Contracts have been signed for the following two plasma arc projects in the United States, and other communities have expressed interest in the technology:

- St. Lucie County, Florida, has signed a development contract for plasma arc facility, currently planned to be 600 tpd. The proponents have yet to apply for air permits from the state.
- Tallahassee, Florida, has signed a development contract for a 1,000-tpd plasma arc gasification plant. Little new information has been made available about this facility since early 2008.

The advantages and disadvantages of this technology are similar to those of pyrolysis and gasification. One additional advantage of this system compared to the others is the more complete breakdown of materials has the potential to result in the lowest possible percent of residuals sent to landfill. One drawback of the technology is the high electric power requirements for the torches, which may make it more difficult to obtain net energy benefits from this technology. To address this, some developers are using the plasma arc after an initial gasification step.

9.5.1.2 Mechanical-Biological Treatment (MBT)

MBT describes the integration of processes normally found in material recycling facilities (MRFs), RDF plants, and composting plants. A key feature of the process is using the activity of microorganisms to create a stabilized output. This can be accomplished either in the presence of oxygen (aerobically; that is, composting) or in the absence of oxygen (anaerobic digestion). The output of the process is typically either stabilized organic matter (compost or landfill cover), biogas (for fuel), or drying (for producing a refuse-derived-fuel).

Like thermal technologies, there are many different MBT processes, systems, and vendors. Today, there are five MBT plants operating in the United States, over 150 MBT plants operating in Europe that are expected to treat more than 13 million metric tons[5], and about a dozen plants currently operating or under development in Australia.

Mixed municipal solid waste (MMSW) composting is a type of MBT facility that has been tried by various jurisdictions in the United States. While MMSW composting is a type of MBT, these "first generation" plants developed in the 1980s and 1990s usually consisted of just an initial shredding and/or biological drum treatment and aerobic composting. There are numerous examples of failed MMSW composting operations resulting from high costs, ongoing equipment breakdowns, odor concerns, and/or an inability to market the compost end-products. Many of the new European MBT plants are more sophisticated than first generation MMSW composting plants, and United States composters are continually

[5] Kallassy et. al. 2008. *Waste Processing: The Status of Mechanical and Biological Treatment*. International Solid Waste Association Beacon Conference on Biological Treatment. Accessed at http://www.iswa.it/materiali/ISWA_beacon_conference_2008/Proceedings%20Iswa%20Beacon%20Conference%202008/2%20-%20Friday%2023rd%20May%20-%202008/Session%204/Boris%20Efremenko%20(Beacon%202008%20Paper%20-%20MBT%20Status%20-%20VES).pdf

modifying and optimizing systems; however, there are challenges that must still be overcome. Examples of continuing challenges with this technology include the Pine Top, Arizona, MBT plant, which was recently converted from accepting MSW to accepting only source separated organics, because of equipment maintenance issues and the challenge of finding markets for the compost it produced. The largest MBT plant in North America, in Edmonton, Alberta, has faced a number of challenges related to equipment failures and maintenance, and the City is considering modifications to its current process to produce an RDF product, or other alternatives to improve the economics of the plant.

Recent experience with European MBT plants have resulted in many similar technical problems initially, with low throughput capacity caused by machine overload or breakdown and higher operational costs than expected due to high maintenance and service requirements. There have also been challenges getting rid of the high caloric fraction produced during mechanical separation. Many of the problems encountered at European plants have been solved, and nearly all of the European facilities are running at their expected capacities, but in some cases this has resulted in significantly higher than anticipated operation costs. One common weak point at MBT facilities is the final biological treatment process, which is often designed like a composting process. Managing odors and meeting material specifications is an ongoing process that requires constant attention.

All MBT processes involve waste input and control, mechanical preparation, biological and/or thermal treatment, and product conditioning. Waste input and control normally consists of manually removing oversized and hazardous materials. Mechanical processing can include minimal separation or shredding, or sophisticated sorting of the inbound waste into biodegradable material, recyclables, and contaminant streams. Sorting is usually done with dry processes but it can also involve wet processes, such as flotation and hydro-pulping. Depending on the quality and market demand, the recyclables are typically sold, but paper fibers, textiles, rubber, plastics, and residual organics can also be used as RDF.

The biological stage of the MBT process can either be aerobic composting or anaerobic digestion. The outputs of this process can be either a synthetic gas, RDF, or compost. The quality of the compost will depend on the specific process used and the ability to separate metals, plastics, glass fragments, and toxic materials from the organic fraction. However, in general, the compost produced from an MBT process is of lower quality than compost produced from source-separated organic material such as green waste or food waste. Some plants produce multiple types of compost and target products for specific applications such as agricultural use, site remediation, or landfill cover. Some processes result in large quantities of residuals (up to 50 percent) that must be landfilled.

Like the thermal recovery options, there are many different processes and systems used in MBT plants. For the purposes of this IRSWMP update, MBT systems are classified into three groups:

- Biological treatment with RDF for combustion
- Biological treatment with composting
- Anaerobic digestion

A brief overview of each type of MBT system follows.

Biological treatment with RDF for combustion. A popular approach in Europe is to do relatively little up-front sorting, and use the heat released from aerobic breakdown of organics to dry the materials. Metals and inert materials are then removed, and paper fibers and plastics are made into RDF. The caloric value of this fuel is relatively high (11 to 17 MJ/kg) and can be used as a substitute for fossil fuels in a wide range of applications, including power stations. The process also produces a low calorific value fraction that is normally stabilized (composted) then landfilled.

Biological treatment with composting. In this process, relatively little mechanical pre-processing is done up front and materials are fed into a long, rotating drum (made by companies like Bedminster and Dano) where the MSW is processed for one to four days. The combination of the mechanical rotation and the beginning of the biological degradation of the organic material allow a reduction of the organic fraction size and good mechanical separation of the organics from physical contaminants. At the end of the process, the organics are sent to composting. The inorganic fraction is either sent directly to a landfill or sorted further to recover recyclables depending on whether or not markets exist for the sorted materials.

Anaerobic digestion. Anaerobic digestion uses anaerobic bacteria to break down material without oxygen. This technology is well established for treating outputs from wastewater treatment plants, dairy farms, and other sources of relatively homogenous organic material. It is now beginning to be applied to source-separated organics and MSW.

To treat MSW using anaerobic digestion, organics must be separated from inorganics and prepared into a slurry appropriate for the digesters. This separation process has proved to be challenging at many facilities processing MSW and organics. Various different technologies exist for the initial separation process that use water, screens, magnets, separators, and shredders in various combinations.

During the digestion process, about two-thirds of the biodegradable organic matter is transformed into a biogas composed mainly of methane and carbon dioxide. The remaining one- third comes out of the process as a digestate that must be treated using an aerobic curing phase (composting) to stabilize it prior to landfilling.

9.5.2 Recovery and Treatment Options for Hawai`i County

The County's recent procurement for a WTE facility for East Hawai`i was undertaken primarily in response to the pending closure of the SHSL. The County's 2002 IRSWMP update projected that the SHSL would close in 2004. Since that time, various engineered

solutions have been implemented that have extended the life of the SHSL until approximately 2013 (at current recycling rates).

It is important to note than no currently known recovery or treatment technology will remove 100 percent of residuals from the municipal waste stream: thus, for the foreseeable future, landfill capacity will be required for residuals generated in the County. As discussed below, the County is currently evaluating a lined extension to the SHSL that would provide an estimated 4 additional years of landfill capacity for East Hawai`i. There are quarries located on the SHSL site that could be developed in order to provide an estimated additional 50 years of capacity for the SHSL. If the County chooses to not pursue those options, the County has at least two other landfill disposal options: trucking East Hawai`i residuals to the WHSL at Pu`uanahulu, or barging residuals to another Hawaiian Island, or to the U.S. Mainland.

A new recovery/treatment facility will more than likely cost considerably more than cost of expanding the SHSL or trucking East Hawai`i waste to the WHSL (probably a minimum of $10 to $20 per ton more, and perhaps over $100 per ton more). Thus, a central question to evaluate when assessing whether or not to develop a recovery and treatment option is:

Do the environmental benefits of these facilities outweigh their additional cost?

The following recovery and treatment options for consideration are discussed below.

R-1 No Action; Wait to Assess Success of Current Conversion Technology Projects

R-2 WTE Facility for East Hawai`i; Ash and Bypass Materials to SHSL

R-3 WTE Facility for all County Residuals; Ash and Bypass Materials to WHSL

R-4 One or More Modular WTE Facilities in Rural Areas; Ash and Bypass Waste to SHSL and WHSL

R-5 Develop MBT Facilities at the SHSL and/or WHSL Sites

9.5.2.1 R-1 No Action; Wait to Assess Success of Current Conversion Technology Projects

In this option, the County would take no immediate action toward developing a new recovery or treatment project. It could then assess how successful new technologies that are under development prove to be in Los Angeles County, California; St. Lucie, Florida; Tallahassee Florida; and other locations. There will likely be some operating history in place from these projects that could be evaluated when the County does its next IRSWMP update in approximately 5 years.

Advantages	Disadvantages
Reduces the risks associated with being at the leading edge of a new technology, such as technology failure or unexpected cost increases.	Continued reliance on landfilling as the County's residuals management technology for a few more years. This also means the County must ensure it has landfill capacity for residuals from East Hawai`i, and would require the County to implement one of the following three options: Develop a lined expansion cell at the SHSL (Landfill Option 1) Truck East Hawai`i residuals to the WHSL (Landfill Option 2) Bale and barge East Hawai`i residuals to the Mainland or another Hawaiian island (Landfill Option 3)

Estimated Cost. See landfill options 1 to 3 for the estimated cost of landfill options. The cost of landfilling is likely to be considerably less than the cost of developing a new recovery/ treatment facility.

9.5.2.2 R-2 WTE Facility for East Hawai`i; Ash and Bypass Materials to SHSL

The Hawai`i County Council recently decided not to enact a contract that was negotiated for a new 230-tpd WTE facility to process residuals from East Hawai`i. The County could potentially reconsider this decision. This project could potentially be revived as is, or the County could conduct another procurement. Some cost savings would probably occur from the original proposal if residual ash could be disposed of at the SHSL instead of being trucked to the WHSL.

Advantages	Disadvantages
Reliable, long-term recovery technology	Considerably higher cost than landfill ($50-75 per ton additional)
Environmental benefits, including reduced greenhouse gas emissions from displacing electricity from oil-fired combustion units and additional recycling of metals	At 230 tpd, the facility would provide a disincentive for aggressive additional waste reduction and recycling, which goes against zero waste principles
Preservation of land, and landfill capacity	While the facility would be highly likely to meet all regulatory requirements, added air emissions would result
Reduced potential for water quality impacts from landfilling unstabilized residuals, and reduced volatile organic compound emissions	

Estimated Cost. As shown in Exhibit 9-4, this option would be likely to cost between $120 and $145 per ton. The range in costs depends on the price received for electricity generated by the project and where ash and bypass wastes would be landfilled (costs would be lower if ash and bypass wastes are landfilled at the SHSL rather than at the WHSL).

9.5.2.3 R-3 WTE Facility for all County Residuals; Ash and Bypass Materials to WHSL

In this option, a new procurement would be conducted by the County seeking to develop a larger WTE facility that could accept residuals from the entire County. This would require a siting study to determine where it should be located; typically the closer such a plant is located to the primary population and employment centers in West Hawai`i, the lower the associated operating costs.

Advantages	Disadvantages
Same as Option R-2 but for a larger quantity of residuals.	Same as Option R-2, but could size the plant for residuals after a 50 percent or higher recycling rate, which would be somewhat more consistent with zero waste principles
Economies of scale would result in lower costs than Option R-2	Added emissions and costs associated with trucking refuse to the plant

Estimated Cost. The cost of WTE would probably be $10 to $30 per ton less than Option R-2 due to the economies of scale associated with larger WTE facilities. This cost savings, however, could potentially be offset by the cost of transferring and trucking waste materials to the facility.

9.5.2.4 R-4 Modular Incinerators in Rural Areas; Ash and Bypass Waste to SHSL and WHSL

Much of Hawai`i County is rural in character, and the County incurs considerable cost transporting residuals from its recycling and transfer stations to the WHSL and SHSL. One option to consider would be to procure and develop one or more small, modular incinerators in rural areas. This would dramatically reduce transportation costs and has the potential to be a cost-effective recovery system that could be located at one or more of the County recycling and transfer stations.

While there are relatively few such units used to process MSW in the U.S. Mainland, there are more than 1,000 modular incinerators serving rural areas, military facilities, and hospitals around the world[6]. These facilities can be good recovery systems for smaller, remote locations. These systems generally cost less in installed cost per ton-day than larger, mass burn WTE facilities, but they also do not have the longevity of those facilities and can cost more to operate on a per-ton basis.

In this type of system, MSW is loaded into a surge chamber using a rubber tire bucket loader. The door that seals the lower chamber is then opened and waste is injected into the combustion chamber. Additional waste can be loaded into the surge chamber after the lower chamber door is closed. It is assumed that the unloading floor would accommodate two unloading stalls plus some room for separated bulky waste that would need to be transferred separately in transfer trailers or drop boxes to a County landfill.

The lower chamber operates at about 1,850°F, while the upper chamber operates at about 1,450°F for reducing air pollution emissions. There is no grate in this unit. Air is applied at a rate that is less than necessary to complete combustion resulting in essentially a gasification or pyrolysis process. The partial combustion products pass into an afterburning secondary chamber that will ensure successful burn out of particulate combustion gases. Air is supplied by outside blowers to provide correct combustion for a given application to meet local emission standards. Controlling the lower chamber gas velocity is important in this process in order to maintain a quiet combustion area. Ash is removed using a roll off box that when filled can be transported to the landfill.

These systems can be used to recover steam and/or generate electricity. Successful electricity generation depends on access to existing electric system infrastructure and a power utility that is a willing partner.

[6] One vendor, Consutech, claims to have over 5,400 units in operation around the world.

For the purposes of sizing and developing cost estimates, this option assumes the following:

- The facility would be located at the Waiohinu recycling and transfer station accepting waste from that facility, Pahala, and Miloli`i (and Ocean View, should that facility come online).
- In 2020, the waste stream assessment forecast is that 18 tons would go to the facility on an average day (assuming today's recycling rate). Thus, a 20-tpd unit would provide adequate capacity for peak flows, yet wouldn't be oversized should significantly more waste be reduced or recycled.
- The facility would be staffed by two to three County employees each day. A front-end loader would be needed to separate bulky materials and load residuals into the unit.
- Improvements to the recycling and transfer station would be required including a small (10,000 ft²) building with a tip floor and a bulky waste load out chute – this could be integrated with planned improvements to the Waiohinu recycling and transfer station.
- About 10 percent of the residuals received would be bulky wastes not appropriate for incineration – these would be transferred to the SHSL.
- Thirty to 35 percent of the incoming material by weight would need to be transported to the SHSL as ash.

Advantages	Disadvantages
Reduction of about 20 percent of total system transfer truck miles and reduced landfilling of organics would result in less air pollution and greenhouse gas emissions	While the system should be able to meet EPA air quality requirements, some air pollutants would result from the incineration process
Potential for additional metal recovery for recycling after combustion	Likely community opposition
	Costing is uncertain at this stage – would need an RFP process to confirm
	A new technology and system would require additional training and skills for County staff

Estimated Cost. It is estimated that this option would cost between $30 and $120 per ton. The large range in costs is because costs will be highly influenced by site specific considerations; particularly installation of the unit in a relatively remote area. Additional research and/or an RFP process would be required to refine this estimate much further.

This estimate includes capital and operating costs minus transportation cost savings. In 2020, it is estimated that this facility would eliminate about 20 percent of the miles currently driven by the County's transfer station trailer fleet resulting in nearly $900,000 per year of transportation cost savings. The estimated capital costs of the facility have been annualized assuming a 5-percent interest rate and 15-year term (approximating the useful life of the facility).

The low estimate includes a $47 per ton savings in avoided cost of landfill; the high estimate assumes no avoided cost savings.

It is assumed that the project would be combined with a reconstruction of the Waiohinu recycling and transfer station. A range of $0.5 million to $1.5 million of additional capital improvements was allowed for to accommodate the incinerator.

It is possible that electricity sales could be profitable for this facility, but considering its remote location, the cost estimate assumes no cost for the equipment necessary to generate electricity and no revenues from energy sales.

9.5.2.5 R-5 Develop MBT Facilities at the SHSL and/or WHSL Sites

As discussed above, there are a handful of MBT facilities operating in the United States and numerous facilities operating elsewhere in the world. While MBT facilities are not as "proven" as WTE or RDF facilities, there is enough operating history for the County to consider developing one or more MBT facilities. It would be prudent for the County to consider initially development of a facility for East Hawai`i because of the capacity issues at the SHSL, and because there are fewer residuals received there than at WHSL.

This option would require additional study, and an RFP process. Through that process, the County could decide on the desired outputs from the process (RDF, biogas, compost), assess markets for recovered materials, and evaluate the implications for landfill operating practices. It's possible that the facility could be developed at the SHSL site, potentially making use of the reload facility in some capacity.

Advantages	Disadvantages
Reduced greenhouse gas emissions	Much higher cost than landfilling ($30 to $130/ton higher)
Reduced potential for water and air pollution from landfilling	Higher risk of system failure leading to higher than anticipated costs compared to WTE or landfill disposal options
Additional recovery of materials not reused or recycled prior to reaching the plant	Systems have many moving parts and will require specialized operating expertise, sound preventive maintenance, and vigilant on-going odor management practices
Beneficial use of materials not otherwise recovered such as electricity, vehicle fuels, compost, landfill cover	
Preservation of current landfill capacity and reduced need for additional land for landfill activities	

Estimated Cost. As shown in Exhibit 9-4, this option could range in cost from $100 to $200 per ton. The wide range in costs occurs because of the multiple different types of MBT systems currently available, wide ranges in the reported cost of these systems, and challenges in translating those costs to Hawai`i County. The results of a conceptual design of two MBT facilities (one for East Hawai`i and one for West Hawai`i) resulted in an estimated cost of approximately $160 per ton (Appendix D). In general, lower cost systems achieve lower recovery, send more residual materials to landfills, are in rural areas so that odor controls are less critical, and produce residual materials that must be landfilled which may not be stabilized as well as residuals produced by other processes.

9.6 Landfill Disposal Options

The County's progress toward zero waste and any decision on whether or not to implement a recovery or treatment option will not eliminate the need for landfill capacity for the foreseeable future. At planned recycling rates and taking into account the current capacity of the sliver fill at the SHSL, the SHSL has approximately 5 to 8 years of remaining life, and the WHSL has approximately 38 years of remaining life. As more materials are reused or recycled, or if a recovery facility is developed, the capacity of landfills in the County will be extended.

The upcoming closure of the SHSL puts pressure on the County to develop replacement capacity relatively quickly. Thus, this IRSWMP update must answer the imminent question of what will be done once the SHSL is at capacity, and evaluate the long-term future of landfilling in the County. In response, the following three landfill disposal options that address both short-term and long-term considerations have been developed for discussion.

- Expand SHSL for East Hawai`i residuals, and use WHSL for West Hawai`i residuals
- Close SHSL and landfill all County Waste at the WHSL
- Bale and Barge East Hawai`i Waste and utilize WHSL for West Hawai`i residuals

9.6.1 Expand SHSL; WHSL for West Hawai`i

This option includes two potential expansion options for the SHSL. The first consists of expanding the SHSL into a parcel of land, adjacent to and northwest of the existing landfill footprint. The County is currently conducting engineering investigations into the feasibility and cost of this expansion. The second is an expansion into existing rock quarries located on the SHSL site. The WSHL would remain open and would function much as it does today. Each option is discussed below.

9.6.1.1 Expansion to the Northwest Adjacent to the Existing Landfill Footprint

Hawai`i County owns a vacant piece of land which borders the South Hilo Landfill on the northwest (see Exhibit 9-1). The lot is approximately 70 percent cleared, with some trees and brush in the remaining 30 percent. At planned recycling rates[7], it is estimated that development of this seven-acre lot would provide approximately 4 years of additional disposal capacity.

Development of this lot for additional landfill disposal would require: clearing the remaining trees and brush; bulk excavation of approximately 30 feet; installation of the liner and leachate collection and recovery system; and realignment of support facilities. This development of additional waste disposal area adjacent to an existing landfill is typically referred to as a lateral expansion.

The existing scale house/office building is on the south side of the existing landfill, which is convenient for current placement of waste. When waste placement operations move to the parcel on the northwest side of the landfill, a new traffic pattern will need to be developed.

[7] This estimate assumes that this expansion would occur after capacity at the existing SHSL is exhausted, and accounts for the effects of the current national recession, growth in disposal, and implementation of recycling programs estimated to result in a 44 percent recycling rate by 2014-15.

For the purposes of this evaluation, it is assumed that the entrance gate and scale house can remain in their existing configurations.

Waste placement operations would be conducted similar to existing operations, meaning that waste is placed loose, and then compacted in place using heavy equipment.

State and federal regulations (Hawai'i Administrative Rules [HAR], Title 11, Chapter 58.1 and 40 CFR 258.48) require that all new landfills be constructed with a waste containment system consisting of a bottom liner with leachate collection and recovery system. The liner system would consist of two layers of heavy duty plastic geomembrane, placed above and below a geosynthetic clay liner. The bottom of the new landfill cell would also have an engineered drainage layer.

When landfills are lined, precipitation and residual water from the waste (that is, leachate) collects on the liner and needs to be actively managed. The leachate collection and recovery system would consist of a series of sumps, pipes, drainage gravel, and one or more pumps to remove the accumulated leachate. Managing leachate in regions of high precipitation means higher volumes of leachate to manage. Hawai`i County plans to actively reduce the volume of leachate generated in the lined lateral expansion by maintaining a system of plastic membranes and tarps to cover the waste. When the waste is covered by membranes or tarps, precipitation can be kept separate from the waste and managed as clean storm water.

Even with the maintenance of membrane and tarp cover, leachate will be generated and will require treatment. Leachate collecting on the landfill liner will be pumped out of the cell, and then treated prior to infiltration into the ground. Treatment options include treatment at the local wastewater treatment plant near the Hilo Airport, and treatment using constructed wetlands. An initial feasibility evaluation indicated that wetlands treatment could effectively treat the leachate[8].

State and federal regulations require that all landfills receive final cover when they reach capacity. Furthermore, regulations require post-closure monitoring for up to 30 years.

An expanded feasibility study and capital cost estimate was prepared to assess whether undertaking a seven-acre landfill expansion immediately adjacent to the SHSL would be less expensive than long-hauling waste to the WHSL. The study did not support the seven-acre expansion and this option has been removed from further consideration.

9.6.1.2 Expansion into the Quarries at the SHSL Site

One option for providing new landfill capacity for residuals from East Hawai`i would be to site a new landfill elsewhere in the County.

A study of locations for a new landfill was conducted as part of this IRSWMP Update, and is included as Appendix E. That study came to the following conclusion:

"The location adjacent to the South Hilo Sanitary Landfill is the most central in terms of population. Though not without traffic problems, is relatively well served by roads. Critically, it is makai of the

[8] CH2M HILL. 2008. *South Hilo Sanitary Landfill Leachate Quality Improvement Using Treatment Wetlands – High Level Sizing and Cost Opinion*. Technical Memorandum to SWT Engineering.

UIC line. The quarry site is ready-made for a landfill, another key advantage. Unencumbered State land is available, although within the Agricultural District (a separate DEM project may attempt to urbanize this area to bring the current landfill into conformance with its Special Permit conditions). LUPAG and County zoning would require amendment. Its principal disadvantage is 126 inches of rainfall, which would require extra steps to minimize and treat leachate. Overall, this location rates highest on this selection of objective factors."

Thus, for the purposes of this IRSWMP update, the quarries adjacent to the SHSL are being evaluated as a potential long-term landfill disposal option for disposal of residuals from East Hawai`i rather than considering other sites.

Hawai`i County owns several parcels of land currently used for quarry operations southeast of the existing landfill. The 75-acre quarry site is slightly larger than the existing landfill footprint (see Exhibit 9-1). Preliminary estimates are that development of this quarry site for future landfill operations would provide approximately 50 years of additional disposal capacity for the County at planned recycling rates.

This expansion would be constructed and operated assuming development of a liner system, constructed wetlands for leachate treatment, landfill gas management, active stormwater management to minimize leachate production, and final closure and post-closure monitoring.

Advantages	Disadvantages
Low risk of failure and consistent with zero waste principles because capital investment would be low relative to most other options	Challenges exist associated with operating a lined landfill in an area with extremely high precipitation
Compatible with all recovery options, now or in the future: some landfill disposal is likely to be required for the foreseeable future	A lengthy permitting process would be required, including a technology (constructed wetlands) that is new to the State of Hawai`i
A known location: few siting issues anticipated	A boundary review process would be required for expansion into the quarries
A known technology that can be operated effectively by County staff	Emissions of greenhouse gases and volatile organic compounds (VOCs) would be higher than any recovery option
Relatively low cost	Some risk to water quality exists with any landfill

Estimated Cost. The estimated cost of construction and operation of a lateral expansion of the SHSL landfill is $82 to $94 per ton, which is $25 to 36 per ton above the FY 07-08 cost of landfill disposal at the SHSL of $57 per ton. The estimated cost of landfill disposal at the quarries on the SHSL site is $69 to $73 per ton. The basis for these estimates is provided in a landfill costing memorandum provided as Appendix F.

These estimates are based on the current cost of operating the SHSL, and additional costs that would result from operating a new, lined landfill including:

- Liner system
- Leachate collection and recovery system
- One additional FTE for management of storm water

- Onsite leachate treatment using constructed wetlands
- Costs for final closure and post-closure monitoring

9.6.2 Landfill All County Waste at the WHSL

In this option, residuals from East Hawai`i would be transferred at the East Hawai`i Regional Sort Station Reload Facility and transported by truck to the WHSL for final disposal. It is assumed that the station would keep the same operating hours as the current operation: 10.5 hours per day, 7 days per week. It is assumed that the County would operate the transfer operation at the reload facility. Customers would unload materials on the tip floor, and remove any clean, readily recyclable material. County staff would use a track loader to break up bulky materials for transport, then push materials into a waiting trailer. From there, materials would be transported to the WHSL.

It is assumed that the County would transport residuals in 75 cubic yard, walking floor trailers at an average payload of 18 tons. At FY 07-08 disposal rates, this would represent 12 truck and trailer combinations traveling from the Hilo reload facility to the WHSL on an average day.

Advantages	Disadvantages
Similar to Disposal option 1 but even lower risk of failure and less capital investment would be required than any other option	Public opposition to trucking waste from East Hawai`i to West Hawai`i is likely (12 trucks per day)
	Emissions of greenhouse gases and volatile organic compounds (VOCs) would be higher than any recovery option, and increased emissions compared to disposal option 1 because of added trucking

Estimated cost. The estimated cost of this option is $82 per ton, consisting of $11 per ton for transfer station operations, $24 per ton for transportation, and $47 per ton for landfilling. The $47 landfill costs represent the estimated variable costs associated with landfill operations at the WSHL in FY 07-08.

9.6.3 Bale and Barge East Hawai`i Waste; WHSL for West Hawai`i

One potential method of managing residuals is to export them off-island to a waste reduction or landfill facility located either on another island, or on the mainland. In 2006 the United Sates Department of Agriculture (USDA) approved interstate movement of garbage (municipal solid waste) from Hawai`i. In 2007 the Honolulu City Council passed a resolution to consider the out-of-state shipment of municipal waste for disposal. Currently the City is evaluating this option to supplement their residuals management program, and has procured proposals from potential vendors to provide the service. Protests surrounding the procurement process

were resolved in March 2009, and the contractor began accepting waste in September 2009. The first barge shipment to the Mainland is scheduled to take place in December 2009.

There is an ongoing waste export industry operating on the West Coast of the United States with more than 3 million tons per year of materials shipped by rail and truck from Seattle, Portland, and other population centers to three large landfills in eastern Washington and Oregon. These systems have been operating effectively for approximately 20 years.

To ship residuals to the Mainland, materials would need to be compressed into bales, then wrapped in an stretched plastic film that creates an airtight seal around each bale. The airtight seal is necessary to destroy unwanted pests or invasive species that may be present in the refuse material. To implement this option, the County would need to install a baler and shrink-wrapping system at the South Hilo Reload facility (or contract with the private sector to provide this service). Bales would be loaded into a trailer or onto a flatbed, and then transported by a truck to the Port of Hilo. From there, the bales would then be loaded onto a barge for transport to the Mainland, and then off-loaded onto a truck for the final trip to the landfill face in Washington state or Oregon. The company that was the apparent successful proposer on the Honolulu County procurement based its proposal on being able to secure a back-haul or aggregates or other commodities from the Mainland to O`ahu (that is, waste would go east, and other commodities would come west on each trip).

Barge transport to a landfill or WTE facility on another Hawaiian island would be technically feasible. At this time no current facilities likely to have the capacity or interest in accepting residuals from the County, but this could prove to be a potential option in the future.

Not all materials currently sent to disposal would be appropriate for the baler that is used to compact materials prior to loading. Thus, the County would need to have landfill capacity for oversize and bulky materials in addition to this system.

Advantages	Disadvantages
Likely to be a technically feasible method for landfill disposal	Many have objections to the principle of sending waste to distant landfills in other jurisdictions
Less environmental impacts and opposition to trucking or landfilling locally	There is added risk associated with pricing that is dependent on securing a reliable back-haul of commodities
	There is added risk associated with shipping shrink-wrapped bales across the Pacific Ocean on a barge – this is not a common method of waste transportation
	While barge transport is relatively efficient in fuel use per mile, there would be considerable air emissions associated with transportation to and from a Mainland landfill
	Experience on the west coast has shown that delays in returning containers can occur; the County would need to have contingency plans to ship waste to the WSHL or retain capacity at the SHSL in case empty container shipments are delayed

Estimated Cost. The cost of waste export is uncertain. Hawaiian Waste Systems (HWS) contract with the City of Honolulu for 100,000 tons per year is reported to be $99.89 per ton

for material delivered to a contractor-operated transfer station in Honolulu. Evidently, the other bids received were $184 and $204 per ton. HWS has suggested to County staff that a similar system could be developed for East Hawai`i for about $85 to $100 per ton including transfer at the East Hawai`i Regional Sort Station and Reload Facility, all transportation, and landfilling at the Roosevelt Regional Landfill near Roosevelt, Washington.

Experience with new technologies in the solid waste field suggest that the actual cost of a new system is typical higher than initial quotes because of contract language, technical specifications, and other requirements that would be part of an actual contract. It is highly unlikely that this option would result in lower cost disposal than either of the other two landfill options.

Value Model and Risk Analysis of Options. As part of the evaluation of options, a value model and risk analysis of options was prepared and presented to the Solid Waste Advisory Committee (SWAC) and County Council Environmental Management Committee. This information was used to help the County decide on a residuals management option that best meets its economic, social, and environmental objectives while considering key risks and uncertainties. Value modeling is a quantitative technique for making decisions that involve multiple financial, environmental, and social objectives that is based on the principles of multi-attribute utility theory. The SWAC participated in defining the most important objectives, and assessing the relative importance of each objective. The results of the analysis indicated that the following three options best met the County's objectives with risks that appeared reasonable:

- Expand the SHSL
- Truck East Hawai`i Waste to the WHSL
- Bale and barge waste from East Hawai`i to another County or the Mainland

A report documenting this analysis is presented in Appendix G.

9.7 Recommendations

The options outlined in Chapter 9.6 were presented to and discussed by the County Council Environmental Management Committee, the SWAC, and at three public meetings held in December 2008. The results of the value model and risk analysis of options were considered in March 2009. After further debate about the merits of different options, an additional analysis of conversion technologies was conducted in May 2009 and three potential residuals management strategies were developed for further consideration[9]:

1. Develop a conversion technology facility
2. Truck waste from the SHSL to the WHSL
3. Investigate the feasibility and cost of expanding the SHSL

Key actions required to implement each strategy, and a comparison of the environmental, social, economic, and risk aspects of each strategy follows.

[9] Bale and barge may be an additional feasible option, but it could potentially cost considerably more than landfilling within the County of Hawai`i, and the feasibility of barging from Hawai`i to the U.S. Mainland on a consistent basis has not yet been demonstrated. This option could also be considered at a later date if the County has difficulty implementing the recommended strategy.

9.7.1 Implementation of Residuals Management Strategies

A summary of implementation actions that would be required for each strategy follows.

1. Develop a Conversion Technology Facility

To develop a conversion technology facility, the County would need to go through an RFP process to select a vendor, then the vendor would need to go through planning, permitting, construction, and testing prior to implementation. It is estimated that it would take 5 to 8 years to develop an operating facility. Some of the key implementation steps follow.

- Make a series of key decisions prior to issuing an RFP:
  - Decide on which technologies to include (for example, "new" conversion technologies, mass-burn WTE and RDF, barging to a facility on another Hawaiian island, barging to a landfill on the Mainland).
  - Decide how much operating experience the County would require for any technology.
  - Decide if the facility should be for East Hawai`i only or for the entire County.
  - Decide if a flow control ordinance is needed (that is, prohibit development of other private facilities that might compete for the same waste).
  - Decide if the County or a private firm would finance the facility.
- Based on those decisions, proceed rapidly with issuing an RFP.
- Expand the SHSL or truck waste to the WHSL for the short term.
- Decide where residuals from the conversion process will be landfilled.
- Decide on the backup strategy (trucking to WHSL versus expanding SHSL).
- Conduct a procurement process, award a contract, and ensure that waste is delivered to the facility in a manner consistent with the facility operating agreement once it is operational.

2. Truck Waste from the SHSL to the WHSL

The option of trucking waste to WHSL has the shortest lead time of the options available. This strategy could be implemented with about 6 to 12 months lead time. The main implementation steps for this strategy would include the following:

- Leasing trucks and trailers
- Hiring and training additional drivers

It is likely that this strategy could be implemented without additional environmental review because this option was part of the Final EIS for the South Hilo Sort Station[10]. However, this option would be unpopular with many stakeholders and would likely result in strong opposition by some residents, organizations, and elected officials.

[10] County of Hawaii. 2004. *Final Environmental Impact Statement, Construction and Operation of the East Hawai`i Regional Sort Station.* http://co.hawaii.hi.us/env_mng/ehrss.htm

3. Investigate the Feasibility and Cost of Expanding the SHSL

If the County decides to expand the SHSL, it is recommended to proceed with developing a new lined landfill in the existing 65-acre quarry site. Note that this strategy includes various up-front activities, added evaluation, and decision points once those activities and evaluations are complete. This would entail the following implementation steps:

- Conduct preliminary engineering and detailed cost estimates, environmental review, and permitting for the expansion area.
- Conduct boundary review for land ownership of the quarry site.

These activities would take some time to conduct and the ultimate feasibility and cost of this strategy is not assured until those activities are at, or near, completion.

9.7.2 Evaluation of Residuals Management Strategies

Exhibit 9-5 provides an evaluation of the three residuals management strategies against the following six criteria: cost, technology and regulatory risks, consistency with zero waste approach, sustainability, environmental impacts, and social impacts.

9.7.3 Recommended Residuals Management Strategy

Selecting a preferred residuals management strategy generated the most vigorous discussion between stakeholders. After considerable evaluation of the merits of the potential strategies, a consensus was reached by the SWAC. On the basis of the input from the SWAC and other stakeholders, and the evaluation provided in Exhibit 9-5, the Plan recommends that the County conduct more in-depth evaluations of the feasibility and cost of the following two options for providing long-term residuals management for East Hawai'i:

1. **Re-configuring the Reload Facility at the SHSL and trucking waste to the WHSL.**
2. **Developing a new lined landfill in the existing quarry site adjacent to the current SHSL that would provide an estimated fifty (50) or more years of additional disposal capacity.**

While the preliminary analysis conducted to date indicates that expanding the SHSL appears to be the less costly option, there are many risks associated with a new landfill that would not be present with the trucking option. Thus, further studies should be conducted to determine the feasibility, costs, risks, timelines, and social and environmental impacts associated with these options. For example, assessing the feasibility of the expanded landfill option will require consultation with the HDOH, and preliminary engineering, environmental review, land use, and permitting activities. Updating the feasibility of the trucking option should include further analysis of the Reload Facility and associated hauling operations, haul routes, and traffic issues, and equipment acquisition plans.

When those activities are complete, the County will be able to decide whether trucking waste from the Reload Facility to the WHSL or developing a new landfill at the quarry site adjacent to the SHSL is the preferred solution for managing the County's waste stream.

In addition to these two primary options, during each subsequent solid waste management plan review period, the County should continue to evaluate whether or not to issue an RFP for a conversion technology for part, or all, of the County's residuals management stream.

Other recommended actions to improve the management of residual wastes during this IRSWMP update include the following:

- **Prepare master planning documents for the WHSL and SHSL facilities.**
- **Engage in a dialogue with other Hawai`i counties about the potential for mutually-beneficial joint solutions.**
- **Conduct a feasibility study of remediating the closed Kailua-Kona landfill.**

EXHIBIT 9-5
Evaluation of Residuals Management Strategies

	Conversion Technology Facility	**Truck Waste from East Hawai`i to the WHSL**	**Investigate Expanding SHSL and Continue WHSL**
Per-ton Cost	\$80-\$200/ton	\$82/ton	Quarries: \$69-\$73/ton
Estimated County Tip Fee			
East Hawai`i Only	\$95-\$140/ton	\$95/ton	\$95-\$99/ton for 4 years then \$90-\$91/ton for long-term
For All County Residuals	\$115-\$235/ton	Same as above	Same as above
Technology and Regulatory Risks			
2a. Risk of technology not working as planned leading to added costs	**Moderate-High**. Very little operating history. Sophisticated equipment requiring long-term maintenance	**Low.** Known technology	**Moderate.** Land use and permits required; constructed wetlands to permit; Relatively common long-term operation and maintenance
2b.Backup plan if technology fails	Truck from East to West, expand SHSL, or bale and barge	Unknown	Truck from East to West
2c. Regulatory risk	**Moderate-High.** no regulations exist for some aspects of technologies	**None**	**Moderate**. Constructed wetlands for landfill is new in Hawai`i
Consistency with Zero Waste Approach			
	Least consistent. High capital cost solutions are generally seen as limiting progress toward zero waste; to mitigate, could size for what remains after 60-70% diversion	**Most consistent**. Little capital being spent; As waste is diverted, total disposal costs decline, but not by same percentage as waste disposal decline	**Somewhat consistent**. Moderate capital being spent; As waste is diverted, total disposal costs decline, but not by same percentage as waste disposal decline
Sustainability (Meeting the environmental, economic, and social equity needs of the present without compromising the ability of future generations to meet their own needs)			
	High. Minimum impact on future generations and least impact to land resources	**Low.** Unknown potential environmental impacts could be placed on future generations	**Lowest.** Potential impacts to future generations and added land impacts at two sites rather than one
Environmental Impacts			
	Depends on technology; most information suggests air emissions from thermal technologies can be less than mass-burn WTE; All have process water that must be treated - anaerobic digestion in particular	Some added air quality impacts from trucking (about 12 to 15 trucks per day); air and water impacts similar to today; potential water quality impacts low	No added trucking, but potential exists for water quality impacts from landfilling in high rainfall of East Hawai`i
Social Impacts			
	Depends on location; potential environmental justice issue if sited at SHSL	Impacts to some along truck routes (12 to 15 added trucks per day); strong opposition by some likely	Environmental justice issue at SHSL site

SECTION 10

Administration, Funding, and Implementation

10.0 Administration, Funding, and Implementation

10.1 Introduction

The current solid waste management programs, as discussed in previous sections, are primarily administered and funded through various state grants, property taxes, and tipping fees. Departments within the County of Hawai`i develop their budgets on an annual basis. The budgets and funding are submitted by the mayor's office, and approved by the County Council.

This section describes current conditions of the existing administration and funding within Hawai`i County, identifies current issues and concerns, and presents options currently under consideration by the County and associated funding and administrative issues for options under consideration. A more detailed evaluation of County financial projections and potential impacts to the County annual budget associated with selected options will be provided in the Implementation Plan.

10.2 Review of 2002 Plan Update

The following is a summary of the recommendations put forth in the 2002 Plan Update relative to administration and funding, and a description of the actions taken to achieve each recommendation.

2002 Plan Update Recommendation	Status
Establish Solid Waste Division as Utility Enterprise	Not implemented
Establish Solid Waste Fees as Part of Property Tax Billing	Not implemented
Update of IRSWMP on 5-Year Schedule	In progress
Waste Characterization of West Hawai`i Waste Stream	A field sampling study was conducted at the WHSL in 2008

The 2002 IRSWMP update also presented information regarding potential funding mechanisms including private financing of large-scale projects, line item charges on property tax bills, and increases in tipping fees.

10.3 Existing Conditions

The County accounts for revenues and expenses for solid waste management in its solid waste fund. Revenues are received from state and county sources. The State provides grants and subsidizes programs, such as glass recycling, used oil collection and disposal, and the beverage container deposit program (HI-5). State funding is generally allocated based on

County population or County's budgetary requests to the State for program administration. The sources of solid waste funding from the County primarily include revenues transferred from the general fund and revenues from fees associated with solid waste disposal at the landfills. In addition, the County typically finances large capital improvement projects with general obligation (GO) bonds.

Budgets for the solid waste fund and capital improvement program are created on an annual basis and approved after a review process by the mayor's office and the County Council that includes public testimony.

10.3.1 Solid Waste Fund Revenues

Exhibit 10-1 presents FY 07-08 actual and FY 08-09 budgeted revenues for the solid waste fund. The main sources of revenue are discussed below.

EXHIBIT 10-1
County of Hawai'i Solid Waste Revenue

Revenue Category	FY 07-08 Actual	FY 08-09 Budget
Federal Grants		
Total Federal Grants	$27,260	$0
State Grants		
Glass Recycling Program	$155,000	$155,000
Used Oil Collection/Disposal	$67,500	$67,500
Beverage Container Deposit Program	$423,930	$1,950,000
Solid Waste		
Landfill Tipping Fees[a]	$8,333,010	$7,456,000
Landfill Permit Fees	$22,190	$14,000
General Fund		
General Fund Balance From Previous Year	$0	$3,046,290
Transfer from General Fund	$17,352,730	$19,147,720
Miscellaneous Revenue		
Charges for Services – General Government	$450	$0
Sale of Equipment	$30,740	$0
Sundry Revenues – Current Year	$430	$0
Sundry Revenues – Prior Year	$2,130	$0
Total Solid Waste Fund	**$26,415,370**	**$34,980,510**

Note: Figures have not been finalized by the County and are pending approval.

[a]FY 08-09 estimated by CH2M HILL based on revenues through March 2009.

A summary of the funding methods used in FY 07-08 and projected for FY 08-09 is shown in Exhibit 10-2.

EXHIBIT 10-2
Solid Waste Fund Revenue Summary, Percent of Total

	Percent of Total	
	FY 07-08 Actual	**FY 08-09 Budget**
General Fund	65%	65%
Tip Fees	32%	32%
Other	3%	3%
Total	**100%**	**100%**

10.3.1.1 State Programs

Glass Recycling. The glass recycling program consists of glass containers not included in the State Beverage Container Deposit Program. The program is administered through the State and is subsidized with an advance disposal fee (ADF), currently at one and half cents per container. The State allocates funds from this program to the counties based on the population size of each island and distributes these funds on a quarterly basis.

Used Oil (motor oil). The State receives funds from a petroleum tax levied on petroleum corporations on a per barrel basis. The collected taxes are placed in an environmental response revolving fund, which then may be allocated to county-based recycling programs. The funds are generally distributed to the counties based on historic needs of the island. The County used oil program allows residents to drop off used motor oil at convenient dropoff centers. The state requires each county to provide convenient dropoff sites and the County of Hawai'i contracts vendors to run the dropoff centers.

Beverage Container Deposit Program (HI-5). The Beverage Container Deposit Program is a state run program which places a 5¢ redeemable deposit on each beverage container, as defined under law. Consumers may then return the container to redeem their 5¢ at any redemption center. A 1¢ non-refundable container fee is assessed to support the costs of recycling and program administration. Any funds that are not redeemed by consumers may be distributed to county based programs. The County submits a list of requests to the State on annual basis, outlining budgetary needs for HI-5 projects and program administration. The County may request additional funds during the year for more redemption centers, shelters, bins, or public awareness programs.

10.3.1.2 County Programs

Landfill Tipping Fees and Permit Fees. The County generates revenue from solid waste disposal through landfill tipping fees and permit fees. Non-residential customers pay $85 per ton of solid waste to the landfill, and for customers that dispose of waste on a routine basis, a $25 one-time annual fee is assessed for account setup and administration costs. Customers may also pay special handling fees on non-routine disposal of solid wastes that

require additional personnel for disposal (for example, bulky wastes, disposal of sensitive wastes).

Transfers from the General Fund. The primary revenue source for County solid waste programs is transfers from the General Fund. Property taxes account for the largest portion of the General Fund. Other fund sources include hotel/tourism taxes, public service company taxes, interest on invested funds, and any carryover of the General Fund balance from the prior year. Each County department forecasts its budgetary needs for the year, and the mayor's office and County Council approve the budgets pending a review process.

10.3.1.3 Other Programs

Abandoned Vehicle Program. The abandoned vehicle program is funded directly from a portion of the vehicle registration fee. The program receives $12 per registered vehicle to pay for program administration, towing companies, and scrap metal vendors.

Diversion Incentive Program. The County subsidizes the recycling program by paying vendors a price per ton of recyclable materials that have been diverted from the landfill. The diversion incentive is based on an average market price per ton of recycled material from the commodities market, such as corrugated cardboard, paper, plastic, and glass. In general, the diversion incentive program pays for costs of receiving, consolidation, transport of recycled materials to Ports, transportation to the Mainland, and further processing and marketing that exceed the prices received for the material from end users or brokers.

Residential Hauler Credit. Vendors that charge a fee for residential waste pickup may qualify for a residential hauler credit. To qualify, the vendor must have a physical address of each customer. The annual credit to the vendor is determined by the annual number of customer accounts multiplied by a factor of 1.5 (tons per year per customer) multiplied by the landfill tipping fee ($85/ton).

10.3.2 Solid Waste Fund Expenses

FY 07-08 actual and FY 08-09 budgeted expenses for the County solid waste fund are shown in Exhibit 10-3. Expenses have been grouped into categories that reflect the main solid waste functions provided by the County. The expense groupings shown were prepared by an allocation process in which 500+ lines of expenditures were assigned to functions using appropriate, available data and professional judgment by County staff.

As shown, budgeted expenses for FY 08-09 are considerably higher than FY 07-08 actuals. Expenses are projected to increase because of inflation, waste stream increases, increased staffing at recycling and transfer stations, and substantial reductions in forecast prices received for recycled materials. With the recent downturn in the economy, it is quite possible that actual expenditures will be less than budgeted.

Exhibit 10-4 provides the Solid Waste Department's prioritized capital improvement funding request as submitted to the County Council (with the highest priorities listed first). These improvements have been included in the CIP forecasts shown later in this section. As shown, the County also has made provisions for closure and post-closure requirements for the SHSL. Closure and post-closure requirements for the WHSL are the responsibility of the County's contractor.

10.4 Issues and Concerns

As discussed in prior sections, the County is considering several potential changes to the current waste management program. Some of the options currently under consideration could be implemented relatively easily and integrated as part of the County's existing waste management system. Other options will require more significant changes including new infrastructure, new administrative positions within the County, coordination with other County agencies, community outreach, behavioral changes by the public (paradigm shift), and in some cases, will require passage of policies, ordinances, and legislation requiring public and commercial participation.

EXHIBIT 10-3
Solid Waste Fund Expenses

			Percent of Total	
	FY 07-08 Actual	FY 08-09 Budget	FY 07-08	FY 08-09
Administration	$1,226,555	$955,790	5%	3%
Recycling	$4,297,674	$7,487,882	17%	23%
Transfer Stations	$8,797,808	$10,249,068	34%	32%
South Hilo Sanitary Landfill	$3,556,342	$4,737,647	14%	15%
West Hawai`i Sanitary Landfill	$7,657,945	$8,377,370	30%	26%
Closed Landfills	$250,000	$470,000	1%	1%
Total	$25,786,324	$32,277,757	100%	100%

Note: FY 08-09 figures have not been finalized by the County and are pending approval. Totals may not add because of rounding.

A central issue for the County is determining the best policies and procedures to fund both existing and new waste management programs and initiatives. Currently, residential customers can deliver waste to County recycling and transfer stations at no charge, while commercial haulers must pay tipping fees at the landfills. As shown in Exhibit 10-2, the County general fund provides approximately two-thirds of the revenue used for funding current solid waste expenses (excluding debt financing for major infrastructure) with just over 30 percent of the necessary funds derived from landfill tipping fees. These percentages are unchanged from those reported in the 2002 IRSWMP update, which indicates that few changes to the overall funding structure have occurred during the past eight years in spite of the fact that tipping fees have increased from $35 to $85 per ton during the past 5 years.

The funding mechanisms, administration, and types of programs and legislation required to implement modifications to the existing waste management program will depend on the options selected for implementation in this IRSWMP Update. It is likely that additional regulations will be necessary to successfully implement changes to the County's current program and to encourage changes in the current patterns of waste disposal by both the public and commercial businesses.

EXHIBIT 10-4
Projected Solid Waste Capital Improvements

Project	Estimated Cost (in thousands)					
	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 13-14	Total
S. Hilo Sanitary Landfill	$1,000	$3,000	$2,000			$6,000
Rural Transfer Station Reconstruction	$8,000	$4,000	$4,500	$5,000	$5,500	$27,000
Equipment Maintenance Facility	$1,000	$8,000				$9,000
Hilo Baseyard Facilities	$2,000					$2,000
West Hawai`i Materials Recovery (MRF)		$7,000				$7,000
Ocean View Recycling and Transfer St.		$5,000				$5,000
Old Closed Kailua Landfill Remediation			$10,000			$10,000
Remediate Old Kona Scrap Metal Yard			$1,800			$1,800
South Hilo Sanitary Landfill Closure						Beyond 2014
	$12,000	**$27,000**	**$18,300**	**$5,000**	**$5,500**	**$86,800**

Note: Preliminary figures

Examples of legislation implemented in other jurisdictions that face similar issues to Hawai`i County were therefore evaluated as part of this IRSWMP update. Two key issues facing the County that may require legislative changes include:

- Moving toward zero waste by thinking of waste as a resource and reducing wasteful behavior.
- Minimizing or eliminating illegal dumping.

In addition to legislation and ordinances, community outreach and education will also be necessary to effect a change in public perception of the issues surrounding waste management, and thereby influence established behavior patterns. As community involvement and concern for waste-related environmental stewardship increase, it is expected that acceptance of additional fees and regulation regarding waste disposal practices will become more widely embraced by the public and commercial sectors.

As part of the IRSWMP update process, the County is evaluating potential options and setting both short-term and long-term goals for waste management. In order to successfully expand and adapt the current county-wide waste management program to meet its goals, the County will need to:

- Carefully evaluate the technology options currently available.
- Make decisions regarding the path forward for both the near-term and long-term.
- Take advantage of best practices and lessons learned from other jurisdictions regarding funding and administration mechanisms, and related legal and regulatory requirements.

The County must also consider the potential implications of various existing Federal, State, and County regulations on the implementation of the waste management program. Depending upon which waste management technologies the County elects to implement, the steps necessary to achieve regulatory approval and compliance will vary. Because regulatory compliance could be a significant factor in the overall applicability of specific technologies, and could also significantly impact schedule and cost, an evaluation of regulatory requirements should be completed as part of the feasibility analysis for specific technologies.

10.5 Administration and Funding Options

Many of the options being considered in previous chapters of this IRSWMP update would require changes to existing methods of administering and funding programs. Some administration and funding options for consideration follow.

10.5.1 Establishing Solid Waste as an Enterprise Fund

As discussed above, currently about two-thirds of the County's expenditures for solid waste management are funded by the County's general fund which is primarily supported by property taxes. There are some disadvantages associated with the current funding system, including:

- Property tax funding provides no financial incentive for residents to reduce waste.
- Using property taxes to fund solid waste services can be perceived as unfair because property tax collections are not correlated specifically with the types and volumes of waste generated, potentially leading to inequitable subsidization.
- It can be somewhat more challenging to manage solid waste programs based on funding allocation of money from the general fund, because the money in the general fund may be redirected towards other pressing county needs.

Another method of funding that is commonly used in many communities is to establish an enterprise fund for solid waste management that would be supported primarily by fees from waste disposal. Some advantages often cited for enterprise funds include:

- Promoting fairness by charging specifically for waste disposed
- Avoiding tax increases
- Requiring a higher degree of sensitivity to customer's needs
- Allowing managers more discretion, but holding them accountable to customers
- Running government more like a business

The main disadvantage cited for enterprise funds is that they can be regressive and place a burden on the poor by increasing the amount they must pay for an essential service like waste management.

If the County were to establish an enterprise fund and accept no revenues from the general fund, the tipping fee (based on FY 07-08 County budget data) would have to be approximately $120 per ton. If that rate were extended to residential deliveries at the

transfer station, the required fee (again, based on FY 07-08 data) for each 25-pound bag would have to be approximately $2.15 to fully fund solid waste services.

10.5.2 Separating Solid Waste Management as a Line Item on Property Taxes

The County could provide additional information to customers about the cost of managing solid waste by adding a separate line item on property tax bills outlining the amount of the tax fee used to fund solid waste services. A possible breakdown might include the six categories of expenses shown in Exhibit 10-3.

10.5.3 Establish PAYT System at County Recycling and Transfer Stations

As discussed in Sections 3.0 and 8.0, there are a number of ways that the County could implement a PAYT system at recycling and transfer stations. Two methods that would minimize staffing requirements at the stations include a "tag" or "bag" system. In a tag system, property owners would be issued tags along with their semi-annual property tax bills that could be used as "currency" for delivering waste, and extra tags could be available for purchase at County offices or retail outlets. Arrangements would need to be made for renters not served by a building collection service.

A bag system would consist of requiring all residents to put waste into a standard type of plastic bag that would be available for purchase at County offices and/or retail outlets.

There would be many implementation challenges associated with this system. An extended phase-in period would be necessary accompanied by an intensive public education program.

10.5.4 Illegal Dumping Prevention

Illegal dumping of household and commercial can have a variety of potential negative impacts. Hazardous chemicals generated from illegally dumped waste can contaminate groundwater and surface water, potentially affecting both human health and aquatic habitats. Flooding can result from blockage of streams and drainage culverts. Property values can be affected by illegal dumping, and economic impacts resulting from costs of clean up can affect County resources. Additional efforts to prevent illegal dumping would be particularly important if the County were to implement a PAYT program or dramatically increase the tipping fee.

The current Hawai`i County code (Chapter 20) contains provisions that prohibit littering. These provisions cover the materials commonly encountered in the municipal waste stream, and prohibit discarding or disposing of these materials on either public or private property. Violators may be fined up to $1,000 and/or not more than 200 hours of community service for each offense. Cost recovery for clean up is also allowed under the current County code.

However, there have historically been areas where various types of waste have been discarded illegally, including along roadways in more rural areas, on vacant lots, and in gulches with major roadways crossing them or near industrial facilities. Enforcement of existing litter laws is challenging due in part to the rural nature of Hawai`i County. The County Department of Environmental Management is eventually responsible for clean up and disposal of the discarded waste materials.

Currently enforcement of the County code is the responsibility of the Hawai`i County Police Department (HCPD). Because littering is not one of the higher priorities for HCPD, many of the violators who litter are not caught or penalized. DEM staff do not have the training or legal authority to enforce litter laws. The County would increase its potential liability if it required DEM employees to enforce policy, even within the confines of County transfer station properties.

It is anticipated that passing ordinances or legislation that requires the public to pay for waste disposal on a per unit basis may, in the short term, increase the occurrence of illegal dumping. Studies conducted in rural areas of Kentucky concluded that when additional fees were implemented for public waste disposal, illegal dumping increased, especially in areas where a higher percentage of the population had low or poverty-level incomes. However, the majority of jurisdictions implementing programs such as PAYT reported only short-term increases in illegal dumping, and a decline to pre-implementation rates of incidence within the first 1 to 2 years after implementation. Exhibit 10-5 presents four programmatic areas the EPA has suggested focusing on for preventing illegal dumping.

EXHIBIT 10-5
Four Programmatic Areas for Preventing Illegal Dumping (EPA, 1998)

Cleanup Efforts. Cleanup projects will require a coordinated planning effort to ensure that adequate resources and funding are available. Once a site has been cleaned, signs, lighting or barriers may be required to discourage future dumping. Signs should indicate the fines and penalties for illegal dumping, and a phone number for reporting incidents. Landscaping and beautification efforts may also discourage future dumping, as well as provide open space and increase property values.
Community Outreach and Involvement. This may be the most important tool in ensuring that this practice is effective. The organization of special cleanup events where communities are provided with the resources to properly dispose of illegally dumped materials increases the understanding among residents of illegal dumping impacts and supplies opportunities to correctly dispose of materials which may otherwise be illegally dumped. Integration of illegal dumping prevention into community policing programs or use of programs such as Crime Stoppers may also be an effective way to increase enforcement opportunities without the additional cost of hiring new staff. Producing simple messages relating the cost of illegal dumping on local taxes and proper disposal sites will aid in eliminating the problem. Having a hotline where citizens can report illegal activities and educating the public on the connection between the storm drain and water quality, and other potential hazards associated with dumping refuse into streams or drains will decrease disposal of waste into streams or storm drain inlets.
Targeted Enforcement. This tool involves the use of ordinances to regulate waste management and eliminate illegal dumping through methods such as fines, cost recovery penalties for cleanup, and permit requirements for waste management activities, to name a few. These fines and penalties can be used to help fund the prevention program or to provide rewards to citizens who report illegal dumping activities. Other recommendations for this tool include training of staff from all municipal departments in recognizing and reporting illegal dumping incidents, and dedicating staff who have the authority to conduct surveillance and inspections, and write citations for those caught illegally dumping.
Tracking and Evaluation. This tool measures the impact of prevention efforts and determines if goals are being met. Using mapping techniques and computer databases allows officials to identify areas where dumping most often occurs, record patterns in dumping occurrence (time of day, day of week, etc), and calculate the number of citations issued and the responsible parties. This allows for better allocation of resources and more specific targeting of outreach and education efforts for offenders.

Other jurisdictions in most cases have implemented litter ordinances similar to those that currently exist in Hawai`i County. In some areas, tougher penalties are in place for more egregious violations. For example, Pennsylvania laws against littering and illegal dumping

include civil penalties up to $25,000 per incident for illegally hauling waste anywhere other than to a permitted facility, and up to $10,000 per incident for dumping waste into streams. In Texas, civil penalties similar to those in Pennsylvania, and criminal penalties ranging from misdemeanor to felony level are in place for illegal dumping violations, depending on the severity of the violation.

A combination of passing more severe penalties for illegal dumping, targeted enforcement actions by HCPD, establishment of new community outreach and participation programs, and other actions found to be successful in other jurisdictions may help to curb illegal dumping in Hawai`i County.

Potential actions that may be considered for Hawai`i County include:

- Civil and criminal penalties: The County could develop legislation that sets more severe civil and criminal penalties for illegal dumping activities. Legislation could be worded such that the penalties increase with the egregiousness of the violation, and based upon a weight, volume, or types of material that are dumped, and location of illegal activity (that is, higher penalties for dumping into streambeds). Legislation could require violators to pay for consequential damages and cleanup costs resulting from specific violations.
- Targeted enforcement: the County could work in conjunction with the community and the HCPD to develop a targeted enforcement program. Incentives could be offered for monitoring and reporting of illegal dumping to authorities, and methods could be developed for periodically evaluating illegal dump sites for evidence of the identity of the violators. Legislation supporting prosecution of violators based on the evidence of ownership at the time of the violation derived from dumped materials may need to be developed to effectively implement such a program.
- Community education, outreach, and involvement: develop programs with school and community groups or organizations to conduct periodic clean ups of illegal dump sites, in order to raise community awareness and involvement in reducing illegal dumping activities.
- Installation of signage at problem areas: The County could install signage at areas where illegal dumping typically occurs listing the more severe civil and criminal penalties for violators in order to curb future dumping.

10.6 IRSWMP Recommendations

This Plan recommends continuing the County's current system of funding most operating expenditures using property taxes and tip fees, along with implementation of new funding sources including, potentially, a PAYT system at County recycling and transfer stations. Major capital expenditures would continue to be funded through general obligation bonds.

Ideally, the County would allow for up to 3 years of planning, research, and outreach prior to implementation of PAYT. This should include research into ways to limit the potential for illegal dumping.

10.7 Recommended Implementation Plan and Financial Analysis

This section provides three perspectives on plan implementation: new solid waste fund operating expenses, new CIP expenditures, and forecast revenues and expenses for the County's solid waste operating fund.

During preparation of this Plan, the County has become immersed in a fiscal crisis resulting from the current worldwide economic recession. In this environment, the funding and implementation of both existing services and the new initiatives outlined in this Plan are in question. Thus, the implementation plan that follows will be modified as the County works its way through this fiscal crisis. The DEM will make every effort to implement recommended programs, but fiscal realities are likely to slow and alter the implementation plan. Further, the County may elect to use any and all funding methods that become available, such as user fees, increased property taxes for solid waste management, or increased landfill tipping fees, rather than relying on a PAYT system.

10.7.1 New Solid Waste Fund Operating Expenses

The new operating expenses recommended in this Plan are provided in Exhibit 10-6. The expenses are organized by Plan section, with a page number reference to indicate where the recommendation is discussed in the Plan. Programs that the SWAC felt were a high priority for implementing early in the 5-year planning cycle are denoted with an "H" in the High Priority column of the exhibit.

10.7.2 Capital Improvement Fund Expenditures

Recommended CIP expenditures are shown in Exhibit 10-7. Those expenditures are generally consistent with the County's most recent CIP funding request, with a few new additions recommended in the Plan (such as investigations related to developing a new landfill in the quarries adjacent to the SHSL site).

10.7.3 Projected Solid Waste Fund Revenues and Expenses

Projected solid waste fund revenues and expenses are shown in Exhibit 10-8. This information relies on projections of ongoing programs made by the County solid waste division through FY 09-10, with the addition of the new programs shown in Exhibit 10-6.

The net revenues shown are revenues minus expenses. As indicated, additional funding beyond revenues projected from the PAYT system will be necessary to pay for the programs outlined in the Plan. The Plan recommends making up the shortfall using a combination of property tax and/or tipping fee increases. For reference purposes, if no property tax funds were used, a tipping fee increase of approximately $25 per ton (to about $110 per ton) would result in revenues equaling expenses throughout the 5-year implementation period. The exact mix of property taxes and tipping fee increases would be determined during the course of Plan implementation.

EXHIBIT 10-6
Implementation Plan for Operations

Program	Page No.	High Priority	Year 0 FY 09-10	Year 1 FY 10-11	Year 2 FY 11-12	Year 3 FY 12-13	Year 4 FY 13-14	Year 5 FY 14-15
Source Reduction								
Ordinance: waste reduction plans for building permits	3-17	H	$0	$0	$11,000	$0	$0	$0
Develop Extended Producer Responsibility (EPR) policy	3-17		$0	$0	$0	$0	$32,000	$0
EPR for difficult-to-recycle campaign	3-17		$0	$0	$0	$0	$0	$32,000
County government source reduction program	3-17	H	$0	$0	$32,000	$0	$0	$0
Business waste audit and education program	3-18		$0	$0	$0	$33,000	$34,000	$35,000
Visitor industry education and promotion	3-18		$0	$0	$0	$33,000	$0	$0
Pay-As-You-Throw at Recycling/Transfer Stations	3-17	H						
Program design			$51,000	$0	$0	$0	$0	$0
Education and outreach campaign			$103,000	$105,000	$108,000	$110,000	$55,000	$55,000
Outreach to retail businesses			$53,000	$53,000	$0	$0	$0	$0
Purchase and deliver bags/tags			$0	$784,000	$1,567,000	$1,607,000	$1,647,000	$1,688,000
Pilot program (free bags/tags, implement and evaluate)			$0	$53,000	$0	$0	$0	$0
Staff training			$0	$53,000	$0	$0	$0	$0
Implementation, monitoring and evaluation			$0	$0	$220,000	$100,000	$50,000	$50,000
Reuse								
Expand reuse facilities – more services; more facilities	3-18	H	$0	$0	$94,000	$193,000	$198,000	$203,000
Reuse education, outreach, and public awareness	3-18	H	$0	$0	$27,000	$0	$0	$0
Public-private partnership with organizations (e.g., Goodwill)	3-18		$0	$0	$0	$28,000	$0	$0
Education, Outreach, and Public Awareness								
3-year education and social marketing plan	5-11	H	$0	$79,000	$0	$0	$85,000	$0
Zero waste education and public awareness coordinator	5-11		$0	$0	$54,000	$55,000	$57,000	$58,000
Implement communitywide social marketing plan	5-11	H	$0	$0	$0	$83,000	$85,000	$87,000
Recycling								
Establish differential tip fee ordinance	4-32	H	$0	$0	$27,000	$0	$0	$0
Establish mandatory source separation and recycling ordinance	4-32	H	$0	$0	$27,000	$0	$0	$0

EXHIBIT 10-6
Implementation Plan for Operations

Program	Page No.	High Priority	Year 0 FY 09-10	Year 1 FY 10-11	Year 2 FY 11-12	Year 3 FY 12-13	Year 4 FY 13-14	Year 5 FY 14-15
Establish opportunity to recycle legislation	4-32	H	$0	$0	$27,000	$0	$0	$0
Establish County "buy recycled" policy	4-32	H	$0	$0	$0	$54,000	$0	$0
Explore State/Regional zero waste marketing and public policy	4-32		$0	$0	$0	$28,000	$0	$0
State, outreach: change school collection contracts to add recycling	4-32	H						No added cost
Recycle art campaign	4-33		$0	$0	$0	$9,000	$9,000	$9,000
Commercial recycling	4-33							
Commercial recycling specialist			$0	$0	$0	$55,000	$57,000	$58,000
Education, outreach and awareness			$0	$0	$27,000	$28,000	$28,000	$29,000
Added recycling at recycling/transfer stations (mandatory recycling)	4-32	H						
Improved signage			$0	$0	$108,000	$110,000	$0	$0
Education, outreach and awareness			$0	$0	$27,000	$28,000	$28,000	$29,000
Increased recyclable transportation, processing, and sales (less avoided cost)			$0	$0	$0	$2,245,000	$3,068,000	$4,716,000
Materials recovery facility for East Hawai`i (using existing re-load facility)	4-33	H						
Operations, labor (2 added FTE - County or private)			$0	$0	$0	$110,000	$113,000	$116,000
Maintenance and miscellaneous supplies			$0	$0	$0	$22,000	$23,000	$23,000
Materials recovery facility (baling/storage) for West Hawai`i	4-33	H						
Operations, labor (3 added FTE - County or private)			$0	$0	$0	$0	$170,000	$174,000
Maintenance and miscellaneous supplies			$0	$0	$0	$0	$45,000	$46,000
County park and public place recycling	4-33	H						
Planning			$0	$0	$0	$0	$34,000	$0
Bins			$0	$0	$0	$0	$20,000	$0
Operations			$0	$0	$0	$0	$0	$696,000
Event recycling	4-33	H	$0	$0	$0	$11,000	$11,000	$12,000
Organics								
Modify zoning rules/County code	4-34	H	$0	$32,000	$0	$0	$0	$0
Organics ban implementation study	4-34		$0	$79,000	$0	$0	$0	$0

EXHIBIT 10-6
Implementation Plan for Operations

Program	Page No.	High Priority	Year 0 FY 09-10	Year 1 FY 10-11	Year 2 FY 11-12	Year 3 FY 12-13	Year 4 FY 13-14	Year 5 FY 14-15
Organics coordinator	4-34	H	$0	$0	$54,000	$55,000	$57,000	$58,000
On-site composting program (subsidized bins and distribution)	4-34	H						
Planning			$0	$32,000	$32,000	$0	$0	$0
Residences - dist. and education (3,000 units/yr, 25% penetration)			$0	$0	$0	$217,000	$334,000	$342,000
Businesses (similar level of effort to residential)			$0	$0	$0	$217,000	$334,000	$342,000
Certified master composter program	4-34							
Planning			$0	$0	$0	$33,000	$0	$0
Implementation			$0	$0	$0	$0	$28,000	$29,000
Training program and guides for farmers	4-34		$0	$0	$0	$0	$68,000	$70,000
Stop wasting food - program with local food banks	4-34		$0	$0	$0	$22,000	$23,000	$23,000
Add green waste dropoff locations at recycling/transfer stations	4-34	H	$0	$0	$108,000	$110,000	$0	$0
Partner to help establish compost demonstration gardens	4-34		$0	$0	$0	$37,000	$38,000	$0
Mobile tub grinder for recycling/transfer stations (contract or County)	4-35	H	$0	$0	$269,000	$276,000	$283,000	$290,000
Conduct pilot food waste composting project	4-35			$0	$108,000	$110,000	$0	$0
Upgrade mulch facility to organics composting facility for West Hawai`i	4-35	H	$0	$0	$1,093,000	$1,120,000	$1,148,000	$1,177,000
Collection and Transfer								
Licensing and recycling requirements for residential collection firms	8-30		$0	$0	$0	$33,000	$0	$0
Change permits to allow small commercial recycling at stations (<1 ton)	8-30	H			In progress - no added cost			
Full-time staffing and reduced operating hours	8-29	H			No added cost			
Operational efficiency analysis	8-30		$0	$131,000	$0	$0	$0	$0
Household Hazardous Waste (HHW) / Electronic Waste (E-Waste)								
Hire HHW / E-waste Specialist	6-9		$0	$0	$0	$55,000	$57,000	$58,000
HHW/ e-waste education, outreach, and public awareness	6-9		$0	$0	$0	$28,000	$28,000	$29,000
Explore e-waste take back programs with State and manufacturers/sellers	6-9		$0	$0	$0	$33,000	$0	$0
Develop e-scrap campaign (anything with a plug)	6-10		$0	$0	$0	$33,000	$0	$0

EXHIBIT 10-6
Implementation Plan for Operations

Program	Page No.	High Priority	Year 0 FY 09-10	Year 1 FY 10-11	Year 2 FY 11-12	Year 3 FY 12-13	Year 4 FY 13-14	Year 5 FY 14-15
Explore legislative actions for takeback of hazardous products and packaging	6-10		$0	$0	$0	$33,000	$0	$0
Additional HHW collection events (10 to 12 additional per year)	6-10	H	$0	$0	$215,000	$442,000	$453,000	$464,000
Residuals Management								
Engage in dialog with State/Counties about joint solutions	9-32		$0	$32,000	$0	$0	$0	$0
Feasibility study of reclaiming old Kona landfill	9-32		$0	$0	$0	$135,000	$0	$0
Master plan for West Hawai`i Sanitary Landfill	9-32	H	$0	$0	$130,000	$0	$0	$0
Master plan for South Hilo Sanitary Landfill	9-32	H	$0	$0	$130,000	$0	$0	$0
Administration and Funding								
Illegal dumping program	10-10	H						
Research and enhanced education program				$0	$0	$54,000	$55,000	$57,000
Signage			$0	$0	$108,000	$110,000	$0	$0
Change enforcement structure					Staff time, no added cost			
Total			**$207,000**	**$1,433,000**	**$4,657,000**	**$8,096,000**	**$8,757,000**	**$11,056,000**

Note: Assumes 2.5 percent annual inflation.

EXHIBIT 10-7
Implementation Plan for Capital Improvement Program (CIP)

CIP Costs in Year of Expenditure Dollars	Page No.	High Priority	Year 0 FY 09-10	Year 1 FY 10-11	Year 2 FY 11-12	Year 3 FY 12-13	Year 4 FY 13-14	Year 5 FY 14-15
Recycling								
Materials recovery facility for East Hawai`i (using existing re-load facility)	4-33	H						
Equipment (baler, bobcat, chassis)			$0	$0	$400,000	$0	$0	$0
Materials recovery facility for West Hawai`i	4-33	H	$0	$0	$7,000,000	$0	$0	$0
Collection and Transfer								
Reconstruct one station per year	8-29	H	$0	$0	$0	$5,000,000	$5,500,000	$6,000,000
South Kona - Ocean View Recycling/ Transfer Station	8-29		$0	$0	$5,000,000	$0	$0	$0
Hilo baseyard facilities	8-30	H	$0	$0	$2,000,000	$0	$0	$0
Equipment maintenance facility	8-30	H	$0	$0	$1,000,000	$8,000,000	$0	$0
Residuals Management								
Quarry Expansion	9-31	H						
Geotechnical investigation			$0	$200,000	$0	$0	$0	$0
Groundwater monitoring plan			$0	$250,000	$0	$0	$0	$0
Design, permitting, and cost estimates for landfill and trucking			$170,000	$170,000	$180,000	$190,000	$210,000	
Environmental review			$62,000	$105,000	$151,000	$0	$0	$0
Land use approvals			$51,000	$53,000	$54,000	$55,000	$0	$0
Old Kona Scrap Metal Yard Remediation	9-32	H	$0	$0	$1,800,000	$0	$0	$0
Old Closed Kailua Landfill Remediation	9-32		$0	$0	$10,000,000	$0	$0	$0
South Hilo Sanitary Landfill Closure			$0	$0	$0	$0	$0	Beyond 2015
Total			**$283,000**	**$778,000**	**$15,785,000**	**$25,045,000**	**$5,710,000**	**$6,000,000**

Note: Assumes 2.5 percent annual inflation.

EXHIBIT 10-8
Implementation Plan – County Operating Revenues and Expenses

	Actual FY 07-08	FY 08-09	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15
Solid Waste (Operating) Fund								
Revenues								
Federal Grants	$27,260	$0	$0	$0	$0	$0	$0	$0
State Grants								
Glass Recycling Program	$0	$155,000	$55,000	$55,000	$55,000	$55,000	$55,000	$55,000
Used Oil Collection/Disposal	$0	$67,500	$59,390	$59,390	$59,390	$59,390	$59,390	$59,390
Beverage Container Deposit Program	$423,934	$940,809	$996,108	$996,108	$996,108	$996,108	$996,108	$996,108
Landfill Tipping Fees and Permit Fees	$9,213,574	$7,564,000	$7,456,000	$8,281,000	$8,444,000	$8,314,000	$8,247,000	$8,170,000
Pay-as-You-Throw at Transfer Stations	$0	$0	$0	$3,757,000	$10,720,000	$10,555,000	$10,470,000	$10,372,000
General Fund								
General Fund Balance From Previous Year	$0	$3,046,293	$0	$0	$0	$0	$0	$0
Transfer from General Fund	$17,352,726	$19,147,721	$16,083,604	$16,154,401	$16,938,697	$19,938,697	$21,938,697	$21,938,697
Miscellaneous Revenue	$3,482	$0	$0	$0	$0	$0	$0	$0
Additional Tip Fee or Property Taxes	($1,234,654)	$1,356,677	$2,709,898	$62,101	$174,805	$1,726,805	$1,379,805	$4,713,805
Total Solid Waste Fund	**$25,786,323**	**$32,278,000**	**$27,360,000**	**$29,365,000**	**$37,388,000**	**$41,645,000**	**$43,146,000**	**$46,305,000**
Expenses								
Administration	$1,226,555	$956,000	$968,000	$1,024,000	$1,179,000	$1,207,000	$1,125,000	$1,153,000
Reduction, Reuse, Recycling	$4,297,674	$7,488,000	$5,382,000	$6,624,000	$11,773,000	$15,489,000	$16,619,000	$19,115,000
Recycling and Transfer Stations	$8,797,808	$10,249,000	$7,126,000	$7,485,000	$9,588,000	$9,861,000	$10,074,000	$10,326,000
South Hilo Sanitary Landfill	$3,556,342	$4,738,000	$4,667,000	$4,784,000	$5,034,000	$5,027,000	$5,153,000	$5,282,000
West Hawai`i Sanitary Landfill	$7,657,945	$8,377,000	$8,712,000	$8,930,000	$9,283,000	$9,382,000	$9,617,000	$9,857,000
Closed Landfills	$250,000	$470,000	$505,000	$518,000	$531,000	$679,000	$558,000	$572,000
Total Operating Expenses	**$25,786,323**	**$32,278,000**	**$27,360,000**	**$29,365,000**	**$37,388,000**	**$41,645,000**	**$43,146,000**	**$46,305,000**
Net Operating Revenues	$0	$0	$0	$0	$0	$0	$0	$0

Based on Solid Waste Division forecasts for ongoing programs through FY 09-10, and Plan implementation. Assumes 2.5 percent annual inflation.