

County of Hawai'i Integrated Solid Waste Management Plan Update

Draft Options for Consideration

December 15-18, 2008



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Presentation Topics

- **Overview**
 - Planning process
 - Zero waste
 - Waste quantities and composition
- **Source Reduction and Education**
- **Household Hazardous Waste and e-Waste**
- **Recycling and Bioconversion**
- **Collection and Transfer**
- **Residuals Management**

Overview

ISWMP Planning Process

- **Objective:** Update the County's Integrated Solid Waste Management Plan (ISWMP) with an county-wide / state-wide focus
- **State Requirement:**
 - Hawai'i Revised Statutes (HRS) Section 342G
 - Last ISWMP update in 2002
- **Community input for island-wide solutions**
 - County Council
 - Policy guidance, monthly workshops
 - Solid Waste Advisory Committee
 - Advice and community perspective, monthly workshops
 - Public meetings
 - Public perspective, meetings in Hilo, Kona, Waimea at project initiation, mid-term, draft plan
 - Plan website
- **Schedule**
 - Monthly workshops and chapter drafts
 - Draft plan in Spring '09

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Solid Waste Advisory Committee

Members

- **Barbara Bell**, *Immediate past Director of Environmental Management, County of Hawai'i*
- **Paul Buklarewicz**, *Executive Director, Recycle Hawai'i*
- **Christine Dochin**, *Office Manager Pacific Waste, Inc.*
- **Jes Foster**, *Executive CentexHomes*
- **Mike Gleason**, *CEO, The ARC of Hilo*
- **Mike Kaha**, *Manager West Hawai'i Landfill, Waste Management*
- **Alex Leonard**, *Senior Projects Manager, Willocks Construction*
- **Steve Okoji**, *Registered Sanitarian, State of Hawai'i, Department of Health*
- **Shon Pahio**, *Manager, HMP, Inc., dba Business Services Hawai'i*
- **Russell Ruderman**, *President, Island Naturals*
- **Nimr Tamimi**, *Owner, Engineering Partners*
- **Ted Vorfeld**, *Mechanical Engineer Hualalai Engineering, Inc.*
- **Lane Otsu and Karl Motoyama** (*non-voting*), *State Department of Health, Solid and Hazardous Waste Branch Representatives*

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Zero Waste

- **Emulate natural cycles – discarded materials treated as resources**
- **Zero Waste**
 - (Resolution 356-07) adopted in 2007
 - “A resolution to embrace and adopt the principles of zero waste as a long-term goal for Hawai`i County”
- **Zero Waste Implementation Plan – draft report is undergoing County review**
- **The ISWMP will incorporate components of the Zero Waste Implementation Plan that can be achieved during the life span of the ISWMP**

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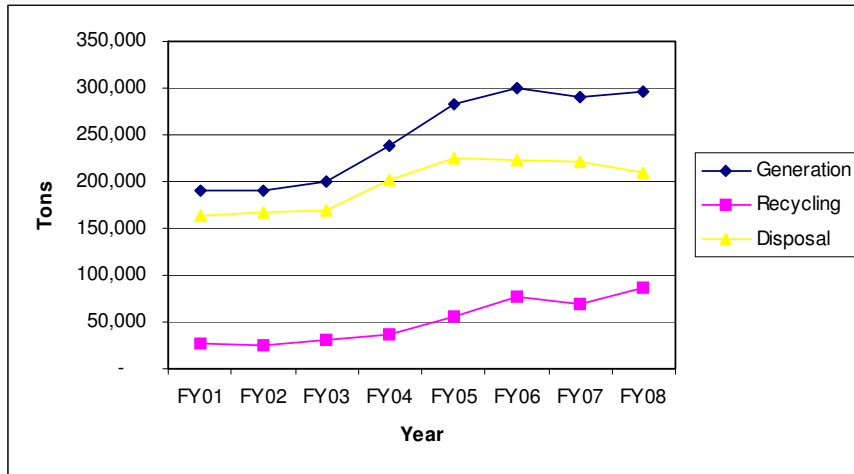
Waste Stream Assessment

- **Sampling studies**
 - S. Hilo landfill in 2001
 - West Hawai`i landfill in May 2008
- **Disposed waste composition**
- **Current recycling by material**
- **Generation = recycling + disposal**
- **20-yr waste generation forecast**



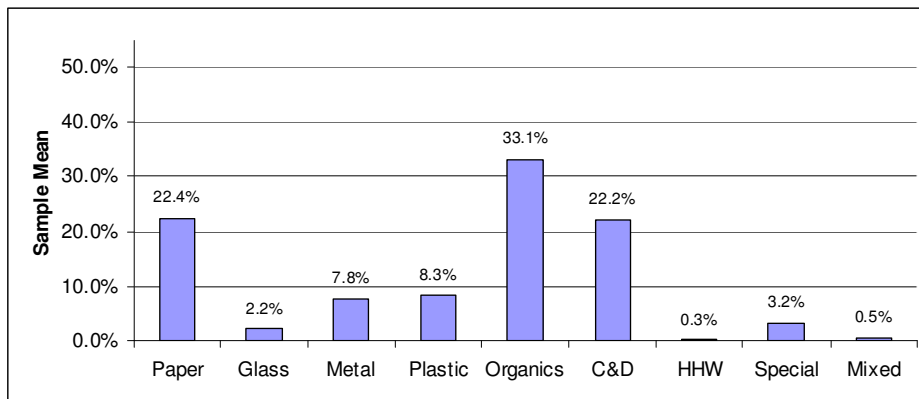
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Historical Generation, Recycling, and Disposal



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Total County Disposed Waste Composition Summary



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Source Reduction and Education



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Source Reduction Overview

- **Definition**
 - Adoption of practices that generate less waste
 - Examples include changes in home composting, product design/packaging, reduction of consumer purchases, reuse of materials or goods
- **Goal**
 - Recycling rate of 50% by 2008

Existing Conditions

- **Hawai`i County Programs**

- Home composting
- Reuse centers
- Reduction and reuse education
- Landfill disposal fees
- Procurement policies
- Elimination of tires from landfills
- E-Waste recycling
- Mandatory recycling (Resolution 30-07)



Kea'au Recycling & Reuse Center
Source of photo: http://co.Hawai'i.hi.us/directory/dir_envmng.htm

- **Other source reduction programs**

- Private reuse facilities: Habitat for Humanity Restore, Lualima Hana, Arc of Hilo

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Option 1: County Source Reduction Practices

- **Implement comprehensive source reduction policies for all County operations**
- **Specific policies and activities could include:**
 - Implement environmentally preferable purchasing policy/guidelines
 - Establish a Zero Waste Purchasing Committee
 - Include Zero Waste goals in job descriptions and performance evaluations
 - Establish a Green Building policy
 - Accept electronic submittal of all applications/submittals
 - Provide incentives for implementing waste reduction initiatives
 - Promote in-house composting programs
 - Encourage or mandate the use of re-usable products

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Option 2: Business Waste Audits and Reduction Plans

- Increase technical assistance with an emphasis on Zero Waste principles
- Encourage retailers and suppliers to participate in “take-back” programs
- Emphasize building deconstruction and support initiatives for adaptive reuse of materials
- Building permits above a particular size threshold to include a Waste Reduction Plan

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Option 3: Tourism Industry

- Partner with tourism industry
- Possible waste reduction initiatives include:
 - Replace disposables with reusables (utensils, dishes, cleaning supplies)
 - Bulk purchasing
 - Newspapers and linens only upon request
 - Reusable soap and shampoo dispensers
 - Use fluorescent bulbs
 - Grasscycling
 - Onsite composting



Source of photo:
<http://www.greenhotels.com/catalog/printed.htm>

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Option 4: Expand Reuse Facilities

- **Broader range of services and greater geographic coverage**
- **Expand existing centers**
 - Permanent facilities
 - Additional staffing
 - Educational outreach activities
- **Develop and communicate a list of the highest priority materials**
- **Maximize the type and quantity of materials**

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Option 5: Pay-As-You-Throw (PAYT) for Residential Discards

- **PAYT**
 - Establishes disposal rates based on quantity of garbage
 - Creates financial incentive to reduce waste
 - Embraced by almost 7,100 communities in the U.S.
- **PAYT at County Recycling and Transfer Stations**
 - Volume-based rates for discarding materials at each station
 - Issue 52 or 104 tags with property taxes (a tag for a bag)
 - Make tags available for purchase at County offices and/or retail establishments

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Option 6: Expanded Home Composting

- **Expand existing program to reach a wider audience**
- **Include aggressive promotion campaign**
- **Establish target penetration rate**
 - e.g., 25 percent of single-family households within five years



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Option 7: Expanded Reusable Bag Program

- **Expand existing program to reach a wider audience**
- **Distribute more reusable bags at residents**
- **Encourage grocery stores to increase the financial discount for using reusable bags**



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Option 8: Expand Source Reduction Education

- **Develop 3-year education and promotion plan**
- **Develop zero waste logo and branding**
- **Conduct waste management attitude survey**
- **Expand existing advertising and marketing**
- **Expand school education program**
- **Expand business education program**
- **Develop tourism education program**
- **Measure program effectiveness**

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Option 9: Establish Extended Producer Responsibility (EPR) Policy

- **Extend manufacturer`s responsibilities to include life cycle costs of products and packaging**
- **EPR programs**
 - Many in Canada, Europe, Asia
 - Voluntary EPR in US for batteries, carpet, cars
 - Hawaii: HI-5 program
- **Possible County actions**
 - Create state/county EPR coalition
 - Support EPR-related policies and programs



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Option 10: Policies and Legislation

- **Specific policies the County could consider adopting:**
 - Mandatory recycling and composting
 - Ban recyclable and reusable materials from landfills
 - Ban disposable products from public events and festivals
 - Require access to recycling services in multi-family dwellings and commercial buildings
 - Support state and federal efforts to adopt Zero Waste principles
 - Create a Zero Waste Fund

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Integrated Solid Waste Management Plan Update

Recycling and Bioconversion

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Recycling and Bioconversion (composting) Overview

- **Recycling goal vs. actual**
 - FY 2008 recycling rate of 29%
 - Goal: Recycling rate of 50% by 2008
- **Zero Waste**
 - Emulate natural cycles – discarded materials treated as resources
 - Zero Waste Conference and Implementation Plan
 - Conference and public meetings held in September
 - The ISWMP will incorporate components of the Zero Waste Implementation Plan that can be achieved during the life span of the ISWMP

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Recycling and Bioconversion (composting) Overview

- **2-bin recycling at recycling and transfer stations**
- **Hi-5 beverage container deposit program**
- **Green waste dropoff and mulching**
- **Home composting**
- **Pending bioconversion RFPs**
- **Scrap metal**
- **Tires (landfill ban)**
- **Fats, Oils, and Grease (FOG)**



Kea'au Recycling & Reuse Center
Source of photo: http://co.Hawaii.hi.us/directory/dir_envmng.htm

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Option 1: Increase Green Waste Drop-off Opportunities at Recycling and Transfer Stations

- **County plan:**
 - 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
- **Diversification potential:**
 - 50% capture = 4,900 annual tons (1.7%)
- **Estimated cost:**
 - Current mulching incentive is \$35/ton
 - Cost depends on local use vs. transport to existing mulching locations
 - If transported, could cost \$650,000-\$800,000 per year

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Option 2: Residential Curbside Collection and Processing of Recyclables

- **Key Issues**
 - Multi-stream vs. single stream
 - Weekly vs. bi-weekly
 - Hills and low route density
 - Service standards – designated zones with mandatory service (~70% of households)
 - Processing: insufficient quantities for sophisticated MRF
 - County crews versus private sector collection
 - Rationalize with other services
 - Pilot programs, consumer research and education



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Option 2: Residential Curbside Collection and Processing of Recyclables (cont.)

- **Diversion potential:**
 - PAYT
 - Multi vs. single stream
 - Weekly vs. bi-weekly
 - Number of materials
 - Resident participation
 - 80% capture for main materials = 8,800 annual tons (3.0%)
- **Estimated cost:**
 - Other services provided (curbside, recycling and transfer stations)
 - Many of same factors influencing diversion (multi vs. single stream, weekly vs. bi-weekly, mandatory vs. subscription)
 - Extent of rural service
 - Public vs. private and competition
 - \$20-30 per household per month

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Option 3: Residential Curbside Collection and Processing of Greenwaste

- **Key Issues**
 - Method of collection – usually rolling carts; could be compostable bags; plastic bags not recommended
 - Processing
 - Mulching vs. composting
 - Additional locations advantageous (collection cost, markets)
 - Many key issues for recycling apply
 - Service standards
 - PAYT
 - County crews vs. private sector
 - Pilot programs, consumer research, and education



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Option 3: Residential Curbside Collection and Processing of Greenwaste (cont.)

- **Diversion potential:**
 - PAYT
 - Weekly vs. bi-weekly
 - Mandatory vs. subscription in service areas
 - Resident participation
 - 90% capture for main materials = 5,600 annual tons (1.9%)
- **Estimated cost:**
 - Other services provided (curbside, recycling and transfer stations)
 - Many of same factors influencing diversion (weekly vs. bi-weekly, mandatory vs. subscription)
 - Extent of rural service
 - Public vs. private and competition
 - \$20-30 per household per month

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Option 4: Add Food and Other Organics to a Residential Curbside Recycling and Green Waste Collection Program

- **3-Cart system similar to San Francisco, Seattle, Toronto and many other communities**
- **Key Issues**
 - Same issues that affect curbside recyclables and green waste
 - Cost and distribution of carts
 - Processing requirements for food and other organics
 - Very different from current system means greater need for pilots, consumer research, and education



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Option 4: Add Food and Other Organics to a Residential Curbside Recycling and Green Waste Collection Program (cont.)

- **Diversion potential:**
 - 50% capture of food and other organics = 18,800 annual tons (6.3%)
- **Estimated cost:**
 - Many of same factors influencing diversion (weekly vs. bi-weekly, mandatory vs. subscription)
 - Extent of rural service
 - Public vs. private and competition
 - \$50-60 per household per month

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Option 5: Mandatory Recycling and/or Disposal Bans at Recycling and Transfer Stations

- **Would apply to 2-bin materials and green waste at recycling and transfer stations**
- **Enforcement would be a challenge**
 - Suggest progressive increase in enforcement
- **Improved signage and 6-12 month education campaign**
- **Diversion potential: difficult to measure; could be 4-5 percentage point increase**
- **Estimated cost:**
 - \$30-100,000 for implementation
 - Could be much more if strict enforcement is required

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Option 6: Commercial Recycling and Green Waste Program

- **Key constraint – Transportation cost to markets**
- **Four key elements:**
 - Mandatory recycling ordinance
 - Business recycling at recycling and transfer stations
 - Require collection firms to provide recycling services through licensure
 - Develop and contract for new processing facilities
- **Diversion potential:**
 - 80% participation and 60% capture = 13,400 annual tons (4.5%)
- **Estimated cost:**
 - Added cost to some businesses
 - Assuming diversion incentives continued: \$540,000 annually
 - Added staffing for implementation, education, and promotion

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Option 7: Bioconversion of Food and Other Organics

- **County issue RFP for organics processing facilities suitable for food and other organics**
- **Key features:**
 - Price less than landfill tip fee (perhaps \$30 per ton less)
 - Outreach with collection firms and major food generators
 - If necessary, food recycling ordinance
- **Collection**
 - Changes to practices for generators
 - Changes to current collection systems
- **Processing**
 - Receive collection trucks and prepare/mix feedstocks in an enclosed building with biofilters and other features to manage air flow and prevent odors
 - Mixing and moving feedstock daily
 - Requires more sophisticated electronic controls and/or more sophisticated and meticulous daily operations



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Option 7: Bioconversion of Food and Other Organics (cont.)

- **Types of processing systems**

- Covered forced air
- Bays, beds and tunnels
- In-vessel
- Anaerobic digestion (wet or dry)

- **Estimated diversion:**

- 50 percent for food, 50 percent for wet- and food-soiled paper, and 10 percent for wood, = 21,600 annual tons (7.3%)

- **Estimated cost:**

- \$70-170 per ton



Option 8: Increase County Procurement of Recycled Products

- **Important way for County to “walk the talk”**
- **Can help local drive markets for glass, mulch and compost, other niche materials**
- **Diversion potential:**
 - Small; main benefit is local market development and related environmental benefits
- **Estimated cost:**
 - Some added cost possible for material purchases
 - Staff time for refining procurement policies

Option 9: Marketing Partnership with Other Hawai'i Counties

- **Team with the other Hawai'i counties and the State government to investigate joint marketing and market development opportunities**
 - Improved pricing for backhauling containers to the mainland and overseas markets
 - Funding pilot programs for new local end uses
 - Joint marketing of materials to improve market prices and/or lower transportation costs
- **Diversion potential:**
 - Small, main benefit is local market development and related environmental benefits
- **Estimated cost:**
 - Staff time for additional marketing activities

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Option 10: Other Potential Recycling Opportunities

- **10a. Improve recycling opportunities in County parks**
 - Develop a program for providing recycling opportunities in all County parks
 - Could be a two-bin system adjacent to all garbage bins at each park
 - Start with pilot program to test effectiveness and cost
- **10b. Improve recycling opportunities on downtown streets**
- **10c. Expand the promotion of event recycling**
- **10d. Expand visitor industry recycling**
 - Expand existing efforts to work with this sector to improve recycling opportunities
- **10e. Construction and demolition waste reduction plans**

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Household Hazardous Waste and E-Waste



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Household Hazardous Waste and Electronics (E-Waste) Overview

- **Household Hazardous Waste**
 - Used household products exhibiting corrosive, reactive, toxic, or ignitable properties are considered “household hazardous waste” (USEPA)
 - Includes automotive fluids, paints, oils, cleaners, pesticides, poisons, and batteries
 - Require special handling, transport, and disposal or recycling methods and should not be disposed of in landfills or the sanitary sewer
- **E-Waste**
 - Electronic waste (e-waste) consist of any broken electronic devices, or unwanted electronic products, at or nearing the end of their useful life
 - Includes computers, VCRs, copiers, stereo equipment, televisions, cell phones, and monitors
 - Many e-wastes, such as CRTs (cathode ray tubes) from televisions and monitors, include components that are toxic and should be kept out of landfills

Household Hazardous Waste and Electronics (E-Waste) Overview (continued)

- **HHW collection events**
 - Hilo Recycling and Transfer Station – 1st Saturday of June and December
 - Kealahou (Kailua) Recycling and Transfer Station – 2nd Saturday of June and December
 - Pahoa Recycling and Transfer Station – 1st Saturday of March
 - Waimea Recycling and Transfer Station – 1st Sunday of March
- **43,652 pounds collected in 2007, and 24.5% diversion rate estimated in 2008 Waste Composition Study**
- **E-waste collected at drop-off sites in Hilo and Kona - collection and recycling by Recycle Hawai'i under contract to County**
- **E-waste shipped to the US mainland, and recycled by certified facilities**
- **Kea'au recycling and transfer station**
 - Product exchange and re-use center for dropoff and purchase
- **183 tons collected in FY 2008**

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Option 1: Develop Fixed, Permanent Facilities at Recycling and Transfer Stations

- **Add permanent collection facilities for HHW, eWaste and some special wastes at select recycling and transfer stations (planned at Pahoa)**
 - Facilities would include secured areas for storing, and packaging many different materials for shipment
- **Estimated cost**
 - \$500,000 - \$1.5 million per facility
 - Annual operating costs about \$750,000 for two facilities: each additional facilities might cost \$100-200,000 per year

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Option 2: Additional One-Day Collection Events

- **Increase frequency of events at existing locations and/or have mobile events in different communities**
- **E-waste collection could include a container or trailer that rotates on a set schedule to different recycling and transfer stations**
- **Somewhat less effective than fixed facilities**
- **Estimated cost:**
 - \$30-40,000 per event
 - A single mobile e-waste trailer could be implemented for about \$100,000 per year.

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Option 3: Establish E-Waste Take Back Programs with Manufacturers or Sellers

- **Possible County actions:**
 - Promote existing take back programs by electronic products manufacturers such as Apple®, Dell®, Hewlett Packard®, and others
 - Request grants from manufacturers or sellers that could be used to offset the costs of handling and shipment of e-waste back to manufacturers
 - Promote re-use networks (e.g., Rethink Initiative) that allows consumers to sell or donate their used equipment to others
 - Work with electronic retailers to establish collection events at retail locations
- **Estimated cost**
 - Modest cost for additional staff time and education and promotional materials

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Option 4: Implement Advanced Disposal Fee for E-Waste

- **County ordinance that would implement advance disposal fees on certain types of e-waste**
 - Collected at the point of sale
 - Earmarked to support additional reuse, recycling and safe disposal of eWaste
 - California fee is \$6-10 for certain hazardous eWastes such as televisions, computers, and other types of equipment that contain cathode ray tubes, liquid crystal displays or plasma screens
- **Estimated cost**
 - Staff time to draft and implement the legislation
 - Added costs to retailers to administer the fee
 - Increased electronics prices paid by consumers

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Option 5: Add E-Waste Product Exchange and Re-Use Centers

- **Establish centers similar to the one at the Kea`au recycling and transfer station at other stations**
 - Feasibility would need to be assessed at individual stations
- **Estimated cost**
 - Minimal added capital cost if added to eWaste dropoff center
 - Additional labor and transportation costs of \$20-100,000 per station

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Collection and Transfer



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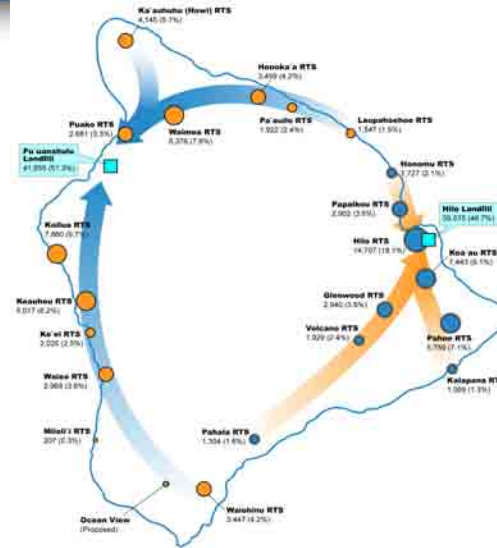
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Existing Conditions Collection

- **Residential collection**
 - No County-sponsored curbside service (21 recycling and transfer stations)
 - Private companies offer curbside service
 - About 10% of SF HH
 - Typically \$20-30 per mo.
- **Non-residential collection**
 - Provided by private firms in competitive market
 - One large firm (Pacific Waste) and many smaller firms
 - Some non-residential use of recycling and transfer stations

Existing Conditions County Transfer System

- **System developed in 1970s**
- **Partially staffed, 12 hrs/day, 362 days per year**
- **Recycling at Stations**
 - Glass (19)
 - Mixed Recyclables (18)
 - Scrap Metal (3)
 - Green Waste (3)
 - Reuse Center (3)
 - Hi-5 Redemption Center (10)
- **FY08 Garbage Deliveries**
 - 41,655 tons to Pu`uanahulu LF
 - 39,575 tons to South Hilo LF
 - 7,470 loads
 - 10.9 ton avg. payload



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Existing Conditions County Transfer System Status

- **Many stations in need of major repair (\$3-5m/station)**
 - Major deficiencies requiring reconstruction (13)
 - Serious deficiencies correctable without reconstruction (6)
 - Minor deficiencies (2)
- **County five year repair and upgrade plan (2006)**
 - Major reconstruction of Volcano, Glenwood, Pāhā, and Waipahoehoe stations between 2006 and 2011
 - Funding authorized for Pāhā only
- **Planned future upgrades**
 - Standardized layouts
 - Minimize station down time
 - Provide for added recycling

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Option 1a: Retain Existing System

- **Advantages:**
 - Simplicity (continue existing practices at no added cost)
 - In more urbanized areas of County, those who want curbside can get it for a fee
Reasonably convenient service provide to all at relatively low cost
- **Disadvantages:**
 - Curbside not available for many residents in rural areas
 - Current curbside service is relatively inefficient
 - No standardization of services
 - No control over the type and condition of vehicles used by haulers

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Option 1b: License all Existing Collection Companies

- **Ordinance requiring all companies collecting garbage or recyclables from residents to obtain a “material collection license”**
 - Small annual fee
 - Display a “license sticker” on each vehicle
 - Annual safety inspections of each vehicle
- **County promote collection services by licensed haulers**
 - Listing business names and phone numbers on website and in promotional material
 - Would help inform the public and provide some measure of “sanction” of those services
- **Estimated cost:**
 - Small initial cost to prepare the ordinance and develop the licensing program
 - Small annual cost to license and inspect each vehicle
 - Part or all of the annual cost of the program could be paid for through licensing fees

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Option 1c: License all Existing Collection Companies and Require bi-Weekly Recycling

- **Same as suboption 1b, except service provided MUST include both garbage and recycling**
- **Materials should match the County's 2-bin recycling system**
- **To implement this option, the County would need to ensure that there are places for haulers to deliver recyclables**
 - A minimum, facilities would be needed on the west and east sides of the island
 - 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
- **Would help increase recycling percentage**
- **Would probably result in some customers dropping the service**

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Option 1d: County Offer Collection Services using County Crews

- **Establish a new department of collections, and implement weekly curbside collection of garbage and every-other-week collection of recyclables County-wide**
- **Service in urban areas (~70% of SFhhs)**
- **Would require processing facilities for recyclables in both West and East Hawai'i**
- **Implementation challenges**
 - 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
- **Estimated cost: \$30 and \$50 per month**

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Option 1e: Exclusive Franchises for Private Sector Collection

- **County establish 2-4 franchises with exclusive right to collect waste and recyclables from residential customers**
- **County recycling and transfer stations would remain open**
- **Optional service, garbage and every-other-week collection of recyclables**
- **Advantages: One truck on one street, same rate for all, increased recycling, increased opportunities for curbside**
- **Implementation challenges**
 - Could this be implemented under state's managed competition statute? – legal challenge from County UPW likely
 - Assigning franchises and equalizing rates Countywide
 - Establishing a rate review process
 - Significant expertise and time required to implement
- **Estimated cost: \$30 and \$50 per month**

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Option 2: Change Permits to Allow Commercial Recycling at Recycling and Transfer Stations

- **Permit change from convenience center to transfer station currently in process**
 - Would allow stations to be accessed by non-residential customers
 - Would eliminate the 40 ton/mo. cap at each station
- **Diversion and Costs**
 - 1,100-2,200 tons per year added diversion
 - \$200,000-\$400,000 annually.
 - Small amount for additional signage, education, and promotion

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Option 3: Timely Reconstruction of Stations That are in Need of Major Repair

- **13 stations needing reconstruction and 6 with major deficiencies**
- **Approx. \$3-5m per station for reconstruction**
- **Recommendation is one station per year**



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Option 4: Add Full-Time Attendants and Reduce Operating Hours at Recycling and Transfer Stations

- **Why?**
 - Fewer hours common in many other U.S. systems
 - As recycling gets more sophisticated, the need for staffing for monitoring and education increases
 - What is an appropriate level of service considering other funding priorities?
- **Assume operating hours would be reduced by approximately 50%**
 - 8 hours per day
 - Larger stations (Kailua, Keahou, Waimea, Hilo, Kea'au, Paho) 7 days per week
 - Smaller stations 3 days per week
 - Include one weekend day
 - Adjacent stations open on alternating days
- **Estimated cost:**
 - Annual savings of \$200-400,000 per year
 - Much more if full time attendants added with today's operating hours

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Option 5: Add Full-Time Attendants, Reduce Operating Hours, and Implement PAYT at Recycling and Transfer Stations

- **Similar to prior option, adding PAYT**
- **Tag system**
 - 52-104 tags to each residential property owner with tax bill each year
 - Additional tags available for \$1-2 each at County offices or possibly at retail establishments
 - Volume-based number of tags for bulk loads (e.g., 4 tags per pickup truck load)
- **Implementation issues**
 - Considerable education and promotion with 3-6 month grace period
 - Provide illegal dumping enforcement authority -- allow County departments to levy fines
- **Estimated cost**
 - No added costs except small attendant shed at some stations
 - Added revenue from tag sales

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Option 6: Reduce System Costs by Closing Select Stations and Reducing Operating Hours

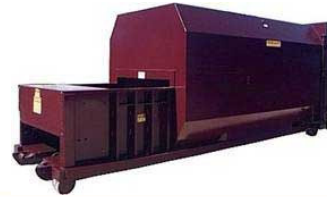
- **Why? Funds for expanding waste reduction and recycling will be tight**
- **This options would allow for an expansion of services, but at fewer locations**
- **Would require education and increased focus on illegal dumping and cleanup**
- **Estimated cost savings: \$0.7m-1.5m per year**

Closed Stations	Closest Remaining Station(s)
Papaikou	Hilo
Honolulu	Laupahoehoe, Hilo
Paʻauilo	Honokaʻa, Laupahoehoe
Puako	New facilities would be opened at the Puʻuanahulu Landfill site, Waimea
Keʻei	Keauhou
Waiea	Keauhou, Waiohinu
Miloliʻi	Keauhou, Waiohinu
Pahala	Waiohinu
Kalapana	Pahoa
Glenwood	Volcano

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Option 7: Lower Transportation Costs by Compacting Recyclables

- **FY2008: \$720,000 for recyclables transportation: \$430,000 for mixed recyclables**
- **7.1 Convert one chute to recycling at Kea`au, Pahoa, Waimea, Keauhou, and Kailua**
 - Cost: About \$100,000 per year for staffing and education, but overall cost-effective
 - May not be feasible because of peak period traffic problems
 - Consider pilot program
- **7.2 Install stationary compactors at stations**
 - Currently 1.4 tons/load for mixed recyclables
 - Increase in compaction 3:1 - 5:1
 - May be cost-effective at some stations, particularly if quantity recycled increases



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County of Hawai`i Integrated Solid Waste Management Plan Update

Residuals Management



CH2MHILL
in association with

GA GESMETRICIAN
ASSOCIATES

SKY VALLEY
ASSOCIATES

Existing Conditions South Hilo Sanitary Landfill

- Located southeast part of Hilo
- Owned and operated by the County of Hawai'i
- In operation since the 1970's
- 40 acre site
- A former quarry
- Unlined
- 5 years of life remaining at current recycling rates (or through 2013)



EXHIBIT 1
South Hilo Landfill Site Map

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Existing Conditions West Hawai'i Sanitary Landfill

- Located southwest of Waikoloa at Pu'uuanahulu
- Owned by Hawai'i County and operated with County personnel
- Managed by WM of Hawai'i
 - Construction of new landfill cells
 - Environmental monitoring
 - Closure and post-closure activities.
- 300 acre site that opened in 1993
- Subtitle-D Landfill
 - Lined with a geomembrane
 - Engineered leachate collection system
 - Landfill gas collection and control system was installed in 2006
- 33 years of life remaining at current recycling rates



EXHIBIT 2
West Hawai'i Sanitary Landfill (Aerial View)

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Kailua-Kona Closed Landfill

- **Operated from the late 1970s until 1993**
- **Located east of the Queen Ka`ahumanu Highway approximately 3 miles north of Kailua-Kona**
- **Subsurface fires since 1991**
- **County is investigating fire suppression options**
- **Long term management options**
 - Extinguishing the subsurface fires, repairing the cover, and managing the waste in place
 - Excavate the landfill, remove materials that can be recycled or composted, and transfer residuals to the WHSL

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Waimea Closed Landfill

- **Operated from the late 1960s until 1987**
- **Subsurface fires documented in 2006 and 2008**
- **Subsurface fires have been extinguished**
 - Limiting the amount of influx of oxygen to the subsurface of the landfill by backfilling and grading
- **Additional cover material will be applied to the surface to seal the landfill from the atmosphere in an effort to prevent further combustion**

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Private Facilities and Flow Control

- **Flow control ordinances**
 - Ensure that materials flow to facilities in which local government has significant capital investment and/or other interest
 - Common in U.S.
- **Proposed recovery facility by a private collection firm**
- **Concerns:**
 - “Some added risk of increased commercial collection costs
 - Reduces the County’s flexibility to adopt zero waste programs
 - Some loss of control and flexibility for County to choose a recovery and disposal technology that best meets the needs of the entire County rather than the interest of a single firm

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Overview Recovery and Treatment

- **Definition: Thermal, biological, or chemical processing**
 - AFTER waste reduction, reuse, recycling, and bioconversion
 - BEFORE landfill disposal
- **“Conversion technologies” or “Alternative technologies”**
 - Tremendous current interest in U.S.
 - Many RFPs and studies in progress
- **European Union Landfill Directive**
 - Driving interest in thermal technologies and mechanical-biological treatment

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Thermal Technologies

- Mass-burn Waste-to-Energy
- Refuse-derived fuel
- Gasification
- Pyrolysis
- Plasma Arc



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Mechanical-Biological Treatment (MBT)

- Biological treatment with RDF for combustion
- Biological treatment with composting
- Anaerobic digestion



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Recovery and Treatment Key Issues

- **Only mass-burn WTE is common in U.S.**
 - About 10 RDF plants and 5 MBT plants in commercial operation in U.S.
 - About 150 MBT plants in Europe
 - No commercial-scale gasification, pyrolysis, plasma arc, or anaerobic digestion facilities processing municipal solid waste in US and very limited elsewhere
- **50-90%+ reduction in landfill disposal**
- **Most technologies are complex with high capital costs**
- **Consistent with zero waste principles?**
- **Costs for East Hawai`i**
 - WTE costs \$120-145/ton
 - Other technologies
 - Highly uncertain costs, \$80-\$210 per ton

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Recovery and Treatment Key Issues (continued)

- **Beneficial uses: further recovery of metals and some recyclables possible, electricity, syngas, compost (usually poor quality)**
- **Greenhouse gas emissions**
 - Complex, but ¼ to ½ the GHG of landfill no/low LFG capture
- **Other air emissions**
 - All can meet U.S. EPA requirements
 - Gasification, pyrolysis, plasma arc – potential for lower emissions than mass-burn WTE
- **Water quality**
 - Most will reduce risk of long-term groundwater quality issues
- **Markets – cost effectiveness can depend on markets**

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Recovery/Treatment Option 1: No Action; Wait to Assess Success of Current Conversion Technology Projects

- **Monitor current developments**
- **Leave open as an option for future plans**
- **Would require committing to a landfill option for East Hawai`i**

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Recovery/Treatment Option 2: Waste-to-Energy Facility for East Hawai`i; Ash and Bypass Materials to SHSL

- **Reconsider Wheelabrator proposal or conduct another procurement**
- **Advantages**
 - Proven technology
 - Added metal recovery and electricity generation
 - Less land needed for landfilling
 - Reduced potential for water quality impacts from landfilling
 - Reduced greenhouse gases
- **Disadvantages**
 - Cost would be \$50-75 per ton more than landfill
 - At 230 tpd, somewhat inconsistent with zero waste principles
 - Would meet regulatory requirements, but some air emissions would result

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Recovery/Treatment Option 3: Waste-to-Energy Facility for all County Residuals; Ash and Bypass Materials to WHSL

- **Same as Option 2, but larger facility**
- **Advantages**
 - Compared to Option 2, lower cost processing on a per-ton basis, but would those savings exceed the added cost of trucking?
 - Could size the plant to accommodate 50% recycling rate or higher
- **Disadvantages**
 - Same as Option 2
 - Added air emissions from trucking waste to the facility

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Recovery/Treatment Option 4: One or More Modular Waste-to-Energy Facilities in Rural Areas; Ash and Bypass Waste to SHSL and WHSL

- **Small 20 tpd modular facility**
- **Locate at the Waiohinu recycling and transfer station (with waste from Pahala, and Miloli'i)**
- **Cost \$40 per-ton less to \$50 per-ton more than landfill (net of trucking cost savings)**
- **Advantages**
 - Reduce County trucking by 20%
 - Could be combined with reconstruction of station
 - Some additional metal recovery
- **Disadvantages**
 - Would meet regulatory requirements, but some air emissions would result
 - Remote location could make electricity generation problematic
 - Added staff training and skills needed
 - Operating risks in a remote area

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Recovery/Treatment Option 5: Develop MBT Facilities at the SHSL and/or WHSL Sites

▪ **Advantages**

- Potential for added recovery of recyclables
- Reduced greenhouse gas emissions
- Reduced potential for water quality impacts from landfilling
- Beneficial use for low-quality compost (land reclamation, landfill cover)

▪ **Disadvantages**

- Cost would be \$30-130 more than landfill
- Highest risk of system failure of any recovery option
- Would require specialized operating expertise, sound preventive maintenance, and vigilant on-going odor management practices

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Landfill Option 1: Expand SHSL for East Hawai`i residuals; use WHSL for West Hawai`i residuals

▪ **Two sequenced expansions**

- Lateral expansion
 - Lined cell adjacent to existing landfill
 - 9 years of capacity at existing recycling rates
- New landfill
 - Lined landfill in on-site quarries
 - 38 years at existing recycling rates

▪ **Lateral expansion**

- Active stormwater management to minimize leachate production
- Regulations would require bottom liner with leachate collection and recovery system
 - two layers of heavy duty plastic geomembrane, placed above and below a geosynthetic clay liner
 - engineered drainage layer
- Leachate treatment
 - Initial feasibility study showed that constructed wetlands could effectively treat leachate

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**Landfill Option 1 (continued):
Expand SHSL for East Hawai`i residuals;
use WHSL for West Hawai`i residuals**

▪ **New Landfill**

- Siting study conclusions: *“The location adjacent to the South Hilo Sanitary Landfill rates highest”*
- *On County-owned land used for quarry operations southeast of the existing landfill*
- *The 75-acre quarry site is slightly larger than the existing landfill footprint (see Exhibit 1).*
- *Would be operated using the same assumptions as the lateral expansion*

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**Landfill Option 1 (continued):
Expand SHSL for East Hawai`i residuals;
use WHSL for West Hawai`i residuals**

▪ **Advantages**

- Relatively low risk technology compatible with any future recovery or treatment option
- Relatively low capital investment -- consistent with zero waste principles
- Few siting issues anticipated
- Relatively low cost option (about \$10-15/ton more than current SHSL cost)

▪ **Disadvantages**

- Operational challenges associated with high rainfall
- Worst greenhouse gas emission performance
- Volatile organic compound (VOC) emissions
- Some water quality risks

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Landfill Option 2 Landfill all County Waste at the WHSL

- **Transfer East Hawai`i residuals at the Hilo sort station and transport by truck to the WHSL**
- **12 trucks on average day (18 tons per truck)**
- **Cost**
 - About \$26 per ton more than current SHSL
 - About \$10-15 per ton more than Option 1
- **Advantages**
 - Similar to Option 1 with less technology risk and less potential for water quality impacts
- **Disadvantages**
 - Public opposition to trucking waste from East Hawai`i is likely
 - Added emissions from vehicles

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Landfill Option 3 Bale and Barge East Hawai`i Waste; WHSL for West Hawai`i

- **Bale and shrink-wrap residuals at Hilo sort station**
- **Barge to other island or to Mainland**
- **Honolulu County Procurement**
 - Award to Hawaiian Waste Systems (HWS) for landfill in eastern Washington State
 - Barge across Pacific and up Columbia River, then short truck-haul to landfill
 - Assumed backhaul of aggregates or other commodities
 - \$99 per ton
 - Award is under protest



Landfill Option 3 (continued) Bale and Barge East Hawai`i Waste; WHSL for West Hawai`i

- **Estimated cost**
 - HWS has suggested \$85-100 per ton to County staff
 - With specific contract language, price would probably be higher
- **Advantages**
 - Appears to be technically feasible
- **Disadvantages**
 - Some people object to the principle of exporting waste
 - Added pricing risk for proposals dependent upon a secure and consistent backhaul
 - Added risk associated with shipping baled garbage across the Pacific Ocean
 - Added fuel emissions from lengthy barge transportation
 - Risk of delays in barge transportation – storage or backup disposal needed

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Next Steps

- **Consider public input and work with SWAC to analyze options**
- **Prepare recommendations and implementation plan**
- **Discuss with SWAC and Council**
- **Draft Plan in May 2009 with public meetings**

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