

**HAWAI'I 2000 PLAN  
for  
INTEGRATED SOLID WASTE MANAGEMENT**

**State of Hawai'i Department of Health  
Office of Solid Waste Management**

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## ACRONYMS AND ABBREVIATIONS

|        |   |
|--------|---|
| AB     | Assembly Bill   |
| ADF    | advance disposal fee  |
| BIA    | Building Industry Association                                     |
| C&C    | City and County of Honolulu                                       |
| C&D    | construction and demolition                                       |
| CCA    | chromated-copper-arsenate   |
| CDL    | construction, demolition and landclearing                         |
| CFR    | Code of Federal Regulations                                       |
| CHC    | Clean Hawai'i Center  |
| CIWMB  | California Integrated Waste Management Board                      |
| CWC    | Clean Washington Center   |
| CY     | calendar year   |
| DAGS   | Hawai'i Department of Accounting and General Services             |
| DBEDT  | Hawai'i Department of Business, Economic Development, and Tourism |
| D.C.   | District of Columbia  |
| DEEP   | Detroit Environmental Enforcement Project                         |
| DEM    | Indiana Department of Environmental Management                    |
| DEQ    | Oregon Department of Environmental Quality                        |
| DLNR   | Hawai'i Department of Land and Natural Resources                  |
| DNR    | Wisconsin Department of Natural Resources                         |
| DOE    | Hawai'i Department of Education                                   |
| DOH    | Hawai'i Department of Health                                      |
| DOT    | Hawai'i Department of Transportation                              |
| DPW    | Department of Public Works  |
| DPW&WM | Maui County Department of Public Works and Waste Management       |
| EBN    | Environmental Business News                                       |
| EE     | environmental education   |
| EMF    | Environmental Management Fund                                     |
| EPA    | United States Environmental Protection Agency                     |
| FCA    | full cost accounting  |
| FY     | fiscal year   |

|         |  |
|---------|--|
| GCA     | General Contractors' Association                       |
| GEMI    | Global Environmental Management Initiative             |
| GO      | General Obligation (Bonds)                             |
| HABiT   | Hawai'i Advanced Building Technologies                 |
| HAR     | Hawai'i Administrative Rule(s)                         |
| HDPE    | high density polyethylene                              |
| HEEA    | Hawai'i Environmental Education Association            |
| HEER    | DOH, Hazard Evaluation and Emergency Response (Office) |
| HEP     | Hawaiian Earth Products, Ltd.                          |
| HHW     | household hazardous waste                              |
| HIMEX   | Hawai'i Materials Exchange                             |
| HIOSH   | Hawai'i Occupational Safety and Health                 |
| HMR     | Hawai'i Metal Recycling Co.                            |
| H-POWER | Honolulu's waste-to-energy incinerator                 |
| HRS     | Hawai'i Revised Statutes                               |
| ISWM    | Integrated Solid Waste Management                      |
| JTR     | Jobs Through Recycling                                 |
| KAB     | Keep America Beautiful                                 |
| MCBH    | Marine Corps Base Hawai'i, Kāne'ōhe Bay                |
| MOEA    | Minnesota Office of Environmental Assistance           |
| MRC     | Master Recycler Composter                              |
| MRG     | Maui Recycling Group                                   |
| MRF     | materials recovery facility                            |
| MSW     | municipal solid waste                                  |
| MWP     | mixed waste paper                                      |
| NOAA    | National Oceanic and Atmospheric Administration        |
| OCC     | old corrugated containers                              |
| ONP     | old newspapers   |
| OP      | office paper   |
| OSHA    | Occupational Safety and Health Administration          |
| OSWM    | DOH, Office of Solid Waste Management                  |
| PAYT    | pay-as-you-throw                                       |
| PCS     | petroleum contaminated soil                            |



|       |   |
|-------|---|
| PGA   | Professional Golfers' Association (of America)    |
| Plan  | ISWM Plan   |
| PSA   | public service announcement                       |
| PSU   | Portland State University                         |
| PUC   | Public Utilities Commission                       |
| RC&D  | Resource Conservation and Development             |
| R&D   | research and development                          |
| RCA   | recycled concrete aggregate                       |
| RCAC  | Rural Community Assistance Corporation            |
| RCRA  | Resource Conservation and Recovery Act            |
| SCORE | Select Committee on Recycling and the Environment |
| SLH   | Session Laws of Hawai'i                           |
| SWAC  | Solid Waste Advisory Committee                    |
| SWANA | Solid Waste Association of North America          |
| TCLP  | Toxicity Characteristic Leaching Procedure        |
| UH    | University of Hawai'i                             |
| UPW   | United Public Workers                             |
| WDOE  | Washington Department of Ecology                  |
| YES   | Youth for Environmental Service                   |

# EXECUTIVE SUMMARY

Hawai'i's waste management system has improved greatly since the beginning of the 1990s, but there is much room for improvement.

Waste management in Hawai'i faces significant challenges. The economy lacks diversity and market access, and management options are severely limited by the shortage and expense of available land. Burying wastes in island landfills is not a sustainable strategy for the long term. In addition, because of the obstacles to accessing national and international markets, due primarily to Hawai'i's isolation, it is essential to develop local reuse and recycle options for discarded materials.

The Hawai'i 2000 Plan for Integrated Solid Waste Management (ISWM) addresses the waste management challenges with diverse recommended actions. The planning process began with the following two basic purposes, defined by the State of Hawai'i Department of Health (DOH):

- To address the primary environmental burdens and liabilities caused by improper handling of solid wastes in Hawai'i.
- To develop programs that have the greatest potential to reduce the quantity of wastes generated and to increase recycling and composting.

This Plan is built on the State's 1991 Integrated Solid Waste Management Plan and the waste management laws that were first adopted that same year. The Hawai'i Revised Statutes (HRS) set out the following ambitious goal for the state:

*"... to reduce the solid waste stream prior to disposal by:*  
*(1) twenty-five percent by January 1, 1995; and*  
*(2) fifty percent by January 1, 2000,*  
*through source reduction, recycling, and bioconversion."* (HRS 342G-3)

These goals have not been met. Achieving the state's solid waste reduction and recycling goals is the priority addressed by this Plan revision.

In Chapter 1, the Plan sets the context for improving waste management practices by examining sustainability concepts. In Chapter 2, the existing waste systems on all islands are examined, and a number of recommendations for improvement are made. In Chapter 3, the core of the Plan, the analysis of six focus topics provides guidance and recommendations for ISWM system improvements. The Solid Waste Advisory Committee (SWAC) and the DOH selected these topics, as follows:

- Illegal Dumping
- Commercial Recycling
- Construction and Demolition (C&D) Waste Management
- Market Development
- Public Education
- State Program Funding

Recommendations that resulted from the analysis of these six topics are included in Chapter 4 of the Plan.

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## A New Context

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Greater solid waste planning challenges will face Hawai'i in the new century. The solutions lie in pursuing sustainability, or "...meeting the needs of the present without compromising the ability of future generations to meet their own needs."<sup>1</sup> Chapter 1 of the Plan begins by identifying five core principles that provide guidance for creating a sustainable ISWM system, as follows:

- Plan for the long-term.
- Work to maximize all elements of the "triple bottom line"<sup>2</sup> (i.e., economic prosperity, environmental stewardship and social equity), and not to trade one against the other.
- Increase efficiency in management of resources because inefficiency damages the economy as well as the ecology.
- Make the most of local strengths while taking advantage of global connectedness.
- Foster collaboration rather than mandates, and support incentives rather than penalties.

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## Changes to the Existing Solid Waste System

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Chapter 2 of the Plan examines the overall conditions of waste management in Hawai'i today. Several recommendations for improvement, which are contained in more detail in Chapter 4, come from this evaluation.

### Reaffirm Statewide Solid Waste Goals

Hawai'i's waste diversion has climbed from under 5 percent in 1990 to over 24 percent in 1999. This is a strong improvement. However, it is well short of the 50 percent goal set in 1991. Hawai'i's diversion rate is about two-thirds the national average as measured by the U.S. Environmental Protection Agency.

Though still remote, the 50 percent goal can be achieved. Effective actions must be taken, such as those outlined in this Plan, and time must be allowed for the private infrastructure to grow.

- ⇒ The Hawai'i State Legislature should reaffirm the 50 percent waste diversion goal, but the timeframe for achieving that goal should be extended to 2010.

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<sup>1</sup> World Commission on Environment and Development. 1987. *Our Common Future*.

<sup>2</sup> John Elkington. 1998. *Cannibals with Forks, the Triple Bottom Line of 21<sup>st</sup> Century Business*. New Society Publishers.

## **Promote County Solid Waste Planning**

To achieve the waste diversion goal, actions at the county level are essential. It is the counties that directly provide and/or authorize waste management services to the public.

- ⇒ The state should challenge and support the counties to update their ISWM Plans. The DOH should request that counties identify and address the highest priority needs to improve their system, and should encourage counties to adopt programs that will contribute to achieving the statewide goals.

## **Develop State Agency Operations into Models**

Agency and facility managers can set a model of best waste management practices for businesses and the public. State agencies can also help improve the economics of waste diversion by recycling more of their wastes and therefore increasing the supply of recyclables.

- ⇒ State agencies should develop and improve in-house recycling programs. Each facility manager should develop and implement a recycling plan and report annually to the agencies' director on their accomplishments.

## **Establish a Permanent Advisory Committee**

An advisory committee provides an important means for sharing information and experiences, and for advising the state on policies and programs. This coordination function should be made permanent to support statewide policies and programs.

- ⇒ DOH should continue regular meetings of an advisory committee for solid waste, with special working groups to coordinate activities on C&D waste management, market development, and public education.
- ⇒ DOH should coordinate and support specialized training on ISWM policies and programs for staff from state and county agencies. This will build needed expertise that can be shared with other jurisdictions in Hawai'i.

## **Restructure Funding of Solid Waste Services**

It has been shown in many mainland communities that if the public pays the full cost of waste disposal, they waste less and recycle more.

- ⇒ DOH should encourage county programs to determine their full costs for waste disposal. Counties should change, when practical, to a user fee revenue base.
- ⇒ State and county agencies should use an increased portion of the fees paid for waste disposal to fund programs that help reduce the waste disposed.

## **Measure Statewide Progress and Report to Public**

The DOH and the counties need to cooperate to gather accurate data from private recycling and waste management companies. An accurate database will provide information on how much and what types of materials are being recycled.

- ⇒ DOH should manage a master database to which counties contribute data.
- ⇒ DOH should publish an Annual Solid Waste Management Scorecard showing progress toward the goal.

## **Reduce the Quantity of Waste Generated**

Hawai'i's waste generation, on a per-person basis, is more than 30 percent greater than the national average. In Hawai'i, trash is produced at a rate of 5.8 pounds per-person-per-day, while nationally that number is 4.4 pounds per-person-per-day. There are many causes of this high generation rate, but the important fact is that this can be managed.

- ⇒ DOH should examine national efforts of source reduction and address important issues, such as public education, backyard composting, and promotion of best practices for waste reduction and recycling by businesses.
- ⇒ DOH and the counties should prioritize programs that create a direct association between the amounts and the costs of waste produced. This would include implementation, if practical, of solid waste user fees.

## **Encourage Sustainable Disposal Strategies**

Solid waste disposal is a long term commitment, but one that is getting more difficult to maintain. In 1991, there were 19 landfills in Hawai'i, but today there are only 10. One incinerator operates on Oahu. Meanwhile, elsewhere in the U.S. and the world, new technologies and approaches for waste processing are rapidly evolving. These include technologies for producing compost, energy, and other potentially valuable materials.

- ⇒ DOH should continue to provide training for the counties in landfill operations.
- ⇒ DOH should provide technical assistance and possibly financial assistance for the selection and implementation of emerging technologies for waste processing.

## **Areas of Focus**

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Chapter 3 presents research and analysis on the six focus topics that the DOH and SWAC selected to be addressed in this Plan. Recommendations from examining these topics, included in Chapter 4, provide opportunities to achieve ISWM improvements in Hawai'i. The following sections describe each focus topic.

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## Illegal Dumping

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Illegal dumping is an ever-present problem that impacts Hawai'i's economy and environment. It includes operation of non-permitted dumps, sometimes used by commercial waste hauling companies, and roadside dumps, most often used by residents. Both have negative impacts on Hawai'i's groundwater and beauty.

### Reduce Economic Advantages of Illegal Dumping

Unfortunately, although damaging to the environment, improper waste disposal can be cheaper and easier than hauling waste to a permitted landfill. In addition, an illegal dump can make money for its operator.

- ⇒ The state and counties should support development of cost-effective and convenient alternatives for diversion of C&D wastes from disposal.
- ⇒ The state and counties should enforce the existing laws more rigorously and publish enforcement actions.

### Coordinate State and County Enforcement Efforts

Coordinated efforts are needed to capture illegal dumpers and dump operators and hold them responsible for their actions. Increased oversight by police, building inspectors, fire and health officials, and community members could help to identify problem areas.

- ⇒ DOH should establish a multi-agency task force to improve coordination, to promote training of state and county officials in investigating problem sites, and to resolve inconsistencies between state and county regulations and enforcement practices.

### Build a Sense of Responsibility for Proper Disposal

Trade associations, waste haulers, landowners, environmental groups, and the public can be effective in curbing or ending illegal disposal practices. In addition, waste materials from construction sites can be tracked to assure that they are properly reused or disposed.

- ⇒ A coordinated state and county education program should be developed to target potential groups that may be involved in, or witness to, illegal dumping.
- ⇒ DOH should require construction and demolition companies to disclose how they dispose of wastes, and to maintain documentation of the "chain of custody" of waste materials to assure that they are properly handled.
- ⇒ A broad educational campaign should be conducted to heighten the public's awareness of the problems of roadside dumping and instill a community ethic that discourages despoiling the *ʻāina*.

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## **Commercial Recycling**

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Hawai'i has substantial opportunity to increase commercial business recycling that is both cost-effective and easy, especially for cardboard and office paper. The national recovery rate for cardboard boxes is 67 percent, while in Hawai'i it is only 29 percent.

The commercial recycling infrastructure in Hawai'i, including companies, equipment, and services, is far less than in areas with higher diversion rates. There is no single solution for the state or counties to increase commercial recycling, but a number of initiatives implemented together have proven successful elsewhere.

### **Target Specific Businesses to Create a Recycling Ethic**

Some types of businesses, such as the visitor industry, retail stores, and office buildings, generate substantial quantities of recyclables. Implementing recycling programs could save them money.

- ⇒ The state and counties should provide educational campaigns and workshops targeted to specific business sectors. The workshops should be followed by no-cost waste audits to help businesses identify recycling opportunities and provide technical information.
- ⇒ State office buildings should be one of the first to receive workshops, audits, and technical advice on recycling.

### **Enhance Economic Feasibility of Recycling**

Businesses that separate their materials for recycling may often pay more than businesses that do not. In addition, the costs of operating recycling businesses in Hawai'i are exceptionally high. Appropriate state and county action can reduce both these economic barriers.

- ⇒ The Hawai'i State Legislature should pass an "Opportunity to Recycle" policy. This policy should assure that businesses that wish to recycle can do so, and that their costs will not be greater if they choose to recycle.
- ⇒ DOH should launch an aggressive set of strategies to reduce transportation costs, both inter-island and overseas, and other operational costs for recycling businesses.

### **Set Commercial Recycling Goals**

The status quo, where waste disposal is favored over source reduction and recycling, needs to change. The state should impress upon businesses and recyclers that it is serious about reducing waste and increasing recycling rates, and that if progress is not forthcoming, legislative actions will be proposed.

- ⇒ DOH should set a goal of 45 percent diversion by 2003 and 50 percent by 2005 for commercial businesses. DOH should develop measurement tools to track progress.
- ⇒ If these goals are not achieved, DOH should convene a task force to develop and introduce to the Hawai'i State Legislature a Mandatory Commercial Recycling Act.

## **Construction and Demolition Waste Management**

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C&D materials, which are fully recoverable and recyclable, make up a significant portion of waste that is landfilled in Hawai'i. Outlets to recycle these materials exist. Construction contractors have been receptive to receiving technical assistance on recycling and best waste management practices. They have also responded favorably to fair, equitable, and flexible regulatory initiatives that would help increase recycling.

The management of treated wood, however, is a problem that requires further study.

### **Encourage Construction Industry Diversion**

The lack of information and experience with job site recycling practices makes it difficult for contractors to initiate new practices.

- ⇒ The state should provide technical assistance to high-volume C&D generators through literature and workshops that highlight best waste management practices.
- ⇒ The contractor licensing process and vocational training programs should be revised to incorporate training on best practices for reducing and recycling C&D waste.
- ⇒ C&D recycling should be made more convenient through development of portable drop-off stations and/or processing equipment to be placed near construction sites.

### **Support C&D Recycling Businesses**

Viable and conveniently located recycling businesses are essential to encourage contractors to recycle C&D materials.

- ⇒ The state should implement a multi-dimensional strategy, including technical and permitting assistance, help with facility siting, and marketing assistance, to encourage formation of new, and expansion of existing, C&D recycling businesses.

### **Discourage Disposal of C&D Wastes**

Both illegal disposal of all types of C&D waste and legal disposal of recyclable materials depress the economic efficiency of recycling.

- ⇒ To obtain a demolition or building permit, construction contractors should have to develop a C&D recycling plan and complete a solid waste disclosure form.



## **Create Model Public Sector Projects**

Government cannot expect industry to adopt improved practices unless public projects provide a model of practices that can be emulated.

- ⇒ DOH should provide training for public project and facility managers in best practices for C&D waste management. High-profile public projects should be targeted.
- ⇒ The State of Hawai'i Department of Accounting and General Services should improve procurement policies and regulations to encourage use of locally recycled products in public projects.

## **Examine Problems and Opportunities for Treated Wood**

New information is emerging about the hazards of treated wood and of new technologies for manufacture and recycling of treated wood.

- ⇒ DOH and the State of Hawai'i Department of Business, Economic Development, and Tourism should conduct research on the risks of disposal of treated wood in unlined landfills, on new wood preservation methods that are less toxic, and on technologies to incorporate this material into composite lumber products.

## **Market Development**

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Effective recycling programs hinge on markets, with local markets playing the key role for some materials. Three target commodities offer special opportunities: compost, glass, and paper. A public infrastructure for market development is lacking in Hawai'i. This is needed to help private industry develop market opportunities.

### **Develop a Market Development Framework**

A dedicated and persistent effort is needed to open new market opportunities and to reduce transportation barriers. The public sector is capable of providing a number of important services, including technology validation, feasibility studies, business recruitment, standards setting, and reduced transportation rates.

- ⇒ DOH should provide adequate budget and resources for a market development program that focuses on the targeted materials.
- ⇒ DOH should acquire, either through internal personnel development or contract, material-specific experts with experience in recycling technologies and communication to effectively work with processors and end-users.

## **Develop Local Organic Compost Markets**

The local compost industry is developing well in Hawai‘i. However, it still relies on low value end uses, such as mulch products. In order to increase the amount of organics diverted from the waste stream, higher value markets for compost products must be created and expanded.

- ⇒ DOH should implement a market development strategy to accomplish the following:
  - Develop a quality assurance system for compost materials used as plant bedding.
  - Demonstrate the value of compost for remediation of depleted soils.
  - Assist compost operators to develop and expand their markets
  - Promote use of compost to potential end-users.
- ⇒ DOH should develop compost quality standards for higher value end uses to assure potential users that compost products will meet their quality requirements.
- ⇒ DOH should provide technical assistance to help compost businesses produce products that meet the higher value specifications.

## **Develop Local Recycled Glass Markets**

Recycled glass processors in Hawai‘i are producing low value products, such as sub-base for road construction or other aggregate use. Higher value markets hold considerable promise and will improve the profit margin and help establish the viability of the industry. Development of these markets can be aided by a number of public sector initiatives.

- ⇒ DOH should implement a market development strategy to accomplish the following:
  - Support processors to produce recycled glass substitutes for higher valued products, specifically golf course sand, water and wastewater filtration media, and abrasive grit.
  - Promote the recycled products to local end-users.
  - Develop public policies and programs to promote the viability of local recycled product industries.
- ⇒ DOH should contract with an experienced technical expert in new uses of recycled glass. This individual would support local processors and promote products to potential users. Over time, this expertise should be developed within state and county agencies.
- ⇒ DOH should increase public sector uses of recycled glass products through cooperation with state and county agencies.

## **Develop Access to Recovered Paper Markets and Local Uses**

Paper fiber holds great potential for increased recovery in Hawai'i. However, financial barriers, such as high transportation costs, are preventing that growth. World markets show strong future prospects, and Hawai'i is well positioned to exploit those markets. There are also viable agricultural uses for low-grade fiber to be developed.

- ⇒ DOH should work with the shipping companies and their regulating agencies to negotiate lower rates for both inter-island and overseas transport of recyclable materials.
- ⇒ DOH should work with Hawai'i's congressional delegation to investigate possible amendments to the federal "Jones Act" that would increase access to Asian markets.
- ⇒ DOH should implement a market development strategy to accomplish the following:
  - Assess and document the technical and economic feasibility of developing production capacity for new end uses of recycled paper.
  - Conduct feasibility studies for using recycled fiber in molded pulp products and animal bedding.
  - Support the development of local businesses to produce these products.

## **Public Education**

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Hawai'i has many public education programs that emphasize environmental protection. However, sporadic coordination between programs and erratic funding of these programs weaken their effectiveness. An organizational approach that provides planning, coordination, and consistent funding could greatly enhance the existing efforts and help to focus public attention on waste reduction and recycling.

### **Improve Coordination of Public Education Campaigns**

Separate efforts in the four counties, given Hawai'i's shared media outlets, can create public confusion. Resources can be more effectively and efficiently used in a coordinated approach.

- ⇒ The state and counties should identify priority educational topics and formalize an approach to coordinate and implement education campaigns.

### **Launch a Statewide Media Campaign**

Frequent messages to the public are essential to instill an understanding of Hawai'i's solid waste problems and an ethic for source reduction and recycling.

- ⇒ DOH should implement a broad campaign with a simple and powerful message that would promote a theme selected by cooperating state and county representatives.

## **Conduct Targeted Campaigns**

A generic message may not effectively reach specialized groups, such as specific sectors of business. A campaign with a tailored theme and substance can be effective in motivating behavior change for a specific audience or industry.

- ⇒ DOH should implement two targeted campaigns annually. Each campaign should address a priority issue or industry selected by cooperating state and county representatives.

## **State Program Funding**

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State funding of solid waste programs in Hawai'i is diverse and broadly based by national standards. An enhanced level of funding is needed at the state level to progress toward waste diversion goals and resolve long-standing problems identified in this Plan. The state should also help counties develop more reliable and effective funding sources for waste management services.

### **Enhance State Funding Sources**

Three different state-level funding sources offer the greatest potential for enhancing the solid waste management budget: solid waste disposal surcharge, advance disposal fees (ADFs) on glass and tires, and federal grants. The tire ADF was adopted during the 2000 Hawai'i State Legislature.

- ⇒ The Hawai'i State Legislature should increase the solid waste disposal surcharge to a level comparable to other states that have adopted surcharges. This will provide critically needed resources to deliver priority ISWM services that can be supported by the counties.
- ⇒ The Hawai'i State Legislature should readjust fees and allocation of funds from the glass container ADF. This should ensure that funding is not reduced for county programs, and still provide increased resources for statewide market development.
- ⇒ DOH should aggressively pursue federal grants for priority ISWM programs.

### **Develop Statewide Funding Policy**

Two critical opportunities, which can improve programs and practices statewide, are solid waste user fees and full cost accounting (FCA) for public expenses.

- ⇒ DOH should promote the adoption of user pay fee systems, called pay-as-you-throw, in all counties. These systems ensure that waste generators pay the full cost of waste management according to the amount that they dispose.

- ⇒ DOH should educate and promote the adoption of FCA practices to ensure that the full and true costs of waste management are understood.

### **Provide Funding Assistance to County Programs**

Providing state funding in special cases to help counties address specific problems, or to develop new opportunities, can benefit the state.

- ⇒ The Hawai'i State Legislature should adopt, and DOH should develop, a program of biennial grants to assist counties in addressing their priority needs and opportunities.

### **Conclusion**

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This Hawai'i 2000 Plan for Integrated Solid Waste Management is intended to provide guidance for creating an improved solid waste system and a more sustainable Hawai'i. People from state agencies, county governments, the private sector, and non-profit organizations must all be participants in the creation of this improved system for Hawai'i.

Hawai'i does not face insurmountable barriers to achieving its ambitious recycling goals, preventing illegal dumping, implementing user pay fee systems, or accomplishing the other recommendations presented in this Plan. However, Hawai'i's isolated island environment makes these goals and recommendations for improving the solid waste management system both more difficult and more crucial.

The approach to improving the solid waste management system must be sensible and cost-effective. It must also be serious and buttressed by a strong will. These diverse needs will require broad coordination and many compromises. The DOH must work closely with other agencies and entities to assure that all interests are treated fairly, and to emphasize that the guiding principles upon which Hawai'i's solid waste management system should be based are economic prosperity, environmental stewardship, and social equity.

## 1.0 INTRODUCTION

This document builds upon and revises the Hawai‘i 1991 Integrated Solid Waste Management (ISWM) Plan. The Hawai‘i State Legislature, through promulgation of Hawai‘i Revised Statutes Chapter 342G (HRS 342G), established the Office of Solid Waste Management (OSWM) within the State of Hawai‘i Department of Health (DOH). They required OSWM to periodically revise the plan and to work with the counties to develop and revise county ISWM Plans.

At the outset of this planning process, the OSWM defined the following vision for this effort:

*“While the original ISWM Plan was a general statement of existing conditions and identified a wide range of possible policy options for the state and counties to consider, the ISWM Plan Revision will be more focused, identifying and recommending specific policy solutions and actions which will move the state toward achievement of diversion goals, address major environmental issues, assess long term solid waste management costs, and provide a structure to address future capacity issues regarding the whole range of solid waste management options.”<sup>1</sup>*

The planning process focused on the following goals:

- To address the primary environmental burdens and liabilities caused by improper handling of solid wastes in Hawai‘i.
- To develop programs that have the greatest potential to reduce the quantity of wastes generated and to increase recycling and composting.

### 1.1 Progress and Challenges

During the last decade, dramatic improvements have been made in solid waste management in Hawai‘i. With implementation of new federal regulations regarding land disposal, most of Hawai‘i’s landfills were upgraded and are now more effective in preventing wastes from contaminating the state’s groundwater resources. In the same period, waste diversion from landfills has substantially increased.

With this progress, however, the following three major challenges exist:

1. Wastes continue to be illegally dumped on open lands and in dumps that lack permits and environmental protections.
2. Recycling and composting are still limited relative to the potential demonstrated by other, similar communities.
3. Hawai‘i residents and visitors generate solid waste at a higher rate than the national average.

This ISWM Plan Revision targets these major challenges. The first two have been addressed effectively by programs in mainland U.S. communities, and good models exist for Hawai‘i to

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<sup>1</sup> DOH, Office of Solid Waste Management. 1998. *Integrated Solid Waste Management Plan, Goals and Objectives*. Provided to the Solid Waste Advisory Committee.

emulate. The third is a continuing problem in our consumer society, but other communities have also demonstrated effective actions to reduce waste generation.

In the early 1990s, the concept of integrated waste management emphasized environmentally responsible disposal and the hierarchy of preferred management techniques – reduce, reuse, recycle, and energy recovery. Disposal in landfills is at the bottom of the hierarchy. These principles guided the 1991 ISWM Plan, and in 1991, they were established in Hawai‘i law (HRS 342G-2). To progress further, new principles are needed to help refocus and revitalize improvement in waste management practices.

## 1.2 A Sustainable Hawai‘i

Sustainability is, at its core, a very simple concept.

*“Sustainability means meeting the needs of the present without compromising the ability of future generations to meet their own needs.”<sup>2</sup>*

Several important principles evolve from this simple concept that can provide guidance for solid waste management in Hawai‘i.

### Principle 1: Long Term Perspective

One principle of sustainability is that the planning perspective should be long-term. The consequences of today’s choices should be examined for their impact on a future Hawai‘i that may have more people, less open space, and greater demand on nature’s resources.

Waste management options that may be economical and expedient in the short term may reduce future options that could be more sustainable. As the state’s population grows, reliance on land disposal for solid wastes will become less viable. In addition, future generations may experience unexpected environmental consequences from the wastes that we land dispose today.

This Plan examines options for increasing the capture of recyclable materials from commercial and construction activities. It also describes the support programs, such as market development, public education, and funding, needed to ensure the success and sustainability of recycling systems. It addresses the problems of improper disposal of wastes, and points to the potential value of emerging technologies for waste transformation.

### Principle 2: Economy, Ecology, and Equity

Protecting the environment (i.e., ecology) is not a goal isolated from other social goals. Enhancing the economy while protecting the environment can also promote social equity. This is called the “Triple Bottom Line”<sup>3</sup> of sustainability — economic prosperity, environmental stewardship, and social equity.

A waste management system that emphasizes recycling and composting promotes local business opportunities and creates local jobs. A cyclical economy that conserves and recycles resources is

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<sup>2</sup> World Commission on Environment and Development. 1987. *Our Common Future*. (Also known as the “Brundtland Commission Report” after the chairman, Gro Harlem Brundtland, Prime Minister of Norway.)

<sup>3</sup> Elkington, John. 1998. *Cannibals with Forks, the Triple Bottom Line of 21st Century Business*. New Society Publishers.

more sustainable than a linear economy that imports materials, which ultimately end up in landfills.

In this Plan, commercial and construction related recycling are examined in depth, along with the mechanisms needed to support recycling.

### **Principle 3: Inefficiency Harms Economy and Ecology**

A large per capita waste stream indicates inefficiency of resource use. The goal of eco-efficiency — where *eco* means both ecology and economy — is that waste should be systematically eliminated from our economy.

Businesses are discovering that investing in eco-efficiency, such as waste reduction and recycling, quickly yields cost reductions. In addition, a land littered by illegal dumping undermines Hawai'i's strongest economic foundation — its tourism industry.

This Plan addresses the above issues by presenting options to expand and support commercial recycling and limit illegal dumping.

### **Principle 4: Localization with Global Connections**

Global interconnectedness is a reality of modern life and is essential to Hawai'i's prosperity. However, promoting local commerce within the state and between the islands would provide mutual advantages to Hawai'i's businesses, farms, and agencies.

This Plan promotes expansion of intra-state reuse and recycling of resources. It advocates greater use of locally made products — such as compost, recycled glass, and recycled paper products — that can serve local needs and benefit the local economy.

### **Principle 5: Collaboration Rather than Regulation**

Greater cooperation between public agencies and private for-profit and not-for-profit sectors can be more effective than regulatory mandates. This cooperation has been limited in Hawai'i's waste management programs, and has contributed to the slow progress toward goals identified in the 1991 ISWM Plan.

This Plan promotes mechanisms for government to collaborate with the private sector to reduce solid waste. Cooperative agreements and collaboration between government agencies and the private sector can be more effective tools for achieving sustainable waste management. Rather than penalties, upon which the regulatory approach is based, incentives can help to drive progress in collaborative systems.

## **1.3 A Promising Time**

Solid waste management in Hawai'i faces imminent changes. The limited space available in Hawai'i for future landfill sites requires that new waste management approaches and technologies be identified. Choices that will be made in the near future will set directions for years to come.



### **Fifty Percent Diversion Goal**

The year 2000 was established as the time by which to achieve 50-percent waste diversion (HRS 342G-3). That goal is far from being met. Substantial growth has occurred in recycling over the past decade. However, Hawai'i's diversion infrastructure is inadequate to achieve this goal.

All four counties rely predominately on waste management techniques that are at the bottom of the solid waste management hierarchy: landfilling and incineration. The choice now is whether or not to recommit to the solid waste management hierarchy and diversion goal of 50 percent, and, if so, to establish an infrastructure and support system to achieve this goal.

### **Barriers to Increased Diversion**

Barriers that contribute to the shortfall of Hawai'i's 50-percent diversion goal include the following:

- A recycling ethic is not yet firmly rooted among Hawai'i's people and businesses.
- User fees, which require direct payment for solid waste disposal, are rare. Therefore, waste disposal appears to be cheap and easy.
- High costs of operating recycling businesses in Hawai'i continue to deter development of collection and processing infrastructure.
- Local recycled materials markets are underdeveloped, and access to out-of-state markets is expensive due to Hawai'i's isolated geography.

### **Hawai'i Waste System Changes**

Overcoming these barriers is possible but will require a commitment of energy and resources from both public and private sectors.

Each county is currently contemplating, or is engaged in making, significant changes to their solid waste systems, as follows:

- Hawai'i County is determining what new waste management or disposal system will replace the landfill on the island's eastside when it closes.
- The City and County of Honolulu (C&C) is expanding curbside collection of green waste and other commercial and residential diversion programs. Even so, they will need expanded landfill capacity in the near future.
- Kaua'i County is siting a new landfill and examining waste transformation technologies.
- Maui County is examining options for multi-tiered user fees, automated trash collection, and curbside green waste collection. They are implementing mandatory trash collection.

Each county must also revise its ISWM Plan. The county plan revision process, required by state law (HRS 342G-24), will be initiated with the adoption of this state ISWM Plan Revision. It is the intent of this Plan Revision to provide practical analyses and recommendations to help improve county solid waste management practices.

## **1.4 The ISWM Planning Process and Organization of this Plan**

The statewide planning process for the ISWM Plan Revision engaged the participation of Hawai'i's solid waste professionals from public and private sectors. The DOH OSWM convened a Solid Waste Advisory Committee (SWAC) composed of volunteers who met during the investigative stages of the Plan and provided input on priorities and opportunities. The SWAC included representatives from county waste management programs; state offices involved in land use, materials procurement, and business development; private waste haulers; recycling and composting companies; environmental organizations; elected officials; and the military. The planning process and SWAC membership is briefly described in Appendix I.

The planning process included examining existing waste management practices, soliciting information from the SWAC during meetings and through a questionnaire, conducting site visits and interviews, and reviewing numerous solid waste documents. Summaries of SWAC input, including a summary of questionnaire results, are contained in Appendix II. This information provided the basis for existing conditions, presented in Chapter 2 of this Plan Revision.

The planning team considered a wide range of solid waste management topics relevant to Hawai'i, and from this, selected 18 topics for initial research. The discussion papers address the following topics, and are included in Appendix III:

- Public Education
- Residential Recycling
- Commercial Recycling
- Illegal Dumping
- Landfill Improvements
- Financial Incentives
- Market Development
- Program Funding
- Manufacturer Responsibility
- Special Waste Management
- Construction and Demolition (C&D) Waste Management
- Organic Waste Management
- Land Use Issues
- Inter-Island Transportation
- ISWM Plan Structure
- Public/Private Partnerships
- Interagency Cooperation
- Source Reduction

The discussion papers were reviewed and discussed by the SWAC and DOH, and from these, six topics were selected for in-depth research. The six focus topics, as follows, are presented in Chapter 3:

- Illegal Dumping
- Commercial Recycling
- C&D Waste Management
- Market Development
- Public Education
- Program Funding

Additional information compiled on C&D waste management is included in Appendix IV. A brief summary of Hawai'i's solid waste regulations is included in Appendix V.

Both Chapter 2 and Chapter 3 include sections titled "Observations and Analysis." These sections highlight critical issues and opportunities evident from review of existing conditions and analysis of the focus topics. Recommendations for action, presented in Chapter 4, were developed based upon these sections.

## **1.5 Sustainable Solid Waste Management**

This Plan Revision is intended to provide a map by which the state and counties can navigate the barriers to ISWM progress and develop a more sustainable solid waste management system. The Plan outlines short and long term actions to address priority issues identified by the SWAC and DOH. Ultimately, however, the DOH, other state agencies, and the counties must develop their own specific priorities and programs, and this Plan can be a tool for that process.

An investment of resources now by the state and counties in the development of sustainable waste management alternatives will enhance and diversify Hawai'i's economy, and help preserve the state's natural environment. This Plan Revision develops a strategy for building a more sustainable Hawai'i through improved and integrated management of solid waste.

## **2.0 EXISTING CONDITIONS**

Chapter 2 includes the following sections:

- 2.1 Introduction
- 2.2 Solid Waste Policy, Planning, and Administration
- 2.3 Solid Waste Performance Measures
- 2.4 Solid Waste Generation
- 2.5 Waste Collection and Transfer
- 2.6 Landfill and Incineration
- 2.7 Diversion
- 2.8 Special Wastes

### **2.1 Introduction**

A description of the existing solid waste management infrastructure in Hawai‘i as of December 1999 is contained in this chapter. Statewide facilities and programs, county infrastructure, and private sector activities are described. The objective of this chapter is to assess the current waste management programs, facilities, and funding mechanisms in order to build the basis for recommendations for improvement.

The recommendations presented in Chapter 4 are based upon information in this chapter that is summarized in the sections entitled “Observations and Analysis,” as well as the focus topics in Chapter 3, and the discussion papers in Appendix III.

### **2.2 Solid Waste Policy, Planning, and Administration**

This section addresses several state and local functions relative to solid waste policy, planning and administration, as follows:

- Overview of key state solid waste policies established by the State of Hawai‘i Legislature.
- Highlights of the 1991 Integrated Solid Waste Management (ISWM) Plan, including a summary of progress.
- Functions of the State of Hawai‘i Department of Health, Office of Solid Waste Management (DOH OSWM) (e.g., planning, assistance and education, and regulation and enforcement) and funding base for DOH OSWM programs.
- Functions, related to waste management, of the Department of Business, Economic Development, and Tourism (DBEDT).
- County solid waste departments’ administrative structures.
- Activities of some independent organizations and programs.

## 2.2.1 Overview of State Solid Waste Management Policy

The state solid waste statute, Hawai‘i Revised Statutes (HRS) 342G, establishes state policies that apply to state agencies, the counties, and all businesses and citizens of Hawai‘i. The statute includes the following solid waste management goals and policies, which are considered high priorities for the state:

*“The Department and each county shall consider the following solid waste management practices and processing methods in their order of priority:*

- (1) Source reduction;*
- (2) Recycling and bioconversion, including composting; and*
- (3) Landfilling and incineration.” (HRS 342G-2)*

*“It is the goal of the state to reduce the solid waste stream prior to disposal by:*

- (1) twenty-five percent by January 1, 1995; and*
- (2) fifty percent by January 1, 2000.*

*“Through source reduction, recycling, and bioconversion. Where feasible, the office shall establish other state goals for specific commodities, recognizing market considerations.” (HRS 342G-3)*

The Hawai‘i State Legislature also set the following additional policies and goals that apply specifically to state and public agencies:

*“It is the goal of the state to reduce by not less than twenty-five percent the amount of office paper generated by all state and county agencies by January 1, 1995, through source reduction.” (HRS 342G-3(b))*

*“It shall be the policy of all state and county public agencies to give preference to the purchase of products made from recycled materials, that are themselves recyclable, and that are designed for durability.” (HRS 342G-41)*

*“The Department of Accounting and General Services, with the assistance of the office, shall develop the recycled product procurement program.” (HRS 342G-42(a))*

*“Double-sided copying shall be standard operating practice for all state and county agencies, offices, and facilities, as available and appropriate.” (HRS 342G-44)*

*“By June 30, 1993, all state and county agencies shall establish an office paper and other materials recovery program.” (HRS 342G-45)*

*“Departments that procure compost or that can substitute compost for other purchased products shall utilize locally produced compost whenever possible.” (HRS 342G-47(1))*

These policy directions are clearly stated: public agencies are expected to lead the state’s source reduction and recycling efforts by example. The state is a major producer of waste, much of

which could be reduced or recycled. It is also a major consumer of commodities, much of which could be produced from recycled materials. The state can be a force in addressing the existing goals and policies related to solid waste management, and strengthening the foundation for source reduction and recycling in Hawai'i.

In addition, the counties are explicit partners with the state to implement the policies and achieve the goals identified above. A key role for the counties derives from their direct responsibility for management of solid waste facilities and delivery of solid waste services to each island community.

On the state level, responsibilities for solid waste management programs are concentrated primarily in the two following agencies:

- The DOH OSWM has responsibility for planning and enforcement, as well as coordination and support of statewide solid waste programs and laws. It also plays a key coordination role in solid waste programs at the county level.
- DBEDT focuses on market and business development.

In addition, other state agencies play an important role in addressing the goals and priorities of solid waste management. State agencies generate waste materials, some of which could be reduced or recycled, and procure supplies, some of which could be manufactured from recycled materials.

## **2.2.2 The 1991 Integrated Solid Waste Management Plan**

The 1991 ISWM Plan established a foundation for Hawai'i's solid waste programs by addressing a broad range of policy options for the state and counties. Many of the 1991 Plan's recommendations are incorporated into HRS 342G.

Substantial progress has been made in waste diversion since 1991. However, some goals described in the 1991 Plan and in HRS 342G have not yet been achieved. An assessment of progress is included in this section.

### **2.2.2.1 Progress Toward the Goals and Objectives of the 1991 Plan**

In the 1991 Plan, the following 4 key cornerstones of solid waste management were identified<sup>1</sup> that have provided the focus for programs during the period from 1991 to the present. There have been accomplishments and there are continuing needs in each area.

- “1. A reorientation away from a disposal-based system to one that promotes source reduction, recycling and bioconversion first, and disposal as a last resort.”*

Major gains in waste diversion through recycling and other methods have occurred since 1991 (see Table 2-1). The following accomplishments that have led to increased recycling:

- Creation of Recycling Coordinator positions in DOH OSWM, Maui County, and the City and County of Honolulu (C&C), and the focused recycling programs that staff in these positions have implemented and supported.

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<sup>1</sup> DOH. March 1991. *Integrated Solid Waste Management Plan for the State of Hawai'i*. (Four cornerstones are contained in Chapter 9.)

- Establishment of advance disposal fees (ADFs) on imported oil and on glass containers, with glass funds used to support recycling efforts.
- Development of companies dedicated to diversion, including recycling of paper, metals, glass, plastic and construction materials, and compost production from green waste and food waste.
- Implementation of mandatory requirements in the C&C, including restrictions on landfill disposal of commercially-generated green waste, food waste and cardboard, and all appliances; and required recycling of commercial glass, office paper (OP), and cardboard by larger businesses.
- Establishment of convenient drop-off stations for residential recycling in each county.
- Implementation of tipping fees and disposal surcharges at landfills.
- Promulgation of mandatory statewide take-back laws for vehicle batteries (HRS 342I-1) and tires (HRS 342I-21).
- Programs directed at increasing source reduction including residential backyard composting, on-farm composting, and commercial purchasing practices.

**Table 2-1:  
Trends in Integrated Solid Waste Management Between 1991 and 1999**

| Category                | 1991 <sup>1</sup> | 1999 <sup>2</sup>   |
|-------------------------|-------------------|---------------------|
| WASTE VOLUME (IN TONS)  | 1,234,000         | 1,873,111           |
| Diverted (percent)      | 5                 | 24                  |
| Landfilled (percent)    | 82                | 46                  |
| Incinerated (percent)   | 13                | 30                  |
| LANDFILLS TOTAL         | 23                | 11                  |
| MSW Landfills           | 17                | 9                   |
| C&D or Ash Landfills    | 6                 | 2                   |
| INCINERATORS            | 2                 | 1                   |
| County Budgets (totals) | \$96,271,000      | \$126,500,000       |
| Tipping Fees (ranges)   | \$17 to \$54/ton  | \$35 to \$67.50/ton |

NOTES: <sup>1</sup> DOH. March 1991. *Integrated Solid Waste Management Plan for the State of Hawaii*.

<sup>2</sup> DOH. 1999. *Hawaii Waste Disposal and Diversion Survey, 1998-99*.  
MSW = municipal solid waste; C&D = construction and demolition.

Diversion of MSW has risen from 9 percent at the time of the 1991 ISWM Plan, to 24 percent today. Despite these gains, the state did not meet the diversion goal of 25 percent by 1995, nor 50 percent by 2000. Moreover, the percent of diverted waste has not increased significantly since fiscal year (FY) 1995/1996. The majority of waste is still disposed in landfills or at an incinerator.

The success of diversion through recycling programs relies on the initiative of private businesses that collect and convert secondary materials, often with support from county and state agencies. One challenge to increased diversion is that many of these private businesses are small, local firms, while Hawaii's business climate is generally regarded as challenging for small business.

There is a critical need to help stabilize and support local businesses that contribute to diversion efforts.

- “2. *County responsibility in ensuring that local waste reduction and disposal programs are implemented in a timely and ultimately economically self-sufficient manner. The most effective means to realize this will be through a comprehensive local solid waste planning process and with support and coordination provided through a State Office of Solid Waste Planning.*”

In accordance with the legislative mandate (HRS 342G-21 to 31), each county developed an ISWM Plan that has been reviewed and accepted by DOH OSWM. As a result, each county has improved their waste reduction and disposal practices compared to 1991 baseline information. Some of the changes have been mandated by state and county regulations and others by economic pressures to conserve landfill space. Even so, counties have not implemented many of the County Plan recommendations because of funding or infrastructure constraints.

Since 1991, all counties have instituted tipping fees and collection fees for commercial disposal accounts. The C&C is preparing to institute a residential collection fee, and Maui County is considering a graduated user fee system. Although new fees have been implemented, they are insufficient to provide sustainable support to county solid waste management. The majority of some county budgets is still drawn from county general funds. The development of a user fee-based waste management system, where reliance on general funds is eliminated, has not occurred in any county.

The DOH OSWM assists counties in waste management enforcement, inspection, training, and public outreach. County requests for this assistance have increased due to increased regulatory requirements and concern over environmental protection. This increased demand has occurred at the same time that state budget revenues for DOH OSWM programs have decreased. Therefore, the DOH OSWM needs to identify additional funding for state programs designed to meet its objectives of promoting source reduction and recycling, and enforcing regulations to ensure environmentally responsible waste management by permitted facilities.

- “3. *The development of local end-uses for recovered materials is imperative to building a sustainable recycling industry in Hawaii.*”

In 1994, the Clean Hawai‘i Center (CHC) was created, within DBEDT, to promote local market development for recycled products. Using funds from DBEDT and DOH OSWM, the CHC provided financial and technical assistance to and conducted educational workshops for local recycling businesses. (See Section 2.2.4 for more information about CHC.)

Hawai‘i companies now use a variety of diverted materials to produce the following:

- Compost and mulch from green waste, food waste and biosolids.
- Glassphalt from asphalt and glass.
- Architectural glass from glass containers.
- Park benches from plastics.
- Oil change boxes and insulation from paper.
- Structural fill from ash.



Even with state-sponsored CHC support for market development and a number of successes in diversion and product development, the status of the recycling market in Hawai'i remains limited for several reasons, including the following:

- Private companies feel they are material limited.
- Inter-island transport costs place marginally valued recycled materials at a disadvantage to virgin materials.
- Hawai'i continues to import compost, soil amendment, and silica sand to meet local demand when locally produced product could serve that need.
- Lack of penetration by products made from secondary materials into higher-end uses.

Section 3.5 of this ISWM Plan addresses support for market development.

*“4. A comprehensive and sustained public education campaign to provide the residents of Hawaii the necessary information to effectively participate in waste reduction efforts.”*

The 1991 Plan recommended that the state support reduction and diversion efforts through internships, waste reduction curricula, public service announcements, full-length documentary films, short documentaries, waste audits, technical assistance, recognition awards, conferences, and a public awareness month. Counties were encouraged to provide information on recycling opportunities through newsletters, bill inserts, door-hangers, block captain programs, telephone hotlines and advertisements on television and radio (HRS 342G-26(g)).

Public education efforts have been sporadic. In 1995, the DOH Litter Control Office, which was heavily involved in public education, closed due to state budget cuts. DOH OSWM is primarily responsible for public education campaigns, publishing information bulletins, and providing funds for county programs and publications. DOH OSWM also provides technical assistance and waste audits upon request in conjunction with its enforcement programs. They also partner with other DOH offices and with CHC to perform educational efforts.

At the county level, the C&C and Maui County sponsor a wide variety of educational programs and provide information through newsletters and workshops. The C&C has also sponsored a media campaign to promote recycling. Hawai'i and Kaua'i Counties contract with non-profit organizations to conduct programs and disseminate information on recycling.

A coordinated and consistent public education effort that promotes both statewide and county-specific programs is still needed. This topic is addressed in Section 3.6.

### **2.2.2.2 Disposal and Diversion Trends**

Between 1991 and the present, there have been several major changes in solid waste management in Hawai'i, as illustrated in Table 2-1.

Between 1991 and 1998, the state's population increased by only 5.1 percent,<sup>2</sup> while waste generation increased by 52 percent (see Table 2-1) However, the increase in waste generation reported between 1991 and 1998 appears to be partially due to accounting and reporting differences. In 1991, only two landfills charged a tipping fee and these were the only facilities

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<sup>2</sup> Percent change based on a comparison of de facto population in the state between July 1, 1990, and July 1, 1998. Source: DBEDT. 1998. *The State of Hawaii Data Book 1998*. Table 1.07.

that had truck scales to measure waste disposed; data from the other landfills were estimated based on the number of trucks. In addition, 1991 data may not include waste disposed at private landfills, and accounting for recycled materials was less rigorous than at present.

Linear extrapolation of data collected between 1993 (when reporting requirements were established by DOH OSWM) and 1998 may yield a more accurate estimate of total waste generation. By extrapolation, the actual generation volume in 1991 may have been approximately 1,730,000 instead of 1,234,000, as was reported in the 1991 Plan. Therefore, the estimated increase in waste generation between 1991 and 1998 would be approximately 8 percent.

There has been an overall reduction in the number of landfills, with 12 closing since 1991. A few of the landfills functioning in 1991 have been expanded. In addition, the proportion of waste incinerated increased due to the introduction of the Honolulu Waste-to-Energy Incinerator (H-POWER) in May 1990.

Collectively, county budgets for solid waste management grew by 31 percent during this period. This relatively small rate of growth is due principally to the C&C's 1991 budget, which included H-POWER financing and construction costs. The other county budgets, by contrast, grew by a much higher percent. Most of these budget increases were made in response to the requirements of Resource Conservation and Recovery Act (RCRA) Subtitle D (see Section 2.6.2).

In addition, the source of county solid waste funds changed between 1991 and present. In 1991, two Counties (Maui and C&C) collected tipping fees at landfills, and general funds were the primary source of support for solid waste management. Since 1991, all counties have developed programs to charge commercial customers tipping fees for landfill disposal, increasing the proportion of budget that comes from sources other than general funds.

### **2.2.3 Office of Solid Waste Management**

This section provides a brief overview of the DOH OSWM, and highlights the following three key functions:

- Planning,
- Assistance and education, and
- Regulation and enforcement.

It also discusses funding for DOH OSWM, which is described in greater detail in Section 3.7.

#### **2.2.3.1 Introduction**

The OSWM, within the DOH, was established by the Integrated Solid Waste Management Act, HRS 342G. The DOH OSWM is responsible for integrated solid waste management planning and for implementing solid waste management policy and regulations on the state level. A central responsibility of the DOH is to implement the two high priority policies and goals identified at the beginning of Section 2.2.1.

The Hawai'i Administrative Rules, Title 11 Chapter 58.1 (HAR 11-58.1), incorporates the provisions of RCRA Subtitle D for municipal and solid waste management (see Section 2.6.2). The U.S. Environmental Protection Agency (EPA) approved the state's solid waste program in

1993. This approval delegates responsibility for permitting and regulating solid waste disposal facilities to the state.

HAR 11-58.1 also regulates C&D landfills, composting facilities, recycling operations, used oil transporters, and salvage yards. The key functions of the DOH OSWM, as designated in HRS 342G-14, include as follows:

*“Promote the development of coordinated statewide solid waste management;*

*“Promote source reduction, recycling, and bioconversion...  
through...statewide public education...;*

*“Create and maintain a database to assess the composition of the state’s waste  
stream...;*

*“Identify and apply for appropriate federal funds to support the programs...; and*

*“Cooperate with appropriate federal, state, and county agencies in carrying out  
the office’s responsibilities.”*

Six full-time and one half-time technical specialist staff the DOH OSWM. One additional position is authorized but is not currently filled.

In Hawai‘i, as in many states, the role of the state solid waste office is challenging and complex. Staff must be both enforcers and collaborators with local government and private business. It is the local governments and private businesses that directly deliver waste management services. However, the state is empowered to guide and regulate their activities to achieve state policy goals while assuring environmental protection.

### **2.2.3.2 Planning Functions**

State statutes (HRS 342G-29) direct the DOH OSWM to revise the Statewide ISWM Plan on a 5-year schedule that parallels the county planning process. To fulfill its planning responsibilities, the DOH is directed by law to convene a “state integrated solid waste management task force.” For the present Plan revision, a Solid Waste Advisory Committee (SWAC) was appointed to provide input into development of the ISWM Plan. The membership of this group is included in Appendix I, and a summary of their input is in Appendix II. A SWAC was also established for the 1991 planning process, but it ceased to exist during the intervening years.

The DOH OSWM is also responsible for review and approval of County ISWM Plans. Each county was required to submit a Plan to DOH by 1995, and to revise the Plan every 5 years thereafter. HRS 342G-23 defines specific criteria by which the DOH OSWM shall review the County Plans.

The DOH OSWM also initiated development of a State Disaster Debris Management Plan in cooperation with the State of Hawai‘i Civil Defense Agency, the counties, and several federal agencies. This Plan is intended to be consistent with the policies of state solid waste management. The goals of the Disaster Debris Management Plan are to maximize the efficiency of debris removal, to reduce the immediate adverse impact(s) on human health and safety, and to mitigate short- and long-term environmental impacts.

An additional planning function is collection of data on the quantity of recycled and composted materials and the status of meeting the state's diversion goals and submittal to the Hawai'i State Legislature. This is discussed in Section 2.3.

### **2.2.3.3 Assistance and Education Programs**

The DOH OSWM sponsors and participates with environmental advocacy and trade organizations involved with various aspects of solid waste management, including the following:

- Technical working groups that recommend methods, procedures, or regulatory modifications.
- Public education and outreach groups who promote recycling, reuse, or alternative waste management approaches.
- Community groups involved with special recycling and waste minimization efforts.

DOH OSWM provides technical and programmatic assistance to the counties, private business, and individuals in the development and implementation of waste management programs. The four counties are the primary recipients of funding support and receive nearly \$2.4 million each year. A majority of the funds is for glass recycling and used oil recovery.

DOH OSWM, in cooperation with other agencies, has produced educational materials on solid waste management topics, including the following:

- *Managing Boat Wastes, A Guide for Hawai'i Boaters*, January 1994 and May 1999.
- *Minimizing Construction and Demolition Waste*, 1st Ed., February 1998.
- *Restaurant Waste Minimization Guidebook*, no date.

The DOH OSWM also helps to plan, develop, and support the following programs, workshops and conferences:

- The Hawai'i Advanced Building Technologies Training (HABiT) Program.
- The annual Christmas treecycling campaign.
- The school recycling contest.
- Workshops on Green Building and C&D waste management.

The DOH OSWM assists and coordinates some of these programs in cooperation with DBEDT, the C&C, and neighbor island counties. Workshops are also conducted in cooperation with trade associations and non-profit groups on demand.

The DOH offers technical assistance and education to businesses that generate hazardous waste. The Hazardous Waste Minimization program provides workshops, produces a newsletter, and develops technical bulletins and a directory on environmental services provided throughout the state.

The DOH arranges for training on an annual basis for the operators of county-owned landfills. The training is generally conducted at DOH OSWM expense by professional trainers from the Solid Waste Association of North America.

#### **2.2.3.4 Regulatory and Enforcement Functions**

DOH OSWM has permit and enforcement authority over all solid waste management facilities within the state, including some that are regulated only by the state and not under federal regulations. The solid waste management facilities that are permitted by DOH OSWM include the following:

- MSW landfills,
- C&D waste landfills,
- Special waste landfills (e.g., asbestos, petroleum contaminated soil),
- Solid waste incinerators,
- Transfer stations,
- Recycling and recovery facilities,
- Solid waste salvage facilities,
- Composting facilities,
- Remediation facilities,
- Medical waste treatment and disposal facilities,
- Foreign waste treatment and disposal facilities, and
- Used oil transportation and recycling facilities.

Engineers in the DOH OSWM review permit applications, designs, and operating plans for conformity with state regulations. Each permit application contains special conditions that are prepared by DOH OSWM staff to address the specific needs of the facility. Approval of a permit may typically require one or more site visits to the facility and meetings with the applicant. If there are objections from the public, these may require the special attention of the DOH OSWM.

The DOH OSWM enforcement staff monitors and inspects 250 permitted solid waste facilities and investigates numerous complaints of illegal dumping and other illegal activities each year. They also provide technical assistance in response to public, industry and government requests, or in instances of apparent need. Three enforcement staff are currently responsible for monitoring compliance with solid waste permit regulations and conducting enforcement activities throughout the state.

#### **2.2.3.5 Department of Health Office of Solid Waste Management Funding**

The primary sources of operational and program funding for DOH OSWM are the solid waste disposal surcharge, the glass ADF, and the petroleum import surcharge. Revenues from the solid waste surcharge and glass ADF are placed in the Environmental Management Fund (EMF). The petroleum surcharge is placed into the Environmental Response Revolving Fund. Some funds are also provided by the state's general fund, and special projects are occasionally funded by grants from the EPA. State funding is described in greater detail in Section 3.7. Funding sources include the following:

- Solid Waste Disposal Surcharge.
- Glass ADF.

- Petroleum Import Surcharge.
- State General Fund.
- U.S. Environmental Protection Agency.

#### **2.2.4 Department of Business, Economic Development and Tourism**

The CHC was created by the Hawai'i State Legislature in 1994 (Act 202, Session Laws of Hawai'i [SLH] 1994) and is housed within DBEDT. Its mission was "to encourage and foster the development of small and emerging recycling businesses and the development of innovative techniques and the application of advanced technology in industry to reduce pollution, extend the life of landfills, save costs of disposal, and recycle valuable resources from the waste stream."<sup>3</sup> As amended in 1996 (Act 83, SLH 1996), CHC was also directed to support development of local recycling, processing, and manufacturing industries, and to establish marketing agreements with foreign end-users of recyclable materials.

The CHC sunset as of June 1999 and staff and functions were incorporated into the Energy, Resources and Technology Division of DBEDT. The Clean Hawai'i Fund, a separate creation of Act 202, SLH 1994, has remained and can be used to support project activities. An analysis of the future need for market development activities is addressed in Section 3.5.

CHC provided six business development grants for expansion of recycling businesses. The businesses have demonstrated some success in their endeavors, and provided technical assistance to over 50 small businesses, all of whom are part of the private waste management industry in Hawai'i. CHC programs have helped to create new jobs and divert nearly 5,000 tons of MSW per year from disposal. Existing recycling and diversion companies that received CHC grants include the following:

- Hawaiian Earth Products, Ltd. (HEP), a green waste composting operation.
- Intech, Inc., a paper recycler that manufactures oil-change boxes and hydromulch products.
- Aloha Plastics Recycling, Inc., a plastic re-manufacturer specializing in plastic lumber products.
- Pacific Allied Products, Ltd., a polystyrene recycler making soil additives from Styrofoam.
- Peak Creations, a glass recycler that manufactures custom glass molded products.

In addition to grants, CHC staff conduct presentations on buy-recycled and business development opportunities. They have also organized workshops and provided exhibits at trade industry fairs.

The DOH OSWM provided \$710,000 to support CHC programs over its 5-year period of operation. During that period, CHC also received \$220,000 in state general funds and received over \$840,000 in federal funds and private in-kind matching funds to support its programs and projects.

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<sup>3</sup> Act 202, SLH 1994.

## 2.2.5 County Administrative Structure and Funding

Throughout the state, solid waste is handled and disposed primarily by the four county governments. Each county appropriates a portion of their general fund to supplement dedicated funding derived from waste management through tipping and collection fees. In the C&C, an Enterprise Fund was initiated in July 1999. Prior to that all funding, except for costs to build and operate H-POWER, was from the general fund. Only the C&C has privatized waste disposal services. Hawai'i and Kaua'i Counties have attempted to privatize their landfills, but were prevented from doing so by the Hawai'i Supreme Court in the *Konno Decision* of 1997.<sup>4</sup>

A comparison of the administration and funding for county waste management programs is presented in Table 2-2. For labor requirements and support, these are not directly comparable between counties due to the differences in the services provided.

## 2.2.6 Independent Organizations and Programs

Non-profit organizations and programs provide waste management or promotional services, and several are supported to some degree with funds and/or technical assistance from DOH OSWM. The following is a brief description of some of these organizations.

**Partnership for the Environment.** This is a cooperative effort between the C&C's Recycling Office and business partners that promote and support waste reduction, recycling, and cost reduction programs for business. The Partnership offers information, resources, technical assistance, and peer consulting by businesses that have already successfully incorporated waste reduction and recycling practices into their every day processes. The Partnership also sponsors an annual awards banquet and conference to recognize waste minimization and diversion efforts in business and the community. DOH OSWM provides annual funding to support the Partnership's educational efforts.

**Green House Hawai'i Project.** This is a non-profit group that focuses on sustainable building technologies. Made up of architects, builders, building suppliers, and government agency staff, the group has constructed mobile exhibits that highlight resource efficient, non-toxic, recycled-content, and locally manufactured materials. The group also develops educational materials for architects and builders, and supports workshops on environmental building technologies.

**Advanced Building Technology Forum.** This national forum consults with local organizers to develop programs focused on training building and design professionals on the practical use of resource-efficient building techniques (e.g., waste reduction, job-site recycling and reuse) and products (e.g., recycled content products). Training materials include a handbook on best management practices for the construction industry along with associated curriculum documents and slide shows.

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<sup>4</sup> *Konno v. County of Hawaii*, 85 Haw. 61, 937 P.2d 397 (1997).

**Table 2-2:  
Solid Waste Administration and Funding Assets by County**

|  | Hawai'i County            | City and County of Honolulu                           | Kaua'i County          | Maui County                  |
|--|---------------------------|---|------------------------|------------------------------|
|  | DPW, Solid Waste Division | Department of Environmental Services, Refuse Division | DPW, Highways Division | DPW&WM, Solid Waste Division |
| Waste Quantity <sup>1</sup> (tons per year)                | 168,851                   | 1,418,756   | 81,576                 | 215,295                      |
| Total Staff (full-time employees)                          | 56                        | 364   | 53                     | 67                           |
| Administrative and Technical                               | 9                         | 22  | 1                      | 7                            |
| Collection   | 0                         | 274   | 36                     | 41                           |
| Disposal   | 47                        | 68  | 16                     | 19                           |
| Municipal Landfills/incinerators                           | 2                         | 2   | 1                      | 4                            |
| Total Budget <sup>2</sup>                                  | \$12,000,000              | \$100,800,000   | \$5,000,000            | \$8,700,000                  |
| Recycling Budget <sup>3</sup>                              | \$716,000                 | \$12,500,000  | \$620,000              | \$1,800,000                  |
| Tipping Fee  | \$35.00                   | \$67.75   | \$56.00                | \$45.00                      |
| County Collection Fee for Commercial Accounts <sup>4</sup> | NA                        | \$1/cf  | \$0.64/cf              | \$6/mo                       |
| Total Cost/Ton, All Programs <sup>5</sup>                  | \$71.07                   | \$71.05   | \$61.29                | \$40.41                      |

NOTES: <sup>1</sup> DOH, Annual Report to the Hawai'i State Legislature 1997-98.

<sup>2</sup> Estimates include both recycling and diversion budgets. Data is from personal communication with solid waste managers in each county.

<sup>3</sup> Tipping fee is for commercial haulers only in C&C, Kaua'i, and Maui Counties. Hawai'i County charges all users at the landfills. The C&C, Kaua'i, and Hawai'i Counties provide residential users with free disposal at transfer stations and convenience centers. Maui County charges \$6 per load for residents, with one Saturday per month free. Data is from personal communication with solid waste managers in each county, Fall 1998.

<sup>4</sup> All counties except Hawai'i County provide limited collection service to commercial accounts.

<sup>5</sup> Total Budget/Waste Quantity.

cf = cubic feet; mo = month; DPW = Department of Public Works; DPW&WM = Department of Public Works and Waste Management.

**Nani O Wai'anae.** This community action group is dedicated to increasing awareness of the problems of illegal dumping. It is a non-profit organization located in an area of O'ahu that has been used by illegal dumpers. The organization works within the community to provide educational materials and a support structure to make it easier for members and friends to report illegal dumping or dissuade potential dumpers through peer pressure rather than legal action. DOH OSWM has provided funds and organizational support to the group.

**Maui Recycling Group (MRG).** This is a non-profit organization on Maui that was established in 1989. Their mission is to provide public education, research, training and technical assistance to encourage environmentally and economically sound management systems for solid waste resources on Maui and in the state. In addition to various community projects, they manage the



Hawai'i Materials Exchange (HIMEX) and helped to create a resource exchange network on each island. MRG received funds from the DOH OSWM to establish HIMEX.

**Recycle Hawai'i.** This is a non-profit organization on the island of Hawai'i that performs education and outreach projects. They provide education, organize household hazardous waste (HHW) collections (semi-annual), perform business audits that include information sessions on setting up recycling, conduct waste minimization workshops, organize Christmas tree-cycling, and conduct a school recycle challenge program. DOH OSWM provides occasional funding to support Recycle Hawai'i programs.

**Resource Conservation and Development (RC&D).** The RC&D is a quasi-governmental, non-profit organization supported in part by the U.S. Department of Agriculture and Natural Resources Conservation Service. Their primary focus is community development, and they conduct training and outreach projects to support that. They have staff at offices on Kaua'i, Maui, and the island of Hawai'i. On Kaua'i, the RC&D received funds from the state, through regulatory settlements, to support composting projects.

**Rural Community Assistance Corporation (RCAC).** RCAC is a western regional organization that has an office in Hilo. They are a non-profit organization that focuses on rural communities and disadvantaged people to improve quality of life. Activities include partnerships, technical training, and resource access. The Hawai'i-based RCAC organization has been involved in integrated solid waste management issues, as well as other environmental and economic development issues. DOH OSWM provides occasional funding to support solid waste training activities.

**University of Hawai'i Sea Grant Extension Service.** This is a federally supported extension program that focuses on marine issues. It is part of a national network of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration. They support a variety of environmental education and action programs in Hawai'i and the Pacific. They have produced educational brochures with the DOH OSWM addressing boater and household wastes, and coordinate the annual "Get the Drift and Bag It" litter cleanup campaign.

## 2.2.7 Observations and Analysis

**Statewide Policy and Goals.** The State of Hawai'i has not achieved its goal of 50 percent diversion, even though progress has been made. Given the state's depressed economy since the early 1990s, the added cost of doing business in Hawai'i, and the historically unreliable status of offshore markets, it is understandable that the goal has not been met. But many of those factors can be overcome with initiatives that enhance public recycling services, provide financial incentives, or improve market opportunities.

According to FY 1998/1999 data,<sup>5</sup> the state has nearly achieved 25 percent diversion (see Table 2-1). Through implementation of the recommendations in Chapter 4 of this Plan Revision, 35 percent diversion could be achieved within a few years. The goal of 50 percent is achievable, but more time will be needed.

The priorities of solid waste management, to reduce, reuse, recycle, and then dispose, are as valid today as when they were written. Source reduction is the most cost-effective and permanent

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<sup>5</sup> DOH. 1999. *Hawai'i Waste Disposal and Diversion Survey, 1998-99.*

solution to waste. Returning discarded materials into the economy through recycling and composting has multiple social benefits of job creation and virgin resource conservation. Even so, disposal through incineration and landfilling are clearly essential parts of the system.

**State Agency Programs.** State law (HRS 342G-41 to 48) is clear that all state agencies have important roles in diverting wastes and in helping create markets for recycled materials through purchasing practices. A thorough review has not been performed to ascertain whether or how well state agencies are implementing the law. Interviews and anecdotes indicate that there is significant room for improvement.

One approach to promoting recycling by governmental facilities is to require them to develop recycling plans. Each state office would develop a recycling plan to identify the major recyclable materials generated, recycling programs, and the tons recycled. Consolidating the data in these plans would provide an overall picture of the state's in-house recycling programs. It is also possible to challenge individual facilities to compete for the highest recovery rate. Recycling program success could then be used as a factor in the performance evaluation of facility managers.

**Integrated Solid Waste Management Planning.** HAR 342G-24 specifies that county ISWM Plans be periodically revised. The DOH could initiate this process by providing expectations about Plan contents, deadlines, and funding.

This State ISWM Plan Revision has taken the approach of building on the pre-existing comprehensive Plan by selecting and prioritizing specific issues for in-depth treatment. Consistent with this approach, it is preferable that counties address the most critical and promising issues in their ISWM Plan Revisions.

State law empowers the counties to negotiate with DOH regarding the contents of their Plans. DOH can take the liberty suggested by this legal intent to negotiate freely with each county regarding their planning process and to help them address the most critical and strategic issues that they face.

**Role of the State Solid Waste Advisory Committee.** According to HRS 342G-29, a solid waste task force or SWAC is formed only during the ISWM Plan revision process. Many states maintain an ongoing SWAC or policy advisory group to provide input from and maintain communications with the community, public agencies and the industry. Such a body can both provide good advice to the agency, and help to build support and collaboration on programs and initiatives.

**State Solid Waste Funding and Administration.** There has been considerable variability over time, and recently, a decline in the funds available to the DOH OSWM. These limitations place constraints on the DOH OSWM's ability to promote waste reduction and recycling statewide, to serve local government's needs for permit applications, and to enforce laws (e.g., illegal dumping). Current enforcement staff is insufficient to assure compliance with state waste management laws and to provide timely services to local governments.

**Roles for Independent Organizations.** Solid waste management, more than other public works functions, entails an active collaboration by public, private for-profit, and private non-profit sectors. It is the DOH's responsibility to monitor, coordinate, and assist with efforts to further state environmental laws and policies.

At present, Hawai'i lacks a state recycling association. At the time of the 1991 Plan, the Recycling Association of Hawai'i was an active entity. That organization closed in 1995. The functions of representation, coordination, and education of the recycling industry played by a professional association could help to further recycling and market development efforts.

## 2.3 Solid Waste Performance Measures

This section addresses the following issues:

- Methods for collecting and managing solid waste data by the state and counties.
- Comparison of Hawai'i's data collection methods with national methods described by the EPA.
- How Hawai'i's FY 1997/1998 waste generation and diversion data could be adjusted, using EPA methodologies, to identify trends comparable with national standards.
- Performance indicators that could help monitor and track progress.

Detailed data on waste generation, disposal and diversion are included in Sections 2.4, 2.5, and 2.6. The data and information about county programs was obtained through review of reports and interviews with county staff and representatives of the solid waste community.

### 2.3.1 Management of Local and Statewide Solid Waste Data

HRS 342G-15 requires that the state solid waste coordinator do as follows:

*"...prepare and submit an annual report to each County, the director, the governor and the legislature...describing...a summary of the results achieved in meeting the state waste reduction goals, including the amounts of waste disposed of, diverted and generated in the state...."*

To fulfill this requirement, each year the DOH OSWM compiles data on waste diversion, disposal and generation and prepares an annual report.

Each permitted waste handling business in the state is required, by their solid waste permit, to report to DOH OSWM the quantity of waste disposed. Landfills and incinerators are able to provide some of the data based upon scale house receipts. Recycling and composting operations weigh or, in cases where material is not directly weighed, estimate the amount of each type of material recycled or composted. In some cases, recycled materials are handled by facilities that do not require solid waste permits, such as distribution warehouses for retail operations (e.g., Kmart, Safeway, and Wal-Mart). DOH OSWM has not consistently collected data from these sources.

Each year, the DOH OSWM sends a reporting form to solid waste permittees and others who handle recyclable materials. The DOH must contact many facilities to solicit information, since return of completed forms has been low.

Some counties also gather data from private recycling operations. Maui County contacts all recycling operations annually to determine recycled tonnage, and provides this information to the DOH. Hawai'i County provides diversion credits and glass recycling payments for recycled materials that are marketed, and so receives data for the materials that qualify for payments. The C&C also contacts recycling companies to gather diversion numbers. These efforts are

complementary to the state's efforts, but the methodologies, timing, and lists of sources are not always coordinated. Therefore, data is not always consistent or comparable.

In Hawai'i as elsewhere, recyclers may be reluctant to divulge information about tonnage received for competitive reasons. In addition, there may be cause to question the accuracy of the numbers recyclers provide. In some states, law provides that the data on individual operations be held confidential, and only aggregated numbers are made public. In Hawai'i, the data is not protected and, though individual company data is not intentionally made public, it could be requested under freedom of information procedures.

The amount of solid waste generated is calculated from reported quantities of waste disposed plus reported waste materials diverted, as follows:

$$\text{Generation} = \text{Disposal} + \text{Diversions}$$

The diversion rate is then calculated as follows:

$$\text{Diversions Rate} = \text{Diversions} / \text{Generation}$$

Since recyclers and composters for each type of material report on diverted quantities, they provide valuable information to determine the diversion rate for specific materials. This can be helpful in determining which materials are achieving high diversion rates, and which could benefit from increased efforts. However, to accurately determine relative diversion rates, it is necessary to have reliable data on the material composition of waste disposed.

Recent waste composition data are not widely available for Hawai'i communities. There has not been a statewide study performed. Waste composition for the C&C was studied in 1999. Maui County conducted a waste composition study in 1994. Hawai'i County conducted a waste composition study in 1993, and in 1997 they conducted a study of east-side waste only. The County of Kaua'i performed a study in 1989. Much has changed in waste generation and diversion since the late 1980s to early 1990s studies for counties were performed. This ISWM Plan Revision is therefore cautious in drawing conclusions about waste composition and diversion for the neighbor islands. To provide better data, the state should consider conducting or funding a statewide waste composition study.

### **2.3.2 U.S. Environmental Protection Agency Data Methodologies**

Each state measures waste generation and diversion differently. This makes it difficult to compare data nationwide and to evaluate the waste streams of individual states relative to the national waste stream. Therefore, the EPA developed national methodologies for waste characterization and measurement of recycling rates.<sup>6,7</sup>

The primary points of interest in comparing EPA's and Hawai'i's methods are the definitions about what is included in MSW. The Hawai'i definition of MSW includes the following types of materials, which are not included in the EPA definition:

- C&D debris.

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<sup>6</sup> EPA. 1997. *Measuring Recycling, A Guide for State and Local Governments*. Report No. EPA 530-R-97-011.

<sup>7</sup> EPA. July 1999. *Characterization of Municipal Solid Waste in the United States: 1998 Update*. Prepared by Franklin Associates, Ltd.

- Auto bodies.
- Petroleum contaminated soils (PCS).
- Motor oil.

C&D debris in Hawai'i comprises between 20 and 40 percent of the waste stream, depending on the community and the level of new building activity. Because C&D is included, Hawai'i waste generation rates appear to be much larger than they would be by using EPA assumptions (refer to Section 2.4). Because C&D waste diversion is relatively high, diversion rates also appear higher.

The EPA definition provides the best nationally consistent methodology for analysis and comparison of waste streams. Some states have begun to adopt the national methodologies, either by modifying their own measurement methodologies, or developing a parallel measurement. If adopted widely, it could help bring waste composition and diversion reports into a common standard.

### 2.3.3 Additional Performance Indicators

The measurement of a diversion rate is defined as a "lagging indicator," which means it measures something that has already happened. "Leading indicators," which measure ongoing activities and progress and may indicate improvements that are yet to come, are also important to measure.

Two possible leading indicators that the DOH could measure would be the following:

- *Completed actions of the four Counties in developing ISWM Plan Revisions* – Measure the number of counties that have: 1) begun the planning process, 2) completed a draft Plan, 3) completed a public input process, and 4) formally adopted a Plan.
- *Completed actions of the state in implementing the recommendations of this State Plan Revision* – Track progress on implementing recommendations included in Chapter 4 of this Plan by measuring the number of recommendations that are: 1) in implementation planning process, 2) being implemented, and 3) fully implemented.

### 2.3.4 Observations and Analysis

**Measurement of Diversion.** The data management activities of the state and the counties could be coordinated to provide reliable rates of waste disposal, diversion, and generation. The DOH and the counties could work as a team in notifying recyclers of the need to report data, and in collecting and analyzing the data.

Greater efforts could be made by DOH and the counties to assure that the data are complete and accurate. The possibility of double counting from interisland shipment of materials should be addressed. Sources that have not previously reported could be included. Data confidentiality for recycling companies could be established to encourage open reporting of collection and amounts. These efforts would help to ensure that the state's reported recycling rates are accurate.

Hawai'i could develop a more informative presentation of its recycling rate by reporting the data in a manner that is consistent with national methodologies developed by the EPA. Even though Hawai'i's current method is equally valid, the issue is one of convention. A simple analysis could provide data displayed according to both Hawai'i and EPA methodologies.

**Measuring State Agency Activities.** To provide stronger incentives for state agencies to recycle, DOH could establish specific metrics to measure the recycling activities of state facilities, and to rate different state facilities and agencies. Facilities could be directed to submit recycled commodity invoices or weight tickets, or solid waste haul invoices, and recycling progress could be tracked over time. A competition could be created to award the facility that made the most progress over a period of time. With these data, it would be possible to incorporate recycling measures into employment evaluations for facility managers.

**Leading Indicators.** The adoption and tracking of some leading indicators, and periodic reporting of progress against indicators, would provide a simple but visible measure of the progress that is underway for the state and county programs.

**Reporting.** Finally, a Solid Waste Management Scorecard could be created and published annually to show the progress the state is making toward its goals, and the contributing activities.

## 2.4 Solid Waste Generation

This section presents data on Hawai'i's generation of solid waste and compares it to national statistics. Factors that contribute to a high waste generation rate in Hawai'i are discussed.

### 2.4.1 Data on Waste Generation

This section presents Hawai'i data both as measured by Hawai'i and as it would be measured using EPA assumptions. Figure 2-1 shows the statewide waste generation, by fiscal year, in thousands of tons. Waste generation increased between 2 and 6 percent per year during the first half of the 1990s, and decreased by 1 to 6 percent between 1996 and 1998.

**Figure 2-1:  
Hawai'i Waste Generation, Disposal, and Diversion**

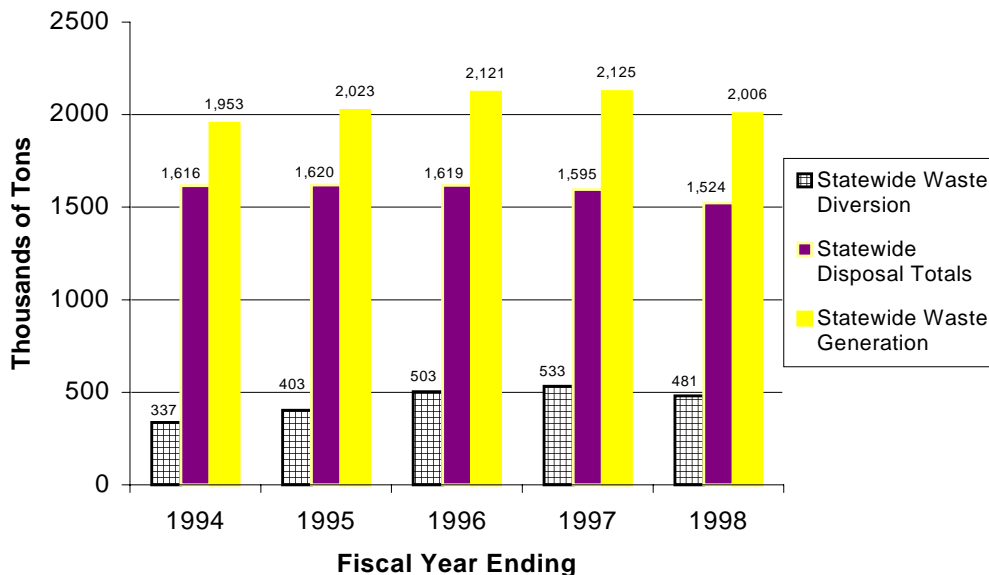


Table 2-3 depicts the major adjustments that would be used to normalize Hawai'i waste stream numbers based on EPA definitions and methods. The unknown amount of C&D material in Hawai'i's waste stream makes it necessary to estimate the waste stream rather than provide a precise number. The assumptions used about C&D generation are consistent with the findings of the recent C&C waste composition study.

**Table 2-3:  
Adjustment of Hawai'i Municipal Solid Waste Stream  
Based on EPA Methodologies**

|   |           |
|---|-----------|
| Hawai'i Waste Stream as Reported (1998-1999 tons/year)                    | 1,884,477 |
| <i>Adjustment to Normalize Hawai'i's Waste Stream to EPA Methodology:</i> |           |
| Subtract C&D (approximately 20 percent)                                   | 376,895   |
| Subtract diverted non-MSW materials                                       | 98,416    |
| Hawai'i waste stream, adjusted using EPA methodologies (tons/year)        | 1,409,166 |

Using the EPA-adjusted waste stream, Hawai'i residents and visitors generate considerably more solid waste per person per day than the national average for U.S. residents (Table 2-4).

**Table 2-4:  
Comparison of U.S. and Hawai'i Waste Generation Rates**

|   |                       |
|---|-----------------------|
| State of Hawai'i de facto waste generation rate | 5.8 pounds/person/day |
| U.S. average waste generation rate              | 4.4 pounds/person/day |

The following factors may influence the per capita solid waste generation rate in Hawai'i, and may account for it being higher than national averages:

- Year-around growing season contributes to high generation of green waste.
- Visitors may consume and dispose of greater quantities of materials while on vacation, especially disposable food packaging and utensils.
- The hospitality industry may dispose of more materials in its operations than other types of industries.
- More transport packaging waste may be generated than national average, including pallets, cardboard and shrink-wrap, because of Hawai'i's reliance on the shipping industry.

In comparing waste composition for Hawai'i versus the U.S. mainland,<sup>8</sup> there are two materials that represent a much larger percentage of the Hawai'i waste stream than nationally: green waste is 60 to 80 percent greater than, and wood waste is 100 percent greater than the national average.<sup>9</sup> Green waste generation can be attributed to the longer growing season. Wood waste can be attributed in part to transport packaging, including pallets, which represents 40 percent of the

<sup>8</sup> EPA. July 1999. *Characterization of Municipal Solid Waste in the United States: 1998 Update*. Prepared by Franklin Associates, Ltd.

R.M. Towill. 1999. *Oahu Municipal Refuse Disposal Alternatives Study, Waste Composition Study*. Prepared for the City and County of Honolulu.

<sup>9</sup> *Ibid.* This is calculated as a per capita generation rate.

wood waste in Hawai'i. Still, these factors do not appear to fully account for waste generation that is nearly 50 percent higher than the national average. Lifestyle differences and personal consumption choices may also be factors.

The U.S. per capita generation rate grew steadily between 1960, when it was 2.7 pounds per person per day until 1994, when it reached 4.5 pounds per person per day. Between 1995 and 1996, national waste generation dropped slightly, and then rose again in 1997 to its most recently measured level of 4.4 pounds per person per day.<sup>10</sup>

Even during the recent period of decline, however, the generation rate of nearly all material types has been increasing. Two exceptions counter the increase – green waste and newspaper. This is believed to be due to green waste composting in back yards and grass cycling (i.e., grass clippings being allowed to mulch on lawns). These changes by the general public are attributed to the increased emphasis by municipalities in promoting backyard composting, and the public's heightened awareness of the costs and impacts of waste management.

## 2.4.2 Observations and Analysis

**Waste Generation.** For a variety of reasons, Hawai'i's solid waste generation rate exceeds the nation's rate.<sup>11</sup> Source reduction in Hawai'i is, and should be, the top priority of the state waste management hierarchy.

**Source Reduction.** Source reduction was not selected for in-depth analysis for this ISWM Plan Revision. The most significant step to reduce waste at its source is to impress on the public that discarding waste is not free. Section 3.7, which addresses state program funding, highlights the single most important action that the state and counties could take, which is to institute solid waste user fees.

The national trend in source reduction of green waste points to some specific opportunities for Hawai'i. Promotion of backyard composting allows the public an opportunity for direct and substantial impact on the amount of waste that they generate.

In addition, communities often implement public education addressing the costs and environmental impacts of disposal so that the public better understands the implications of waste generation. These opportunities are discussed in Section 3.6.

**Source Reduction by Business.** National businesses are increasingly recognizing that waste is a sign of inefficiency. They are therefore working to reduce their costs while reducing their wastes. They can do this through better management of both purchasing and disposal practices. An increasingly common practice of businesses is to benchmark best practices in eco-efficiency in order to reduce paper waste, transport packaging, food and hospitality waste, and other specific targets (see Section 3.3.3.3 on benchmarking)

## 2.5 Waste Collection and Transfer

This section addresses waste collection and transfer systems in the four counties.

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<sup>10</sup> EPA. July 1999. *Characterization of Municipal Solid Waste in the United States: 1998 Update*. Prepared by Franklin Associates, Ltd.

<sup>11</sup> See Figure 2-1.



### **2.5.1 Introduction**

Both county governments and private industry provide waste collection and transfer services in Hawai'i. With the exception of Hawai'i County, county public works crews collect residential waste from single-family homes and some multifamily homes. In all counties, private haulers collect commercial waste, except for small businesses, which in some cases are included in the county residential collection routes. The counties do not regulate the rates or routes of private commercial haulers.

In all cases, transfer stations and convenience centers are owned by the counties and are operated by public crews or county-contracted private crews.

### **2.5.2 Hawai'i County**

Hawai'i County does not provide waste collection services. Private companies haul approximately 50 percent of the waste generated in areas that have relatively dense residential development to one of two landfills. The remaining 50 percent, or possibly greater, is self-hauled. Most self-hauled waste is taken to one of the county's 21 transfer stations. Most of the transfer stations have a 40-foot compacting transfer trailer equipped with a dump chute. In one rural location, they use a 40-foot roll off that, when full, is hauled to a landfill by a private contractor.

Only four of the transfer stations are gated with set hours of operation. Most are open facilities that are monitored by rotating county attendants or security guards who provide some public education and monitor for hazardous wastes. There is no charge for disposal at the transfer stations and they are intended for use by residents only.

The majority of waste from transfer stations is taken to Pu'uana'hulu Landfill, on the west side of the island, for disposal. The transfer stations have proven to be an economical alternative to county collections in areas with sparse populations and long haul distances.

The county is examining options for future changes to the system. A study funded by EPA looked at the changes that would be necessary to implement pay-as-you-throw (PAYT), which would require charging for disposal at the transfer stations. The county is also considering options for waste processing following the planned closure of the South Hilo Landfill. This is discussed in Section 2.6.3.

### **2.5.3 City and County of Honolulu**

C&C crews provide waste collection to all single-family residences on a twice-weekly basis. Collection services are also provided to a limited number of commercial customers at a rate of \$1.00 per cubic foot. The C&C provides collection to some townhouses, apartment buildings, and condominiums. Most commercial waste is collected by private haulers. Therefore, C&C crews collect approximately 40 percent of the total waste stream. The remainder is either self-hauled or collected by private haulers.

Collection services are paid for out of the C&C general fund rather than a user fee. The C&C is considering various options for reducing cost in the face of rising labor and operating costs and competing demands on the general fund. One option is to assess an annual collection fee and decrease collections to once per week.

The C&C operates three transfer stations, used by both municipal short-haul vehicles and by residents that self-haul waste, and six convenience centers that are available for residents' disposal of self-hauled waste. Residents are not charged a tipping fee at transfer stations or convenience centers. Some transfer stations and convenience centers allow limited commercial disposal for a fee.

Several of these facilities attempt to sort waste prior to tipping, but none are presently equipped with designated containers for traditional recyclable materials such as glass, paper, and aluminum. Containers for recyclables were located at some facilities but were later removed due to lack of use by customers. Most do offer drop off for separated green waste. All transfer stations and convenience centers are staffed during operating hours and each has somewhat different operating procedures. Some are not equipped to accept special wastes such as tires or white goods; others have designated locations for these items. Users may determine which materials can be disposed at each of the facilities by calling the C&C Department of Environmental Services, Refuse Division, or by reference to published information from the Refuse Division.

#### **2.5.4 Kaua'i County**

The county provides waste collection to residences and to some small commercial generators. The general fund, supported by the property tax, covers the program costs that are not paid for out of enterprise funds. Commercial accounts are billed monthly for weekly service at a rate of \$11 for the first 32-gallon can, \$17 for 2, \$23 for 3, and \$6 for each additional can over 3 cans. Private companies haul approximately 60 percent of waste, county crews haul 30 percent, and the remaining 10 percent is self-hauled.

The county operates four transfer stations, which provide free disposal for residents. One of those transfer stations also provides drop-off for recyclable materials. Small commercial loads, up to  $\frac{3}{4}$  ton, are accepted at any of the transfer stations. They are charged a fee of \$6 per auto; \$10 per passenger van,  $\frac{1}{2}$  ton-and-under pick-up truck and small trailer; and \$20 per cargo van, pick-up truck or trailer up to  $\frac{3}{4}$  ton. Fees are paid in advance through purchase of coupons at county offices; transfer station operators accept these.

#### **2.5.5 Maui County**

County crews collect residential waste once a week. There are 12 full-time, 3-member crews on Maui. Part-time collection crews service the town of Hana and the islands of Moloka'i and Lana'i. Lana'i has automated refuse collection equipment that requires only one person for a collection vehicle.

A service fee of \$6.00 per month is assessed to each residential account, no matter how much waste is collected. Private waste haulers provide approximately 70 percent of collection services.

The county operates one transfer station in Olowalu for Lahaina area residents. The transfer station handles 2,400 tons per year. Pacific Waste, Inc. operates it under contract.

#### **2.5.6 Military**

Collections on most military bases are provided as contract services by private vendors. Military waste is generally disposed at county facilities. Marine Corps Base Hawai'i, Kāne'ōhe Bay

(MCBH) does not provide collection services, but instead, waste generators deliver source separated materials directly to recycling centers located on base.

## 2.5.7 Observations and Analysis

**Local Versus State Interest.** Collection and transfer of solid waste is the direct responsibility of local governments. The state's interest in these services is limited to public health issues and how these impact state policies for the diversion of waste from landfill. Issues such as whether haulers encourage recycling by their customers, make recycling as convenient as possible, and integrate charges for waste and recycling services can affect recycling participation.

**Integrated Collection Services.** In each county, some haulers provide integrated waste and recycling services, and some provide only trash pick-up without offering recycling. In a few cases, recycling services are provided for commercial trash accounts at no extra charge. The consistent ability of a customer to obtain recycling services from their hauler contributes significantly to increased recycling participation. However, an added cost for recycling can discourage customers from recycling. This issue is discussed in relation to commercial recycling in Section 3.3.

**Drop-off Services.** The availability of recycling drop-off centers at transfer stations is inconsistent throughout the state, and sometimes even within a single county. In most cases recycling has been added to a pre-existing transfer station, and in many cases this has not been practical. However, the more consistent that a system is, the more easily it can be promoted through public education, and the easier it is to create new citizen habits.

**Financial Issues.** Section 3.7 addresses two financial issues relative to the trash collection system that are of statewide concern:

- Full cost accounting (FCA).
- PAYT user fees.

Together, these practices can show waste generators that waste disposal is not cheap. When the full costs are accounted for and are charged to generators in proportion to the amount of waste that they produce, waste reduction becomes an economical choice. Communities that have implemented such systems, together with recycling options, report large increases in recycling rates.

Recent studies that have examined mature recycling programs to identify the factors that have greatest impact on diversion,<sup>12</sup> point to graduated user fees and unit-based pricing (i.e., each unit of volume of waste disposed increases costs proportionately).

These two systems are not fully implemented for the residential sector in Hawai'i — though O'ahu has a FCA system and Maui is considering a tiered-rate user fee system. Section 3.7 further describes advantages of these systems.

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<sup>12</sup> Jeffrey Morris, "What Works Best to Increase Waste Diversion?" *Resource Recycling*, January 2000, pp. 37-40.

## 2.6 Landfill and Incineration

This section provides an overview of disposal facilities statewide and presents changes in solid waste practices since adoption of new federal landfill regulations. It also introduces the problem of illegal disposal, which is addressed more thoroughly in Section 3.2.

### 2.6.1 Introduction

The 1991 ISWM Plan listed 13 MSW landfills, 6 C&D landfills, and 1 MSW incinerator in the state. At the end of 1999, there were 8 MSW landfills, 2 C&D landfills, and 1 MSW incinerator. Table 2-5 presents data on the active landfills and disposal facilities in Hawai'i as of the end of 1999.

**Table 2-5:  
Active Solid Waste Disposal Facilities by County**

| Name and Type                       | County           | Remaining Capacity (Years) | Annual Volume (Tons) | Bottom Liner                     | Owner                  | Operator                                 |
|-------------------------------------|------------------|----------------------------|----------------------|----------------------------------|------------------------|--|
| Pu'uana'hulu Landfill               | Hawai'i          | 25                         | 78,452               | High density polyethylene (HDPE) | County                 | County/Waste Management of Hawaii, Inc.  |
| South Hilo Landfill                 | Hawai'i          | 4 <sup>1</sup>             | 66,060               | None                             | County                 | County                                   |
| H-POWER Waste to Energy Incinerator | Honolulu         | Not applicable (N/A)       | 638,000              | N/A                              | County                 | Honolulu Resource Recovery Venture, Inc. |
| Waimānalo Gulch Landfill            | Honolulu         | 15                         | 310,000              | HDPE                             | County                 | Waste Mgmt.                              |
| PVT C&D Landfill                    | Honolulu         | 15                         | 262,000              | None                             | PVT Land Company, Ltd. | PVT Land Company, Inc.                   |
| MCBH Landfill                       | Honolulu         | 25                         | 10,000               | None                             | Military               | Military                                 |
| Kekaha Landfill                     | Kaua'i           | 5                          | 73,227               | HDPE                             | County                 | County/Sanifill of Hawaii, Inc.          |
| Central Maui Landfill               | Maui             | 30                         | 135,000              | Clay/HDPE Phase IV               | County                 | County                                   |
| Hana Landfill                       | Maui             | 55                         | 2,000                | Clay                             | County                 | County                                   |
| DeCoite C&D Landfill                | Maui             | 15                         | 0 <sup>2</sup>       | HDPE                             | Private                | Private                                  |
| Kalaupapa Landfill                  | N/A <sup>3</sup> | 20                         | 20                   | None                             | State                  | State                                    |
| Moloka'i Landfill                   | Maui             | 20                         | 7,000                | Clay                             | County                 | County                                   |
| Lana'i Landfill                     | Maui             | 8                          | 3,000                | None                             | County                 | County                                   |

NOTES: <sup>1</sup> Permit for this added capacity is not yet approved. See Section 2.6.3.

<sup>2</sup> DeCoite Landfill was closed during 1998.

<sup>3</sup> Kalaupapa Landfill, located in Kalaupapa on Moloka'i, is under state jurisdiction.

## 2.6.2 Effect of RCRA Subtitle D on Waste Disposal Practices

Since publication of the original 1991 ISWM Plan, new federal regulations have been promulgated to address health and environmental risks resulting from MSW landfill operations and closure. RCRA Subtitle D, and its implementing regulation, Title 40 Code of Federal Regulations, Part 258 (40 CFR §258), specifies requirements for municipal landfills, including siting, design, construction, operating conditions, monitoring and maintenance, closure/post-closure, and financial assurance. The various requirements of RCRA Subtitle D were promulgated between 1991 and 1996.

The 1991 ISWM Plan was prepared, in part, to address RCRA Subtitle D regulations that had been proposed, but not implemented. In 1991, landfill tipping fees were non-existent in Hawai'i and Kaua'i Counties, and much lower than the current levels in the C&C and Maui County.

RCRA Subtitle D has substantially increased the complexity and cost of solid waste disposal. Requirements address siting and design, monitoring and maintenance, restriction of liquids and hazardous wastes, closure, and legal liability for environmental contamination. Subtitle D landfills require more skilled technical personnel to conduct management, maintenance, and monitoring activities than were required prior to 1991.

RCRA Subtitle D has also resulted in a reduction in the number of landfills. Consolidation of landfills reduces the fixed costs, and improves utilization of expensive equipment and labor. A long-term national trend to consolidate landfills started prior to RCRA Subtitle D and continues. Since disposal space has become more valuable as a result of RCRA Subtitle D, alternatives to disposal such as recycling and bioconversion have become more economically attractive.

The trend for large disposal facilities has been to contract operations to a private company even when the public owns the infrastructure. The 1997 *Konno Decision* has stalled this trend in Hawai'i. The advantages of privatizing disposal facilities include relieving the counties of some environmental liability and placing responsibility for waste management operations with specialized waste management companies. However, a loss of public sector jobs resulted. The compromise that has been worked out has retained the operational jobs in the public sector, while applying private expertise to management.

The 1998 Hawai'i State Legislature passed a bill that allowed "managed competition" (Act 230) between public and privately operated utilities, including landfills. The intent of the law is to allow landfills to be privatized if it is demonstrated that equivalent services can be provided at reduced cost by private entities.

The current status of the six major disposal facilities in Hawai'i shows the following complex mix of public and private roles:

- Hawai'i County:
  - Pu'uanahulu Landfill in Hawai'i is owned by Waste Management of Hawai'i, Inc. and operated by county personnel with management assistance from Waste Management.
  - South Hilo Landfill is owned and operated by the county.
- City and County of Honolulu:
  - Waimānalo Gulch is owned by the C&C and operated under contract by Waste Management of Hawai'i, Inc.

- The H-POWER facility is owned by DFO Partnership Inc. and operated under contract by Honolulu Resource Recovery Venture, Inc. The C&C owns the property on which H-POWER is located.
- Kaua'i County:
  - Kekaha Landfill is owned by the county and operated by county personnel with assistance from Sanifill of Hawai'i, Inc.
- Maui County:
  - Central Maui Landfill is owned and operated by the county.

### 2.6.3 Hawai'i County

Hawai'i County has two active landfills. The South Hilo Landfill is in Hilo and Pu'uanahulu Landfill is in North Kohala. There is a \$35 per ton charge for disposal by commercial haulers or residents at both landfills. However, there is no charge for disposal at transfer stations, which are intended for residential use.

South Hilo Landfill will need to be closed in the mid-term future when it reaches capacity on the present footprint.<sup>13</sup> This old and unlined landfill is a pre-RCRA Subtitle D landfill that was allowed to continue operation under a "grandfather" clause. Due to the fact it will reach capacity soon, and it would be difficult to site a new landfill in the area, its future closure presents one of the major solid waste challenges facing the county.

By agreement with DOH, the closure of South Hilo Landfill is expected to occur 5 years from October 1998, the application date for the final permit extension. Obtaining the additional 5 years of capacity within the current landfill footprint will require approval of a permit renewal application currently being reviewed by DOH. Though unlined, no significant groundwater contamination has been detected during quarterly monitoring to date.

Upon closure of the South Hilo Landfill, Hawai'i County faces important decisions regarding what to do to address east-side waste management. The county will have to develop a new east-side option. Several alternatives are being evaluated, as follows:

- Construction of a transfer station to collect waste prior to transport to Pu'uanahulu, over 100 miles away.
- Construction of a materials recovery facility and/or other recycling infrastructure to reduce the volume of waste to be transported to Pu'uanahulu.
- Upgrade to an existing biomass incinerator to burn MSW.
- Construction of new facility employing a solid waste processing technology.

Upon closure of the South Hilo Landfill, if all waste is transported to the west side, the estimated life of the Pu'uanahulu Landfill as the county's only MSW disposal site would be about 25 years.

The Pu'uanahulu Landfill is on state land and was originally privately owned and operated by Waste Management of Hawai'i, Inc. It was the subject of litigation between the United Public Workers (UPW) Union and Hawai'i County (*Konno v. County of Hawai'i*). The UPW claimed

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<sup>13</sup> The request for a vertical expansion is currently under review by DOH OSWM.

that the County had illegally privatized services that were traditionally performed by civil service workers. The *Konno Decision* by Hawai'i's Supreme Court upheld the claim and forced the county to make arrangements with the private operator to provide jobs for county landfill operators. Waste Management of Hawai'i, Inc. continues to provide overall management as well as construction services at the landfill.

#### **2.6.4 City and County of Honolulu**

The C&C directs all MSW to H-POWER. Residual ash, bulky waste and some commercial waste goes to Waimānalo Gulch, a RCRA Subtitle D landfill.

The 1,700 tons per day of waste delivered to H-POWER is reduced to 280 tons per day through incineration and recycling.<sup>14</sup> The incinerator fires steam boilers that power turbine generators, producing 87 megawatts of electricity. Approximately 50 megawatts (6 percent of O'ahu's power) is sold to Hawaiian Electric; the remainder powers the facility.

H-POWER accepts wastes generated by residents and businesses. Approximately 2 percent of the wastes delivered to H-POWER are unacceptable wastes and are hauled directly to the Waimānalo Gulch Landfill.

Ferrous metal and aluminum are removed and recycled before incineration. Glass is not removed and is a major component of H-POWER ash. The C&C continues to investigate alternative uses for its ash, and currently has federal assistance to develop secondary markets.

H-POWER has processed a greater volume than its design capacity every year since its construction. The current remaining Waimānalo Gulch landfill capacity of 20 years would likely be gone today without H-POWER. Tipping fees at H-POWER are reported to be among the lowest in the nation for similar facilities. However, they are considerably higher than tipping fees on the other Hawaiian Islands. None of the other counties operate a similar facility.

Waimānalo Gulch Landfill, which opened in 1989, is located on the southwest side of O'ahu and is the only MSW landfill serving the island. The C&C owns the land, and county personnel staff the scale house. Waste Management of Hawai'i, Inc. operates the landfill under a contract with the C&C. It accepts commercial and non-hazardous industrial solid wastes, MSW, and ash.

The landfill footprint occupies 66 acres. The ash landfill covers 20 acres and is composed of 8 cells. The MSW phase occupies 60 acres and is constructed in 11 cells. A 60-acre lateral expansion is under consideration; this would provide an additional 15-years capacity. Construction on the lateral expansion has not yet begun pending design and receipt of permits. It is anticipated to begin operations in 2002 to 2004.

PVT Landfill in Nanakuli is a C&D landfill privately owned and operated by PVT Land Company, Ltd. It has an annual disposal volume of over 260,000 tons per year. The active landfill is not lined, and has been granted a permit for a vertical expansion that allows an additional 2 to 3 years' capacity within the current footprint. Upon completion of the current landfill, a horizontal expansion will be constructed with a compacted clay liner and leachate collection system. The site has the potential for over 20 years capacity with additional horizontal expansions.

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<sup>14</sup> Personal communication, Mr. Ray Rosetti, Waste Management of Hawai'i, Inc. (landfill operations contractor to the C&C), April 1998.

### **2.6.5 Kaua'i County**

Kaua'i County has one operating MSW landfill, Kekaha Landfill Phase II, constructed in 1993. It accepted approximately 68,000 tons during the 1999 calendar year.

Kekaha Landfill Phase I was an historical dumpsite that was converted to a landfill. In September 1992, Phase I had less than 2 years remaining capacity when Hurricane 'Iniki struck. The hurricane generated over 5 years equivalent amount of debris, which came into the waste stream over the following 2 to 3 years. The county set up temporary hurricane debris receiving sites to segregate and process hurricane debris, and began a fast-track design and construction of Kekaha Landfill Phase II. Phase II was constructed in part using funds from the Federal Emergency Management Agency, which covered the cost of construction for a landfill with a 5-year capacity. Kekaha Phase I ceased accepting waste in October 1993 when Phase II opened, and closed in 1994. DOH OSWM approved a vertical expansion of the Kekaha Landfill Phase II, which will provide another six years of disposal capacity.

Kaua'i County had originally contracted operations at Kekaha to Sanifill of Hawai'i, Inc. (USA Waste Services, Inc.). However, under the *Konno Decision*, the county replaced the private operators with civil service operators. The land under the landfill is owned by the state and the facility is owned and operated by the county. Sanifill of Hawai'i, Inc. provides management oversight and technical assistance in landfill operations.

Studies are currently underway by the county to site a new landfill and/or to explore alternative methods for disposal. The interest of potential vendors for providing an alternative technology has been solicited and submittals will be evaluated during 2000. The decisions by the County of Kaua'i could have significance for other counties.

Halehaka Landfill, which served the Līhu'e area, ceased accepting waste in June 1991 to avoid regulation under RCRA Subtitle D regulations and to prepare the property for use as part of a golf course in a planned adjacent development. The landfill was unlined. The relative absence of detected pollutants and the slight variation in water quality between the upstream and downstream monitoring wells indicated that leachate migration was minimal. The landfill was closed in 1994, and further contamination has not been detected. Currently, no C&D landfills or MSW incinerators are located on Kaua'i.

### **2.6.6 Maui County**

Maui County contains the islands of Maui, Moloka'i, and Lana'i. The four MSW landfills in Maui County are owned and operated by the county. One C&D landfill is privately owned and operated.

The Central Maui Landfill receives 98 percent of the annual disposal volume generated on the island. In 1998, the landfill received 135,000 tons. The Central Maui Landfill was originally unlined and located on a former quarry site. The landfill is divided into four phases. Phase I reached capacity in 1998 and Phase II is expected to reach capacity by 2002. Both Phases I and II are approximately 17 acres. Phase III is used as a co-composting and biodiesel production site. Phase IV is lined and is expected to begin accepting waste in August 2001. The current design will give the county 30 years of landfill disposal, as future cells are added.



The Hana Landfill serves the rural east of Maui. It is located on state-owned land south of Hana. It is an unlined landfill operating under a small quantity exemption from RCRA Subtitle D regulations. This landfill is estimated to provide 50 years of disposal under current County projections. Its 1998 volume was approximately 2,000 tons.

The Moloka'i Integrated Solid Waste Facility is located in central Moloka'i. It was completed in 1993 as a RCRA Subtitle D clay-lined landfill. Its annual volume is approximately 7,000 tons; this landfill is expected to serve the county for more than 20 years.

The Lana'i Landfill has an annual volume of approximately 3,000 tons. A vertical expansion was completed in 1994 near the island's airport. The landfill is operated under a waiver from the DOH OSWM for the airport exclusion requirement. It has no bottom liner and is excluded from the design requirements of RCRA Subtitle D due to a small quantity exemption. Assuming somewhat increased levels of diversion, it is anticipated to provide 8 years of disposal capacity.

DeCoite Landfill in Mā'alaea, Maui, is a privately owned and operated, lined C&D landfill. It has received an annual volume of over 14,000 tons per year. DeCoite landfill was closed during 1998 because of an underground fire that burned over an extended period, creating a nuisance for neighbors. The fire was extinguished and the landfill again began operations in early 1999.<sup>15</sup> The remaining capacity at the site is over 10 years if horizontal expansions are allowed.

### 2.6.7 Military

Military waste disposal is conducted predominately using county disposal facilities. The only active military landfill is located at MCBH Kāne'ohe on O'ahu. The MCBH Landfill is unlined and has a disposal volume of approximately 10,000 tons per year, and a remaining capacity of about 25 years.

Table 2-6 provides data on military waste streams in Hawai'i.

**Table 2-6:  
Military Waste Generation and Disposal**

| Service   | Major Base         | Year  | Generated | Disposed |
|-----------|--------------------|-------|-----------|----------|
| Army      | Schofield Barracks | FY 97 | 28,379    | 25,189   |
| Air Force | Hickam             | FY 98 | 13,033    | 9,339    |
| Marines   | MCBH Kāne'ohe      | CY 97 | 70,200    | 47,494   |
| Navy      | Pearl Harbor       | CY 98 | 20,949    | 15,618   |

NOTE: CY = calendar year.

### 2.6.8 The Problem of Improper and Illegal Disposal

DOH observes that a substantial quantity of waste is disposed in non-permitted landfills and uncontrolled areas each year.<sup>16</sup> Much of the illegally disposed refuse is C&D waste, white goods,

<sup>15</sup> Personal communication, Dr. Hana Steel, Recycling Coordinator, County of Maui, October 1998.

<sup>16</sup> Personal communication, Mr. John Harder, DOH Solid Waste Coordinator, March 1998.

tires and green waste. The primary groups responsible for illegal disposal appears to be small construction and landscaping contractors and residents who seek to avoid the expense or inconvenience of legal disposal or diversion.

Potential hazards created by non-permitted landfills and roadside dumping include contamination of soil, air, and groundwater; physical hazards; and ecological damage resulting from contamination of soil or surface water. Non-permitted dumps and roadside dumping may decrease land values, impact the visitor industry, and affect community pride. Illegal dumping also has a negative economic impact on operators of permitted disposal and diversion facilities.

DOH and the SWAC identified illegal dumping as one of the priority focus areas for state action. Illegal dumping issues are discussed in Section 3.2 and recommendations to reduce the problems associated with illegal dumping are included in Chapter 4.

## 2.6.9 Observations and Analysis

**Landfill Operations.** The promulgation of RCRA Subtitle D has resulted in a reduction in the number of landfills and an increase in the sophistication of operations nationwide. This is attributable to increasing cost of environmental compliance, and to the complexity of complying with the regulations relating to facility operations, and potential liability of non-compliance.

The current status of disposal facilities in Hawai'i shows a complex mix of public and private roles in ownership and operations. The DOH plays an important role in regulating these facilities, and in providing training in landfill operations and environmental monitoring and control.

**Landfill Capacity.** There are no immediate problems with landfill capacity in the C&C and Maui County. However, the Counties of Kaua'i and Hawai'i need to address landfill capacity issues very soon. Kekaha Landfill Phase II on Kaua'i and South Hilo Landfill on Hawai'i will likely both close within 5 to 6 years. Because it can take 5 to seven 7 or more to site and construct a new landfill, or to implement an alternative to landfilling, both of these counties are currently moving ahead with solid waste management planning.

**A Sustainable Disposal Strategy.** The state and the counties are recognizing that, in the long term for a land-limited state, landfilling is not a sustainable disposal strategy for a high percentage of the waste stream. Therefore, the emphasis on waste diversion through recycling and composting is a very important priority in Hawai'i.

In addition, the counties should be encouraged to explore other options for waste processing and transformation. The high cost of land in Hawai'i—including financial, social, and environmental costs—lend an important advantage to waste processing over waste disposal for those materials that cannot be recycled.

Waste combustion and MSW composting are the only widely implemented technologies for processing of unsegregated waste streams. However, both of these methods have substantial problems with public acceptability and environmental impacts. There are, however, some promising technologies that are under development and are emerging as significant possibilities for the future. These include thermal gasification—by means of oxygen-starved combustion or an electric arc—or low-temperature gasification—through catalytic or biological processes.

None of these technologies are well proven or widely implemented in handling MSW. They are therefore risky. However, Hawai'i is a logical testing ground from the perspective of developers and vendors for these technologies, for the following reasons:

- Disposal costs are relatively high.
- Energy prices are high (energy is often a by-product of these processes).
- Counties, due to isolation as islands, have good control of waste flows.
- There is a strong need for new solutions in at least two counties.
- Unlike large commercialized technologies, some emerging technologies are better at handling smaller waste streams and are favored by economies of scale.

Counties in Hawai'i should be cautious of vendors that would take advantage of their need to find disposal alternatives and who propose unproven, risky or overly costly technologies. MSW, by its nature, is a very difficult waste to process. Many of these technologies are being modified from other, more uniform waste streams, such as agricultural, medical, or hazardous wastes. Their reliability and economical performance with MSW is yet to be demonstrated.

Development of any such alternatives could be applicable statewide. Therefore, the DOH, possibly in coordination with the University of Hawai'i, could help to identify and evaluate alternatives. While the counties are taking the lead, the state could, for example, provide technical information and assistance in the challenging task of evaluating new and emerging proprietary systems.

## **2.7 Diversion**

This section addresses diversion of solid waste from disposal through recycling and composting. It discusses statewide and county diversion activities, including public sector and private enterprise activities. More detailed information about local recycling activities is provided in Chapter 3 (Sections 3.3, 3.4, and 3.5).

### **2.7.1 Introduction**

The functions of recycling and composting are largely performed by private businesses. However, by their nature, waste materials are of marginal economic value. It sometimes costs more to collect and process them into marketable commodities than they bring in the marketplace. This extra cost of recycling, however, is generally less than the cost of disposing of the materials as waste.

It is, therefore, often necessary to invest public funds to support diversion of materials from landfills. These funds often flow from the public to the private sector. This creates the context for cooperative public/private partnerships in achieving recycling goals.

### **2.7.2 Statewide Diversion Performance**

Recycling and composting have grown substantially in Hawai'i since the 1991 Plan was completed. The Hawai'i diversion rate in 1990 was under 5 percent. In FY 1998/1999, the diversion rate for Hawai'i was 24 percent.

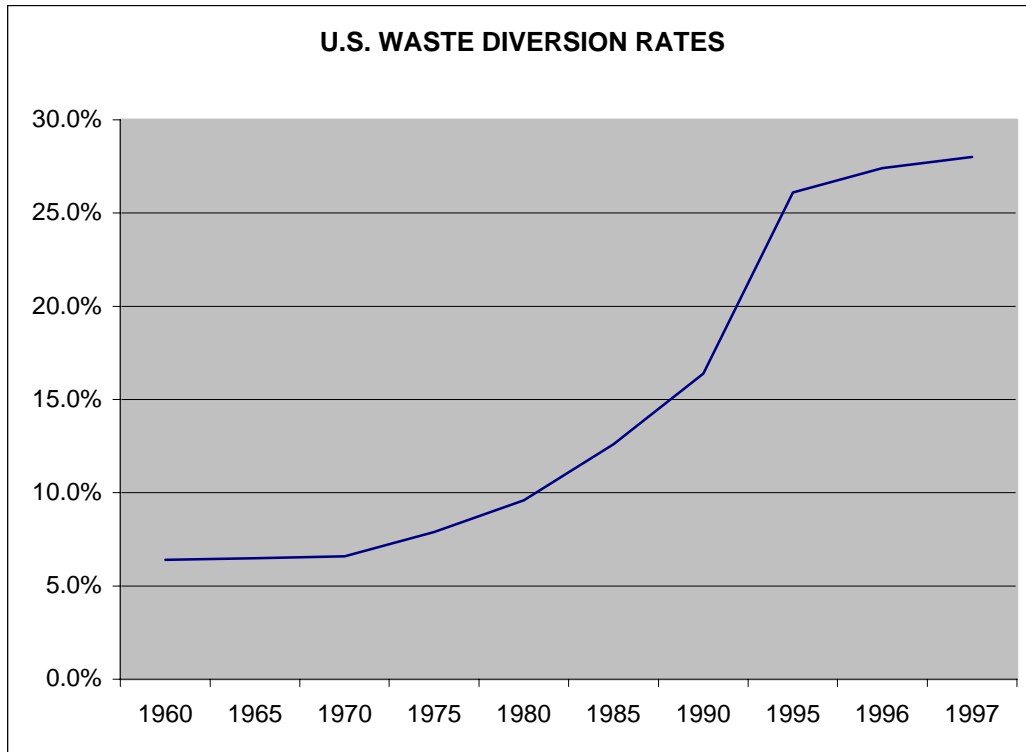
In order to examine Hawai'i's waste diversion rates using EPA definitions (see Sections 2.3.2 and 2.4.1), it is necessary to adjust estimates of both the diverted material and the total waste generated. The result of this recalculation is that Hawai'i's diversion rate is approximately 19 percent by EPA methodologies.<sup>17</sup> By comparison the national average diversion rate is 28 percent.<sup>18</sup> Table 2-7 contains assumptions about Hawai'i's diversion rates by EPA's definition, while Figure 2-2 shows the national trend in waste diversion.

**Table 2-7:  
Normalized Hawai'i Waste Diversion Rate<sup>1</sup>**

|  |           |
|--|-----------|
| Hawai'i MSW Stream (EPA methodology)                           | 1,409,166 |
| Tons Diverted in Hawai'i in 1998/1999 (EPA methodology)        | 269,962   |
| Hawai'i Diversion Rate in 1998/1999 (EPA methodology; percent) | 19.2      |
| 1996 National Diversion Rate (percent)                         | 28.0      |

NOTE: <sup>1</sup> See Section 2.4.1 for description of EPA methodology and normalization process.

**Figure 2-2: National Trend in Waste Diversion**



<sup>17</sup> This figure is uncertain, primarily due to different assumptions about how much C&D waste is generated.

<sup>18</sup> EPA. July 1999. *Characterization of Municipal Solid Waste in the United States: 1998 Update*. Prepared by Franklin Associates, Ltd., p. 30.

The increase in national diversion rates has slowed in the last few years. In Hawai‘i, between 1996 and 1999, the recycling rate has been steady at 24 to 25 percent (by Hawai‘i definitions). This is apparently due to several factors, including depressed markets for recycled materials. Most recycling markets, however, have shown strength and growth over the last several months.

Approximately 33 percent of the total quantity that is diverted in Hawai‘i is classified as “other materials,” composed primarily of sewage sludge, incinerator ash, used oil, and asphalt. Scrap metal accounted for another 33 percent of the waste diverted, green waste accounted for 15 percent, and food and wet waste accounted for 3 percent. Table 2-8 portrays the data on waste diversion for the state as a whole.

**Table 2-8:  
Statewide Waste Diversion**

| MATERIAL TYPE                       | WEIGHT<br>(in tons) | MATERIAL TYPE      | WEIGHT<br>(in tons) |
|-------------------------------------|---------------------|--------------------|---------------------|
| <b>METALS</b>                       | 154,118             | <b>PAPER</b>       | 61,517              |
| Ferrous Scrap Metal                 | 111,174             | Cardboard          | 35,805              |
| Auto Scrap                          | 33,914              | Newspaper          | 12,227              |
| Aluminum                            | 5,615               | Mixed Paper        | 6,670               |
| Other Non-ferrous                   | 3,415               | High-grade Paper   | 2,618               |
| <b>OTHER MATERIALS</b>              | 149,813             | Magazines          | 3,403               |
| PCS                                 | 11,367              | Other Paper        | 794                 |
| Concrete, Asphalt,<br>Miscellaneous | 131,392             | <b>CONTAINERS</b>  | 12,532              |
| Tires                               | 7,054               | Glass              | 12,138              |
| <b>ORGANICS</b>                     | 82,493              | Plastic Containers | 394                 |
| Green Waste/Wood Waste              | 68,567              | <b>TOTAL</b>       | 460,472             |
| Food/Wet Waste                      | 13,926              |                    |                     |

By comparing state diversion rates for specific materials to diversion nationwide, it is possible to identify specific areas where program improvements are possible. The EPA has calculated current recovery rates for each material (i.e., the percentage diverted divided by the total amount generated for each material). However, it is difficult to compare recovery rates of individual materials between Hawai‘i and the U.S. mainland due to the lack of reliable waste composition numbers for the neighbor islands.

Given the limitation of available data, this Plan Revision used the quantity diverted on a per person basis (pounds per person per year) to indicate the quantity of recycling for each material. This approach has its limitations due to differences in waste composition between different communities. However, it does provide a general indicator for planning purposes. Table 2-9 depicts Hawai‘i and national recovery on a pounds per person basis.

**Table 2-9:  
Comparison of National and Hawai'i Diversion by Material**

| <b>MATERIAL</b>    | <b>NATIONAL RECOVERY</b><br>(Percent of total generated) | <b>NATIONAL RECOVERY</b><br>(Pounds/capita/year) | <b>HAWAI'I RECOVERY</b><br>(Pounds/capita/year) |
|--------------------|--|--|---|
| Metals             | 39.1   | 49   | 238   |
| Green Waste        | 41.4   | 86   | 104   |
| Paper Fibers       | 41.7   | 261  | 93  |
| Glass Containers   | 24.3   | 22   | 18  |
| Plastic Containers | 5.2  | 8  | 0.5   |

Metals constitute the single largest category of materials diverted from the Hawai'i waste stream, and are captured at a considerably higher proportion than the national average. This is due in part to the recovery of ferrous metal at H-POWER. In addition, some Hawai'i metal recovery is from C&D debris, which is not included in the national numbers.

Green waste is the next largest category shown in Table 2-9. Due to an active and growing composting program in Hawai'i, green waste recovery per capita exceeds the national average by 21 percent. However, this high relative per capita recovery is more than offset by the fact that Hawai'i generates upwards of 60 percent more green waste per capita than the nation as a whole. Therefore, Hawai'i's diversion rate for green waste, as a percent of the amount generated, is below the national average.

Paper represents the largest per capita diversion nationwide. However, in Hawai'i it lags behind, at only 36 percent of the national rate. Recovery of all grades is below the national average and shows considerable opportunity for increased recovery. Recycling of commercially generated paper, such as old corrugated containers (OCC) and OP, are addressed in Section 3.3.

Diversion of glass containers is close to the national average. In Honolulu, most of that diversion is from the commercial sector due to mandatory recycling requirements. In addition, throughout Hawai'i glass recovery is supported by the ADF subsidy. It is important to note that national recovery rates for glass containers are supported in part by bottle bills in some states, which result in exceptionally high glass recovery.

Plastic container recycling in Hawai'i has considerable room for growth. This topic is not addressed in depth here since plastics recycling was not selected as a topic for in-depth review.

### **2.7.3 Hawai'i County**

Hawai'i County is an island where great distances and sparse populations make provision of recycling services difficult. In addition, waste disposal at transfer stations and landfills is free for residents, reducing economic incentives to recycling. The county does not maintain a staff dedicated solely to recycling, and operates its recycling and public education efforts primarily through contracts. Hawai'i County contracts with Recycle Hawai'i, a non-profit organization, to provide waste recycling assistance and public education (see Section 2.2.6).

There is no county-supported or -mandated door-to-door collection of household trash. Residents either haul their trash to designated County-operated transfer stations or landfills, or in more densely populated areas, they have the option of contracting with a private waste hauler.

DOH OSWM permit files show that there are 6 recycling companies, 5 composters, 2 metal salvage companies, 4 tire collectors and 2 solvent or oil recyclers in Hawai'i County. The two largest companies that provide recycling services are Business Services Hawai'i and Environmental Recycling, both of which operate balers for export of recyclables. In addition to its collection service, Business Services Hawai'i performs monthly collections at two community recycling events. Environmental Recycling also provides community recycling through community buy-back events for aluminum.

Business Services Hawai'i owns drop boxes for glass that are located at five transfer stations on the island. Approximately 150 tons of glass per month are collected and processed through these five stations as well as at a station managed by Kona Waste Management. Glass is used by a number of private companies to create art and architectural glass, material for sandblasting, water filtration, and construction needs.

Green waste is diverted at the South Hilo landfill, at the Kealakehe Transfer Station servicing Kailua-Kona, and in Waimea. Residents and commercial haulers may drop green waste at these locations free of charge. County contracts for chipping the material and selling the product totaled over \$263,000 in FY 1998. As of December 1999, Hawai'i Metal Recycling Co. (HMR) was granted the county contracts to process green waste. Mauna Lani Resort processes green waste, producing compost and mulch for use on their grounds.

The county contracts with HMR to recycle metals, including auto hulks, which are shipped back to O'ahu for processing. This contract is funded through a \$4 per auto registration fee. Some appliances are recycled with the autos by HMR.

The County of Hawai'i pays a quarterly Diversion Grant, at \$40 per ton, to any company that delivers designated recyclable materials to an end user. The recycler must have a contract with the county and provide evidence of transfer of the materials, such as a weight ticket, to receive the grant. The materials covered by the disposal grant include all grades of paper, plastics, ferrous cans and cooking oil, which was recently added. The county allocates a maximum amount that can be spent each quarter. During FY 1998, the county paid over \$285,000 in Diversion Grants to seven firms.

Glass container recycling is supported separately by state glass ADF payments. The payments are \$160 per ton, which amounted to just under \$185,000 in FY 1998. There has been recent controversy about the glass payments since markets for glass are weak and material has been stored for extended periods.

**Diversion Statistics.** Table 2-10 depicts waste generation and diversion rates, and Table 2-11 displays the weight of material diversion for Hawai'i County as reported to DOH for FY 1998/1999.

**Table 2-10:  
Hawai'i County Waste Generation<sup>1</sup>**

| <b>WASTE GENERATED</b><br>(in tons) | <b>WASTE DISPOSED</b><br>(in tons) | <b>WASTE DIVERTED</b><br>(in tons) | <b>DIVERSION RATE</b><br>(percent) |
|-------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| 168,851                             | 146,416                            | 22,435                             | 13                                 |

NOTE: <sup>1</sup> DOH, *Hawai'i Waste Disposal and Diversion Survey, 1998-99.*

**Table 2-11:  
Hawai'i County Waste Diversion by Material**

| <b>MATERIAL TYPE</b>                | <b>WEIGHT</b><br>(in tons) | <b>MATERIAL TYPE</b> | <b>WEIGHT</b><br>(in tons) |
|-------------------------------------|----------------------------|----------------------|----------------------------|
| <b>METALS</b>                       | <b>16,673</b>              | <b>PAPER</b>         | <b>1,391</b>               |
| Ferrous Scrap Metal                 | 16,673                     | Cardboard            | 1,221                      |
| Auto Scrap                          | –                          | Newspaper            | 72                         |
| Aluminum                            | –                          | Mixed Paper          | –                          |
| Other Non-ferrous                   | –                          | High-grade Paper     | 74                         |
| <b>OTHER MATERIALS</b>              | <b>2,269</b>               | Magazines            | –                          |
| PCS                                 | –                          | Other Paper          | 24                         |
| Concrete, Asphalt,<br>Miscellaneous | 348                        | <b>CONTAINERS</b>    | <b>15</b>                  |
| Tires                               | 13                         | Glass                | –                          |
| <b>ORGANICS</b>                     | <b>3,995</b>               | Plastic Containers   | 15                         |
| Green Waste/Wood Waste              | 3,995                      | <b>TOTAL</b>         | <b>22,435</b>              |
| Food/Wet Waste                      | –                          |                      |                            |

The County of Hawai'i diverted approximately 13 percent of its waste during FY 1998/1999. Ferrous metals accounted for the largest fraction of the amount diverted, followed by green waste/wood waste, cardboard, glass and tires. The private diversion companies in Hawai'i County have specialized equipment that is underutilized because of the small volumes being collected.

A study was performed by Recycle Hawai'i, funded by the EPA, to examine options for a PAYT system, or user fees, on Hawai'i. The recommendations addressed a wide range of issues, such as recycling services at transfer station, cost accounting, illegal dumping, litter, and public education. The county is considering the options presented in the PAYT study, as well as other waste processing options.

#### **2.7.4 City and County of Honolulu**

The C&C has made a significant commitment to increasing recycling as evidenced by its full-time recycling coordinator and support staff, sponsorship of recycling drop off centers, outreach to commercial businesses, source reduction programs, publications, and events. C&C has sponsored numerous waste diversion services. The major activities are listed below.



### **Drop-off Recycling Services**

- Approximately 60 drop boxes for recyclables are placed at schools and community sites. These drop boxes are intended for residential paper and mixed glass, plastic, and aluminum containers. Fees are paid to the schools out of the market revenues.
- Separate areas for collection of recyclable materials, white goods and other types of special waste such as tires, green waste, or soil have been established at most transfer stations and convenience centers. The only exceptions are where site characteristics constrain the placement of collection areas.

### **Organics Composting**

- Green waste is collected once per month in residential areas with automated collection. This service is to be expanded. Chipped green waste is made available to residents free of charge.
- In 2000, the C&C is beginning a 1-year pilot program for co-composting green waste and sewage sludge at the Navy's composting facility at Barbers Point.

### **Commercial Recycling Services and Policies**

- The C&C's Partnership for the Environment provides several services to businesses to encourage recycling. This program is also described in Sections 2.2.6, 3.3 and 3.6.
- Mandatory diversion ordinances are in place for commercial facilities such as restaurants and offices (Revised Ordinances of Honolulu, Section 9-3):
  - Green waste from commercial and government sources is restricted from disposal. No loads containing more than 10 percent green waste are allowed at disposal facilities or transfer stations.
  - Cardboard from commercial and government sources is restricted from disposal. No loads containing more than 10 percent cardboard are permitted at disposal facilities or transfer stations.
  - All restaurants and bars serving alcoholic beverages are required to separate glass and arrange for its collection for recycling.
  - Office buildings greater than 20,000 square feet are required to recycle paper and cardboard.
  - Food service businesses above a specific size are required to recycle food waste when it can be done at a cost that is less than or equal to the cost of disposal.
  - Appliances are banned from disposal.

### **Financial Assistance to Recyclers**

- The C&C originated an ADF on glass that has become a statewide program (see Section 2.2.3.5). The ADF provides funds that are used to support glass-recycling operations. The Refuse Division, under contract to the State DOH, processes incoming payments of ADF. In addition, regulations (Revised Ordinances of Honolulu, Section 9-8) are in place that allow for use of glass in highway construction projects.
- A rebate on disposal fees for recyclers is provided for disposal of contaminants. Disposal can be no more than 25 percent of the total weight of material recycled.

### **Public Agency Recycling**

- The C&C recycles asphalt-paving aggregate from the cold planing process as base course for road repair.
- A metals recovery system for bottom ash operates at H-POWER, and extracts aluminum, other non-ferrous metals, and ferrous metals for recycling. This results in a high recycling rate for ferrous metals on O‘ahu. Private research on ash recycling methods is continuing.

The C&C’s strategy has been to focus on commercial recycling since it represents the greatest opportunities for cost effective diversion. Thus the mandatory requirements, the material disposal bans, and the Partnership for Environment are major programs targeted at the commercial sector. These programs and their performance are discussed in Section 3.3.

Residential programs are less far reaching and include drop-off centers and public education. A curbside recycling pilot program was implemented in Windward O‘ahu in the early 1990s, but due to high costs, was not continued. Curbside collection of green waste is being conducted with plans for expansion. Overall, the recovery of recyclables from residents has been low relative to most medium-to-large U.S. mainland cities with curbside recycling.

Another impediment to residential recycling is that there is no direct charge for waste collection to single family residents in Honolulu. C&C general funds pay for waste collection for single-family homes. Cities that have implemented solid waste user fees have shown a much greater residential participation in recycling.

The C&C has undertaken a consulting study to investigate additional waste management initiatives, and have performed a detailed waste composition study.<sup>19</sup> They also have examined options for organic waste bioconversion, including sludge and food waste, and investigated other waste management technologies.

DOH records show 30 private recycling companies which include glass, paper, aluminum, C&D materials, and tire recyclers; 16 used oil or solvent transporters and recyclers; 10 composters; 9 metal salvage and recycling companies; 4 petroleum contaminated soil treatment facilities; and 1 cooking oil recycler located on O‘ahu. The major recycling companies on O‘ahu are identified below.

### **Multi-Material Processors**

- Honolulu Environmental Transfer, Inc., purchased by BFI Waste Systems, receives paper fibers and containers, except for plastic, from commercial accounts and the C&C’s school drop box program. They provide integrated collection service (trash and recycling) to their customers. They purchase glass from small collectors and send magazines and newspapers to Honolulu Recovery Systems for processing.
- Honolulu Recovery Systems, a division of Honolulu Disposal Service, Inc., picks up recyclables from businesses and condominiums with two collection vehicles, and processes paper and containers for market. They do not charge for materials that are dropped off, but they do charge for pick-up service. They sort their materials on a conveyor line, and send glass to BFI Waste Systems for processing. They have a greater capacity for processing material than is being actively used.

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<sup>19</sup> R.M. Towill. 1999. *Oahu Municipal Refuse Disposal Alternatives Study, Waste Composition Study*. Prepared for the City and County of Honolulu.

- Island Recycling, Inc. collects diverse recyclable materials, including glass, plastic, paper and aluminum, and manually sorts them for packing or baling and shipment to market.

### **Metals**

- HMR ships metal to recycling smelters on the U.S. mainland and in Asia. Most of the ferrous materials diverted throughout the state are consolidated at the HMR facility in Campbell Industrial Park on O‘ahu. HMR has facilities on all islands that accept auto scrap metal and other metal. Metal collected on the neighbor islands are shipped to O‘ahu with minimal processing, where they are shredded, separated from soft components and stockpiled for sale. Commodity prices for ferrous metal have been low until recently, so metals may be stockpiled until more favorable prices can be obtained. When sold, shredded metal is trucked to Barbers Point Harbor for loading onto ships.

### **Paper Fiber**

- INTECH, Inc. uses recycled paper to manufacture a product used on O‘ahu for collection of used residential motor oil. The used oil change boxes are sent to H-POWER for incineration along with the general waste stream. INTECH, Inc. also produces hydroseed mulch made from recycled paper. Their primary source of paper is from collection and destruction of confidential records.

### **Construction and Demolition Waste**

- Island Demo, Inc. operates an “in-town” C&D recovery facility in Hawai‘i. They receive C&D loads at their Māpunapuna facility. They segregate mixed loads and recover materials for reuse or recycling. Residues are landfilled.

### **Organics**

- HEP, in Campbell Industrial Park, collected and processed over half of all Oahu green waste diverted during FY 1997/1998. Greenwaste is composted with livestock manure in some batches and marketed as Menehune Magic®, a compost and mulch product. HEP sells all of their compost on O‘ahu, and their production is supply-limited.
- Kalaheo Greenwaste Recycling operates a site close to the C&C’s Kapa‘a Transfer Station in Windward O‘ahu. They took in slightly less than half of green waste diverted in FY 1997/1998 to produce compost for retail and commercial sales.

Many of these recycling and composting businesses operate on marginal returns because of the high costs of doing business in Hawai‘i, the high cost of shipping to mainland or Asian markets, and the characteristically marginal economics of scrap businesses. High-value local markets for recycled glass, plastic and paper are not yet developed. Development of local markets is discussed in Section 3.5.

**Diversion Statistics.** Table 2-12 summarizes overall generation and disposal quantities and Table 2-13 presents diversion quantities by material type for the C&C.

**Table 2-12:  
City and County of Honolulu Waste Generation<sup>1</sup>**

| WASTE GENERATED<br>(in tons) | WASTE DISPOSED<br>(in tons) | WASTE DIVERTED<br>(in tons) | DIVERSION RATE<br>(percent) |
|------------------------------|-----------------------------|-----------------------------|-----------------------------|
| 1,418,756                    | 1,050,019                   | 368,737                     | 26                          |

NOTE: <sup>1</sup> DOH, *Hawaii Waste Disposal and Diversion Survey, 1998-99.*

**Table 2-13:  
City and County of Honolulu Waste Diversion by Material**

| MATERIAL TYPE                       | WEIGHT<br>(in tons) | MATERIAL TYPE      | WEIGHT<br>(in tons) |
|-------------------------------------|---------------------|--------------------|---------------------|
| <b>METALS</b>                       | <b>133,247</b>      | <b>PAPER</b>       | <b>54,794</b>       |
| Ferrous Scrap Metal                 | 93,826              | Cardboard          | 31,026              |
| Auto Scrap                          | 30,614              | Newspaper          | 11,832              |
| Aluminum                            | 5,392               | Mixed Paper        | 5,219               |
| Other Non-ferrous                   | 3,415               | High-grade Paper   | 2,544               |
| <b>OTHER MATERIALS</b>              | <b>125,720</b>      | Magazines          | 3,403               |
| PCS                                 | 11,367              | Other Paper        | 770                 |
| Concrete, Asphalt,<br>Miscellaneous | 108,687             | <b>CONTAINERS</b>  | <b>10,302</b>       |
| Tires                               | 5,666               | Glass              | 10,141              |
| <b>ORGANICS</b>                     | <b>44,674</b>       | Plastic Containers | 161                 |
| Green Waste/Wood<br>Waste           | 32,699              | <b>TOTAL</b>       | <b>368,737</b>      |
| Food/Wet Waste                      | 11,975              |                    |                     |

The C&C diverted 26 percent of their waste stream during FY 1998/1999. This is primarily due to the contribution from general scrap metal (36 percent of total waste diverted). Some of the ferrous metals processed on O‘ahu for recycling are actually diverted from neighbor island waste streams, but these proportions are not known. The next highest fraction of the total waste diverted is classified as “other materials.” AES Hawai‘i Inc. accounted for 57 percent of the other materials category through ash recycling, and Hawaiian Bitumuls Paving and Precast Co. accounted for 28 percent through asphalt recycling.

Diversion of food and wet waste has dropped nearly 80 percent during 1999 due, apparently, to the closure of Unisyn Biowaste Technology, a primary processor for that material. At present, food waste that is collected is diverted to animal feed operations, and some may not be fully accounted for.

### 2.7.5 Kaua‘i County

The County of Kaua‘i operates most recycling and promotional efforts through contracts with private firms. The county does not maintain a permanent, dedicated recycling staff.

Recyclables collected within Kaua'i County include glass, paper, aluminum, and cardboard. Six drop box sites are located on the island near shopping centers or other public places, and a recycling drop-off center is located near the entrance to Kekaha Landfill. Until the end of 1999, Garden Isle Disposal Inc. had a county contract to collect glass and send it to J.C. Sandblasting for processing. J.C. Sandblasting operates a glass buy-back center for commercial sources and recently received the county's glass recycling contract for both collection and processing.

The county is developing the Kaua'i Resource X-Change Center, which is intended to accept reusable building materials and household items. The Center is located adjacent to the Līhu'e transfer station and will provide the opportunity for expanded diversion of items that have residual value. The concept of the Center is that residential and commercial waste haulers may unload reusable items free of charge. The cost savings is primarily an issue for commercial users; residents do not have to pay for disposal of these, but may be interested in having their discarded items be reused rather than disposed. Residents may purchase items from the Center below the retail value. The Center is being constructed using county and federal grant money, but is expected to be self-sufficient in its operations.

Green waste is accepted from residents free of charge at 3 transfer stations and the landfill; commercial haulers pay a tipping fee. The county grinds green waste and makes it available to residents and non-profit organizations free of charge. County officials report that demand for mulch from landscape contractors and residents is strong and that the current green waste diversion system could be expanded to meet that demand. Kaua'i Nursery and Landscaping, Inc., also converts green waste into a compost product, and Sanifill of Hawaii, Inc., at the Kekaha Landfill, diverts green waste for mulching.

The county is constructing a metal recycling yard in Puhi that will accept and process auto hulks and white goods. It is expected to open in 2000 and will be operated under a county contract.

The county provides residential collection of waste at no direct cost to the generator. As in the C&C, this provides little incentive for residents to reduce the amount of waste they generate.

DOH records show that Kaua'i has 1 metal recycler, 3 composting companies, 2 recycling companies, 1 battery recycler, and 1 used oil or solvent transporter and recycler.

**Diversion Statistics.** Table 2-14 summarizes overall generation and disposal quantities and Table 2-15 presents diversion quantities by material type for Kaua'i County.

**Table 2-14:  
Kaua'i County Waste Generation<sup>1</sup>**

| WASTE GENERATED<br>(in tons) | WASTE DISPOSED<br>(in tons) | WASTE DIVERTED<br>(in tons) | DIVERSION RATE<br>(percent) |
|------------------------------|-----------------------------|-----------------------------|-----------------------------|
| 81,576                       | 67,591                      | 13,985                      | 17                          |

NOTE: <sup>1</sup> DOH, *Hawaii Waste Disposal and Diversion Survey, 1998-99.*

**Table 2-15:  
Kaua'i County Waste Diversion by Material**

| MATERIAL TYPE            | WEIGHT<br>(in tons) | MATERIAL TYPE      | WEIGHT<br>(in tons) |
|--------------------------|---------------------|--------------------|---------------------|
| <b>METALS</b>            | –                   | <b>PAPER</b>       | <b>1,053</b>        |
| Ferrous Scrap Metal      | –                   | Cardboard          | 730                 |
| Auto Scrap               | –                   | Newspaper          | 323                 |
| Aluminum                 | –                   | Mixed Paper        | –                   |
| Other Non-ferrous        | –                   | High-grade Paper   | –                   |
| <b>OTHER MATERIALS</b>   | <b>1,196</b>        | Magazines          | –                   |
| PCS                      | –                   | Other Paper        | –                   |
| Concrete, Asphalt, Misc. | 105                 | <b>CONTAINERS</b>  | <b>400</b>          |
| Tires                    | 1,091               | Glass              | 400                 |
| <b>ORGANICS</b>          | <b>11,336</b>       | Plastic Containers | –                   |
| Green Waste/Wood Waste   | 11,336 <sup>1</sup> | <b>TOTAL</b>       | <b>13,985</b>       |
| Food/Wet Waste           | –                   |                    |                     |

NOTE: <sup>1</sup> Green waste diversion is an estimate since quantities are not weighed.

Kaua'i County achieved a diversion rate of approximately 17 percent of its total waste during FY 1998/1999. Green waste and wood waste dominated the waste diversion. Other diverted waste categories included other materials, metals, tires, OP, OCC, old newspaper (ONP), and glass.

### 2.7.6 Maui County

Maui County, which includes the islands of Moloka'i and Lana'i, supports recycling and composting efforts through a wide variety of waste diversion programs administered by its full-time Recycling Coordinator and support staff in the County Solid Waste Division.

The county sponsors public education campaigns and technical development projects. Glass processing and marketing is supported by the county, using ADF funds from DOH, with 90 percent of the resources going to Aloha Glass Recycling and 10 percent used by the county to support its glass recycling programs. The County also contracts with MRG, a non-profit organization, for certain public education and special events (see Sections 2.2.6 and 3.6).

Twenty-eight county-sponsored recycling drop boxes are located at schools and other public areas. Approximately 2,000 tons of plastic, newspaper, cardboard, and aluminum are collected annually from the drop boxes. Revenues from the sale of aluminum are returned to the schools. Revenues from other material sales are used to offset the cost of processing and shipping the materials. The county is issuing a Request for Proposal for mini-materials recovery facility (MRF) in order to process the materials from the drop boxes.

The county provides waste collection for residents within populated areas and charges a user fee of \$6.00 per month. Trash service is not mandatory, but over 75 percent of residents subscribe

where the service is offered. The county is studying implementation of a volume-based fee. Residents pay \$6 per load for disposal at the landfill.

DOH permit files contain listings for 18 businesses or organizations holding solid waste permits. Of these, 7 are recyclers, 5 are composters, 4 are used oil recyclers or transporters, 1 is a salvage yard, and 1 is a C&D landfill.

Maui County has historically provided support for recycling businesses, primarily through an active grant and contracting program. Some of the firms assisted are listed below.

- EKO Systems, Inc. accepts green waste at the Central Maui Landfill, which they mix with sewage sludge to create a compost product. Maui EKO sold all of its compost in Hawai'i during 1998. Other companies that reported accepting green waste during that time were Campaign Recycle Maui, Maui Composting Co., Maui Recycling Service, Inc., and Sustainable Technologies International.
- Aloha Glass Recycling, Inc., processes all of the glass collected from sources on the island and sells processed glass to artisans, sandblasters, and contractors for aggregate.
- Aloha Plastic Recycling, Inc., accepts all the plastics collected on Maui and produces plastic lumber. The product is used for parking curbs, park benches, wastebaskets and other items that are purchased by the county, other agencies, or private consumers.
- Pacific Biodiesel, Inc. is the only permitted facility in the state that accepts cooking oil and produces a usable product. The company has a patented process that removes contaminants and other components from used cooking oil and produces light biodiesel, a fuel suitable for use in diesel engines.
- Maui Recycling Service, Inc., offers curbside pick-up of source-separated recyclables to residential and commercial subscribers. In 1998, service was provided to 235 residents and 165 businesses. Although significant, the number of customers reflects the small fraction of residential and commercial generators who are willing to pay extra for curbside recycling.
- Maui Scrap Metal Co. is the dominant recycler of paper products, aluminum, scrap ferrous including auto hulks, and batteries.

**Diversion Statistics.** Table 2-16 summarizes overall generation and disposal quantities and Table 2-17 presents diversion quantities by material type for Maui County.

**Table 2-16:  
Maui County Waste Generation<sup>1</sup>**

| <b>WASTE GENERATED</b><br>(in tons) | <b>WASTE DISPOSED</b><br>(in tons) | <b>WASTE DIVERTED</b><br>(in tons) | <b>DIVERSION RATE</b><br>(percent) |
|-------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| 215,295                             | 159,979                            | 55,316                             | 26                                 |

NOTE: <sup>1</sup> DOH, *Hawai'i Waste Disposal and Diversion Survey, 1998-99.*

**Table 2-17:  
Maui County Waste Diversion by Material**

| <b>MATERIAL TYPE</b>                | <b>WEIGHT<br/>(in tons)</b> | <b>MATERIAL TYPE</b> | <b>WEIGHT<br/>(in tons)</b> |
|-------------------------------------|-----------------------------|----------------------|-----------------------------|
| <b>METALS</b>                       | <b>3,998</b>                | <b>PAPER</b>         | <b>4,279</b>                |
| Ferrous Scrap Metal                 | 675                         | Cardboard            | 2,828                       |
| Auto Scrap                          | 3,300                       | Newspaper            | –                           |
| Aluminum                            | 223                         | Mixed Paper          | 1,451                       |
| Other Non-ferrous                   | –                           | High-grade Paper     | –                           |
| <b>OTHER MATERIALS</b>              | <b>22,536</b>               | Magazines            | –                           |
| PCS                                 | –                           | Other Paper          | –                           |
| Concrete, Asphalt,<br>Miscellaneous | 22,252                      | <b>CONTAINERS</b>    | <b>1,815</b>                |
| Tires                               | 284                         | Glass                | 1,597                       |
| <b>ORGANICS</b>                     | <b>22,488</b>               | Plastic Containers   | 218                         |
| Green Waste/Wood<br>Waste           | 20,537                      | <b>TOTAL</b>         | <b>55,316</b>               |
| Food/Wet Waste                      | 1,951                       |                      |                             |

Maui County diverted 26 percent of their waste stream during FY 1998/1999, comparable to the diversion rate for Oahu. The diverted waste stream was mostly attributed to green waste, wood waste, and other materials.

### **2.7.7 Military**

Each branch of the military service plans and implements their own waste reduction and recycling program. Recycling is encouraged at a command level and in some instances it is required.

The Air Force recycling program located at Hickam Air Force Base serves 8,670 tenants and 1,284 civilian employees. Curbside pick-up of recyclable materials is conducted at work centers and residential areas. Collections are also made at drop-off locations around the base. The recycling center also collects and chips green waste for distribution as mulch to on- and off-base users. HHW, solvents, and refrigerants may be deposited at the recycling center.

The Army conducts recycling for roughly 45,000 residents and employees at Schofield Barracks through its DPW. The primary commodities recovered include paper, food waste, and sewage sludge.

The Commander of Naval Region Pearl Harbor administers the Navy's recycling and diversion programs. Pearl Harbor and all of its support facilities participate in the recycling program. Naval housing areas have curbside pickup of recyclables provided weekly by a private operator.

MCBH requires all base personnel to participate in the recycling program administered by the Environmental Compliance and Protection Department. The Department provides containers for recyclables. The recycling efforts are self sufficient and return funds to the MCBH treasury.



Generators deliver source-separated materials to the recycling center where recyclables are sorted and baled, or delivered to the MCBH landfill. The largest component of materials recycled is classified as “other” and include pavement and sewage sludge.

Table 2-18 portrays the amount and type of waste diverted by each of the armed forces in Hawai‘i during 1997 and 1998.

**Table 2-18:  
Military Waste Diversion**

| <b>WASTE STREAM COMPONENT</b> | <b>Air Force<sup>1</sup><br/>(tons)</b> | <b>Army<sup>2</sup><br/>(tons)</b> | <b>Navy<sup>3</sup><br/>(tons)</b> | <b>Marines<sup>4</sup><br/>(tons)</b> |
|-------------------------------|---|------------------------------------|------------------------------------|---------------------------------------|
| Paper                         | 1,396                                   | 1,122                              | 722                                | 445                                   |
| Plastic                       | 30                                      | 0                                  | 0                                  | 6                                     |
| Green Waste                   | 0                                       | Unknown                            | 5                                  | 67                                    |
| Food Waste                    | 0                                       | 686                                | 40                                 | 120                                   |
| Wood                          | 23                                      | 0                                  | 0                                  | 235                                   |
| Metals                        | 552                                     | 112                                | 2,461                              | 59                                    |
| Glass                         | 165                                     | 169                                | 82                                 | 42                                    |
| Other                         | 0                                       | 637                                | 998                                | 21,218                                |
| Special and Hazardous         | 10                                      | 143                                | Unknown                            | 92                                    |
| Total Waste Diverted          | 2,176                                   | 2,869                              | 4,308                              | 22,284                                |
| Diversion Rate (percent)      | 17                                      | 10                                 | 21                                 | 31                                    |

NOTES: <sup>1</sup> Personal communication, Mr. Jack Hindeman, Hickam AFB Recycling Center Manager, 1998 data.  
<sup>2</sup> Personal communication, Mr. Gary Takahashi, DPW, Schofield Barracks, 1997 data.  
<sup>3</sup> Personal communication, Navy Pollution Prevention Summary, U.S. Navy 1998, 1998 data.  
<sup>4</sup> Personal communication, Ms. Karen Gumtow, Recycling Program Manager, MCBH, 1997 data.

### 2.7.8 Observations and Analysis

**Diversion Performance.** The performance of diversion programs for Hawai‘i’s four counties fall into two distinct groups: the C&C and Maui County achieved diversion rates of 26 percent, while Hawai‘i and Kaua‘i Counties diversion rates are in the mid teens. This difference can be correlated with two following dominant factors:

1. Commitment to recycling by the C&C and Maui Counties, as evidenced by the consistent level of staffing and ongoing programs.
2. The rural nature of Hawai‘i and Kaua‘i Counties.

This pattern closely corresponds to patterns seen in mainland communities. Though many rural communities have very effective recycling programs, the absence of a commitment of dedicated staff and services will generally cause recycling levels to remain in the low to mid teens. Recycling and composting programs require a consistent investment of modest amounts of public resources, especially during establishment.

Recycling in Hawai'i is further depressed by several other factors, described in greater detail in Section 3.3. The statewide recycling rate has remained in the 24 to 25 percent range (17 to 19 percent by EPA definitions) since 1996.

**Diversion Infrastructure.** One of the major barriers to increasing recycling in Hawai'i is the lack of diversified processing capacity. This issue is explored in Section 3.3.

A community of over 1 million people, with strong recovery of recyclables, would be expected to have at least 8 to 10 diversified recycling processing facilities. This would often include facilities that perform the following services:

- Pack bulk grades of fiber (OCC and ONP) for shipment to market.
- Process paper to recover high-grade fiber from mixed OP.
- Separate commingled recyclable materials, including containers, from residential and/or commercial sources.
- Recover OCC from mixed loads of commercial waste.
- Process C&D debris for recovery of wood, OCC, and aggregate.

In contrast, only three facilities in the C&C, and one on each of the neighbor islands, upgrade and pack recyclable materials. The facilities that exist are performing below their capacity, especially in the C&C, due to the lack of a collection infrastructure.

On Maui, which has the highest diversion rate in the islands, the only multi-material processor has faced challenges with operational, regulatory, and financial issues. Though organic diversion is strong, the recycling system for paper fiber and metals is unstable. In Kaua'i and Hawai'i Counties, the recycling infrastructure, including collection and processing of recyclable materials and organics, is in early development.

**Glass Advance Disposal Fee.** The state's glass container ADF has provided strong incentives and support for glass recycling. This has been accentuated in the C&C by the glass recycling mandate for bars and restaurants. In the C&C, there are numerous small recyclers (i.e., one-truck operators or "mosquito fleet") collecting glass from bars and restaurants. There is no similar service for OP or OCC, even though paper recycling has similar mandates. The lack of a subsidy for paper and historically depressed market prices have not created the incentives that exist for glass container recycling.

**County Coordination.** The recycling system in each of the counties is unique, with different methods and priorities. However, the counties are dependent on each other and on the state in many ways. There can be no benefit in making their programs alike. However, developing more cooperation and mutual assistance could be helpful. This could take several different forms, as follows:

- Coordinate efforts to improve measurement of diversion quantities and rates.
- Coordinate investment in staff training, such as in areas of specialized expertise such as business waste audits, enforcement of illegal dumping, or user fee systems.
- Share successful experiences, such as FCA, research on alternative technologies, or strategies to increase commercial recycling.
- Coordinate a statewide public education program.

**Initiatives to Improve Recycling.** The analysis for this ISWM Plan Revision suggests that there are two major factors that constrain recycling, which could possibly be influenced.

1. In some counties, there is a lack of commitment to maintain a consistent county recycling staff and programs that assist, promote, and support development of private recycling businesses. This factor can be addressed in County ISWM Plans.
2. There is a need for public investments to improve the economics of private recycling. The following provides some ways to accomplish this:
  - Technical assistance and support for the development of higher-end local markets for selected materials.
  - Assistance in reducing transportation costs.
  - Programs and incentives to increase the flow of recyclables and reduce per-unit cost.
  - Grants, tax incentives, low interest loans, or contracts that provide consistent support for private companies while they build capacity.
  - ADF-type subsidies or diversion credits.

Several of the above initiatives are included in this ISWM Plan Revision.

**Attaining the Next Diversion Level.** The next plateau for Hawai'i is to advance beyond the current diversion rate of 24 percent toward 35 percent. EPA has estimated the recovery rate by material to achieve a scenario of 35 percent nationwide recovery.<sup>20</sup> Table 2-19 compares the current recovery rates for some selected materials in Honolulu<sup>21</sup> to the EPA projected 35 percent recovery scenario.

**Table 2-19:  
Projected Recovery Rates and City and County of Honolulu  
Current Recovery Rates for Selected Materials**

| Material Type    | EPA Projected Recovery to Achieve<br>35 Percent Overall Recovery<br>(percent) | Current Estimated C&C<br>Recovery Rate<br>(percent) |
|------------------|---|---|
| OCC              | 73  | 34  |
| ONP              | 65  | 25  |
| Glass Containers | 40  | 42  |
| Ferrous Metal    | 56  | 77  |
| Plastic Bottles  | 8   | 2   |
| Green Waste      | 57  | 16  |

Hawai'i is doing well in glass and ferrous metals recovery. The materials that should be the focus to improve diversion programs include all paper grades, green waste, and plastics. OCC is an issue primarily for commercial recycling and is addressed in Section 3.3. ONP and plastics are

<sup>20</sup> EPA. July 1999. *Characterization of Municipal Solid Waste in the United States: 1998 Update*. Prepared by Franklin Associates, Ltd., p. 156.

<sup>21</sup> R.M. Towill. 1999. *Oahu Municipal Refuse Disposal Alternatives Study, Waste Composition Study*. Prepared for the City and County of Honolulu.

primarily issues for residential recycling. Curbside collection is the most effective method to capture ONP and plastics, but buy-back programs can also be effective. Residential programs are not addressed in detail in this Plan Revision.

Green waste recovery will be increased by the expansion of curbside collection, as is being considered or implemented in the C&C and Maui County. In addition, development of high-end markets for compost products will improve the economics of composting. This is addressed in Section 3.5.

## 2.8 Special Wastes

Special wastes include such diverse materials as asbestos, lead-acid batteries, food waste, sewage sludge, medical waste, and PCS. These wastes are a small proportion of the waste stream, but they can pose potentially adverse impacts to public health and the environment if not handled and disposed properly. Special wastes were not selected as a topic for in-depth study in this Plan Revision.

Special wastes that are targeted by programs to enhance diversion and recycling include lead-acid batteries, used oil, white goods, tires, derelict vehicles, food and wet wastes, and sewage sludge. These programs are described below. All reported quantities recycled are from the *Annual Report to the Legislature 1997-1998*.<sup>22</sup>

### 2.8.1 Special Wastes Targeted for Diversion

**Lead Acid Batteries.** A statute requiring retailer “take back” of lead-acid vehicle batteries was implemented in 1993 (HRS 342I-2). Under this regulation, retailers are required to accept batteries from customers who purchase new batteries. There are also battery recyclers on each island that will take batteries, often for a charge. Most batteries are collected and shipped to lead recycling locations on the U.S. mainland and in Asia. In FY 1997/1998, 1,932 tons of batteries were collected for recycling. Even with the take back requirement, batteries continue to be a litter problem because many are left at roadsides and on residential properties or vacant lots. Each county addresses this issue a little differently, either by allowing drop off at landfills, accepting them at HHW collection events, running public service announcements encouraging people to return them to retailers with a new purchase, or collecting batteries from public roadsides.

**Used Oil.** By law, businesses must recycle the used oil they generate using a permitted used oil transporter (HRS 342J-53). If properly managed, used oil is exempted from hazardous waste regulations. Collection and recycling for residents varies in each county. On O‘ahu, residential customers are encouraged to manage their used oil by putting it into an oil absorbing box and discarding it in the trash. It is incinerated at H-POWER. On Maui, there are 9 permanent drop-off sites for residential used oil recycling. Hawai‘i County has been sponsoring collection events at 4 sites every 3 months, but is shifting to providing permanent disposal sites at businesses. On Kaua‘i, 3 of the 4 county transfer stations accept used oil during regular business hours (the Līhu‘e Transfer Station does not accept used oil). Disposal of used oil in a container that absorbs and contains the oil is acceptable for residents on all the islands; hence, the used oil in containers would ultimately be landfilled or, on O‘ahu, incinerated. Approximately 2.6 million gallons of used oil was collected for recycling in FY 1997/1998 from commercial, and possibly some residential, sources. Unitek Solvent Services, Inc., with offices on all the islands collects and

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<sup>22</sup> DOH. 1999.

transports over half of the used oil recycled in the state, followed by the U.S. Navy and Philips Services on O'ahu. Most is burned as fuel by agricultural boilers or concrete companies.

**White Goods.** Large appliances, such as refrigerators and stoves, are collected on each island for metal scrap and processed at HMR on O'ahu prior to shipping to metals recycling markets on the U.S. mainland or in Asia. Most residents can arrange for pick-up of refrigerators or other white goods through their county's solid waste office, or have white goods hauled off when new appliances are delivered for an additional cost. Collection of Freon<sup>®</sup> from refrigerators occurs during processing of white goods for recycling. Collection of general scrap for recycling, much of which is assumed to be associated with white goods, reached 101,962 tons during FY 1997/1998.

**Tires.** State regulations, implemented in 1993 (HRS 342I-23), require that used vehicle tires be accepted and properly disposed by retailers that sell them (similar to the lead-acid vehicle battery take back program). Whole tires are banned from landfills in the state. Maui accepts tires at the Central Maui Landfill if they are cut in half; other landfills will accept chipped or shredded tires only. Processing tires for boiler fuel by chipping them has been periodically available through a few businesses on O'ahu. Currently, Unitek Environmental Services is the only tire processor in the state. Unitek has facilities on all islands that collect tires, and they ship them to O'ahu for processing. The central facility shreds tires and separates metal components that are then disposed at Waimānalo Gulch landfill (the metal contains too much residual rubber to be acceptable for recycling). The vast majority of shredded rubber is sold to AES Hawai'i Inc. to be incinerated for electrical generation. Small amounts of crumb rubber are sold for ground cover in playgrounds and other applications. During FY 1997/1998, 4,144 tons of tires were collected for recycling.

**Derelict Vehicles.** Abandoned and derelict motor vehicles are collected for parts and metal recycling on all islands. Final processing for shipment to metals recycling markets on the U.S. mainland and in Asia usually occurs at HMR on O'ahu. Stockpiles of derelict vehicles exist on Kaua'i, partly due to the closure of the only automotive processing facility in 1996. A new facility in Puhī is being developed, and vehicles have been moved to the site and temporarily stored prior to shipping to O'ahu. Hawai'i has a facility operated by HMR, and Maui has a facility operated by Maui Scrap Metal that dismantles derelict vehicles for parts, drains fluids and ships the metals to the HMR facility on O'ahu. Auto scrap collected for recycling totaled 36,742 tons during FY 1997/1998.

**Commercial Food Waste.** This waste stream comes primarily from the restaurant and grocery industries, and presents a challenge to solid waste and wastewater disposal systems. The C&C has an ordinance requiring large restaurants to divert residual food waste (Revised Ordinances of Honolulu, Section 9-3.5). On O'ahu, Unisyn Biowaste Technology, Inc., collected this waste to fuel its anaerobic digesters. Methane from the digesters was used to generate electricity. Sludge from the digesters was mixed with green waste and composted for soil amendment. Unisyn closed in 1999 due to regulatory, community, and economic factors.

Hog farms have historically provided the principal means of diverting food waste on all islands. Small businesses broker food waste to hog farmers and other concentrated animal feeding operations directly or through a food waste wholesaler. On O'ahu, the largest food waste recycler is Island Commodities, Inc. Solid waste permits are required for food waste recyclers, such as hog farms and brokers of food waste, if they process wastes. Reuse of food waste (e.g., animal feed) does not require a solid waste permit.

Some restaurants donate food to Hawai'i Food Bank and other similar programs. During FY 1997/1998, 57,273 tons of food/wet waste was diverted from the waste stream, primarily on

O'ahu and Maui. However, in FY 1998/1999 this dropped to 13,926 tons following the closure of the Unisyn facility.

On Maui, Pacific Biodiesel Inc. processes used cooking oil. In the future, they may accept grease trap waste to convert into a light fuel that can be burned in diesel engines.

**Sewage Sludge.** Sludge generated by wastewater treatment facilities is dried and landfilled. Maui County has been mixing sludge with green waste for composting. The C&C is in the process of procuring services to perform this type of activity, as well. The sludge adds valuable nutrients to the compost. Some concerns have been raised about the safety of such practices due to the presence of persistent chemicals and heavy metals. It has been shown, in mainland U.S. studies,<sup>23</sup> that when sewage from major industries can be excluded, the sludge is effectively clean of these contaminants and can safely be used as compost.

## 2.8.2 Special Wastes Targeted for Separation and Disposal

**Wet Wastes.** Grease trap waste and other wet waste<sup>24</sup> must be solidified before disposal as MSW. Grease trap waste, used oil from residential sources, and biosolids from septic tanks can be solidified using sawdust, commercial absorbent material, paper or rags. Many types of wet waste may also be discharged to sewage treatment plants that are equipped with septage handling facilities. This material is highly concentrated organic waste and can be odorous.

**Household Hazardous Waste.** HHW includes items such as paints, pesticides and cleaners used by households, not for commercial activities. They are toxic, ignitable, corrosive and/or reactive wastes as defined by EPA (40 CFR, Part 261.20). HHW is periodically collected through collection events on an annual schedule on Kaua'i and a semi-annual schedule on Hawai'i. Maui County does not have a collection event, and advises residents to dispose of HHW in the trash. On O'ahu, residents can call the Department of Environmental Services, Refuse Division to make an appointment for dropping off HHW at a collection site near Honolulu. Upon calling, wastes are screened through a series of questions, and callers are often advised to dispose of some materials down the toilet or in the trash. There are few records on amounts of HHW collected; it is estimated that approximately 7,500 tons a year are disposed in the Hawai'i MSW stream. Public education brochures, with information on reducing HHW through use of alternative materials and specific disposal practices, are available from the DOH.

**Medical Wastes.** Medical wastes are generated at hospitals and other health care facilities. In the past, hospitals had waste incinerators on-site where they could burn medical wastes, including pathological waste. Pathological wastes are regulated differently from other medical waste because they may contain pathogens that can cause infectious diseases. Pathological waste includes all tissues and bodily fluids, along with materials that may have contacted human pathogens.

Hospital incinerators have come under more stringent air emission requirements, resulting in the need to upgrade or close incinerators. This has resulted in closure of many incinerators in Hawai'i, and few options exist for medical wastes, especially pathological waste that must be incinerated. Disposal of non-pathological medical wastes can be performed by autoclaving, then landfilling.

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<sup>23</sup> EPA. October 1981. *Process Design Manual, Land Treatment of Municipal Wastewater*. Report No. EPA625/1-81-013.

<sup>24</sup> This is defined as waste having approximately 60 percent moisture or greater, and is not retained when strained through a paint filter.

Two private medical waste treatment companies are located on O'ahu. NCNS Environmental operates an autoclave that sterilizes medical waste, which can then be disposed at a MSW landfill or H-POWER. Hawai'i Bio-Waste Systems, Inc. also operates an autoclave, and follows a similar process as NCNS. In addition, Hawai'i Bio-Waste took pathological waste for processing until 1998, but has since restricted their processing to non-pathological wastes. Other medical waste incinerators and treatment systems (generally autoclaves) are associated with hospitals or large health care facilities. A few hospitals that have functioning incinerators have taken pathological wastes from other facilities in the past, but no longer perform this service. Medical waste accounted for 838 tons of the total wastes generated in the state during FY 1997/1998.

Information on methods for the proper disposal of medical waste generated in homes (particularly needles) can be obtained from the DOH.

**Asbestos.** Serious health impairments can result from the breathing of asbestos fibers. Therefore, when it is removed from structures it is doubled-bagged and disposed in a lined MSW landfill in a specially identified area.

**Municipal Solid Waste Incineration Ash.** This material is generated only on O'ahu. It is processed to recover metals and then landfilled at Waimānalo Gulch in a monofill area. The C&C is investigating possible options for use of the ash.

**Petroleum Contaminated Soil.** PCS is bioremediated on site, resulting in the removal of most of the petroleum contaminants. It is then deposited in lined cells at a landfill approved for bioremediation, or treated by thermal desorption by special soil incinerators.

## 3.0 FOCUSED OPPORTUNITIES

Chapter 3 includes the following sections:

- 3.1 Introduction
- 3.2 Illegal Dumping
- 3.3 Commercial Recycling
- 3.4 Construction and Demolition Waste Management
- 3.5 Market Development
- 3.6 Public Education
- 3.7 State Program Funding

### 3.1 Introduction

This chapter introduces the key areas of opportunity for improvement of Hawai‘i’s Integrated Solid Waste Management (ISWM) Program. The 6 focus areas were selected by the State of Hawai‘i Department of Health (DOH) and Solid Waste Advisory Committee (SWAC) through an examination of 18 different topics, which are presented in Appendix III.

The detailed organization of Sections 3.2 to 3.7 varies slightly in order to best explore the topic. The primary organization does include consistent sections, as follows:

- Introduction
- Background and Existing Conditions
- Program Models
- Observations and Analysis
- Scope of the topic, methodology, data sources, and section organization.
- Status of existing state and local programs and private activities, and other background conditions.
- Programs from Hawai‘i and other communities that addressed the issue successfully and creatively.
- Key findings and conclusions from the previous sections and rationale for associated recommendations in Chapter 4.



## 3.2 Illegal Dumping

### 3.2.1 Introduction

Illegal dumping includes a diverse set of activities that are not allowed under solid waste regulations or municipal ordinances in Hawai‘i. For purposes of this chapter, illegal dumping is defined in the following two ways:

- Disposal of waste in a non-permitted dump.
- Dumping of more than one cubic yard of waste along the roadside, in open lots, or public places (“roadside dumping”).

**Non-permitted Dumps.** Some non-permitted dumps in the islands are large and contain waste deposits up to 30 feet thick, require heavy equipment for operating, and charge haulers for disposal. However, they have no environmental controls.

Non-permitted dumps may exist because of the following factors:

- Economic benefit to responsible parties (e.g., contractors seeking least costly waste disposal options, income to those accepting the wastes).
- Risk of being caught is low (i.e., large areas of undeveloped “agricultural” land with no site controls that can be used for non-permitted dump sites without attracting the attention of surrounding communities).
- The historical practice of using portions of plantations as agricultural dump sites. While no longer an acceptable practice, agricultural dump sites are still used.

**Roadside Dumping.** Roadside dumping of waste material, including household trash, construction and demolition (C&D) waste, white goods, or hazardous substances, differs from operation of non-permitted dumps in that they are random, publicly visible, and unsupervised. The common causes of roadside dumping include the following:

- Avoidance of cost to legally dispose of waste.
- Avoidance of hauling distance and time to legally dispose of waste.
- Lack of awareness of county collection assistance provided free of charge.
- Confusion over the operating hours of legitimate disposal facilities and of materials that are accepted for disposal or recycling.

Areas that have a history of roadside disposal are more likely to be used consistently and perpetuate an ongoing problem.

#### 3.2.1.1 Purpose

Operation of large, non-permitted dump sites has been identified by the DOH Office of Solid Waste Management (OSWM) and the SWAC as posing a substantial potential threat to public health and the environment. Without environmental controls, hazardous materials in non-permitted dumps can leach into the surrounding environment, including groundwater. Much of

the material in these dumps is treated wood from demolition and construction. This wood contains chemical preservatives, including creosote, pentachlorophenol, and chromated-copper-arsenate (CCA). These chemicals are toxic and persistent and could contaminate groundwater and surrounding lands, such as agriculture, for years to come. In addition, non-permitted dumps can create fire and explosion hazards, harbor disease vectors such as rats and mosquitoes, reduce community property values, and create a tempting but dangerous playground for children.

Persistent roadside dumping sites is another illegal dumping priority. Roadside dumping of solid and hazardous waste is often visible and can therefore impact tourism. It also may create fire and vector problems and adversely impact neighboring property values.

Littering is also a problem, but poses less of a threat to public health than illegal dumping. For this reason, and because it is regulated at the county level, it is not addressed in detail in this Plan Revision.

### **3.2.1.2 Organization**

This section is organized into the following four main sections:

- 3.2.1 Introduction
- 3.2.2 Background and Existing Conditions
- 3.3.3 Program Models
- 3.2.4 Observations and Analysis

These sections provide the supporting information and rationale for the recommendations on illegal dumping contained in Chapter 4.

### **3.2.1.3 Priorities**

The approaches recommended to reduce and eliminate illegal dumping involve a combination of prevention and enforcement. While elements of these strategies currently exist within DOH OSWM programs, this Plan identifies methods to increase their effectiveness, as follows:

- Eliminate the economic advantages of operating non-permitted dump sites and of disposing at these sites.
- Send a clear signal to illegal dumping violators through enhanced enforcement.
- Build a coordinated enforcement effort of state and local authorities.
- Discourage illegal dumping through education and outreach.
- Build a sense of responsibility for proper disposal through chain of custody requirements of C&D wastes.

### **3.2.1.4 Methodology and Related Topics**

The information in this section was first developed through examination of illegal dumping prevention programs currently implemented by the state, local governments, and the private sector. In addition, model programs from elsewhere were examined through review of studies and interviews with program managers. From these model programs, the strongest elements that could fill gaps in the Hawai'i programs were identified.

Supporting information on illegal dumping prevention programs also appears in sections addressing C&D waste management (Section 3.4) and public education (Section 3.6). The section on C&D waste management shows that C&D waste may account for the majority of materials that are illegally disposed.<sup>1</sup> In addition, it has been shown that public awareness of the problems associated with illegal dumping is the first step toward its reduction or prevention.<sup>2</sup> Targeted parties for public education could therefore include contractors and individuals involved in C&D projects.

### 3.2.2 Background and Existing Conditions

Public and private efforts to reduce illegal dumping are presented in this section.

#### 3.2.2.1 State Programs

DOH OSWM has the primary responsibility for planning, permitting, inspection, and enforcement for solid waste activities in the state, as established in Hawai'i Revised Statutes Chapter 342H (HRS 342H). Their primary method of preventing illegal dumping has been through a system of inspections and enforcement.

**Site Identification and Inspection.** At the close of 1998, DOH OSWM had on record reports identifying 14 non-permitted dumps and 112 incidents of roadside dumping. DOH OSWM currently has two inspectors who conduct investigations on permit violations or operation of illegal disposal facilities.

To alert interested parties of illegal dump sites, DOH OSWM maintains an *Impacted Sites List*. Property that has been subjected to illegal dumping, either as a non-permitted dump or as a roadside dump, may be placed on the *Impacted Sites List*. Placement of a parcel on the list may alert other regulatory agencies, investors, real estate personnel, and neighbors that there are environmental concerns associated with the parcel that may impact surrounding land values as well as public health. Placement on the list is at the discretion of DOH OSWM and is not a voluntary action of the landowner. Properties that have been cleaned sufficiently for unrestricted use can be removed from the list. Currently, the list is not published or circulated except by request.

**DOH Enforcement Methods.** Upon discovery of illegal activities, DOH OSWM provides potentially responsible parties the opportunity to voluntarily cease activities, remove solid waste to a proper disposal location, and remediate remaining contaminants rather than face legal action.<sup>3</sup> Legal actions most commonly take the form of an administrative penalty, but may also include civil or criminal penalties in more severe cases. DOH OSWM may also delegate enforcement authority to other agencies (HRS 342H-2.5).

HRS 342H-7 authorizes DOH to conduct enforcement actions against violators of solid waste pollution regulations, as follows:

- “(1) *Issue an order assessing an administrative penalty for any past or current violation;*
- “(2) *Require compliance immediately or within a specified time; and*

<sup>1</sup> Advance Building Technology Forum. February 1998. *Minimizing Construction and Demolition Waste*.

<sup>2</sup> Keep America Beautiful. 1999. *Tips for Preventing Litter*. KAB website: <http://KAB.org>.

<sup>3</sup> Personal communication, Mr. John Harder, DOH OSWM Coordinator, October 12, 1998.

- (3) *Commence a civil action in the circuit court including a temporary, preliminary, or permanent injunction, the imposition and collection of civil penalties, or other relief.”*

*Administrative Enforcement.* Once an inspection is conducted and a violation is discovered, the DOH may, depending on the responsible party and the degree of environmental impact, issue one of the following as its initial response:

- Letter of Concern – Used when the violation is of minor environmental impact, or involves a first-time violation.
- Warning Letter – Used if DOH intends to pursue issuance of an Order and/or penalties, and if there is a moderate degree of environmental impact.
- Notice of Violation – Used in severe cases, it is an administrative order that levies penalties for violation of state regulations.

*Civil Enforcement.* HRS 342H-11 authorizes the DOH to institute civil actions in any court of competent jurisdiction for any of the following reasons:

- To impose and collect civil penalties,
- To collect administrative penalties, or
- To obtain other relief.

*Criminal Enforcement.* The criminal justice division is the lead agency in enforcing the illegal dumping prohibitions established in HRS 342H-30. DOH will assist the criminal justice division of the State Attorney General’s office in the event criminal sanctions are pursued. The relief measures in the statute are exercised on a case-by-case basis by the appropriate criminal court judge.

**DOH Preventative Approaches.** In addition to its enforcement efforts, DOH OSWM uses proactive methods to reduce illegal dumping. These include providing the following:

- Information on cost-effective disposal and diversion,
- Financial support for public and private efforts to reduce illegal dumping, and
- Planning and coordination of monitoring and permitting with other public and private agencies.

DOH OSWM participates in solid waste public education efforts sponsored by the counties and nonprofit groups, and engages in solid waste planning efforts to determine the areas of greatest need for ISWM. DOH OSWM has provided funding for groups such as Nani ‘O Wai‘anae, Community Workday programs, Clean Hawai‘i Center (CHC), Advance Building Technology Forum, City and County of Honolulu (C&C) Partnership for the Environment, and other organizations whose mission is to enhance and promote proper methods of waste management.

DOH OSWM and the State of Hawai‘i Department of Business, Economic Development, and Tourism (DBEDT) now sponsor The Advanced Building Technology Forum, which provides training to audiences that include members of industry that are known to use illegal waste disposal practices.

**DOH Hazard Evaluation and Emergency Response Office.** The State On-Scene Coordinators, in the DOH Hazard Evaluation and Emergency Response (HEER) Office, respond to emergency

releases or emergencies where the potential exists for release of hazardous chemicals or oil. Their cases include illegal disposal of drums suspected to contain hazardous material.

### **3.2.2.2 County Programs**

Each of Hawai'i's four counties enforces a prohibition of illegal dumping through grading permits, building permits, and litter ordinances. Counties may impose civil or criminal penalties against violators.

**County Grading and Building Permits.** All counties use the general building permit application form for demolition. The C&C requests information on the proposed disposal location for demolition debris upon submission of a completed application form. This information is written on the application by the person accepting the application. None of the other counties require any information on disposal when accepting demolition permits.

Use of fill material is covered under county grading permits.<sup>4</sup> The characteristics of fill material are similar to that of inert waste, which is defined by the state.<sup>5</sup> Disposal of inert waste requires a state solid waste permit.

Illegal dumpers may obtain county grading permits and define materials they accept as fill, when in fact the material should be covered under an inert waste solid waste permit. In addition, operators of non-permitted dumps may conceal the composition of material that is illegally disposed, using fill as a cover material, and attempt to avoid state waste management regulations. Thorough inspection of disposed material may be required to prevent such avoidance of the law.

**County Enforcement Resources.** Resources for prevention of illegal dumping that are common to all four counties include the police and prosecuting attorneys who have the responsibility to enforce anti-litter and anti-dumping laws, and building departments that issue grading, stockpiling, building, and demolition permits. Police and fire officers, sheriffs, and building inspectors make up a potential inspection and enforcement corps against roadside dumping. They regularly interact with the public and observe activities throughout the state during the pursuit of their primary responsibility.

In a program that is comparable to illegal disposal of solid wastes, the C&C Wastewater Division provides training to police to help them recognize illegal dumping of grease and cooking oil.

**Programs to Improve Diversion of Targeted Materials.** The best prevention of illegal dumping is to make proper disposal of waste materials convenient and cost-effective. However, to encourage recycling, materials are often banned from landfill disposal. Examples include restrictions placed on the disposal of green waste and C&D debris to improve diversion of these materials. This can, in some cases, contribute to illegal dumping. To avoid this, counties have instituted special collection systems that target some of the materials that are often illegally disposed.

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<sup>4</sup>The Revised Ordinance of Honolulu, Chapter 1415, requires that "...fill material shall be selected to meet the requirements and conditions of the particular fill for which it is to be used. The fill material shall not contain vegetation or organic matter. Where rocks, concrete, or similar materials of greater than eight inches are incorporated into the fill, they shall be placed in accordance with the recommendations of a soils engineer."

<sup>5</sup>Hawai'i Administrative Rules (HAR) 11-58.1 defines inert waste as "...wastes which are limited to earth and earth-like products, concrete, cured asphalt, rock, bricks, and material which will not cause leachate of environmental concern."

The C&C has implemented collection and drop-off programs to make disposal of banned items and diversion of recyclables more convenient. These programs include the following:

- Pickup for derelict vehicles, appliances, and other bulky waste.
- Recycling drop boxes, transfer stations, and convenience centers at 67 locations.
- Drop-off programs for household hazardous waste and Christmas trees.
- Curbside collection of residential green waste in some areas.

In an effort to divert C&D waste from municipal solid waste (MSW) landfills, the C&C has imposed a 10 percent maximum limit on the amount of C&D material in any load disposed at O'ahu's MSW facilities. In addition, O'ahu's sole C&D landfill, a private facility, is not permitted to accept waste containing more than 10 percent MSW. Therefore, mixed loads containing more than 10 percent, but less than 90 percent C&D waste cannot be legally disposed.

On O'ahu, commercial green waste is not accepted at C&C facilities. Most commercial green waste can be legally disposed at only two composting facilities on O'ahu; one is located on the southwest corner of the island at Campbell Industrial Park and the other is near the eastern end of the island near Kalaheo Landfill. In many cases, these locations are not convenient for green waste contractors. While the tipping fee for green waste at these facilities is approximately \$35.00 per ton, which is less than the cost of disposal for MSW, the time and indirect costs needed to haul green waste to one of these facilities are factors that may deter proper disposal.

Instead of materials bans, Hawai'i, Kaua'i, and Maui Counties have instituted economic incentives to facilitate diversion of green waste. These counties provide areas where segregated green waste can be conveniently disposed at a cost that is either significantly less than at landfills or free.

In addition to implementing collection programs, each county sponsors public outreach and education programs to inform their customers about proper disposal. In the C&C, the *Recycling Guide for O'ahu* and the Partnership for the Environment program increase public awareness of proper disposal and diversion options. Hawai'i County has contracted with Recycle Hawai'i and Renew Hawai'i for public education. Maui County produces publications through its own recycling coordinator, and has contracted with Maui Recycling Group for outreach. Kaua'i supports volunteer organizations for recycling drives and public awareness. See Section 3.6 for more information on public education.

### **3.2.2.3 Private Programs**

The economic downturn that prevailed throughout the 1990s in Hawai'i has created financial difficulties for businesses of all sizes, but has particularly impacted nonprofit organizations that depend on contributions, subscriptions, or grants for funding. Out of 20 nonprofit environmental organizations listed in the *1997 Environmental Services Directory*, nearly one third are apparently out of business, as of 1999, and only Nani 'O Wai'anae was involved with solid waste issues.

Nani 'O Wai'anae, which focuses its efforts on the Wai'anae Coast (west side) of O'ahu, conducts forums, produces educational materials, and coordinates a neighborhood watch for illegal dumping in conjunction with DOH OSWM and county law enforcement agencies. The group has a larger set of goals, though it shares with DOH OSWM the goal to reduce dumping in an area of O'ahu that has been particularly affected by non-permitted dumps. Area residents are encouraged to report suspicious behavior to neighborhood leaders, who will then contact the

responsible landowner, the resident, or the DOH OSWM. The disapproval of community representatives is often sufficient to stop illegal dumping, and it is apparent that people are often more willing to report suspicious behavior to a neighbor than to make a complaint to the police. Nani 'O Wai'anae has received funding from DOH OSWM and from local businesses, but depends heavily on volunteer support.<sup>6</sup>

The primary objective of the Community Workday program on Maui, which works in affiliation with the national Keep America Beautiful (KAB) Program, is reduction of litter and misplaced solid waste. Community Workday partners with government agencies to sponsor events such as Adopt-a-Highway, Get-the-Drift-and-Bag-It, the Great American Cleanup, and other programs that use volunteer labor to remove litter from neighborhoods. Volunteers respond to requests for action from communities through a statewide litter prevention hotline (1-888-592-2522), which operates during business hours and receives between 50 and 60 calls per day.<sup>7</sup>

Keep Hawai'i Beautiful is a chapter of KAB located in Hawai'i County. As with the focus of the national organization, the primary focus of Keep Hawai'i Beautiful is litter control and cleanup. However, they respond to any report involving inappropriate disposal. Their activities include curriculum development at local schools and clubs, teacher training, and community cleanup events. KAB reported that their affiliates provided over \$105 million in services in exchange for less than \$9 million in government support.<sup>8</sup> The cost benefit ratio they achieve (12:1) is an example of how a limited amount of public funding can be used effectively by the private sector to achieve specific public service goals.

Large landowners in the state typically provide for collection and disposal of vehicles, appliances, and other roadside dumping that occurs within their property boundaries. Most counties dispose of vehicles that are abandoned on public roads, but former plantation roads are not public roads and therefore the cost of disposal is levied on the landowner. For most of the large landowners the costs of periodic cleanup is less than the cost of installing site controls or employing security guards.

### **3.2.3 Program Models**

This section describes actions taken in other parts of the country to reduce illegal dumping. Many effective illegal dumping prevention programs are based on an integrated approach that includes convenient, cost-effective alternatives to illegal dumping, public outreach and community involvement, clear regulatory authority, and enforcement. The most successful programs integrate the resources of the state, counties, and private groups to identify and correct the causes and conditions that lead to illegal dumping. The models presented below were selected based on the success of their methods or on problems that are common to Hawai'i.

#### **3.2.3.1 Case Studies on Proactive Programs to Prevent Illegal Dumping**

Proactive methods to prevent illegal dumping include community outreach, public education, involvement of non-profit organizations, and community-based cleanup programs. Often these programs target activities on sites that are repeatedly used for illegal dumping and tend to become nuisances. An effective method of reducing the incidence of illegal dumping is to clean up existing dumpsites and to establish site controls that will prevent easy access.

<sup>6</sup> Personal communication, Ms. Katy Kok, Nani 'O Wai'anae/Keep Hawai'i Beautiful, May 1999.

<sup>7</sup> Personal communication, Ms. Jan Dapitan, Community Work Day Program/KAB, May 1999.

<sup>8</sup> KAB. 1998. *Year in Review*.

Community-oriented policing for prevention of illegal dumping has grown in popularity during the 1990s as a result of its effectiveness in targeting problem areas by enlisting the aid of community residents. Community policing is based on individual relationships between police officers and residents, and requires the officers to interact with the community at special meetings and events. Prevention programs require coordinated planning, resource acquisition, and implementation efforts. Funding can be provided by government agencies, nonprofit environmental organizations, or businesses.

The focus of a public education effort should be to teach residents what can be done to prevent illegal dumping, why it is important, how they can get involved, and who to contact for assistance. An effective outreach program may involve community events and targeted public education programs. Models of proactive prevention programs from mainland cities are described below.

**East St. Louis, Illinois.** New Spirit, an organization of over 30 neighborhoods, provides coordination and logistical support for community cleanup days. New Spirit organizes volunteers from each neighborhood for trash and tire pickups using 550 dumpsters obtained from a local waste management company. Efforts are concentrated on one or more non-permitted dumpsites within the community. Local contractors also donate equipment or provide services at a reduced rate. The effect of the community cleanup days has been to improve awareness of illegal dumping and assist landowners and the public sector in site cleanup.

**Pennsylvania.** Pennsylvania CleanWays is a nonprofit organization that helps communities clean up illegal dumpsites. As a condition of providing cleanup services, the group works with the community to develop a site maintenance plan designed to prevent future illegal dumping. At each site, the management team is composed of residents, law enforcement officials, businesses, trash haulers, and landfill operators. Residents are taught how to look for indications of illegal dumping, whom to contact to initiate an investigation, how to contact them, and how to install cost-effective site controls. In areas where non-permitted dumps are identified, Pennsylvania CleanWays enters into a contract with landowners or other potentially responsible parties to install site controls and implement other prevention programs as a condition of their assistance.

**Chicago, Illinois.** Community meetings involving police officers, staff from the Illinois Department of Environment, and residents provide a forum for two-way information transfer, and familiarize residents with enforcement personnel so that reporting illegal dumping crimes is less intimidating. Police officers and residents meet monthly at “beat meetings” to identify neighborhood crime issues and develop prevention strategies. Staff from the Illinois Department of Environment attend these meetings to discuss illegal dumping and other environmental issues. The information gained at these meetings informs citizens of the potential hazards of illegal dumping, identifies alternatives to illegal dumping, helps police prioritize surveillance efforts, and alerts residents about illegal dumping activities.

**Clifton, New Jersey.** The City of Clifton set up the Clean Communities Program to clean up and maintain areas subject to illegal dumping or littering. The program focuses on community cleanup activities rather than prevention. The program is funded by a statewide advance disposal fee (ADF) on items that commonly end up as litter. The money is used for small grants to businesses and community groups, city cleanup projects, and purchase of road signs cautioning against illegal dumping.

Over 150 businesses, all of the city’s schools, and various youth and community groups are registered with the program. Program members who wish to make a proposal to the City to



“adopt” an area are given grants of \$250, certification as a member of the Clean Communities Program, and supplies such as bags and gloves. Businesses often decline the grant money but use the certificate for display in storefronts. Adoption of an area requires that the adopting member provide periodic cleanup of the area and cooperates with City officials in identifying more serious dumpers. Almost all of the commercial and residential areas within the city are “adopted” and maintained by community groups.

Clifton’s Clean Communities Program also works with local enforcement authorities, but most illegal dumpers are interstate or intrastate transients who are not easily tracked. Inmates from the county prison provide heavy-duty labor for cleanup activities. The Clean Communities Program pays inmates a nominal fee for labor and provide supplies, heavy equipment, and personnel as necessary.

A significant fraction of the community is aware of the program or involved as participants. The level of participation is attributed to several aspects of the outreach program: community pride, the small amount of funding and certificates, and the increased level of awareness resulting from statewide advertising and other community activities.

**Philadelphia, Pennsylvania.** Philapride, a nonprofit environmental organization, publishes illegal dumping prevention and enforcement information in two publications that are designed for specific target audiences. The book for adults, *Organizing Your Community Against Illegal Dumping*, is distributed at community meetings and upon request. A comic book series for children, *The Untrashables*, is circulated in the schools. Local businesses also sponsor television and radio advertisements. The organization receives the majority of its operating funds from local business and community groups.

### **3.2.3.2 Case Studies on Integrated Enforcement**

Enforcement of environmental laws may take a low priority in comparison to violent crimes or property crimes because of the misconception that dumping is a victimless crime. On the contrary, everyone who pays taxes, drinks from the public water supply or enjoys other natural resources is a victim of an environmental crime. When methods of prevention fail to deter illegal dumpers, then effective enforcement and prosecution of environmental crimes must be considered. Effective enforcement requires clear and effective regulations, well-trained investigators, and dedicated prosecutors at the state and county levels. Effective regulations ensure that violators can be penalized to an extent that makes it impractical or economically imprudent to ignore the law.

Some U.S. mainland counties have supported efforts to prevent illegal dumping by dedicating enforcement resources to illegal dumping. Law enforcement officers assigned to illegal dumping task forces must have sufficient training, as well as the authority to conduct investigations and make arrests. The most successful programs have also had the full support of prosecuting attorneys or attorneys general within their jurisdiction.

The programs described below include a variety of different efforts, as follows:

- Twenty-four hour hotlines for reporting illegal dumping.
- Cross-agency coordinated enforcement and prosecution.
- Dedicated task forces targeting illegal dumping.
- Training programs for enforcement personnel.

Some of these elements are included in the recommendations, contained in Chapter 4.

**Franklin County, Ohio.** The County Solid Waste Authority sponsors a program called “Nail-a-Dumper,” in coordination with city refuse departments, to catch and prosecute illegal dumpers. The program integrates community outreach programs with training for enforcement officers, dedicated prosecutors, and an Environmental Court system. The program administrator credits the success of the Nail-a-Dumper program to close cooperation among the county prosecutors, police departments, boards of health, and city refuse departments. Each of its components is funded through a statewide tipping fee surcharge of \$1.25 per ton. Franklin County in central Ohio consists of 13 cities and 17 villages with a total population of slightly more than the State of Hawai‘i.

The centerpiece of Nail-a-Dumper is a 24-hour hotline that is staffed by a commercial answering service. The answering service attendant records calls and forwards them to the appropriate agency. Common recipients include the following:

- *The County Solid Waste Authority.* This agency is contacted when illegal disposal is discovered without a perpetrator and where there is no immediate danger to public health.
- *Police.* The police are contacted when illegal dumping is ongoing, or a vehicle license plate number has been identified.
- *Fire.* The Fire Department is contacted when disposal of hazardous waste is suspected.

The Nail-a-Dumper hotline is advertised on billboards, buses, and newspaper inserts. The Solid Waste Authority believes that a large fraction of the population is aware of the program and can gain access to the hotline telephone number when necessary. In 1995, the annual volume of calls to the hotline peaked at nearly 5,000. Eight percent of these calls resulted in charges being filed, while the remainder were resolved by voluntary or administrative action. The County Solid Waste Authority claims a 100 percent success rate in following up on calls to the hotline.

The Solid Waste Authority pays the salaries for two police officers and a building inspector. These personnel remain with their respective agencies and also conduct regular police and building department business if they are not engaged in illegal dumping inspection or enforcement. The inspectors have the authority to look through waste to identify the generator. Each case is first referred to the hauler, if known, to the generator if no hauler is identified, and to the landowner if neither the hauler nor generator is identified. The responsible party is given the opportunity to clean up the site and pay an administrative penalty. If the county does not receive satisfaction by this route, legal charges are filed and the case is heard in the Environmental Court.

The Nail-a-Dumper program also supports public education and outreach programs that are aimed at school children. The program advertises in municipal buses and on highway signs rather than radio and television advertising because of the cost. The program also sponsors annual training courses for law enforcement officers. The most essential component for collecting information about illegal dumping is the hotline, but the program would not work properly without a dedicated enforcement and prosecution team whose first priority is to prevent illegal dumping.<sup>9</sup>

**Detroit, Michigan.** The Detroit Environmental Enforcement Project (DEEP) Task Force was established to catch illegal dumpers in action. The DEEP Task Force consists of officials from the city’s law, fire, police, public works, water, environmental affairs, communications, and planning

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<sup>9</sup> Personal communication, Ms. Mitzi Kline, Franklin County Board of Health, June 3, 1999.

departments. In the pilot phase, seven police officers, two firefighters, and four state conservation officers conducted surveillance and investigated illegal dumping in two precincts. Task force members wear plain clothes and drive unmarked cars (donated by a local auto manufacturer) when attempting to catch dumpers in the act. A toll-free complaint hotline was established and reported cases are electronically tracked. The program resulted in nearly 100 arrests during its first two years. The task force activities were expanded to involve all 12 of Detroit's police precincts. In this model, close cooperation between agencies resulted in an effective force against environmental crimes.

**St. Louis, Missouri.** The Trash Task Force consists of off-duty police officers who use personal vehicles to conduct surveillance and enforce illegal dumping ordinances. Task force members are carefully chosen and must be former detectives with experience investigating environmental crimes. The officers sign independent contracts to cover the 20 hours per week they spend on task force activities. They make arrests and contact on-duty officers using cellular phones to obtain backup or to transport offenders. The task force also responds to citizen complaints received through the Citizens Service Bureau, a clearinghouse for illegal dumping questions and complaints. In 1996 and 1997, the task force made over 100 arrests, towed 21 vehicles, and conducted over 1,600 investigations. The task force comprises a low-cost dedicated enforcement corps that reduces the burden of inspection and enforcement on state and county agents.

**St. Clair County, Illinois.** The Illinois Environmental Protection Agency works closely with the local State Attorney General's Office to prosecute environmental cases. About 20 percent of the State Attorney's time is dedicated to enforcement of illegal dumping laws, greatly enhancing prosecution of environmental cases and allowing for collection of penalties and site cleanups. The program's reputation serves as a deterrent to illegal dumping and has led to the cleanup of many sites. In addition, the State Attorney General serves as an advisor to local enforcement officials on solving environmental problems. Dedication of the resources of the Attorney General toward enforcement of environmental crimes has resulted in substantial decrease in the operation of non-permitted dumps.

**Honolulu, Hawai'i.** The Hawaiian Humane Society is a nonprofit corporation that operates as a municipal franchise to manage stray pets and enforce leash laws. The officers of the Humane Society are sworn in as special police officers by C&C to uphold and enforce a certain subset of municipal ordinances. The Humane Society provides an example of a non-governmental organization in Hawai'i that assists state and local government and has the ability to issue citations. This model may be applicable to small scale illegal dumping including littering.

### **3.2.4 Observations and Analysis**

#### **3.2.4.1 Characteristics of Illegal Dumping in Hawai'i**

The most common materials found in illegal dumps are C&D debris, derelict vehicles, parts and tires, appliances, furniture, and yard waste.<sup>10</sup> Roadside dumping often consists of household trash. Typical users of illegal dumps (prioritized by frequency) include C&D or roofing contractors, waste management companies, junkyard operators, automobile repair shops, scrap collectors, and self-haulers.<sup>11</sup>

<sup>10</sup> EPA. March 1998. *Illegal Dumping Prevention Book*. Report No. EPA905-97-001.

<sup>11</sup> *Ibid.*

The U.S. Environmental Protection Agency (EPA) characterizes communities that have problems with illegal dumping as those with limited access to convenient, affordable waste management services, where illegal dumping is given low priority by law enforcement officials, and where illegal dumping or open burning is a common historical practice. These factors characterize Hawai'i communities to different degrees.

Other factors that may be specific to Hawai'i include the following:

- Undeveloped lands in close proximity to population centers where unobserved roadside dumping and operation of non-permitted dumps can occur.
- Former agricultural lands with few or no site controls.
- Historic practice of waste disposal on plantation lands.

Dumping waste illegally is cheaper than legal disposal or diversion as long as one does not get caught. This fact, alone, is the primary reason why contractors are willing to use non-permitted dumps or to dump illegally. Many disposal services are offered through a bid process. The low bidder is normally awarded contracts for disposal services to commercial or apartment buildings, or on construction, demolition, environmental remediation, or landscaping projects. Illegal dumping offers the competitive advantage of low-cost disposal to contractors who are willing to use non-permitted dumps.

Operation of non-permitted dumps has persisted on all islands because the risk of being caught is low and the penalties are low in comparison to the potential benefits. In addition, illegal dumping of C&D is difficult to enforce because, unlike MSW, C&D waste generally does not contain much information, such as discarded mail that can be used to identify the perpetrator.

OSWM has been unable to meet the demands for enforcement of solid waste regulations. Also, inspection and enforcement personnel in other state and county agencies do not normally assist DOH OSWM with non-permitted dumps because of the technical nature of solid waste regulations, and because the limited resources of other agencies' are devoted to their primary responsibilities.

#### **3.2.4.2 Activities that Can Help Prevent Illegal Dumping**

The following sections identify activities from the successful model programs described above that could be used to address illegal dumping in Hawai'i.

**Eliminate the Economic Advantages of Illegal Dumping.** The economic advantage of operating or disposing of wastes in non-permitted dumps can be addressed by increasing enforcement actions against operators, contractors, and haulers that profit from those dumps. It can also be addressed by making information regarding lands where illegal dumping has occurred available to real estate businesses, thus highlighting the liability for owners or prospective purchasers.

The economic advantage can also be reduced by providing convenient and cost-effective methods of diverting wastes that are commonly disposed illegally.

**Increase Enforcement.** To improve the effectiveness of enforcement actions against known or suspected illegal dump operators, there should be an increase in dedicated enforcement staff at DOH OSWM or use of enforcement personnel from other agencies. The existing staff shortfalls could be addressed through increased funding or by formally transferring some responsibility for

illegal dumping to other agencies. However, many government agencies are experiencing budget shortfalls and may find it difficult to supply additional enforcement efforts. Section 3.7 discusses potential sources of additional funding for DOH OSWM.

Training of enforcement personnel in regulations and enforcement procedures for illegal dumping is an essential part of inter-agency coordination. The C&C program to train police officers in recognition of illegal disposal of greases into wastewater is an example of such an effort.

**Coordinate Between State and County Agencies.** Models from other cities show that coordinated efforts involving police, health agency staff, and prosecuting attorneys can significantly increase capture for violations of both illegal dump operations and roadside dumping. The use of police or building inspectors for investigating solid waste violations is likely to create additional awareness among other county personnel, and may result in greater interagency cooperation.

Lack of coordination among, and conflict between, state and county agency approaches and regulations can complicate enforcement efforts by allowing potential violators to seek shelter under conflicting regulations and ordinances.

**Improve Information for Tracking Wastes.** Contractors who dispose of C&D debris at illegal dumpsites can be discouraged from doing so if their waste materials are documented and tracked. Counties often issue building and demolition permits without requiring contractors to document their planned waste disposal method. The information that would be valuable for tracking the waste materials from a demolition project, and for encouraging proper diversion or disposal, would include the disposal location, the waste hauler, the estimated cost of disposal, and potential alternatives to disposal.

**Conduct Education and Outreach Programs to Prevent Illegal Dumping.** Public education and community outreach are viewed as two of the most essential components of the effort against illegal dumping. The objective of any community outreach program is to raise awareness of the environmental risks and the community impact of illegal dumping, and to inspire community members to take an active role in its prevention.

The following are essential aspects of a successful public education program to prevent illegal dumping:

- Target the key constituencies that engage in illegal dumping.
- Target organizations that could broaden community support for prevention of illegal dumping.
- Assess methods of information transfer that work best for the target groups.

As identified above, targeted parties could include contractors and other individuals involved in demolition and construction activities.

Community leaders and landowners can prevent illegal dumping on former plantation land through proactive measures such as the following:

- Organize educational, training, or informational meetings for residents, contractors, and former plantation workers.

- Provide signs, security patrols, or other site controls to reduce access to potential dump sites.
- Use community events or other venues to raise awareness of the problems associated with illegal dumping.

Programs that inform people of the human health risks that result from illegal dumping may help to prevent illegal dumping and be more cost effective than issuing citations after dumping has occurred. Public awareness of existing services that are available may also help to reduce roadside dumping of white goods, household hazardous waste, appliances, and vehicles.

**Assign Responsibility for Proper Disposal of C&D Waste.** The lack of accountability associated with the treatment of waste from the point of generation to disposal contributes to improper disposal. Many communities have implemented an enforceable system where accountability for wastes begins with the generator and continues through to the disposal site operator. In Hawai'i, ownership of waste is assigned to the generator until it is properly collected, and then to the collector until it is properly disposed.<sup>12</sup> Requiring waste generators to demonstrate that wastes have been properly collected and disposed would provide a mechanism to ensure proper disposal.

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<sup>12</sup> HRS 340A-2.

## **3.3 Commercial Recycling**

### **3.3.1 Introduction**

This section addresses recycling at businesses and institutions. The commercial sector generates between 35 and 45 percent of a typical community's waste stream.<sup>13</sup> Commercial waste generators include office buildings, institutions, restaurants, retail stores, and gas stations.

Commercial waste consists of a high percentage of recyclable materials such as high quality paper and cardboard. Due to the diversity among types of commercial generators and waste quantity and composition, there is no single recycling system that fits all types of businesses.

In Hawai'i, private haulers commonly collect commercial waste whereas public crews collect most residential waste. Therefore, the role of government in increasing commercial recycling is less direct than for residential recycling. For commercial recycling, government often uses a "carrot and stick" approach, such as education and incentives together with regulatory requirements.

Multifamily housing is a source of residential recyclables that is sometimes addressed with commercial recycling. The haulers that serve that sector and the type of equipment used have more in common with commercial than residential recycling. However, in this ISWM Plan, multifamily housing is considered a part of the residential sector and is not addressed.

C&D materials are also generated by commercial businesses; this is addressed in Section 3.4. The processing and marketing of compostable materials, such as green waste and food waste, is addressed in a discussion paper included in Appendix III. Markets for recyclable materials are addressed in Section 3.5.

#### **3.3.1.1 Purpose**

The purpose of this section is to characterize the commercial recycling infrastructure in Hawai'i, to identify barriers to increased recycling, and to identify potential opportunities to increase commercial sector recycling.

#### **3.3.1.2 Organization**

This section is organized into the following four major sections:

- 3.3.1 Introduction
- 3.3.2 Background and Existing Conditions
- 3.3.3 Program Models and Approaches
- 3.3.4 Observations and Analysis

These sections build toward programmatic action recommendations included in Chapter 4.

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<sup>13</sup> EPA. 1998. *Characterization of Municipal Solid Waste in the United States, 1997 Update*. Report No. EPA 530-R-98-007, p. 162.

### **3.3.1.3 Priorities**

The SWAC identified commercial recycling as one of the high priority topics for development in the ISWM Plan. In addition, they identified the following key objectives that should be achieved:

- To increase recycling participation by commercial generators.
- To ensure that adequate service options are provided to commercial generators, including the following:
  - Reasonable prices,
  - Reliable service,
  - Geographic coverage,
  - Efficient collection methods, and
  - Competition.
- To ensure that generators who recycle save or make money by doing so.
- To broaden the scope of materials that are recovered from the commercial sector.
- To provide stable end markets for the recovered materials.

These priorities, along with the findings from the research on existing conditions and model programs, form the backbone of the recommendations for action to increase commercial recycling.

### **3.3.2 Background and Existing Conditions**

The seven aspects of commercial recycling described in this section include, as follows:

1. Materials that represent the primary targets for commercial recycling.
2. Elements of a model commercial recycling infrastructure.
3. Current commercial recycling infrastructure in each of the four counties.
4. Current materials recovery rates from the commercial sector.
5. Barriers to increased commercial recycling.
6. Two Hawai'i programs that can serve as models for expansion or duplication.
7. Three initiatives previously proposed for Hawai'i, but not implemented.

#### **3.3.2.1 Commercial Recyclable Materials**

Waste composition studies often do not distinguish between commercial and residential sources of materials. Therefore, most of the composition data in this section addresses recyclable materials that are the primary components of the commercial waste stream, but not generated exclusively by them. Table 3-1 depicts the primary commercial recyclable materials and their sources.



**Table 3-1:  
Principal Commercial Recyclable Materials**

| Material         | Approximate Tons Generated | Amount from Commercial Sector (percent of total) <sup>1</sup> | Primary Commercial Sources                              |
|------------------|----------------------------|---|---|
| OCC              | 130,900                    | 80  | Retail, Grocery, Wholesale and Distribution, Industrial |
| ONP              | 55,800                     | 10  | Office Buildings, Institutions                          |
| OP               | 118,600                    | 75  | Office Buildings, Institutions                          |
| MWP              |                            | 30-35   | Office Buildings, Institutions                          |
| Glass Containers | 38,900                     | 15-20   | Restaurants, Bars, Institutions                         |
| Plastic Bottles  | 10,700                     | 10-20   | Restaurants, Institutions                               |
| Food Waste       | 191,100                    | 50  | Restaurants, Institutions                               |
| Green Waste      | 257,900                    | 10  | Office Buildings, Business Parks, Institutions          |

NOTES: <sup>1</sup> EPA. 1992. *Characterization of Municipal Solid Waste in the United States: 1992 Update*. Report No. EPA 530-R-92-019. (This table is not repeated in later editions. The percent shown is of the total of that specific waste stream.)  
OCC = old corrugated containers, ONP = old newspapers, OP = office paper, MWP = mixed-waste paper.

Ferrous metals (including tinned cans, appliances, and miscellaneous scrap) are an additional material of interest from the commercial sector. However, their origin and composition have not been well enough studied in Hawai‘i to include in Table 3-1. Ferrous metals have a very high rate of diversion in Hawai‘i, due in large part to recovery at Honolulu’s waste-to-energy incinerator (H-POWER). The primary types of ferrous are as follows:

- Tinned cans from restaurants and institutions, which are often collected in other locations together with glass containers.
- Major appliances, which are primarily generated from the residential sector.<sup>14</sup>

### 3.3.2.2 **Portrait of a Model Commercial Recycling Infrastructure**

The basic elements of a well developed commercial recycling infrastructure are described below for purposes of comparison with activities in Hawai‘i. Commercial recycling consists of a number of different services and facilities.

**Old Corrugated Containers.** Paper fiber, particularly OCC, is the most important commodity in commercial recycling due to its high market value and relative ease of recovery. Large generators of OCC will either bale the material at their site, or compact it in a large portable compactor. Bales will be hauled on a truck that may have a route including several generators. Large compactors are hauled to a processing center. Smaller businesses will flatten their boxes and place them in a cage or other container for collection, often by a front-load compacting vehicle.

<sup>14</sup> EPA. 1998. *Characterization of Municipal Solid Waste in the United States. 1997 Update*. EPA 530-R-98-007, p.162.

OCC is often collected from small generators by small independent recyclers or individuals referred to as the “mosquito fleet.”<sup>15</sup> The mosquito fleet operates with pickup trucks, and in some cases with shopping carts. They pick up OCC that has been set out on the curb by the generator. Their business is very sensitive to the price paid for delivered cardboard, and they stay in business or not as prices rise and fall. The amount of mosquito fleet activity can be viewed as an indicator of overall commercial recycling activity because they often collect from generators that are not economically feasible for larger haulers to service.

OCC is often processed by dumping it on a floor, breaking open store bales, removing contaminants by hand, and baling it in a high-density baler for shipping to market. Often the processor operates a buy-back center for OCC or other fiber grades delivered by independent haulers, businesses, and the mosquito fleet.

Even when source separation is widely practiced, some generators may not source separate for practical reasons. With intentional routing of collection vehicles, to avoid collecting wet waste in the same load, loads containing 30 percent or more OCC can be generated. These are called high-grade commercial loads. Processing centers will accept these loads, often for a tip fee that is \$10 per ton or more, below the fee for disposal, and recover the OCC for marketing. This provides an incentive for the hauler to work with customers to produce such loads. The effectiveness of this system of recovery depends on relative economic factors to make it feasible, including the price of OCC and the cost of solid waste disposal. Municipal governments often encourage such recovery by providing a subsidy to make it more economically feasible.

**Office Paper.** This is collected from office buildings and institutions by private recyclers and haulers who set up an arrangement with the generator. This arrangement often specifies the grades of paper recycled, provides an in-office collection system, and collects material that has been aggregated at the shipping dock.

The paper may be packed and sold directly to market, or the white paper or other grades may be separated to increase the value of the load. The material is then baled.

**Glass Containers.** Glass is collected from large generators such as restaurants and bars if the price of glass cullet can support the cost of collection and processing. This price depends on the strength of a local market or possibly a subsidy by government. This is the case in California where a redemption center system was created by a deposit law, and in Hawai‘i where payments from the glass containers are collected as an ADF.

Glass processing is dependent on the market and end-use product. Processing includes removal of contaminants, size reduction, and occasionally color separation. All these processes have been developed by glass processing facilities on the mainland, primarily due to curbside recycling of residential glass.

**Food Waste.** The collection and processing of food waste is still experimental and the few systems that exist differ substantially. Systems include collection of source separated organics from restaurants, groceries, and/or produce processors. Material may include low grade paper such as waxed corrugated cardboard that is generally compostable but not recyclable. The options for processing include as follows:

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<sup>15</sup> The “mosquito fleet” is a term used to describe independent recyclable material collectors who generally operate small vehicles, such as pick-up trucks, and collect material from small and medium-sized generators. In Honolulu, a mosquito fleet exists for glass container recovery due to the state subsidies, but the mosquito fleet for paper grades is very small.

- Mixed stream wet waste composting.
- Aerobic composting with a bulking agent such as green waste.
- Anaerobic digestion sometimes for production of an energy product.
- Animal feed.

The latter is currently the only option in Hawai'i. Until 1999, Unisyn Biowaste Technologies were producing energy and compost. It was closed due to unresolved environmental and land use issues. Food waste often entails a tip fee or a charge to the generator, though that can be less than the cost of disposal.

**Integrated Versus Independent Collection Service.** A common issue in commercial recycling is whether collection is performed by an independent recycler or by the generator's waste hauler. Both models occur in Hawai'i and on the mainland. Integrated systems are becoming more common since they allow for more flexibility between the recycler and the generator regarding service and price. When separated, the cost savings from reduced disposal fees are not always transferred to the generator's benefit.

### **3.3.2.3 Hawai'i Commercial Recycling Infrastructure**

The following section contains a brief description of commercial sector recycling activities in the four counties, including private recycling industry and public sector support. The primary purpose of this section is to build the basis of understanding current conditions in order to identify actions to improve the performance of recycling systems.

**City and County of Honolulu.** The C&C has placed a high priority on increasing commercial recycling and implemented a number of programs to support it. Their programs emphasize cooperative outreach to businesses to encourage and promote recycling. This is supported by mandates and regulations of certain types and sizes of businesses.

*Private Infrastructure.* A number of companies provide collection of recyclable materials, including OCC, ONP, OP, glass containers, aluminum, and food waste. In addition, a number of processors receive materials for processing or sale. Three companies perform the bulk of the processing of the core commercial recyclables (e.g., OCC, OP, and glass): Honolulu Recovery Systems, Island Recycling and BFI (dba Honolulu Environmental Transfer).

The primary providers of integrated trash and recycling services for collection and processing are Honolulu Recovery Systems and BFI. Honolulu Recovery Systems operates two collection vehicles for recyclables. They have extensive equipment for sorting and packing recyclables. However, the facility is operated well below its capacity due to a shortage of materials. They charge customers for collection of recyclables.

BFI also collects recyclables and operates a materials recovery facility (MRF) that receives material from other haulers. They process glass that is delivered to Honolulu Recovery Systems, and in turn they process newspapers and magazines. The site includes conveying equipment for sorting recyclables, a baler and glass crusher. The processing equipment has capacity to handle a substantially greater volume of materials than is presently delivered.

Island Recycling processes glass, paper grades, and aluminum from the commercial sector. They perform material cleaning and separation primarily from the tipping floor, and have equipment for baling and glass crushing.

The mosquito fleet in Honolulu is active for glass collection. Few operators, however, pick up cardboard and other paper grades. For comparison, in most communities, the mosquito fleet is built around OCC. Due to the Hawai'i glass ADF, processors are paid per pound by the C&C when they sell glass to the end user. Processors also pay collectors directly for color-separated glass. Only two major processors buy back material from the mosquito fleet: BFI and Island Recycling. Most of this material is shipped to California, where it is processed into bottles or fiberglass insulation.

One measure of maturity in the recycling industry is the capacity and utilization of the processing infrastructure. A MRF can be defined as a facility that receives mixed recyclable materials, including paper fiber, and processes and packs those materials for delivery to market.<sup>16</sup> By this measure, Honolulu has three MRFs, at least two of which are operating below capacity due to lack of input material. By comparison, the Portland Metro area has twelve MRFs. Portland's population is 25 percent larger than the C&C and supports extensive curbside collection. However, the difference of built infrastructure is striking, and it is one of the factors in explaining the relatively low commercial recycling rate in Hawai'i.

Another form of MRF is a facility that takes mixed trash, generally commercial high-grade trash, and separates OCC, ONP and other recyclables. In Hawai'i, no MRFs come under this definition. Honolulu Recovery operates a sorting line with a conveyor belt and pick stations. This is used for residential recyclables from drop-off centers and from some commercial customers who mix recyclables. One activity Honolulu Recovery performs is sorting paper into individual grades for market.

Some recycling operators that offer both trash and recycling collection report that in Honolulu, most of their large customers recycle at least some of their OCC. Other haulers, however, do not offer recycling services or do not encourage and assist their customers to recycle. This is especially true for small and medium-sized businesses, which represent the majority of trash generation capacity. Consequently, the overall rate of recycling of OCC and OP in Honolulu is relatively low.

One generator in Honolulu, the Sheraton Waikiki, has a notable recycling program where they process the material coming out of guest rooms and separate mixed paper, including travel brochures. This material is collected by Honolulu Recovery and sold as MWP.

*Public Sector Programs.* The C&C has the highest tip fee in Hawai'i, primarily due to the cost of operating H-POWER. This fee should provide a substantial incentive for commercial generators to recycle. In addition, the C&C has implemented a number of efforts to increase recycling. The most visible effort is an extensive business outreach program, Partnership for the Environment. This program is described further in Section 3.6, public education.

The C&C has adopted ordinances that mandate businesses to recycle certain commodities, as follows:

- Office paper, newspaper, and cardboard by office buildings with greater than 20,000 square feet of office space. This applies to approximately 150 buildings in the C&C.
- Glass containers by bars and restaurants that serve alcoholic beverages. This applies to approximately 800 establishments.

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<sup>16</sup> Other definitions of MRF include a facility that processes commingled recyclables collected at curbside. The definition used in this paper is more inclusive.

- Food waste by large hotels, restaurants, grocery stores, food manufacturers/processors, and hospitals. This applies to approximately 500 businesses.

The mandatory ordinances allow for suspension of the requirement if the cost to recycle exceeds the cost to dispose.

In addition, the C&C prohibits disposal of OCC at a rate greater than 10 percent in a load of trash at C&C disposal sites. Inspectors at the landfill, H-POWER and transfer stations monitor trucks and can issue violations. This ban should create incentives for trash haulers and commercial self-haulers to assure that large amounts of OCC are not thrown away.

The C&C performs inspections of regulated businesses to confirm that they are recycling. Generally they have found that bars and restaurants are recycling glass. It is not difficult to find someone to pick up glass containers, since the glass container ADF provides a strong financial incentive to recycle.

Some offices, on the other hand, are not recycling paper as demonstrated by the low OP recovery rates (refer to Section 3.3.2.4). There are more disincentives on OP recycling, such as complex in-building systems, the need to educate and monitor large numbers of employees, and low value of material, which lacks the support of an ADF or other economic enhancement.

The C&C has implemented various other promotion and education programs to encourage recycling by businesses, including detailed information on how to separate and store recyclable materials. Some of these educational materials are described in Section 3.6 on public education.

**Maui County.** Maui County has the most extensive recycling services for commercial generators outside of the C&C. However, recycling businesses continue to struggle economically in Maui County, as in other counties, due to lack of local markets and high shipping and operation costs.

*Private Infrastructure.* Several haulers provide recycling services. Maui Disposal and Maui Recycling Service have provided the bulk of commercial recycling collection. Maui Recycling Service served approximately 165 commercial accounts and provided for-fee recycling collection. They do not haul trash. They pick up a variety of recyclables, including food waste. They also serve residential customers with fee-for-service curbside collection.

Maui Disposal, which has merged with BFI (or Allied), reports that approximately 50 percent of their customers do some recycling. At the customer's option, they provide containers for OCC, glass, ONP, MWP, plastics and green waste. Customers are charged for the materials that they recycle, though the fees are generally less than for disposal. They also report that a lot of condominium units recycle (see discussion under Kaua'i). Pacific Waste and Valley Isle Disposal also offer recycling services to their commercial accounts.

Many commercial businesses on Maui have been served by one company for trash and another for recycling. This makes it difficult to share cost savings between the two services. Maui Recycling Service recognized this and partnered with haulers to capture some of these advantages. They recognize the advantages of integrated trash and recycling services.

Both Lana'i and Moloka'i offer some recycling services, mainly for residents, with Moloka'i collecting OCC and glass for businesses.

On Maui, OCC and glass are the main materials recycled from the commercial sector, though some mixed paper and food waste is collected from restaurants and hotels. Food waste is delivered to pig farmers. Cooking oil and grease trap wastes from restaurants and hotels are manufactured into a biofuel by Pacific Biodiesel operating at the Central Maui Landfill.

Nearly all revenues for recyclers come from charges to the customer. OCC is delivered to Maui Scrap Metal, the only outlet on the island, for a fee (\$30 per ton). Some revenues are received for glass recycling at Aloha Glass, due to the glass ADF, which supports the costs of processing. In addition, minimal revenues may be received for food waste from the pig farmers. Some recyclers have received grants from the county for development of services and programs.

*Public Sector Programs.* The county has had a very aggressive program of grants and technical assistance to local recyclers, and has purchased recycled paper, glass, plastic products, and green waste for county projects. They also provide a wide set of public education and information services, as described in Section 3.6 on public education. The county collects trash from residential customers, and from a few commercial businesses in Hana. They do not provide recycling collection services to those customers.

Maui recently offered Restaurant Waste Minimization and Pollution Prevention training to restaurant managers on the island, which was conducted by Maui Recycling Group (MRG). This program is discussed as a model program in Section 3.3.2.6. The county has also produced educational and promotional materials, including a Recycling Guide (now on the web) and how-to handbooks to encourage commercial recycling.

The activities of the county have strongly contributed to development of diverse recycling opportunities on Maui and a diversion rate of approximately 30 percent. Green waste comprises the bulk of diverted tonnage. Approximately 20 percent of the OCC generated is recycled, although, as with other islands, some material is not reported because it is shipped directly by retail stores to the mainland. By Maui County's calculations, over 60 percent of commercial refuse that is landfilled consists of recyclable or compostable materials.

A weak link in the recycling chain on Maui is that only one outlet accepts major paper grades, and that revenues are not paid to the collector for those materials. The county is considering issuance of a Request for Proposal to support development of a "mini-MRF," a small recyclables processing facility. This facility would target the county's residential recycling programs, and could also provide a better market for paper grades collected from commercial generators.

The cost of transport, both interisland and overseas, is another barrier for Maui recycling. The County Deputy Public Works Director appealed to and received tentative agreement from the major mainland-shipping firm to reduce shipping costs for recyclables. Negotiations at present are stalled.

**Hawai'i County.** Hawai'i County is very large with sparse population. The long distances between commercial centers make recycling services difficult. In addition, waste disposal is free for most residents and many of them use the no-charge system of transfer stations. Since there is no county-supported door-to-door pickup of household garbage, residents haul their trash to designated county-operated transfer stations or landfills. General household garbage, separated green waste, and old appliances may be deposited without cost at these landfills; bulky waste such as scrap building material may be left for a fee.

*Private Infrastructure.* Recycling services for businesses differ in the three main business districts on the island: Hilo, Kona and Waimea. Four businesses collect the primary commercial recyclables (e.g., OCC, white OP, and glass). Three businesses serve the east side and one serves the north and west sides. Only one business on the east side picks up mixed office paper. The two largest companies providing commercial recycling are Business Services Hawaii and Environmental Recycling. Both operate balers for export of recyclables.

In addition to its collection service, Business Services Hawaii operates six drop-off centers and performs monthly collections at two community-recycling events. Environmental Recycling also provides community recycling through buy-back events for aluminum. In addition, one business picks up food scraps and two pick up cooking oil. Of the four main recycling collectors, two are integrated with trash collection companies and two are independent recyclers.

Another company, Pacific Waste, advertises that they provide recycling services island wide as a part of their trash hauling, but they are discontinuing that service and now only accept OCC, glass, and aluminum when dropped off at their yard. Pacific Waste is one of the fastest growing trash companies on the island.

Several of the recyclers and waste collectors on the island of Hawai'i do not charge extra for their recycling services. This is economically feasible due to the diversion credit (see below) that supports recycling activities. Even so, when some haulers offered recycling for no extra charge, they found that they were losing money due to reduced tonnage hauled to landfills and consequently had to accommodate the loss by adjusting their overall rates.

*Public Sector Programs.* The County of Hawai'i pays a \$40 per ton diversion credit to any company that delivers designated recyclable materials to an end user. The recycler must have a contract with the county and provide evidence of transfer of the materials, such as a weight ticket, to receive the credit. The materials covered by the disposal surcharge include the following:

- All paper grades.
- Plastics.
- Tin cans.
- Cooking oil (recently added).

Glass container recycling is supported separately as a result of state glass ADF payments. The payments are \$160 per ton, and the allocation of those funds are carefully monitored.

Ferrous metal recycling, dominated by auto hulks, is funded through a \$4 per auto registration fee. Hawaii Metal Recycling Co. (HMR) on O'ahu has the contract to collect and ship metals for recycling. HMR also recycles some appliances.

Recycle Hawaii, a non-profit organization, has been contracted by the county to provide public education on recycling. They actively promote commercial recycling through flyers and educational materials, workshops targeted at specific types of businesses, and special promotional events. They also offered the Restaurant Waste Minimization and Pollution Prevention training to restaurant managers, similar to the program offered by MRG. Section 3.6 on public education contains more information on this organization.

According to data from the state, the overall-recycling rate for the County of Hawai'i is about 13 percent. OCC recovery is under 10 percent. As with other islands, large retailers such as Safeway

and Kmart are shipping some material directly back to the mainland. Commercial recycling on Hawai'i appears to have substantial growth potential.

**Kaua'i County.** Kaua'i has the smallest population of the counties in Hawai'i. County crews collect rubbish from the residential sector and from some small commercial accounts, whom they charge by container.

*Private Infrastructure.* The island has four main commercial sector waste haulers, and a number of smaller companies. Garden Isle Disposal, the largest hauler, also performs the majority of commercial sector recycling. At the customers' option, they pick up OCC, ONP, OP, glass, and aluminum. They provide a collection bin and charge extra for recycling services. Garden Isle also sorts recyclable materials, though they do not have conveyor belts or other mechanical processing equipment. Recycled materials are baled for export.

Garden Isle reports that most of their larger customers are recycling, though overall approximately 10 percent of all their customers recycle, and the primary material is OCC. Some larger chain stores such as Safeway and Kmart ship their OCC directly to distribution centers on the mainland rather than using their local hauler. This material is often overlooked in calculating recycling rates. Other large stores recycle through their local haulers.

Garden Isle operates the county's five recycling drop-off sites, which are primarily designed for residential users, but may also be used by commercial accounts.

*Public Sector Programs.* Using funds from the glass ADF, the county has operated a glass buy-back and processing operation for commercial generators. It was recently operated under contract to J.C. Sandblasting, which also processes glass for sandblasting and aggregate substitute.

The county's efforts for education have been primarily focused on increasing residential recycling, and to reduce the amount of contamination in the drop off program.

Kaua'i reports that, as on Maui, some of the best recycling rates come from condominium units. This is attributed to visitors who have recycling service on the mainland and demand it of their condominium managers.

According to state data, commercial recycling rates on Kaua'i are low and have substantial growth potential. The recycled OCC reported last year was only 282 tons, which likely represents a single digit rate of OCC recovery.

#### **3.3.2.4 Quantities Generated and Current Recovery**

This section examines the commercial recycling rate in the state. The primary purpose is to assess how much emphasis the ISWM Plan should place on increasing recycling rates from the commercial sector. Recovery rates in Hawai'i are compared to those in other communities for a number of materials, and recovery of OCC is used as a key indicator to measure effectiveness of commercial recycling efforts.

**Statewide Recovery Rates.** The approximate available (i.e., disposed) quantities and current recycled quantities of principal recyclable materials are shown in Table 3-2.



**Table 3-2:  
Estimated Statewide Disposed and Recycled  
Quantities of Principal Recyclable Materials (1998)<sup>1</sup>**

| Material         | Tons Disposed | Tons Recycled |
|------------------|---------------|---------------|
| OCC              | 92,579        | 35,805        |
| ONP              | 43,344        | 12,227        |
| OP/MWP           | 105,847       | 12,691        |
| Glass Containers | 24,768        | 12,138        |
| Plastic Bottles  | 10,291        | 394           |
| Food Waste       | 133,876       | 13,926        |
| Green Waste      | 192,795       | 68,567        |

NOTE: <sup>1</sup> The numbers in Tables 3-2 and 3-3 are approximate and may contain errors due to differences between islands, changes in waste streams over time, and differences in study methodologies. For the C&C quantities, the estimation is derived from the 1999 waste characterization study. For generation of material quantities on neighbor islands, the percentages from the 1994 waste characterization study for Maui are extrapolated to the other islands and adjusted for population. The tons generated is then subdivided into disposed and diverted according to the reported diverted quantities.

The strength of the local recycling industry, including collectors and processors, depends on a reliable and sizable supply of recovered feedstock. Table 3-2 demonstrates that there are significant quantities of all these principal recyclable materials available for recovery from the waste stream.

Each recyclable material is generally considered to have an optimal recovery rate, beyond which recovery becomes decreasingly cost-effective. For example, OCC as a commodity is highly recyclable, however, a certain percentage of OCC may not be, due to the presence of the following types of cardboard:

- Waxed (e.g., produce boxes).
- Low grade (i.e., to as “Asian board”).
- Food contaminated (e.g., pizza cartons).
- Used for another purpose and not disposed (e.g., long-term storage).

For OCC, the economic optimum for recovery is considered to be in the 70 to 80 percent range.

To assess where the major growth could occur in Hawai‘i recycling, it is valuable to review recovery rates for materials in other communities. This can provide help to identify materials that lag substantially behind other communities or national levels. Table 3-3 compares recovery rates for principal materials in Hawai‘i to the national average and to rates in Portland, Oregon.<sup>17</sup>

<sup>17</sup> Portland, Oregon, is used for comparison because its diversion systems are well developed, and the Portland area, with a population of 1.2 million, is roughly comparable to Honolulu with a de facto population of 0.9 million.

**Table 3-3:  
Comparison of Recovery Rates for Key Materials**

| Material                 | Hawai'i Statewide Recovery Rate (percent) | National Recovery Rate (percent) <sup>1</sup> | Portland, Oregon Recovery Rate (percent) <sup>2</sup> |
|--------------------------|---|---|---|
| OCC                      | 29  | 67  | 74  |
| ONP                      | 22  | 56  | 80  |
| OP/MWP                   | 11  | 30  | 57  |
| Glass Containers         | 33  | 24  | 69 <sup>3</sup>                                       |
| Plastic Bottles          | 4   | 9   | 21  |
| Food Waste <sup>4</sup>  | 9   | 3   | 4   |
| Green Waste <sup>5</sup> | 26  | 41  | 78  |

NOTES: <sup>1</sup>EPA. 1998. *Characterization of Municipal Solid Waste in the United States*.  
<sup>2</sup> Oregon Department of Environmental Quality. 1998. *Oregon Solid Waste Composition, and Solid Waste Material Recovered*.  
<sup>3</sup> Note that glass recovery in the Portland, Oregon, area is high due to a Bottle Bill.  
<sup>4</sup> Food waste recovery is in transition on O'ahu due to the closure of Unisyn in 1999. These data may not reflect the current situation.  
<sup>5</sup> Data for green waste are uncertain due to new programs and resent waste stream changes.

*Glass Containers.* Glass has the highest relative recovery rate in Hawai'i, much higher than the national average, due in part to the glass recovery subsidy provided by the ADF, and in part to the recycling mandate by the C&C. Several of the counties subsidize the market price for glass by providing funds to local recyclers according to the amount of glass they process. Wherever market prices for recovered materials are solid, an infrastructure will develop to collect the material from generators. This has happened most notably in the C&C, and to a lesser degree in the other counties.

Each county allocates the glass ADF fees, which come from the state, differently. The C&C and Hawai'i County pay recyclers for tons of glass diverted, using different formulas. Kaua'i County contracts for operation of a glass buy back and glass processing. Maui County provides grants to the island's processor. For all counties, the effect is to subsidize the value of glass and to create a market demand. This stimulates haulers to collect glass and independent collection efforts by the mosquito fleet, resulting in the high diversion rate.

The quantity of glass recovered is pushing the ability of markets in Hawai'i to absorb the material. Much glass is sitting in storage even though potentially profitable uses could be developed. Therefore, glass is a focus of Section 3.5 on market development.

*Paper.* The paper grades in Table 3-3 show substantial potential for increased recovery relative to national and Portland recovery rates. All three grades are traded on international markets, and all three are projected to have good market capacity in the foreseeable future. OCC, the key indicator for commercial recycling, is expected in the near term to have a reliable market, though prices will fluctuate as they do for all commodities. However, a major barrier is that fiber prices at the dock are \$20 less per ton than West Coast shippers receive.

*Plastics.* Plastic bottle recovery has room to grow in Hawai'i, though as seen in Table 3-1, the commercial sector is not a major generator.

*Organics.* Green waste recovery also has room to grow, though the commercial sector is not a major generator. Food waste is a major area for recovery from the commercial sector.

*Ferrous Metals.* Ferrous is not included in the Table 3-4 due to methodological difficulties of deriving good numbers. Different combinations of white goods, auto hulks, and food and beverage cans are used in different calculations. However, due to recovery at H-POWER, ferrous has a high recovery rate on O'ahu. Recovery of tinned cans and ferrous scrap has potential.

**Recovery in the City and County of Honolulu.** Table 3-4 depicts the recovery rate for key materials from the C&C waste stream. A recent waste composition analysis has been performed for Honolulu that makes it possible to assess the recovery rates for individual materials.

**Table 3-4:  
Honolulu Recovery Rates for Key Materials (1999)**

| Material         | Honolulu Recovery<br>(percent) |
|------------------|--------------------------------|
| OCC              | 36                             |
| ONP              | 28                             |
| OP/MWP           | 11                             |
| Glass Containers | 44                             |
| Ferrous Metal    | 83                             |
| Plastic Bottles  | 1                              |
| Food Waste       | 11                             |
| Green Waste      | 18                             |

Some materials, such as glass and ferrous metal, demonstrate a very high rate of recovery in Honolulu. This is most likely due to the presence of mandatory glass recycling and the glass ADF, and of the recovery of ferrous metal at H-POWER. Other materials show a substantially lower rate of recovery.

For the C&C, the chief materials from the commercial sector for which recovery could be prioritized are paper grades and food waste. Honolulu's recovery of OCC is 54 percent of the national rate, and 49 percent of the Portland, Oregon, rate, indicating substantial room for growth.

**Recovery on Neighbor Islands.** On the neighbor islands, it is difficult to calculate recovery rates on a material basis due to the lack of recent waste composition studies. In addition, depicting recovery rates by material type according to the assumptions used for the C&C could be deceptive.

The amount of material recovery varies substantially from county to county, as demonstrated in the recovery statistics presented in Chapter 2. County issues on recovery for specific commodities should be addressed by individual county implementation plans.

**Verifying OCC Recovery.** The low rate of OCC recovery shown in data appears to be at odds with observations of recyclers that most of their customers are recycling OCC. The following factors could underlie the misleading numbers:

- Not all recycled OCC has been accounted for.
- Residential OCC is recycled at a lower rate due to the absence of curbside programs.

*Could significant amounts of OCC not be accounted for in the recovery statistics?* Some larger retail stores, such as Safeway, Kmart, and Wal-Mart, ship OCC directly back to mainland distribution centers. To date, this material has not been captured in the recovery data. To do this, it will require special reporting and the estimation of material weights recycled by individual stores.

*Does the amount not accounted for change the potential for recovery of OCC?* A way to answer this question is to look at the relative amounts of OCC disposed and recycled on a per person basis in Hawai'i and in the nation. Table 3-5 compares the tons per year of OCC that is disposed, recycled and generated in the C&C and the nation.

**Table 3-5:  
Comparison of Honolulu and  
National OCC Disposal and Recovery**

|            | Honolulu                  |                                  | National Average          |                                  |
|------------|---------------------------|----------------------------------|---------------------------|----------------------------------|
|            | Weight<br>(thousand tons) | Generation<br>(tons/person/year) | Weight<br>(thousand tons) | Generation<br>(tons/person/year) |
| Disposed   | 55,147                    | 0.062                            | 9,680                     | 0.036                            |
| Recovered  | 32,703                    | 0.037                            | 19,340                    | 0.073                            |
| Generation | 87,850                    | 0.100                            | 29,020                    | 0.109                            |

Table 3-5 shows that total OCC generation per person in Honolulu is very close to the national average. This indicates that although some recycled OCC may be missed in surveys, it does not appear likely that significant amounts are missed. However, it is striking that disposed tons per person are high and recovered tons per person are low, by a 60/40 to 40/60 percent reversal. This clearly indicates that there is a substantial opportunity to divert a greater amount of OCC.

If the generated OCC from the residential sector is taken out of the calculation, is there still substantial material to be recovered from the commercial sector? Since Honolulu does not have curbside collection, and many mainland communities do, it could be that unrecovered residential OCC is skewing these numbers.

According to the C&C waste composition study, commercial disposed waste includes 39,802 tons of OCC. Even if all OCC recovered from Honolulu is assumed to be from the commercial sector, then the recovery rate for commercial OCC is still only 45 percent. Since the national recovery rate is 64 percent and the great majority of this is from the commercial sector, it is concluded that there is substantial potential for increased recovery of commercially generated OCC in Honolulu, and likewise on the neighbor islands.

**Conclusions.** The recovery numbers in Tables 3-2 through 3-5 include both residential and commercial recycling. In order to better understand the status of commercial recycling in Hawai'i, the recovery of OCC was examined more closely. OCC is a good indicator of the overall status of waste diversion from the commercial sector because, as noted above, 80 percent of the

OCC is generated by the commercial sector. Also, due to its high value and ease of separation, it is one of the materials most readily recycled.

The increased recovery potential for OCC can be extrapolated to other commercially generated recyclables, especially OP. The numbers for OP are less precise because grade definitions differ substantially between studies. However, as indicated in Table 3-3, the recovery rate in Honolulu would have to double to approach national rates, in spite of the presence of mandatory OP recycling for some generators.

*Priority Materials.* The priority materials targeted to increase commercial recycling are selected based on Table 3-1 and the analysis of existing recovery shown in Tables 3-2 and 3-3. The primary criteria are as follows:

- The existence of significant quantities that could be captured from the commercial sector.
- The demonstration that recovery, at a substantially higher rate than is now occurring in Hawai'i, is feasible based on the experience of other communities.

Based on these criteria the primary target materials for increasing commercial recycling in Hawai'i are OCC, OP, MWP, and food waste. In addition, materials generated by the commercial sector in lesser quantities, (e.g., ONP, plastic bottles, and green waste) and materials that currently have a high rate of recovery (e.g., glass containers) should not be overlooked. However, they need not be the primary focus of a commercial recycling program.

*Will there be a market for increased recovery of paper grades from Hawai'i?* International recycled paper markets, as discussed in the Section 3.5 on market development, are expected to support reasonable growth in material supply into the future. The worldwide economics for recycling OCC, OP and even MWP are expected to remain strong in the near and midterm. No one can predict the long term, but with mill expansion occurring in East Asia, there are no obvious reasons to be concerned about a long-term market collapse.

*Will there be a market for increased food waste recovery from Hawai'i?* Since recovered organic materials are not traded long distances, this depends on the expansion of local markets.

With the exception of glass and ferrous metal, which are recovered at very high rates in Hawai'i, an effort to increase commercial recycling within practical economic realities should be a high priority for the state and the counties. If the public sector can address some of the barriers against recycling in Hawai'i, it should be feasible to substantially increase commercial recycling.

*Priority Generators.* The primary generator types to target for increased commercial recycling should include the following:

- Small and medium size businesses, which represent most of the trash generation capacity and tend to recycle at a lower rate due to economic constraints.
- Larger businesses that are more likely to be recycling the commonly recycled materials, but which could increase their capture rate (i.e., the percentage of a given recyclable material from a single generator that is actually recycled versus thrown in the trash) and could recycle additional types of materials. These rates could be improved through aggressive promotion, education and business assistance programs.

### **3.3.2.5 Barriers to Increased Commercial Recycling**

There are a number of reasons that recycling is lower in Hawai'i than in other U.S. communities. These include many that are unique to Hawai'i relative to mainland communities, as follows:

- The cost of collection and processing exceeds market prices.
- The cost of collection and processing for recycling exceeds disposal costs.
- The Hawai'i economy was persistently depressed during the 1990s.
- A lack of manufacturing infrastructure.
- Market prices fluctuate making revenues unpredictable.
- The high cost to transport recyclables between the islands.
- Generators' lack of motivation to recycle.
- Space limitations in many commercial establishments, partly due to high real estate costs.

Some of these barriers, such as a depressed statewide economy, are beyond the scope of this Plan. Others may offer insight into opportunities for improvement.

A small, informal poll of Hawai'i's recycling processors identified three barriers that most impact recycling rates:

1. Poor economics of recycling (e.g., market prices and disposal costs).
2. High costs of transportation.
3. Fluctuating market prices.

When asked which barriers they thought could be addressed most effectively through state action, local recyclers identified the following three:

1. High cost of transportation.
2. Poor economics of recycling.
3. Generators' lack of motivation to recycle.

The first priority for state action, the high cost of transportation, affects all islands since the cost of transportation to East Asian markets from Honolulu is approximately \$20 per ton more than from the U.S. West Coast. This is due to higher rates charged by the shipping companies, and the lack of economies of scale due to smaller overall volumes. The recent acquisition of the international liner business of Sea-Land Service, which ships recyclable materials from Hawai'i to East Asia, by the A.P. Møller-Maersk Line, a Danish shipping company, has created additional uncertainty in shipping rates for fiber. In mid-December, 1999, they suspended shipping of waste paper from Hawai'i to the East Asia due to cost considerations, then resumed shipping at a higher price. Discussions are ongoing between the state and Møller-Maersk Line.

The neighbor islands have an added cost of transporting materials to Honolulu before shipping to out of state markets. Interisland barge shipping is regulated by the Hawaii Public Utilities Commission.

An additional barrier to increased commercial sector recycling in Hawai'i is the lack of curbside collection systems. In all states except Hawai'i, curbside collection of recyclables has been

implemented for residents of major urban areas. Residential recycling programs have the following two effects that contribute to greater commercial recycling:

- They build an ethic of recycling at home that translates into an expectation that recycling opportunities will also be provided at work.
- They build and support a processing infrastructure that can incorporate commercial recyclables.

A major problem for private recyclers is that they need a larger and more consistent flow of materials to help pay off their capital investments from land, facilities, and equipment. These investments tend to be more costly in Hawai'i, as do operating costs, and only a strong supply of material can help make recycling businesses sustainable.

### **3.3.2.6 Model Commercial Recycling Initiatives in Hawai'i**

Two Hawai'i initiatives were selected for models in this section because they provide excellent examples for programs recommended in this ISWM Plan: the C&C's Partnership for the Environment, and the Restaurant Waste Minimization Project. In addition, several other initiatives have been effectively implemented and contribute to the current rate of commercial recycling, including the following:

- Mandatory recycling ordinances for OP, glass containers, and food waste by the C&C.
- Funding of glass recovery through the state ADF.
- Disposal surcharge paid to recyclers by Hawai'i County, recycling grants in Maui County, and recycling contracts in Kaua'i County.

**The C&C of Honolulu's Partnership for the Environment.** The Partnership for the Environment is an initiative to increase recycling in the commercial sector. The C&C has prioritized commercial recycling due to the substantial percentage of recyclable materials available in the commercial waste stream. The Partnership program is a complement to the mandatory commercial recycling ordinances adopted by the C&C. The Partnership is educational and outreach programs are described in greater detail in Section 3.6, Public Education.

The Partnership provides services to commercial businesses that are a good model for other counties. The Partnership has emphasized that companies should examine their particular waste stream and identify the most feasibly recycled materials. They have published a "Business Guide to Waste Prevention, Recycling and Buying Recycled-Content Products" that includes guidance on performing waste audits. It includes the following information:

- Waste composition data for different types of businesses, developed by the EPA.
- Audit forms and checklists for assessing waste streams.
- Step-by-step guidelines on setting up a recycling program.
- A recycling action plan worksheet.
- Guidelines on waste prevention.

Business people learn best and most convincingly from their peers, and the Partnership has set up a peer-consulting program to help businesses set up successful programs. A list of "Peer Consultants" who can help a company establish a recycling program have been selected from active partnership members. They volunteer their time to help others.

The Partnership also actively promotes companies that have established good programs and tours of programs at their annual awards luncheon.

**Restaurant Waste Minimization Project.** Under a grant from the EPA, the DOH contracted with MRG in Maui County, and Recycle Hawaii in Hawai'i County, both non-profit advocacy and educational organizations, to undertake a project focused on waste management and pollution prevention in restaurants. This is an excellent model, though in an early stage, for targeted commercial sector waste reduction.

The Restaurant Waste Minimization Project initially included demonstration audits of two restaurants on Maui conducted by MRG and Harding Lawson Associates, a private consultant. Both restaurants were Denny's – in Lahaina and Kihei, Maui. The audits resulted in a total of 70 recommendations for the restaurants regarding pollution prevention and resource efficiency improvements that could result in substantial reduction of waste generation and energy use. These recommendations are summarized in the project report to DOH. Some of the key recommendations for waste reduction and recycling included, as follows:

- Changes in food handling and serving that would reduce the amount of discarded food waste.
- Separate collection of food waste for composting or delivery to pig farmers.
- OCC recycling to capture a higher percentage of the discarded OCC and reduce contamination.
- Purchase more commodities in bulk.

During follow up with the restaurants, it was determined that one restaurant implemented 15, and the other implemented 9 of the recommendations. However, some recommendations were only partially implemented and some were implemented differently than proposed. The recommendations that were implemented provided cost savings of approximately \$20,000 per year for the two restaurants.

The key reasons that recommendations were not more fully implemented include, as follows:

- Participation in the project was not a high priority for restaurant management and owners. The lack of time and interest expressed were major barriers.
- Frequent turnover in managers and employees interfered with implementation.

The results demonstrate the following important points about waste management audits:

- Third party auditors can provide some valuable ideas, based on the expertise they bring. However, auditors should be familiar with the particular waste and business management issues of the business sector they are auditing.
- Engagement and commitment of management and staff is needed to implement new ideas. Often, outside advice can be ignored if it does not seem practical, or if management or staff resists it.
- Cost savings, though often real, can be elusive to document. For example, disposal tip fee savings may accrue to the waste hauler rather than to the business, unless dumpster size or service frequency is modified. Often, cost savings are difficult to quantify and depend on the documentation for financial and utility records.



- Some recommendations require the cooperation of others outside of the business, such as mall or property managers. This can be difficult to obtain.

Following the audit project, training sessions were held for restaurant managers, two on Maui and two on the island of Hawai'i. In both cases the workshops included speakers and breakout sessions that covered the following range of topics:

- Regulatory issues, with a focus on wastewater.
- Integrated pest management methods.
- Waste reduction.
- Energy conservation.
- Local purchasing of recycled materials.

On Maui, the events were promoted to over 380 restaurants, with additional promotion in the newspaper and by the Maui Hotel Association. A total of 19 restaurant owners and managers attended the two sessions. On the island of Hawai'i, the two workshops were not as widely promoted, but attendance also reached 19 restaurant owners and managers.

Though the promotions were good and the topics were relevant, the workshop turnout was low. This may be due to timing, since workshops were conducted during peak tourist season. It also may be that small and medium-sized business managers are overworked. This makes it difficult to attract businesses to work on improvement opportunities even when the benefits may be clear.

Project organizers believed that additional workshops, contacts with individual businesses, and program assistance and audits are essential to build on the momentum of the projects. It would also be productive to expand this program to include similar business sectors.

### **3.3.2.7 Programs Previously Proposed for Hawai'i but Not Implemented**

To complete the examination of existing conditions, and build the appropriate basis for making program recommendations, it is important to identify a few programs that have been proposed, but which were not implemented for a variety of reasons.

**Legislatively Mandated Commercial Recycling.** In 1998, legislation was introduced, though not passed, to establish statewide mandatory recycling for commercially generated newspaper, office paper and corrugated cardboard. DOH testified for the legislation to include glass containers. This bill would have expanded the C&C mandate statewide. Recycling would be required only if it is proven to be cost-effective. It would also have avoided conflict with local ordinances, such as that of the C&C.

The mandatory recycling proposal is not promoted in this ISWM Plan. The requirements would not extend the current laws in Honolulu and would only apply to the neighbor islands. The legislation in each county, which could not be performed with current staff in OSWM or DOH environmental programs, would require the State DOH to enforce requirements on individual businesses. In conclusion, the strategy for working with businesses to increase recycling should be left to the counties, with state involvement on request.

**Establishment of a Recycling Park.** One of the major barriers to increased recycling, both of commercial recyclables and C&D debris, is the high cost of building and operating processing

capacity that is also conveniently located for customers. The high cost of land in Hawai'i is one critical factor. Draft legislation was introduced in 1997 to establish a Recycle Park on state land on Sand Island, O'ahu, or other appropriate industrial locale, including possibly a Brownfield's site (i.e., contaminated land that would be cleaned up during development). The State Recycle Park would allow the state to lease land at or below-market value to recycling companies. This could provide a major economic benefit to companies interested in setting up recycling systems.

This option is similar to an enterprise zone, which is a designated area set aside for specified types of industrial use. The state or local government is authorized to provide financial and tax advantages for companies that locate in enterprise zones.

The proposal was criticized because it would benefit only those companies that build new facilities within the Recycle Park, and could create unfair economic advantage for new companies relative to existing recycling operations. Existing operations have made an investment in their present sites and could lose that investment upon moving to a Recycle Park.

However, providing economic assistance for recycling operations should be a high priority for the state and counties, and this option should be further explored. Currently, most of the in-town recyclers are operating on public lands, either managed by the Department of Transportation (DOT), Harbors Division, or the Department of Land and Natural Resources (DLNR).

One option that would help existing recyclers move to a Recycle Park would be for the state to appraise improvements at existing sites and grant a credit toward deferment of rent in the Recycle Park for those improvements. This will enable recyclers to redo those improvements at a new facility in the Recycle Park.

A related issue is the uncertainty that some Honolulu recyclers face regarding future use of their land. Two of the major recyclers are on lands leased from the state that may be converted to other uses in the future. Part of this problem is that recycling is not defined as a maritime use, placing recyclers in a precarious position if a maritime use was in need of the land. This problem needs to be researched by the DOH, and could possibly be addressed through an administrative solution.

**Reduction of Transportation Costs.** Alternatives to reduce transportation costs for recycling have been pursued for several years. Shipping of scrap materials often costs nearly as much as the market value of the material. In addition, shipping costs are incurred between the islands and overseas, causing a doubling of costs at some locations.

Several initiatives have resulted in some reduction in interisland transport rates. More should be done to reduce both interisland and mainland and East Asian shipping rates. Hawai'i's recycling companies will be at a severe disadvantage to mainland recycling companies until the net rates for transportation to markets are comparable. This could be accomplished by taking advantage of scrap shipping rates that are offered for some materials and of empty containers that could transport recyclable materials on back hauls.

This is a critical and key issue for the economic viability of private recycling throughout Hawai'i, and is a high priority action item. Resolution of the issue will require careful analysis, leadership of state authorities, close communication and coordination with shipping companies and the State Public Utilities Commission (PUC), and persistence by state staff. Action is currently underway on this issue.

### 3.3.3 Program Models and Approaches

Commercial recycling programs come in many forms. Section 3.3.3.1 provides an overview of programs that have been implemented around the country, identifying elements that are appropriate for Hawai‘i. The following sections provide greater detail on four programs that have program elements that should be considered for implementation in Hawai‘i.

#### 3.3.3.1 Overview of Commercial Recycling Programs Nationally

How to increase commercial recycling is a particular dilemma for states and counties due the prevailing structure of waste collection for the commercial sector. Public agencies typically control residential waste services through one of several means: public collection systems, contracts with private haulers, public franchises with private haulers, or regulations affecting rates and services. These controls can directly and easily be extended into the recycling arena.

Commercial waste management is more typically a private arrangement between hauler and generator. Commercial waste collection rates are set competitively and vary from generator-to-generator. There are substantial differences in service between generators, ranging from small 3 cubic yard “front load” containers to 40 cubic yard roll off compactors. Likewise commercial recycling service is difficult to standardize because the types and amounts of recyclables vary greatly from generator to generator.

**Commercial Recovery Rates.** A certain level of recycling has arisen in the commercial sector due to pure economics without governmental intervention. Of the primary commercial recyclables, OCC and high grade office paper would be recycled to a certain degree, even if government played no role. Under a totally free-market system, recycling could be expected to recover 10 to 15 percent or more of commercial waste. This number may be lower in Hawai‘i due to the economic disadvantages of recycling on isolated islands.

Commercial recycling recovery rates have in recent years been rising on their own, due to several factors. When curbside residential recycling is provided in a community, people begin to ask for recycling at work. Today, two-thirds of communities with curbside programs now have government-sponsored commercial recycling programs. In addition, government has begun to play a direct role in commercial recycling.

One economic barrier that commercial recycling faces, which residential recycling does not, is routing inefficiencies. With different hauling services (e.g., different sizes and types of containers, or different frequency of collection) for different businesses in one neighborhood, it is difficult to establish efficient routes. However, routing efficiency is essential to make recycling cost effective in both urban and rural areas.

**Types of Commercial Recycling Programs.** Commercial recycling programs fall into two categories—mandatory and voluntary.

*Mandatory Programs.* These often include state or local laws that, as follows:

- Require generators to source separate materials for recycling.
- Ban the disposal of specific materials, thus requiring haulers to assure that they are kept out of the trash.

The C&C mandatory commercial recycling program includes each of these. Glass containers, office paper and food waste must be recycled by generators, and OCC is banned (up to 10 percent allowed) in loads of trash.

A third model of mandatory commercial recycling is when a community directly specifies the services that a hauler provides its customer. In this model, the providing of recycling service can be a requirement of the authorization to provide trash service.

Mandatory recycling has been implemented in Rhode Island, and by local governments in New York City, Philadelphia, Chicago, Miami/Dade County, and Portland.

*Voluntary Programs.* Voluntary or cooperative programs can include a number of different elements, such as promotion and education, financial incentives, free provision of technical services, or generator requirements. An example of the latter is Newport News, Virginia, and a voluntary commercial recycling program that requires each business to submit a recycling plan each year to report on their recycling activities.

When hauling rates are not controlled by a municipality, it is difficult in a voluntary program to provide a direct financial incentive to generators. San Jose, California, however, has used their franchise fees structure to create incentives for haulers to provide recycling services. This provides an indirect incentive for the customer to recycle. The City waives two fees; a franchise fee and a special fee to support recycling programs. Together, these amount to a substantial charge for each cubic yard of garbage. This makes the collection of source-separated materials considerably cheaper than garbage.

In addition, San Jose, California, offers free waste audit and consulting services, provided by City staff, to businesses who request it. After initially receiving a lukewarm response from businesses when they did not actively promote the service, they are starting to proactively target specific business sectors with outreach programs. Spokane, Washington, also offers free waste audits, and they provide recycling containers free of charge. Outreach and education have been implemented in many different forms, perhaps most comprehensively in the Los Angeles, California, program (described below).

The City of San Francisco, California, is another model for a voluntary program. They have a unique relationship with commercial haulers. Only two companies are granted permits to collect commercial trash within the city: Sunset Scavenger and Golden Gate Disposal. Neither their rates nor services are regulated; only their right to do business as commercial haulers. Because of the strong commitment to recycling by the City of San Francisco, backed up by California's strong state recycling laws, the two haulers have voluntarily instituted a number of recycling programs. These include source separated recycling, blue bag programs (in which recyclables are put into a blue bag and collected together with garbage for separation at the transfer station), wet/dry collection systems (in which all dry wastes and wet wastes are collected separately and processed for recovery), and food waste collection.

In addition, Sunset Scavenger offers a program for small and medium businesses whose source separated paper grades and glass containers are collected at no charge. Other materials can be recycled, but for a charge. Totes or other collection equipment are provided, and the company uses their residential curbside collection vehicles for small businesses. For large businesses, the company offers free recycling collection service for white office paper, OCC and bottles and cans. Essentially, Sunset Scavenger has integrated the cost of recycling collection, especially for

small businesses, into their overall trash collection rates. This eliminates the financial disincentive for small businesses that want to recycle.

**Challenging Businesses to Participate.** An important element of successful commercial recycling is getting businesses to take recycling seriously. Often recycling can save them money, but they still do not participate because it is not a high enough priority among the many responsibilities of business owners and managers. This impediment applies both to voluntary and mandatory programs. Even mandatory programs where the threat of enforcement is not severe languish due to non-participation. This may be applicable to the C&C office paper-recycling mandate.

Two of the model programs described below, in Los Angeles, California, and Portland, Oregon, are included because of their unique approach to capturing the attention and cooperation of the commercial sector. The third, for the State of Oregon, uses a unique method to help make recycling more economically advantageous.

### **3.3.3.2 Los Angeles Targeted Commercial Sector Outreach Program**

This case study examines the City of Los Angeles's approach to commercial recycling and the results achieved. This program approach should be considered in Hawai'i, not because Los Angeles is a comparable community, but because the approach has strong aspects.

**Background.** The State of California adopted Assembly Bill 939 (AB 939) that required each city and county to develop a plan to achieve 25 percent recycling by 1995 and 50 percent recycling by 2000. In the early 1990s, local governments throughout the state were engaged in developing source reduction and recycling elements to achieve the mandated goals. The City of Los Angeles adopted its two-part plan in 1991: one part for the residential sector, that included curbside recycling, and one part for the commercial sector.

In the early 1990s, the recycling rate for the over 140,000 businesses was 20 percent. The City does not control hauling or recycling services for businesses. Therefore, rather than focus on the hauling community, the City chose to develop a program that encouraged recycling by generators. That program is currently managed by the Solid Resources City-Wide Recycling Division of the Bureau of Sanitation, Department of Public Works.

**Targeted Generator Outreach Program.** Los Angeles' program includes an aggressive outreach to targeted generator groups (e.g., the retail sector, office buildings, and hotels). The approach was called a "City/Private Sector Partnership." It emphasized flexibility so that individual generators could chose their own methods of recycling. The program included several elements that were implemented concurrently, as follows:

- Selection of Target Sectors – Based on waste composition studies for specific types of commercial generators, the City identified business sectors with the greatest potential for diversion. The City's logic was that since 20 percent of the businesses generate 80 percent of the waste, the emphasis should be on that 20 percent.
- Target Sector Working Groups – Representatives of several target sectors were convened to identify generator-specific diversion goals and help define model programs. Model programs identified the most feasible materials to recycle from the sector, operational methods to separate and capture materials, and collection and processing options. Working groups required a substantial amount of support from City staff. Since the initial

effort, the working groups have generally not continued. However, certain individuals from those groups remained active as leaders for recycling within their sectors.

- Promotion and Education – The City developed over 60 publications, many of them targeted with specific information regarding recycling programs for specific generator sectors. The program also included training programs using video and audiotapes, and an information hotline. The publications addressed such important issues as space allocation for recycling, how to contract for recycling services, less wasteful packaging options, and buy recycled options.
- Business Sector Workshops – Initially, the City held workshops with each sector to provide information and facilitate the interchange of ideas between business peers. These were effective, but due to costs and “workshop fatigue,” they have not continued.
- Waste Audits – The City provided waste audits for selected businesses. However, this has been a minimal effort due to staff constraints.

An initial sector that the program targeted was City-operated facilities. These facilities generate over 12 percent of the disposed waste stream, and it was recognized that if they recycled, they would help support the development of the recycling infrastructure.

The program continued its emphasis on specific generating sectors and selects two to three sectors a year to target. In 1995, a re-examination of the plan adopted priorities for the following sectors:

- Office buildings.
- Schools and universities.
- Retail establishments.
- Construction and demolition debris generators.
- Multifamily dwelling units.

The multifamily buildings sector has been particularly difficult to motivate. The City Council persisted in its emphasis on that sector and is now actively considering franchise fees, among other methods, to stimulate recycling.

The City also adopted a contingency plan that, if program objectives for diversion were not being met, would require the following:

- Business waste reduction/recycling plans.
- Mandatory source separation.
- Ban on disposal of designated recyclables.

None of these contingency methods have been implemented, though the lack of success with multifamily recycling may lead the City to consider them.

**Results.** The recycling rate from the commercial sector reached 46 percent in 1998 and is expected to exceed 50 percent in 1999. The City set goals to achieve 60 percent by 2010 and 70 percent by 2020. City staff believe that the program approach has worked well, though staffing has been inadequate for the outreach activities.

### **3.3.3.3 Benchmarking of Best Business Practices**

It is possible that commercial recycling programs that rely on business partnerships could benefit from benchmarking methods. Benchmarking has been widely used to improve all kinds of business practices. The Global Environmental Management Initiative (GEMI)<sup>18</sup> model program described the benchmarking methodology for environmental program improvement. This model could complement a targeted commercial sector outreach program.

GEMI is a group of 27 companies dedicated to fostering worldwide environmental excellence by business. GEMI promotes environmental business ethics; provides examples, research and leadership; and promotes dialogue between companies.

*Benchmarking: The Primer*, produced by GEMI,<sup>19</sup> outlines the methodology for a business to create an environmental benchmarking structure for itself. Benchmarking is viewed as internal goal setting for a Plan-Do-Check-Act performance improvement process.

The improvement process creates detailed information on the performance of three to six “best-in-class” firms for a selected aspect of the business. These firms are termed “benchmarking partners.” The firms are selected as most comparable to the home company, and the environmental factors studied are targeted for relevance to the home company’s performance improvement goals.

The methodology follows a nine-step process:

1. Project Conception – Obtain management commitment, establish scope, estimate resource requirements, set schedule, form the benchmarking team, and develop project specifics.
2. Planning – Develop project plan and share with management.
3. Preliminary Data Collection – Develop best-in-class (six to eight) selection criteria, develop data collection forms, establish techniques and sources, collect preliminary data from secondary sources (focusing on eight to twelve most promising candidates), and develop baseline of your home company’s current process.
4. Best-In-Class Selection – Review and select benchmarking partners and review and refine question set.
5. Best-In-Class Data Collection – Schedule and prepare data collection sessions, conduct site visits, and prepare site visit report.
6. Assessment – Analyze data, define elements of best-in-class model, define home company’s gaps, and develop improvement recommendations.
7. Implementation Planning – Develop operational plans and change strategies.
8. Implementation – Manage and monitor the change process.
9. Recalibration – Check and adjust benchmarking findings.

This process is used commonly for business practices and could be used to define best practices for commercial recycling within specific business sectors. It would be especially appropriate for the visitor industry. There exists substantial information for hotel and restaurant environmental

<sup>18</sup> GEMI. 1994. *Benchmarking: The Primer, Benchmarking for Continuous Environmental Improvement*. GEMI, 818 Connecticut Ave. N.W., 2nd Floor, Washington, D.C. 20006, Tel: (202) 296-7449.

<sup>19</sup> Ibid.

practices, including case studies that could provide the basis for benchmarking. A model waste management program for the Hawai'i visitor industry could be defined based on benchmarking to best practices comparable to the best mainland or European models.

#### **3.3.3.4 City of Portland's Commercial Recycling Mandate**

The City of Portland has a successful commercial recycling program. The recovery rate in Portland has been steadily increasing, and in 1999 it exceeded 50 percent for commercial waste. This section describes the primary features of the program, and on the process by which the City developed it. The success of the program and acceptance by the business community are directly related to how the program was developed.

The following two important points are demonstrated by this program:

1. That a well-conceived and participatory process can convene diverse sectors to examine alternatives and make difficult choices.
2. What the essential elements of such a process might be.

**Background.** The Portland Bureau of Environmental Services administers the commercial recycling program. Recycling is mandatory for all businesses within the City. All businesses must separate recyclable materials from mixed waste, and recycle a minimum of 50 percent of their waste, within practical limits. Multifamily complexes are also required to provide recycling service for their residents.

Every business must complete a Recycling Plan on a City-provided form. This form lists the materials that will be recycled and how they will be collected. The forms are returned to the waste hauler, and then to the City. In practice, it is frequently the waste hauler who fills out the form. The property owner is also required to provide clearly marked and convenient recycling containers and storage space. The City performs inspections of sites to assure that the recycling requirements are adhered to.

**Design Process.** Portland's design and implementation of this program has been essential to its success. The City had established a successful residential recycling program that provided weekly curbside collection for a wide range of recyclable materials. Private haulers provide service, but implementation occurs through City franchised residential trash and recycling collection.

In 1993, the City turned to the commercial sector, which recycled much less than the residential sector. Residential recycling at the time was recovering 41 percent of their trash, while commercial recycling was recovering only 32 percent. A study showed that although 70 percent of the businesses recycled, only 19 percent recycled more than two materials. Participation (the percentage of businesses that recycle) was strong, but capture (the percentages of recyclable material from any one participating business) was low.

Price competitiveness within the hauling community was a major factor identified as hindering recycling. Few collectors were willing to spend additional time and money to offer enhanced recycling. It was recognized that offering garbage-plus-recycling often cost the customer more than garbage only collection, especially for smaller businesses. Though the haulers could not charge more for garbage only collection (see Section 3.3.3.5), they also could not encourage their customers to recycle.



The business community, haulers and citizens were engaged during a 2-year period in a participative planning process to design the City's program. First, a technical report, which included examination of local conditions and model case studies, was produced. Guiding principles for the process were then defined, such as businesses' and haulers' support for the solution, and cost minimization.

The City of Portland made it clear that it was serious about achieving its goals, and that, if necessary, it was prepared to regulate commercial trash collection as it had done for residential service. Therefore, the selected program must promise real success.

City staff made presentations at business group and neighborhood association meetings. A fifteen-member workgroup was assembled that included representatives of businesses, haulers and environmental groups. The workgroup was assigned alternatives evaluation and plan selection, and was responsible to present the plan to the City Council. The workgroup identified the following 15 alternatives:

1. Increase education and promotional efforts.
2. Franchise garbage and recycling collection.
3. Regulate multifamily rates.
4. Prohibit disposal of some recyclables.
5. Bid out garbage and recycling services in specific zones.
6. Regulate garbage rates only.
7. Regulate recycling rates only.
8. Regulate garbage and recycling rates.
9. Require recycling.
10. Include small businesses in existing residential franchises.
11. Create non-exclusive franchises.
12. Require haulers to publish rates.
13. Contract for recycling collection.
14. Create weight-based rates for garbage collection.
15. Do nothing.

The workgroup evaluated and scored the alternatives according to the following criteria:

- Will the alternative increase the amount of material recycled?
- Will the alternative increase recycling for the generator segment that needs it most?
- How difficult will the alternative be to implement, administer and enforce?

The workgroup decided that increased education and promotional efforts would be part of any plan. They then eliminated alternatives 12, 13, 14, and 15; scored the remaining alternatives; selected a shortlist; and conducted a second round of public outreach presentations. Meanwhile, a consulting study was performed on the cost of commercial trash service, which found that a broad range of prices were charged. For example, the price charged for a single 1.5 cubic yard container ranged from \$38 to \$300 per month. The study also calculated the actual cost of providing the service. City staff used this data to compare alternatives and prepare recommendations.

After 19 months, the workgroup adopted a recommended program similar to the final program as described above. The mandatory recycling ordinance became effective in January 1996. The City then formed an implementation team consisting of 15 individuals with similar interests as those who served on the workgroup.

**Outreach, Education, Promotion, and Assistance Program.** This effort is considered the hallmark of the program. Enforcement was a relatively minor aspect of the program. The program included a general brochure, business sector-specific brochures, peer match program, teams of canvassers, and City-supplied recycling containers.

The City contracts with Portland State University (PSU) to assist with outreach. Student interns provide a variety of services to support the commercial recycling mandate, including research, waste audits, surveys, and data collection.

*Waste Audits.* The PSU business waste audit program follows a format that includes initial contact, first visit, and follow-up contact. Participating businesses are either referred or respond to a mailing from PSU staff. The staff makes initial contact to establish how they can be of assistance and the business' level of interest. During the scheduled first visit, PSU conducts a comprehensive walk through audit to establish the following baseline information:

- Current recycling activity and garbage contents.
- By-products produced, including any unusual specialty waste materials.
- The hauler, service level, and pickup schedule.
- The business' needs as viewed by the business.
- Waste prevention opportunities.

PSU staff send a follow-up letter to the business that explains the baseline information obtained during the walk-through, and current strengths and opportunities for increased recycling and waste prevention. Other services are offered such as redesigning the existing recycling system, acting as a liaison with the hauler, obtaining appropriate containers, training employees, developing flyers or posters for the office, and conducting a waste sort. After sending the follow-up letter, PSU staff call the business to see how they want to proceed. Typically, they find that smaller businesses want to meet ordinance requirements, while larger businesses see greater potential for rewards.

Due to this extensive outreach program and a strong residential curbside program, the recycling awareness is high among the business community in Portland. A recent survey performed for the Metropolitan Service District found that, "The majority of business executives surveyed had an interest in and an awareness of recycling and waste prevention."<sup>20</sup>

The City does not overlook enforcement. City staff randomly visits hauling companies to check records and ensure they have recycling plans on file for their customers. They also visit businesses to check what materials are being recycled and disposed. The City will send a letter to a business if they are not in compliance. City staff have found high levels of compliance.

### **3.3.3.5 Oregon's Opportunity to Recycle Act**

The approach by the State of Oregon to improve recycling has some valuable elements that should be considered in Hawai'i. This section provides a brief overview of the Oregon recycling statute and explores relevant elements of the Recycle Act in greater detail.

This program has been effective and has established some important principles that may be relevant for Hawai'i. It is widely supported by the recycling industry, waste haulers, local

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<sup>20</sup> Gwenn A. Baldwin. January 19, 1999. *Business Waste Prevention Study 1998*.

governments and the public. Oregon's overall recovery rate in 1997 was 36 percent, with over 50 percent achieved in the City of Portland.

The core of the Oregon approach is that waste generators shall be assured the Opportunity to Recycle if they chose to do so, rather than establishing mandates, bans or regulations.

The law is specific in defining the standards for local government implementation. The Oregon law includes the following key elements:

- Definition of the Opportunity to Recycle (see below).
- Statewide recycling goals and required recovery rates by region.
- Opportunity to Recycle program elements (see below).
- Limitation on amount charged for source separated recycling (see below).
- Requirements for a statewide ISWM Plan and solid waste composition study.
- Requirements for the state to provide education, promotion, and technical assistance.
- Oregon Department of Environmental Quality (DEQ) authority to mandate source separation by generators if participation rates do not achieve the state's recycling goals.
- Recycled content requirements for newsprint, directories, and glass containers.
- Priority for use of compost by state agencies.
- Requirement for plastics recycling.
- Beverage container deposit law.

**Definition of the Opportunity to Recycle.** The Opportunity to Recycle means that a city or county responsible for solid waste management must assure that residents and businesses have convenient recycling services. This is defined specifically that communities must, as follows:

- Provide collection service in cities over 4,000 population and drop off service in cities under 4,000 population.
- Meet the recycling goals defined in the law.
- Provide public education and promotion to encourage source separation.

**Background.** The Oregon law further specifies recycling services that communities must provide in order to meet the Opportunity to Recycle requirement. Requirements differ for cities of different sizes, with more elements required for larger cities. Different regions of the state have different diversion goals, depending on their proximity to markets and urban/rural character. The full list of requirements includes, as follows:

- Curbside collection from residents.
- Provision of a recycling container.
- Education and promotion.
- Multifamily recycling.
- Yard debris collection.
- Commercial recycling program, including:

- Onsite collection.
- Education and promotion.
- Waste assessments.
- Recognition programs.
- A 50 percent goal for each generator.
- Expanded deposits.
- Residential incentive collection rates.
- Food and other compostable waste collection.

**Integrated Pricing for Trash and Recycling Service.** One key element of the Oregon law establishes that generators will not pay more if they choose to recycle. It establishes that pricing for trash collection and the Opportunity to Recycle shall be integrated. Oregon Revised Statutes 459A.070 states, as follows:

*“Limitation on amount charged person who source separates recyclable material.  
(1) A collection service or disposal site may charge a person who source separates recyclable material and makes it available for reuse or recycling less, but not more, for collection and disposal of solid waste and collection of recyclable material than the collection service charges a person who does not source separate recyclable materials.*

*“(2) A collection service or disposal site may charge a person who does not have solid waste collection service but who source separates recyclable material and makes the material available for reuse and recycling, for the cost of providing that service. In no case shall the charge be greater than the charge to collect or dispose of the material as solid waste.”*

The net effect of this provision, as it relates to a business (the definition of “person” includes business), is that a hauler is responsible to provide collection service if a customer wants to recycle, and that the hauler shall not charge more if the business source separates materials for recycling. The DEQ uses an economic and market availability test for designating which materials are covered by this provision, and it applies to urban areas only.

In essence, trash haulers must set their trash hauling prices to cover extra costs they might incur in recycling. At first, this causes some pricing uncertainty, but over time it balances out. The law has been accepted by the hauling and business community, has been widely implemented, and never challenged.

### **3.3.4 Observations and Analysis**

#### **3.3.4.1 Background and Action Objectives**

In this section, the existing conditions of commercial recycling in Hawai‘i are analyzed. It is apparent that Hawai‘i has a substantial opportunity to grow and develop commercial recycling beyond its current rate. The recycling system in Hawai‘i is under-utilized and it should be a high priority to improve. This conclusion is supported by the diversion numbers presented in Section 3.3.2.4, and the analysis of diversion levels in each county in Section 3.3.2.3. The potential for

improvement is high in all four counties, and particularly for Maui, Kaua'i, and Hawai'i Counties.

There is no single solution that characterizes a successful commercial recycling program. However, successful programs have the following characteristics:

1. They require the dedicated, consistent, and coordinated commitment of a number of individuals from state agencies, the counties, private not-for-profit organizations, waste generators, and the waste management industry.
2. They necessitate that the state and the counties work as a team in leading the effort — by setting rules, consistently promoting and enforcing those rules, and providing model examples.
3. They entail diverse efforts — mandates and bans, promotional and educational programs, financial incentives, and models and examples.

The key question for this Plan Revision is the state's role in commercial recycling. The counties are primarily responsible for commercial recycling, and different counties have adopted different approaches. However, none of the county programs have achieved an optimal level of recycling that results in the amount of diversion that is feasible when compared to communities outside of Hawai'i. Therefore, an important question is, "What can the state do to support the counties in improving commercial recycling?"

The following materials are identified as initial priorities to improve commercial recycling rates:

- OCC.
- OP.
- MWP.

Other materials, such as glass containers and ferrous metals, have achieved good recycling rates in Hawai'i, though improvement is always possible.

Sectors with the greatest opportunity for increased recycling include, as follows:

- Small and medium size businesses that tend to recycle at a lesser rate than larger businesses.
- Larger businesses that are recycling commonly recycled materials, but that could increase the capture rate of those materials, and could recycle additional types of materials.

Following are some suggested infrastructure elements that exist in the strongest commercial recycling systems. These would need to be available to businesses in Hawai'i in order to more fully develop commercial recycling systems in the islands:

- Greater interest and participation by businesses resulting in larger volumes of recyclable materials.
- Greater capacity for collection and processing of source separated recyclables.
- An active mosquito fleet and buy-back centers to service the fleet, to capture recyclables from small and medium sized businesses.
- High-grade commercial waste processing capacity for recovery of corrugated cardboard and other recyclables from mixed commercial waste.

- An integrated trash and recycling system to assure that waste haulers offer recycling options to their customers, and that businesses gain financial benefit from reduction of waste.

Based on the priorities identified by the SWAC, on the input from local recyclers, and on an analysis of why more recycling is not occurring, the following barriers to increased recycling were identified:

1. Added cost of transport.
2. Poor economics of recycling.
3. Lack of motivation to recycle by generators.

**Action Objectives for Commercial Recycling.** The following objectives could guide action to increase commercial recycling:

1. To create an ethic of recycling within the business community.
2. To ensure that economically beneficial or neutral recycling service options are available to businesses.
3. To help reduce the economic disadvantage of local recycling businesses relative to their mainland counterparts.
4. To set goals, implement programs and monitor progress, with the option of increasing regulatory actions if goals are not met.

#### **3.3.4.2 Targeted Business Sector Outreach**

Business owners and managers are wary regarding changes in business practices, unless they perceive a corresponding benefit. They respond first to bottom line benefits, for example cost avoidance. However, if an ethic is created within the business community, business people will respond to social responsibility and environmental stewardship motivations. An important challenge to state and local governments is to build the ethic of waste reduction and recycling in the business community.

Business owners and managers do not respond well to generic appeals. They respond best if substantive information is provided that relates directly to their business, especially if a peer provides that information. The C&C Partnership for Environment and the Restaurant Waste Minimization Project provide excellent examples of how that can be accomplished. The City of Los Angeles program also provides an excellent framework for an outreach program to commercial businesses.

By providing information that is specific for different business sectors that is presented by peers, a recycling ethic can be built over time. This will require the concerted and coordinated efforts of the state and each county. Several tools have been demonstrated to be effective in these efforts, as follows:

- Waste audits, such as those provided free of charge to businesses by the City of Portland, San Jose, and Los Angeles.
- Benchmarking such as that developed by GEMI to challenge and instruct businesses in recycling opportunities.
- Sector workshops such as those provided for restaurants in Maui and Hawai'i Counties.

- Promotion and education campaigns targeted at specific business sectors, including the presentation of case studies and model programs.

In order for the state to carry out a commercial recycling program, staff will need to be assigned and trained to provide substantive support and information to businesses. The state can also provide general training sessions and finance specialty training for individuals and businesses.

The strongest programs work with individual business sectors so that unique issues can be most effectively addressed. The first priority generator types can be selected based on opportunity and the amount of recyclable material available. The following sectors are among those that could be considered as first priorities for Hawai'i:

- Restaurants.
- Visitor industry.
- State agencies.
- Small and medium size retail establishments.
- Office buildings.
- Schools and universities.
- C&D debris generators (see Section 3.4).

#### **3.3.4.3 Opportunity to Recycle**

The state can ensure that recycling services are available to businesses that want them, and that those services are economically beneficial to the generator, or at least, economically neutral. The State of Oregon law establishes the policy that each generator should have the "Opportunity to Recycle", and defines the means for assuring this. Oregon also assures that businesses that recycle will not be charged more than businesses that do not.

The Oregon approach requires that trash and recycling services be integrated, with trash haulers holding the primary responsibility for assuring that customers' recycling needs are met. This can be accomplished through providing the service themselves, or by arranging with independent recyclers to provide that service, as is done on Maui.

Integrated trash and recycling in Hawai'i County is supported in part by the positive economics created by the diversion credit. This has caused some haulers to not charge for recycling service. This is also the case in San Francisco and Oregon, but without the benefit of a subsidy. In these cases the costs of recycling are incorporated into the overall cost of trash collection for all customers.

A commercial recycling system should assure that the following occur:

- Existing independent recyclers have a fair opportunity to provide the service for waste generators who request it.
- Only materials that can be economically recycled are included, so that an unreasonable cost burden is not placed on the hauler.
- Recyclables that are source separated for recycling will be recycled, and not mixed with waste and disposed.

This approach has several advantages over the institution of statewide mandatory recycling or disposal bans, as follows:

- The Opportunity to Recycle is a partnership approach rather than a mandate. Government defines a minimal set of rules, and the private sector is challenged to initiate solutions to address the rules.
- The motives to recycle under the Opportunity to Recycle concept are economic rather than regulatory.
- The generator is key to initiating enforcement of the Opportunity to Recycle, rather than a government inspector. If a generator wants recycling services, and the hauler does not provide them, they can appeal to the county or state.

The advantages of this approach are consistent with the principles of sustainability, which is characterized by partnership efforts.

#### **3.3.4.4 Recycling Economics**

It is imperative that, in order for recycling to increase, local recyclers must receive some economic assistance with recycling in Hawai'i. This will require a number of approaches to address recycling economics.

In Hawai'i, capital and operating costs for local recyclers are greater than for mainland recyclers due to the following:

- Cost to transport collection and processing equipment to Hawai'i.
- High operating costs due to high energy prices and labor costs.
- High transportation costs to markets in East Asia and the U.S. mainland.

An important objective is to level the playing field with mainland competitors. The Hawai'i glass container ADF helps to accomplish this and the result is a high recovery rate for glass. The Hawai'i County diversion payments also provide substantial support to local recyclers. Greater quantities of recycled materials should flow as a result of implementing the programs described in Sections 3.3.4.2 and 3.3.4.3. This increased flow should improve the economics of recycling.

The problem of high transportation costs can be directly addressed by the state. In part, this problem is tied to the current low volume of material being generated. With greater volumes, it will be more practical for shippers to offer reduced shipping rates since their per-unit cost will be lower.

The state can directly address shipping rates by working with the shipping companies and the PUC. The state could work to negotiate substantially discounted rates for inter-island back hauling of scrap materials, and favorable rates for scrap materials shipped overseas.

Section 3.5 on market development identifies several initiatives to upgrade the value of markets for glass, green waste, and paper. This will improve the economics of recycling by providing more stable and higher-value markets, yielding greater revenues from the sale of materials.

The state can also directly address the high operating costs for recyclers. Several options exist that could allow the state, at modest cost, to favor development of an industry that provides environmental benefits as well as new jobs, as follows:



- Establish a Recycle Park with a rent credit for pre-existing improvements that must be recreated at the new site.
- Clarify recycling as a maritime use, or other action to provide greater security for future use of state land by recycling companies.
- Establish a function within DOH, or other appropriate agency, empowering a staff person to advocate for recycling companies with other state agencies, and help negotiate for financial advantages such as reduced rent or longer term leases.
- Develop a state diversion credit funded through an expanded ADF.
- Establish a state program to provide low-interest or secured credit loans for purchase of equipment or development of recycling facilities.

By directly addressing the high cost of doing business in Hawai'i, the state will increase processing capacity for recyclable materials and lower the overall cost of recycling.

#### **3.3.4.5 Contingency Plan**

The state should monitor commercial sector recycling over the next 3 to 4 years. The diversion goal for the commercial sector should approach 40 to 45 percent in that time. OCC and high-grade paper in the waste stream should drop to less than half of current levels.

The state can also monitor its own activities and those of the counties. If the programs described in this ISWM Plan are implemented, and commercial sector recycling does not dramatically improve, the state will be justified in considering regulatory initiatives.

The state could convene a multi-sector workgroup and present them the challenge of defining a program to improve commercial recycling. This could result in greater regulation of the transportation industry to provide recycling collection services, and/or mandatory source separation by all businesses.

## 3.4 Construction and Demolition Waste Management

### 3.4.1 Introduction

This section addresses recycling of waste from C&D activities. Based on research performed for this study and national estimates from the U.S. EPA, C&D waste contributes from 20 to 30 percent of the state's solid waste stream.

C&D waste comprises primarily wood, drywall, concrete, and asphalt, with smaller amounts of metals, plastics, glass, and packaging materials. Many of these materials are recyclable. Studies show that up to 80 percent of this waste could potentially be diverted from landfills, depending upon the nature and location of the construction site.<sup>21</sup> C&D waste diversion clearly merits investigation for increased recycling and reduced landfilling in Hawai'i.

#### 3.4.1.1 Purpose

The purpose of this section is to characterize types and quantities of C&D waste generated and recycled in Hawai'i, to identify and assess barriers to increasing C&D materials recovery, and to identify recommendations for improved C&D diversion.

#### 3.4.1.2 Organization

This section is organized into four major subsections and provides the rationale for a variety of programmatic recommendations included in Chapter 4:

- 3.4.1 Introduction
- 3.4.2 Background and Existing Conditions
- 3.4.3 Model Programs and Approaches
- 3.4.4 Observations and Analysis

Appendix IV includes support materials for this section, as follows:

- IV.1 Construction Photographs.
- IV.2 Model Programs.
- IV.3 References.

#### 3.4.1.3 Priorities

DOH OSWM and the SWAC identified the following priorities related to the recovery of C&D waste:

1. Problem materials:
  - **Treated Wood.** Nearly all wood construction in Hawai'i uses treated wood to resist termite infestation. Treated wood presents special challenges because it is a large

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<sup>21</sup> Triangle J Council of Governments. July 1995. *WasteSpec*.

- contributor to the C&D waste stream, there are a number of different treatment methods in use, and treated wood is not recyclable at present. There is also uncertainty as to what constitutes the best and safest disposal practice for this material.
- **Co-mingled Demolition Waste.** For the past few years, demolition has comprised a major portion of construction activity in Hawai‘i, and demolition activity generates large volumes of co-mingled C&D waste. High labor costs discourage effective source separation and recycling of this waste. Co-mingled waste also often includes specific problem materials that make processing/recycling difficult or prohibitive.
2. High potential materials:
- **Wood, Steel, Concrete, Asphalt, and Drywall.** Because these materials are high volume components of C&D waste, it is important to gain an understanding of how these materials are handled on the job site and determine whether they provide an opportunity for improved recovery.
  - **Recycled Concrete Aggregate (RCA).** A product made from one high volume C&D waste component. Recycling of waste concrete and asphalt into RCA for use in roads and other applications is increasing throughout the country and the world. The research explores current practices in Hawai‘i with an eye toward identifying further opportunities.

#### **3.4.1.4 Methodology and Definitions**

According to HAR 11-58.1, C&D waste is:

*“...solid waste, largely inert waste, resulting from the demolition or razing of buildings, of roads, or other structures, such as concrete, rock, brick, bituminous concrete, wood, and masonry, composition roofing and roofing paper, steel, plaster, and minor amounts of other metals, such as copper. Construction and demolition waste does not include cleanup materials contaminated with hazardous substances, friable asbestos, waste paints, solvents, sealers, adhesives, or similar materials.”*

This definition does not specifically mention waste generated by new construction and renovation activities. In practice, however, C&D waste includes these waste streams as well as waste from associated landclearing activities.

Table 3-6 contains a summary of C&D waste material types and typical sources (related primary industry activity).

**Table 3-6:  
Common Construction and Demolition Waste Materials and Sources**

| <b>Material</b>  | <b>Primary Industry Activities</b>        |
|--|---|
| Adhesives, glues, sealants, solvents                   | Construction <sup>1</sup>                 |
| Asbestos-containing materials                          | Demolition                                |
| Asphalt (pavement)                                     | Construction, Demolition                  |
| Asphalt roofing  | Construction, Demolition                  |
| Brick  | Construction, Demolition                  |
| Cardboard  | Construction                              |
| Concrete   | Construction, Demolition                  |
| Dirt/earth   | Construction, Demolition,<br>Landclearing |
| Drywall  | Construction, Demolition                  |
| Fiberglass insulation                                  | Construction, Demolition                  |
| Glass  | Construction, Demolition                  |
| Metals   | Construction, Demolition                  |
| Oil, battery, antifreeze                               | Construction, Demolition,<br>Landclearing |
| Miscellaneous building components, tools and equipment | Construction, Demolition,<br>Landclearing |
| Paints – Water-based                                   | Construction                              |
| Paints – oil or solvent-based                          | Construction                              |
| Plastic  | Construction, Demolition                  |
| Porcelain  | Construction, Demolition                  |
| Wood – dimensional lumber                              | Construction, Demolition                  |
| Wood – landclearing wood                               | Landclearing                              |
| Wood – treated wood                                    | Construction, Demolition                  |

NOTE: <sup>1</sup> “Construction” includes renovations.

To gain an understanding of existing conditions and other factors that affect C&D recovery, research for this section included personal interviews with key individuals in the construction and recycling industries and the public agencies that interface with them. These sources were as follows:

1. Telephone interviews with county representatives of the SWAC and results from the May 1999 SWAC questionnaire (contained in Appendix II).
2. Telephone interviews with state and county officials, landfill operators, and other involved individuals and agencies.
3. In-depth surveys of construction contractors. In June 1999, the consultant distributed a “fax-back” survey of construction waste management practices to 47 O‘ahu and 15 neighbor island construction contractors. The purpose of the survey was to obtain

information to characterize the C&D waste according to type of construction (construction sector), develop estimates for the relative contributions of each sector to the overall waste stream, and estimate how and how much C&D waste is currently being recycled. The survey also explored current industry practices and attitudes regarding recycling of C&D waste and other related issues. Of the 62 surveys, the consultant received responses from 17 O'ahu and 3 neighbor island firms for a total of 20 responses (32 percent return rate).

4. In-depth telephone interviews with six businesses that conduct most of the C&D recycling on O'ahu and one non-profit re-use store on Kaua'i. The interviewees represent a variety of materials, business types, sizes, and services to obtain a broad-based processor perspective on needs and opportunities for C&D recycling in Hawai'i.
5. Research of five construction waste management program models and their applicability or adaptability to Hawai'i.
6. Information gained during the December 4, 1998 statewide Recycling Market Developmental Forum.
7. Published research, including references 1 through 4 (Appendix IV.3).
8. Other C&D research performed by O'Brien & Company, including information contained in C&D discussion paper (included in Appendix III).
9. Statewide information provided by OSWM representatives.

### **3.4.2 Background and Existing Conditions**

The aspects of C&D waste management that are discussed in this section include the following:

1. Regulatory Framework.
2. C&D Waste Characterization.
3. Facilities.
4. Illegal Dumping.
5. Industry Awareness and Practices.
6. Treated Wood.

#### **3.4.2.1 Regulatory Framework**

Table 3-7 provides a summary of C&D regulatory oversight responsibilities.

**Table 3-7:  
Construction and Demolition Regulatory Oversight Responsibilities**

| Regulatory Agency                              | Regulatory Activity |              |                      |                               |         |                     |
|--|---------------------|--------------|----------------------|-------------------------------|---------|---------------------|
|  | C&D Landfill        | MSW Landfill | Recycling Facilities | On-site Grinding and Crushing | Burning | Grading and Filling |
| DOH, OSWM <sup>1</sup>                         | X                   | X            | X                    | X                             |         |                     |
| DOH, Clean Air Branch <sup>2</sup>             |                     |              | X                    | X                             | X       |                     |
| DOH, Clean Water Branch <sup>3</sup>           |                     |              |                      | X                             |         |                     |
| County water quality jurisdiction <sup>4</sup> |                     |              | X                    | X                             |         |                     |
| County zoning jurisdiction <sup>5</sup>        | X                   | X            | X                    | X                             |         |                     |
| County planning jurisdiction                   |                     |              |                      |                               |         | X                   |
| OSHA/HIOSH <sup>6</sup>                        | X                   | X            | X                    |                               |         |                     |

- NOTES: <sup>1</sup> Solid Waste Management Permit.  
<sup>2</sup> Non-covered Source permit or Covered Source permit. Criteria is based on emissions and whether federal regulations apply, regardless of whether on-site or facility based. Rules of thumb: 1. If wood waste or green waste, a permit is probably not required. 2. If grinding concrete or rubble, a permit probably is required.  
<sup>3</sup> Plan approval and/or National Pollutant Discharge Elimination System, General Permit or Individual Permit. If the contractor brings a crusher on site, this may require a water permit because discharge may include dust or other solid debris. Facilities are already covered for this possibility by OSWM permit.  
<sup>4</sup> Industrial wastewater discharge permit for all industrial or commercial users of the local sewer system, if applicable.  
<sup>5</sup> Various types of permits depending upon the nature and location of the activity or facility. If using a mobile chipper/grinder to process site-generated waste only, it is not a zoning issue. If processing waste generated elsewhere, the operation must be permitted as a recycling facility.  
<sup>6</sup> OSHA = federal Occupational Safety and Health Administration; HIOSH = Hawai'i State Occupational Safety and Health.

**Regulatory Agencies.** This section describes federal, state, and local regulatory agencies.

*State Regulatory Agencies.* HAR 11-58.1 incorporates the provisions of Resource Conservation and Recover Act (RCRA) Subtitle D (see Section 2.6.2) and also regulates other waste handling facilities including C&D landfills, transfer stations, and recycling and materials recovery facilities. Recycling facility permit requirements, regulations and governing agencies (state, local, and federal) are listed and described in Appendix IV.3, references 7 through 10.

Senate Concurrent Resolution 81 requires the State DOT, the Department of Accounting and General Services (DAGS), and DLNR to require private contractors to haul green waste to composting companies and to purchase in bulk Hawai'i-manufactured compost and soil amendment.

Hawai'i Public Procurement Code Section 103D-1005 gives preference to use of products containing recycled material.

*County Regulatory Agencies.* County Building Departments issue permits for private building activities (new construction, renovation, and demolition). They also have permitting and enforcement authority for grading activities (see discussion on *Grading/Fill* below). Counties also establish and enforce zoning requirements.

*Occupational, Safety, and Health Administration/Hawaii'i State Occupational Safety and Health.* The federal OSHA and HIOSH regulate worker safety. C&D waste contains materials that are potential sources of exposure to controlled hazardous materials including asbestos, cadmium, and lead. Potential problem materials include treated or painted lumber, asbestos-containing materials (insulation, ceiling material), lead-containing paint, light ballasts, mercury-containing light switches and thermostats. As such, OSHA/HIOSH has determined that their regulations that govern exposure to asbestos, cadmium, and lead apply to activities including those that involve handling of C&D debris through wrecking, demolition, or salvage of structures.

As a minimum, an initial assessment of airborne contaminants for personal exposure levels must be performed. Other requirements, depending upon the duration of handling activities, include training, medical surveillance and respiratory protection programs. The only exemptions are when inspection and sampling shows that no asbestos, cadmium, or lead is present in the debris. These inspection and sampling results must be documented, retained, and made available to OSHA upon request.

Table 3-8 contains a list of the OSHA and HIOSH regulations pertaining to C&D handling and salvage/recycling.

**Table 3-8: OSHA and HIOSH Regulations**

| Material | Federal OSHA <sup>1</sup> | State of Hawaii'i HIOSH <sup>2</sup> |
|----------|---------------------------|--------------------------------------|
| Asbestos | 29 CFR 1926.1101          | HAR 12-145.1                         |
| Cadmium  | 29 CFR 1926.1127          | HAR 12-147                           |
| Lead     | 29 CFR 1926.62            | HAR 12-148.1                         |

NOTES: <sup>1</sup> 29 Code of Federal Regulations (CFR) 1926.  
<sup>2</sup> HAR 12-8, Part 3.

**Regulated Activities.** A number of activities carried out by the C&D industry, and related industries, are regulated by these agencies.

*Landfills.* MSW and C&D landfills require a solid waste permit and must comply with applicable county zoning and OSHA/HIOSH requirements. Chapter 2 describes existing landfill requirements, fees, and capacities.

*Transfer Stations/Recycling Facilities.* Transfer stations and other full-scale recycling facilities require both solid waste and air permits.

*Single Source Recovery Facility.* A sited facility handling only one kind of material is classified by OSWM as a “single-source” facility and falls under the “permit-by-rule” procedure. A nominal fee, simple site plan, and brief narrative are required for obtaining the 5-year OSWM facility permit. A county land use variance may be required.

*On-Site Portable Recycling Facility.* On-site, portable facilities, such as mobile crushers and grinders, must comply with all regulations governing air pollution control and solid waste facilities.

*Grading/Fill.* Grading and fill activities are governed both by state regulations (related to oversight of solid waste disposal) and county regulations (related to grading permits in support of construction work). The regulations also affect the degree to which crushed/recycled C&D waste can be used for fill. Current state and C&C requirements differ slightly. The State recently defined inert fill as earthen materials that may contain concrete less than 8 inches (with no exposed rebar) and “earth-like” materials (e.g., brick and asphalt). Materials must be “clean” with no lead-based paint, asbestos, lead, petroleum, or other contaminants. Wood and other organics are prohibited. C&C requirements (Appendix IV.3, reference 11) define fill material as “earth materials” but also refer to concrete “or similar matter.” Requirements of other counties are similar to C&C. The State and C&C recently agreed that the C&C definition is acceptable, provided the county engineer approves the grading/fill plan. Issues not yet resolved are how to ensure there is no contamination in the fill material, and whether the state should provide oversight in this area.

### **3.4.2.2 Construction and Demolition Waste Characterization**

**Overview.** C&D waste is characterized by both type (composition) and quantity. This discussion is based on results from the June 1999 survey of local construction contractors. Survey responses were consistent with U.S. EPA estimates (Appendix IV.3, reference 2) and with the 1998 waste sort conducted by Solid Waste Associates and R.M Towill for the C&C at the C&D landfill on O‘ahu.<sup>22</sup>

Because both the quantity and composition of C&D waste vary greatly with the type of construction, it is useful to organize data by construction type. Using industry conventions and survey responses, the data are organized by the following construction types:<sup>23</sup>

- Demolition.
- Residential new construction (solely).
- Commercial and residential renovations (solely).
- Commercial/military/industrial (new construction and renovation).

Because of limited neighbor island response to the survey, these data primarily reflect conditions on O‘ahu. Nonetheless, the results are useful for statewide planning because O‘ahu accounts for approximately two-thirds of the State’s total building activity (based on the number of building permits) and approximately three-fourths of the State’s total disposal tonnage in 1997. Targeting O‘ahu will give priority to the largest C&D waste contributor, increasing the likelihood of meaningful gains and setting up a model for adaptation on neighbor islands.

A summary of results from a comprehensive report on the contractor’s survey provided below (Appendix IV.3, reference 12) notes that waste wood is assumed to be treated wood, and compositions are given as approximate volume percentages.

**Composition.** Waste composition has been studied for demolition, new construction and renovation.

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<sup>22</sup> R.M. Towill. 1999. *Oahu Municipal Refuse Disposal Alternatives Study, Waste Composition Study*. Prepared for the City and County of Honolulu.

<sup>23</sup> The categories reflect the construction categories of the responding firms. Those that did commercial new construction were also involved in renovations. Those that did only renovations were often involved in both commercial and residential work.



*Demolition.* Demolition waste comprises approximately one-third waste wood, one-third concrete, and one-third other mixed waste. Demolition activities generate the largest amount of waste, with disposal costs comprising up to 40 percent of project costs compared to between 1 and 5 percent for new construction. With the recent construction slow down in Hawai'i, construction activity on O'ahu has been almost exclusively demolition. As a result of these two factors, nearly all C&D waste now generated on O'ahu is demolition waste.

Composition results for Hawai'i compare favorably with national studies on residential demolition waste (Appendix IV.3, reference 2, Figure 7 of the U.S. EPA study). The results compare less well with *nonresidential* demolition waste studies (Appendix IV.3, reference 2, Figure 9), which shows a higher proportion of concrete (66 percent) and a lower proportion of wood (16 percent). These differences might be due to differences in accounting for concrete and different wood handling methods. The U.S. EPA methodology includes concrete waste that is recycled/reused onsite. However, contractors who recycle/reuse concrete onsite often do not consider this material as part of the waste stream and thus do not track it or report it as such. For wood, there are generally more options for diversion of demolition wood on the mainland. In Hawai'i, nearly all demolition wood is treated wood and cannot be recycled or burned.

*Residential New Construction (Solely).* C&D waste for this construction sector comprises primarily wood (35 percent), packaging (30 percent), drywall (20 percent), concrete/asphalt rubble (10 percent), and concrete (5 percent). These results are consistent with the EPA studies (Appendix IV.3, reference 2, Figures 4 and 5), which show that wood and drywall are the major components of new residential debris. However, wood contributes somewhat less of the waste in Hawai'i than in the EPA studies, which were based upon home building projects in the Pacific Northwest. A greater use of wood in the Pacific Northwest, including wood roofing, may help explain the difference. In addition, the almost exclusive use of high cost treated lumber in Hawai'i is helping foster the use of waste reducing estimating and construction techniques.

*Commercial and Residential Renovations (Solely).* C&D waste for this construction sector comprises primarily drywall (25 percent), wood (25 percent), concrete (10 percent), concrete and asphalt rubble (10 percent), and 30 percent other materials. Results are consistent with the EPA study (Appendix IV.3, reference 2, Figure 6) for residential renovations, which show that major waste components are wood and drywall. In the EPA study, roofing materials comprise 28 percent of the residential waste stream. Though not specifically identified in our survey or the responses, roofing materials likely comprise a significant portion of the "other materials."

*Commercial/Military/Industrial (New Construction and Renovation).* C&D waste for this construction sector comprises drywall (20 percent), wood (20 percent), concrete (15 percent), metals (10 percent), packaging materials (10 percent), and 25 percent other materials (primarily concrete and asphalt rubble, asphalt, glass, and plastic waste). The U.S. EPA study (Appendix IV.3, reference 2) notes there is little commercial waste sort data available and so provides no composition data for comparison. However, the eight responding firms showed close agreement in reported percentages.

**Quantities.** Accurate C&D waste accounting data from generators or recyclers were not available for this report. Of the contractors who responded to the survey, not all provided sufficient data to develop precise estimates for total C&D generation for the State. (Many appear to track their waste quantities roughly, if at all.) Other unknowns include the amount of concrete, asphalt, and wood that is recycled on-site and the quantity of C&D waste that is burned or illegally disposed. And while each permitted waste handling facility provides OSWM with an annual report of the quantity of waste disposed, the reports do not support an accurate analysis of C&D waste as a

separate stream. For example, the reporting system does not necessarily differentiate between C&D and other types of waste, nor does it account for C&D waste that is disposed illegally, reused on-site, or shipped out of the state.

As a starting point for this analysis, Table 3-9 provides rough order of magnitude estimates for C&D generation in Hawai'i, developed by the consultant using available data and three independent methodologies.

**Table 3-9:  
Hawai'i Construction and Demolition Waste Generation Estimates  
(FY 1997/1998)**

| Method   | Estimated Annual C&D Generation, (Tons) |
|--|---|
| 1. Using EPA per capita generation rate (Appendix IV.3, reference 2) and a de facto population of 1.29 million. <sup>1</sup>   | 659,190                                 |
| 2. Using Hawai'i FY 1997/1998 waste stream information and EPA approaches (see Chapter 2). <sup>2</sup>  | 378,780 to 568,169                      |
| 3. Using C&C building permit data, EPA methodology (Appendix IV.3, reference 2), and consultant-developed multipliers for contributions from government and neighbor island work. <sup>3</sup> | 340,200                                 |

NOTES: <sup>1</sup> EPA estimated per capita generation rate in 1996 was 2.8 pounds per person per day. This does not include debris from roadway and bridge C&D or from land clearing projects.  
<sup>2</sup> EPA method assumes that C&D is 20 to 30 percent of total waste.  
<sup>3</sup> This does not include C&D waste from road or bridge work. It does include all waste from buildings (including waste managed on-site and dumped illegally) and debris from buildings destroyed by disasters.  
FY = fiscal year.

For planning purposes, this section recommends the estimate of 660,000 tons per year (Table 3-9, Method 1). The EPA per capita generation rate shown in Method 1 accounts for all building related waste, whether disposed at a C&D or MSW landfill, recycled on site or off site, burned, or dumped illegally.

Using contractor estimates for the amount of treated wood in their waste streams, which were consistently reported between 25 percent and 35 percent, the amount of treated wood in Hawai'i's waste stream is estimated to be between 85,000 and 165,000 tons per year.

**3.4.2.3 Facilities**

**Disposal Options, O'ahu.** Following are the facilities that accept C&D debris on O'ahu.

*PVT Land Company C&D Landfill (Nānākuli).* The PVT landfill accepts all types of C&D site material—concrete, hollow bituminous concrete, asphalt pavement, wood, glass masonry, flooring, siding, plaster, dirt, rock, stumps, boulders, and brush. The current tipping fee is \$25 per ton.

PVT has a maximum limit of 10 percent MSW waste in any incoming load. The PVT owner representative stated that in practice, they accept no MSW and no more than 10 percent green waste. Nearly all incoming material at present is demolition waste. The landfill operators perform a pre-demolition site check, but usually find that most materials of value have already been

salvaged. They perform two additional checks: a camera at the landfill videotapes the incoming trucks, and a worker spot-checks the loads as they are being dumped.

Despite the C&D ban at the MSW landfill, tonnage at PVT has decreased sharply in the last few years, primarily a result of sluggishness in the construction industry, but also in part to increased recycling. The landfill received an average of 718 tons per day (262,000 per year) in 1998 and has an estimated 15 years remaining capacity (see Chapter 3).

Table 3-10 shows the composition of waste disposed at the landfill during a recent waste composition study (Appendix IV.3, reference 3).

**Table 3-10: PVT Landfill Waste Composition Study Results (1998)**

| Components  | Estimated Percentage by Weight |
|---|--------------------------------|
| Wood (new lumber, demolition lumber, wood roofing and siding, pallets and crates, creosote wood, other pressure treated, painted, or stained wood, other) | 30.6                           |
| Aggregate (asphalt paving, built-up roofing, concrete, tile)  | 30.2                           |
| Drywall:  | 11.5                           |
| New gypsum scrap  | (10.5)                         |
| Mixed/demolition scrap  | (1.0)                          |
| Metals (aluminum, ferrous, mixed)   | 11.1                           |
| Other Inorganics (sand, soil, dirt, miscellaneous)  | 7.0                            |
| Furniture (mattresses, plastic, glass, other)   | 4.7                            |
| Paper (cardboard, Tyvek, other)   | 2.2                            |
| Yard Waste (logs, stumps, large prunings, other)  | 1.6                            |

This study was based on results from 80 spot checks; 40 in summer and 40 in winter. PVT's representative stated that, based on his daily observations, the landfill probably receives more treated wood and fewer recyclable metals than the study results indicate. He also notes that most incoming drywall is damaged. PVT staff grind and landfill drywall and try to recover and recycle any incoming metals. PVT's strategy for the future is to strive to improve their understanding and handling of incoming material and look for ways to increase diversion.

*MSW Landfill (Waimānalo Gulch).* C&C recently imposed a 10 percent upper limit per load on the amount of C&D material allowed at Waimānalo Gulch in order to preserve space at this more costly MSW landfill. As such, the MSW landfill is a limited option for the legal disposal of C&D waste on O'ahu. The tipping fee at Waimānalo Gulch is \$67.50 per ton.

**Disposal Options, Neighbor Islands.** Following are the facilities that accept C&D debris on the neighbor islands.

*DeCoite C&D Landfill (Mā'alaea, Maui County).* This landfill is a privately owned and operated, lined C&D landfill with a remaining life of 10 to 15 years. An underground fire at the landfill in 1998 resulted in a temporary shutdown. Re-opened in mid-1999, the landfill now accepts only

earthen materials (no wood or other combustibles). Prior to the suspension, its annual volume was 14,800 tons of C&D waste. The current tipping fee is \$35.00 per ton.

*MSW Landfills (Lana'i and Moloka'i).* C&D wastes are disposed in the county-owned MSW landfills on the islands of Lana'i and Moloka'i. The tipping fee is \$37.00 per ton for commercial loads; free to residents.

*MSW Landfill (Hawai'i County).* C&D wastes are currently disposed in the island's county-owned MSW landfills. An official with the Hawai'i County Department of Public Works reported that the county is evaluating the need for a C&D landfill on their island, similar to Maui's C&D landfill. At this writing, they are planning an assessment of the C&D waste stream on Hawai'i. The tipping fee for commercial haulers and residents is \$35.00 per ton.

*MSW Landfill (Kekaha, Kaua'i).* C&D wastes are disposed in the county-owned MSW landfill on Kaua'i. The tipping fee is \$56.00 per ton for commercial loads; free to residents.

**Reuse.** At present, formal reuse programs in Hawai'i include the Habitat for Humanity Re-Store on Kaua'i and Hawai'i Materials Exchange (HIMEX), a statewide computerized materials exchange.

The Re-Store on Kaua'i accepts all types of reusable/recyclable construction materials, including drywall (usually donated to a nursery) unopened cans of paint, clean wood, treated wood scraps up to one foot long, new treated wood (used for Habitat for Humanity projects), carpeting, and discounted, returned, or discontinued merchandise from local department and hardware stores. Open to the public for a little more than one year, it has been highly successful (see Section 3.4.3).

HIMEX is an automated system for exchange of new, used, and recyclable building materials via an interactive web site at [www.himex.org](http://www.himex.org). All types of materials, even hazardous products, can be offered for trade or giveaway, and not for sale. Trades and/or transfers are arranged and completed by the participating individuals, not by HIMEX. Because HIMEX has no physical facility to warehouse materials, it is not widely used by the construction community; contractors typically need to off-load the materials (see Section 3.4.3).

In addition to formal reuse facilities/programs, many contractors reported using an informal approach by offering used or salvaged materials for giveaway, sale, or trade. The demolition community especially has responded to increasing disposal costs with new techniques for deconstruction, and reuse and trades within the community.

**Recycling.** Options for recycling of C&D debris differ by material type.

*Concrete.* A heavy, high volume component of demolitions, waste concrete is often crushed with portable/mobile crushers and reused on-site or delivered to recovery facilities.

*Asphalt.* Asphalt paving companies incorporate cold-planed asphalt back into their virgin mix up to State-allowed limits. On O'ahu, some paving companies also accept waste from road and parking lot demolitions. They crush this material and sell it for use as highway underlayment/base.

*Drywall.* On O‘ahu and Hawai‘i, there are no facilities for recycling drywall. On Kaua‘i and Maui, some private nurseries accept new drywall and incorporate it into their compost/soil amendments.

*Asphalt Roofing.* There are no facilities in Hawai‘i for recycling asphalt roofing. There are facilities on the U.S. mainland that successfully recycle this material.

*Treated Wood.* Although this is an area of active research, there are no facilities at present for industrial scale recycling of treated wood. All treated wood waste in Hawai‘i is reused or landfilled.

*Clean Wood.* All islands have facilities for recycling clean wood waste, often by grinding and incorporating into composting operations.

*Metals.* All islands have facilities for recycling metals. Because recyclers pay for scrap metal, there is economic incentive for recovery.

References 1 and 5 (Appendix IV.3) provide a list of C&D recycling options for O‘ahu and neighbor islands, respectively. Chapter 2 describes specific materials and quantities of materials recycled in each county.

Table 3-11 contains a list of the major C&D recyclers on O‘ahu, with a summary of information from consultant interviews.

**Table 3-11: Construction and Demolition Recycler Survey Summary**

|   |   |
|---|---|
| <p><b>Island Demo (ID)</b><br/>"In-Town" C&amp;D Transfer Station<br/>Permitted Transfer Station</p>  | <p>O'ahu<br/>Māpunapuna</p>   |
| <p><b>Materials Recovered/Diverted</b><br/>Metals, cardboard, concrete.<br/>Comments:<br/>ID performs manual separation of mixed C&amp;D loads, recycles recoverable materials (i.e., metals and cardboard), and takes any concrete to a crusher. ID crushes (with a loader) and disposes the remainder at the PVT C&amp;D landfill. Most (approximately 95 percent) of their incoming materials are from residential and commercial demolition.</p>  |   |
| <p><b>Materials Accepted</b><br/>Mixed loads of C&amp;D waste (no MSW). No liquid wastes, treated wood (unless the hauler provides a hazardous waste analysis that allows ID to dispose of it at the landfill), asbestos, polychlorinated biphenyl ballasts, paint cans, and other exclusions per operating manual.<br/>Comments:<br/>Before expansion (see <b>Future Plans</b>), accepted primarily one-ton flat bed loads; could not accommodate larger trucks. Sometimes contracts with a hauler to attach a bin to their roll-off container. Provides a small bin service for work in space-critical areas (e.g., shopping malls). One hundred eighty contractors use the Island Demo facility.</p> |   |
| <p><b>Capacity</b><br/>In 1998: Recycled 1,645 tons scrap ferrous metal and 25 tons scrap aluminum. Disposed 17,488 tons. (Diversion rate approximately 25 percent).<br/>Expansion increases their capacity six-fold.</p>   | <p><b>Fees</b><br/>Self-haul—Old rates were based on truck size; 8500T was \$85; flat beds (10,000-ton) was \$145. With expansion, will use new scale; scale rates to be determined.<br/>Bin service—if contractor fills with only metal, bin is free, otherwise \$35.00 per bin.<br/>They also accept debris from other haulers.</p> |
| <p><b>Future Plans</b><br/>At this writing, ID is completing a major expansion of their work area from 4,000 square feet to at least three times that size. Upgrades include a wood grinder and magnets for metals separation.</p>  |   |

**Table 3-11: C&D Recycler Survey Summary** *(continued)*

|   |                           |
|---|---------------------------|
| <p><b>Resource Recovery (RR)</b><br/>On-site crushing of concrete for use as fill and secondary road base.<br/>Permitted Transfer Station</p>   | <p>O'ahu<br/>Honolulu</p> |
| <p><b>Materials Recovered/Diverted</b><br/>Concrete and asphalt.</p>  |                           |
| <p><b>Materials Accepted</b><br/>Accepts only clean concrete or asphalt, separate or mixed. Small amounts of dirt and metals okay. No wood, plastic, or paper.<br/>RR separates concrete from asphalt. Depending upon the nature of the load, customers may be asked to help with the separation. RR crushes concrete to produce three different aggregate products—base coarse; ¼ to ¾- clean; and ¼-in minus. This is in accordance with state and federal specifications. They also separate soil from loads, screen it, and sell it as topsoil.<br/>Comments:<br/>Construction contractor self-hauls, truck, and trailer loads. Some roll-off companies also bring material.<br/>Equipment—impact crusher (horizontal shaft impactor) and magnets to separate metals.<br/>Primary Source: Demolition, some new construction</p> |                           |
| <p><b>Future Plans</b><br/>Planning to add a primary crusher in front of the existing secondary one to reduce pre-processing and provide consistent feed for the secondary crusher. Improve system to increase production to double capacity. Difficult to keep up with current demand.<br/>Also planning to move crushers to inside a relocated building.</p>  |                           |

**Table 3-11: C&D Recycler Survey Summary (continued)**

|   |   |
|---|---|
| <p><b>Hawaiian Bitumuls &amp; Paving (HB&amp;P)</b><br/>Asphalt paving contractor and recycler</p>  | <p>O'ahu<br/>Kalihi</p>   |
| <p><b>Materials Recovered/Diverted</b><br/>Asphalt, glass.</p>  |   |
| <p><b>Materials Accepted</b><br/>Ground (rotomilled) asphalt from their own roadwork, which is run back through the production plant. State approved to incorporate up to 20 percent of virgin mix. Source, their own operations.<br/>Large chunks from parking lots and old roads. Since this is usually contaminated with some of the underlayment/rock, it is not acceptable to incorporate into the mix at the plant. Crush/grind/screen and sell (\$5 or \$6 per ton) as underlayment/base of the highway. Source, different private contractors who purchase the product from them.<br/>Glass for "glassphalt." At present, glassphalt is used only in the base material because the oil does not adhere to glass, and if used on the surface, the glass works its way out.<br/>Comments:<br/>HB&amp;P is looking at recycling asphalt roofing at the request of the state, but is cautious due to anticipated problems with processing higher volume of fines.</p> |   |
| <p><b>Capacity</b><br/>30 to 40 tons per year recycled through the plant.<br/>280,000 to 300,000 tons per year total production.<br/>Less in recent months due to economy.</p>  | <p><b>Fees</b><br/>\$100 a load (vice about \$300 per load at landfill).<br/>Accepts loads only from those that are buying from them. Sells crushed product for \$5 or \$6 per ton.<br/>No tipping fee for glass (C&amp;C subsidizes collectors).</p> |
| <p><b>Future Plans</b><br/>The material is currently approved for use by state and federal agencies, but not approved for use by C&amp;C. HB&amp;P would like C&amp;C to approve its material for base course since they do a lot of road work for C&amp;C and approval would expand their capacity to use recycled asphalt.</p>  |   |



**Table 3-11: C&D Recycler Survey Summary** *(continued)*

|   |  |
|---|--|
| <p><b>Grace Pacific (GP)</b><br/>Asphalt paving contractor and recycler</p>   | <p>O'ahu<br/>'Aiea</p>   |
| <p><b>Materials Recovered/Diverted</b><br/>Asphalt, glass.</p>  |  |
| <p><b>Materials Accepted</b><br/>Cold planed roadways that are removed for re-surfacing. GP does their own cold-planing; doesn't accept anything from anyone else.<br/>Glass crushed to specifications (3/8-inch minus) and reasonably clean. GP has specified item that gives preference to glassphalt when it is available and when it is less expensive. Maui is main source at present. O'ahu sources have been slow.<br/>Ash from H-POWER as a pilot/research project (wet process). Product is currently being analyzed for leaching.<br/>Comments:<br/>The glass takes the place of some of the aggregate in the product, but requires more asphalt for total encapsulation. It is nearly cost-neutral, even though the glass is free.</p> |  |
| <p><b>Capacity</b><br/>Can accommodate as much glass as is available. Other outlets for crushed glass include Hawaiian Bitumuls, use in pipe bedding material.</p>  | <p><b>Fees</b><br/>No tipping fee for glass (C&amp;C subsidizes collectors).</p> |
| <p><b>Future Plans</b><br/>None, except to participate in pilot research projects. Two potential projects are: (1) test a drier process for ash recycling, and (2) mix the ash in with bedrock material. May be able to use more volume by mixing ash with bedrock materials but may not comply with structural specifications (state is examining this).</p>   |  |

**Table 3-11: C&D Recycler Survey Summary** *(continued)*

|  |  |
|--|--|
| <p><b>Hawaiian Earth Products (HEP)</b><br/>Composting</p>   | <p>O'ahu<br/>Campbell Industrial Park</p>  |
| <p><b>Materials Recovered/Diverted</b><br/>Green waste.<br/>Comments:<br/>Working with CHC to develop pilot project to incorporate drywall, borate-treated lumber, and untreated lumber into composting operations.</p>  |  |
| <p><b>Materials Accepted</b><br/>Yard trimmings primarily from commercial landscapers and tree-trimmers. Also receive small amounts from C&amp;C pickups and convenience centers. Working with C&amp;C for curbside pickup of homeowners yard clippings. Construction contractor self-hauls. Does not see much from the state.<br/>Also accepts manure and food waste, but most food waste (from hotels) goes to pig farmers.<br/>HEP collected over half of all green waste during FY 1997/1998. They produce Menehune Magic<sup>®</sup>, a compost and mulch product.<br/><i>Comments:</i><br/>Does not see a lot of wood. Most scrap lumber is treated wood, which they cannot accept. Notes that untreated wood is primarily pallets that usually go to pallet re-builders (costs less).</p> |  |
| <p><b>Capacity</b><br/>2,000 tons per month (currently at near-capacity).<br/>Although new equipment capacity is high, storage space limits actual production capacity.</p>  | <p><b>Fees</b><br/>For commercial haulers: \$40 per ton for mixed green waste and logs.<br/>C&amp;C rate: \$34.95 per ton.<br/>No tipping fee for pre-chipped green waste.</p> |
| <p><b>Future Plans</b><br/>No major changes, but striving to improve production efficiency and quality.</p>  |  |

**Table 3-11: C&D Recycler Survey Summary (continued)**

|  |   |
|--|---|
| <p><b>HIMEX</b><br/>Computerized material exchange of new, used, and recyclable building materials via an interactive web site at www.himex.org</p>  | <p>Statewide</p>                              |
| <p><b>Materials Recovered/Diverted</b><br/>Any reusable materials, including C&amp;D.</p>  |   |
| <p><b>Materials Accepted</b><br/>All materials can be offered for trade or giveaway, but not for sale. Core of the program is an interactive statewide web site that anyone can use. Trades and/or transfers are arranged and completed by the participating individuals, not by HIMEX.<br/>Comments:<br/>HIMEX has no physical facility, and this has discouraged use by contracting community. Contractors typically need to off-load the materials. Mostly used by private individuals.<br/>Funding and administrative changes have resulted in less advertising and/or organizations promotional activity than in the past. HIMEX is not as comprehensive as similar exchanges on the mainland because there is less manufacturing in Hawai'i.</p> |   |
| <p><b>Capacity</b><br/>No limits/restrictions.</p>   | <p><b>Fees</b><br/>None.</p>                  |
| <p><b>Future Plans</b><br/>Future plans are on hold, pending resolution of funding and administrative direction.</p>   |   |
| <p><b>Kalaheo Green Waste</b><br/>Composting</p>   | <p>O'ahu<br/>Near Kapa'a Transfer Station</p> |
| <p><b>Materials Recovered/Diverted</b><br/>Green waste.</p>  |   |
| <p><b>Materials Accepted</b><br/>Green waste to produce compost for retail and commercial sales.<br/>(Note: Not interviewed.)</p>  |   |
| <p><b>Capacity</b><br/>They took in slightly less than half of all green waste diverted in FY 1997/1998.</p>   | <p><b>Fees</b><br/>None.</p>                  |

**Table 3-11: C&D Recycler Survey Summary** *(continued)*

|  |                          |
|--|--------------------------|
| <b>Hawai'i Metals Recycling (HMR)</b>  | O'ahu                    |
| Recycle/buy-back center for ferrous metals   | Campbell Industrial Park |
| <b>Materials Recovered/Diverted</b>  |                          |
| Metals.  |                          |
| <b>Materials Accepted</b>  |                          |
| Ships metal to recycling smelters on the U.S. mainland and in Asia. Most of the materials diverted throughout the state are consolidated at HMR facility on O'ahu. |                          |
| (Note: Not interviewed.)   |                          |

**3.4.2.4 Illegal Dumping**

C&D recovery competes with both low-cost legal disposal and low-cost to zero-cost illegal dumping. Recent reports of increased illegal dumping on O'ahu may be related in part to restrictions on disposal of C&D waste at the MSW landfill as well as increased tipping fees at the PVT C&D landfill. Illegal dumping is addressed in Section 3.2.

**3.4.2.5 Industry Awareness and Practices**

**Industry Education and Information Initiatives.** Recent and ongoing programs that have helped raise awareness of C&D waste management and resource efficient construction in Hawai'i include the following:

*Clean Hawai'i Center.* An agency of DBEDT, CHC was created by the Hawai'i State Legislature in 1994 to encourage and foster the development of small and emerging recycling businesses. As amended in 1996, CHC was also made responsible for the market development of local processing and manufacturing industries. Although the CHC sunset in June 1999, CHC staff continue to work within the Energy Resources and Technology Division of DBEDT, and the Clean Hawai'i Fund is still active. (See Section 2.2.4 for more information.) CHC programs and resources include the following:

- Hawai'i Construction and Demolition Waste Management Education and Business Development. In 1998, DBEDT and DOH sponsored two joint construction waste management workshop/C&D recycling business developmental forum sessions to begin assessing problem areas in C&D waste management. A Contractor's Waste Management Guide—Best Management Practices and Tools for Job Site Recycling and Waste Reduction in Hawai'i (Appendix IV.3, reference 5) was developed with input from the construction industry as part of this effort. It provides practical tools to help contractors reduce construction waste, increase recycling, and increase the use of recycled-content or salvaged building materials in residential, commercial, and remodeling projects.
- Minimizing Construction and Demolition Waste. Published in February 1998 jointly by DOH OSWM and DBEDT CHC; Environmental Building Coalition of Hawai'i; Building Industry Association of Hawai'i; and the General Contractors Association of Hawai'i, this guide includes a directory of C&D waste management facilities on O'ahu.
- Earth-friendly Products and Materials. A list of materials available through the Green House Hawai'i Project (see below).

- Where to Buy Recycled Products and Recycling Services in Hawai'i Guide.

*Green House Hawai'i Project.* The Green House Hawai'i Project is composed of volunteer architects, builders, and public agency personnel who promote resource-efficient building techniques, waste reduction, and use of recycled/remanufactured materials. The organization prepares exhibits for trade shows and training programs for resource-efficient builders.

*Hawai'i Advanced Building (information) Technology Program (HABiT).* This project of DBEDT and the University of Hawai'i (UH), was funded by the U.S. Department of Energy. It debuted in February 1999 with a series of workshops for industry professionals on O'ahu, Hawai'i, Kaua'i, and Maui, presented and facilitated by local leaders in the field. The *Guide to Resource Efficient Building in Hawai'i*, a publication of the program, is the core training tool for HABiT. The *Guide* has been well received by the construction community and is in its second printing. Construction waste management is one of six environmental objectives of the program. HABiT's informational tools, which include the *Guide* and a companion workshop curriculum document, will continue to be used in future educational efforts.

*Hawai'i County Reuse Study.* The Rural Community Assistance Corporation (RCAC) conducted this study with funding from the CHC and the U.S. Department of Health and Human Services, and a rural business enterprise grant from the U.S. Department of Agriculture, Rural Development. The purpose of the study was to evaluate opportunities for a new program in Hawai'i County that would capture for reuse certain discarded new and reusable materials, including building materials, before they were landfilled. The fall 1999 RCAC report of findings and recommendations is under review as of this writing.

*Maui Recycling Group.* This nonprofit organization on Maui was established in 1989. (Please refer to Section 2.2.6 for additional information on MRG.) MRG recently conducted a pilot program during construction of the Liholani Golf Villas on Maui to demonstrate the feasibility construction-site recycling (this is discussed further under *Model Approaches*, below). At present, MRG is working with DBEDT and non-profit recycling groups on other islands to enhance recycling/reuse of building materials. Current plans include a series of workshops to be held on each island in spring 2000 to provide information, promote statewide networking, and develop relationships between the recycling groups, reuse groups, and the construction industry.

*Guidelines for Sustainable Building Design in Hawai'i, A Planner's Checklist.* Developed by the State Office of Environmental Quality Control under the authority of Hawai'i's environmental review law (HRS 343), this document provides recommended actions for public projects to conserve natural resources, promote efficient use of water and energy, and encourage recycling of waste products.

*Senate Concurrent Resolution 65 SD1.* This Senate Resolution requests DOH to study and report on the feasibility of recycling asphalt roofing materials into economically viable products, with assistance from DBEDT and the Hawai'i Roofing Contractors Association.

**Contractor Awareness.** The education and information initiatives have met with some success, which is described below.

*Awareness.* Most contractors interviewed by the consultant showed awareness of the need for increased diversion, indicating that educational initiatives have had some effect. Contractors report rising disposal fees and the geographical constraints of landfilling on an island as primary reasons for needing to recycle more. Other recurring themes were as follows:

- A nearly unanimous perception that waste separation and recycling takes more time and costs more than conventional disposal.
- Recycling must be cost-effective and convenient. The industry is highly competitive and labor rates are high. Companies cannot afford to spend more on waste management if it means losing a bid.
- The playing field needs to be level. More than one contractor favored regulation to require waste management plans and/or recycling so that everyone has to comply and assume the added cost.

In addition, most of the responding firms were interested in technical assistance to help them develop and implement an effective waste management plan to recycle more.

*Practices.* Based upon the contractor's survey, the industry has responded to increased disposal fees and lumber prices by finding alternatives to conventional disposal and by reducing waste at the source. The demolition community especially has developed the infrastructure, both formal and informal, for reusing salvaged building materials and for crushing and recycling concrete and asphalt.

Many contractors also grind and recycle green waste and reuse or donate treated wood scraps. Several contractors regularly give away or donate scrap lumber. Others do not, due to concerns about potential liability. Nearly all contractors who responded to the survey recycle or reuse other valuable materials (metals) and easily extractable items.

C&D waste that is not recycled or reused is often mixed waste from demolitions comprising unrecoverable materials such as contaminated/dirty drywall, wood that is treated/painted/stained, plastics, and small amounts of metal. This is consistent with anecdotal information and waste composition studies of waste disposed at the PVT C&D landfill (see prior discussion of disposal options). In addition, most contractors who responded to the survey, even those that did no separation or recycling, used a variety of techniques to reduce waste. For example, consultant site visits and interviews revealed several instances of low-cost waste-reduction strategies including placing drywall scraps in walls, returning damaged concrete masonry units to suppliers, and deconstructing and reusing entire walls.

Based upon interviews with both contractors and recyclers, the extent to which contractors source separate depends upon the nature of the construction, size of the project, whether the additional effort is likely to generate enough recyclables to be worth it, and the location of the job. For example, smaller contractors working in Honolulu are likely to take all of the waste to the Island Demo transfer station, except metals, which they tend to separate and recycle themselves. Though the tipping fee is slightly more at Island Demo, it still costs them less than source-separation or hauling to PVT C&D landfill in Nānākuli. However, large companies usually haul their own waste in 25-ton trucks, and before their recently-completed expansion, Island Demo could not accommodate this volume. In these cases, the firms were likely to haul their own waste to PVT C&D landfill.

Based on documented incidents of illegal dumping as well as observations by many of the individuals interviewed for this report, some contractors are disposing of C&D waste at unpermitted landfills or other illegal dumps or use hauling contractors that do.

Appendix IV.1 provides photos of current job-sites and construction practices on O'ahu.

**Recycler Interview Results.** Interviews with recyclers identified a number of challenges, as presented below.

*Economics.* Economic issues for recycling businesses include competition with low disposal tipping fees; lack of affordable, properly zoned property for permanent facilities; and limited availability of long term leases.

(Note: The Hawai'i Capital Loan Program provides low-interest financing up to \$1 million to eligible businesses for plant construction, conversion, or expansion; land acquisition for expansion; purchase of equipment, machinery, supplies, or materials; or for working capital.)

*Permit Processes.* Recyclers and contractors who recycle on-site reported that a major challenge is the complex permit process that involves numerous types of required permits. Users of portable crushers and grinders especially expressed concern with this process, and stated that the time required for permit approval may undermine production demands.

*Regulatory Issues.* OSHA and HIOSH regulate worker exposure to hazardous materials including asbestos, cadmium, and lead. For C&D recyclers who are unaware of OSHA/HIOSH requirements and/or do not comply, there is increased health risks for workers and potential liability for the firm. Costs for compliance must be factored into market development economic analyses.

At Island Demo, workers are OSHA-certified. Their facility includes a laboratory with \$300,000 in analytical equipment.

*Use of Recycled Concrete Aggregate in Roads.* The use of RCA in base course has been approved for use by the DOT and federal agencies, but has not been approved for use on C&C roadways. In addition, both state and C&C agencies have policies promoting the use of recycled glass in glassphalt, which has, according to one recycler, competed with the use of RCA.

*Infrastructure.* The islands currently lack local end use markets for many potential recyclable materials. At present, there are no recycling outlets in the state for treated wood or asphalt roofing. On O'ahu and Hawai'i, there are no recycling outlets for drywall at present. On Kaua'i and Maui, some private nurseries accept new drywall and incorporate it into their compost and/or soil amendments. On O'ahu, CHC funding has been granted to Hawaiian Earth Products to help develop a process for using gypsum wall board in their soil amendment product.

*Lack of Public Agency Support.* More than one recycler commented about the lack of business support from county, state, and federal agencies. Examples include green waste sent to the landfill instead of to composters, lack of promotion about existing pickup programs, and limited use of RCA in public road projects. In other cases, specifications for public projects may require the use of a recycled product, such as compost or mulch. However, according to one manufacturer of an approved, recycled-content soil amendment, contractors often improperly substitute or omit these materials altogether. Proper material selection is often not monitored or enforced.

*Illegal Dumping.* Recyclers cannot compete with low or zero tipping fees for illegal dumping. Several recyclers expressed frustration with the apparent lack of enforcement in this area.

### 3.4.2.6 Treated Wood

The information below is drawn primarily from articles in *Environmental Building News*, Volume 6, Number 3, March 1997. Other sources include the websites of the American Wood Preservers Association, the American Wood Preservers Institute, and Osmose Wood Preserving Corporation.

**Background.** Pressure treated wood is lumber or plywood that has been impregnated under high pressure with preservatives that protect the wood from termites and fungal decay. Older preservatives, such as pentachlorophenol and creosote, pose considerable health risks to users of the wood, but new water-based preservatives are safer.

The most common type of wood preservative used today is CCA, which comprised 94 percent of the water-based chemicals used in 1995. The primary chemicals in CCA are highly toxic but, during the treatment process, they become tightly bonded to the wood. Manufacturers maintain that CCA-treated wood is the most effective wood preservative known today and is safe for most applications when properly treated and used as directed.

In response to manufacturing and disposal safety concerns, the wood preserving industry has recently developed copper-based alternatives to CCA that eliminate its most toxic components, arsenic and chromium. Other water-based chemicals are used in pressure-treating ammoniacal copper zinc arsenate, ammoniacal copper quaternary compound, and several others, including borate. Some express concern that these CCA alternatives may cost more and may not work as well as CCA. Efficacy is a concern not only for financial reasons, but also for waste management reasons, since durability is a key strategy in minimizing waste.

**Disposal.** The federal government has various regulations that control disposal of treated wood in order to prevent the release of hazardous chemicals into the environment. The EPA has developed the Toxic Characteristic Leaching Procedure (TCLP) (40 CFR 261.24) to set threshold levels for toxicity of 40 different chemicals, including chromium and arsenic. If measured leaching from a waste product exceeds the TCLP limits, it is considered a “hazardous waste” and regulated according to state and federal laws (HAR 11-260 and 40 CFR 260, respectively).

Creosote-treated wood and penta-treated wood consistently pass TCLP tests, and the wood products are not defined as hazardous waste. CCA-treated and other arsenic-treated wood products are exempted from the regulation in 40 CFR 261.4(b)(9), but at least one test obtained by *Environmental Building News* (EBN) shows that CCA-treated wood fails the test for arsenic and only barely passes it for chromium. The ash from treated wood that has been burned, which contains concentrated levels of the treatment chemicals, fails the TCLP testing and is not exempt.

At present, landfilling of CCA-treated wood is the only environmentally acceptable disposal option. In Hawai‘i, large quantities of CCA-treated wood are coming out of service now and in the foreseeable future. In an effort to keep bulky C&D waste out of expensive MSW landfills, it is diverted to less expensive, unlined C&D landfills. According to *EBN*, these unlined landfills may not adequately protect area groundwater from contaminants in CCA-treated wood.

A number of researchers are working to chemically remove CCA from wood, but have had only moderate success so far. Other research is being done on recycling treated wood directly into other products without removing the treatment chemicals. Perhaps even more promising is the use of treated-wood fiber in fiber-cement products, which are gaining popularity in the construction industry.



**Current Practices in Hawai'i.** Given disposal-related and other safety concerns, some in the industry foresee the eventual phase-out of CCA-treated wood in favor of preservative treatments that offer better disposal options.<sup>24</sup> These concerns are apparently driving many contractors on O'ahu to switch from CCA to borate treated wood.

Not all islands are following suit. This may be because the efficacy of alternative treatments has not been fully established. For example, although not required by law or code, most projects on Maui specify the use of CCA-treated wood that is certified under the "Hawai'i Use Only" program.<sup>25</sup>

Because treated wood is very expensive, contractors on all islands save and use scraps of new treated wood. Used treated wood often cannot be reused by contractors, however, because it does not meet code requirements for new construction. Many contractors give the used wood scraps away to workers or the public; others do not because of concerns about potential liability. Most demolition wood waste is disposed at landfills (i.e., C&D landfills on O'ahu and Maui, MSW landfills on Kaua'i and Hawai'i).

### 3.4.3 Model Programs and Approaches

Successful programs on the mainland and in Hawai'i demonstrate the economic and environmental benefit of recovering, recycling, and re-using C&D waste stream components. The models selected for discussion have shown prior success in Hawai'i or are adaptable to Hawai'i. They are described in the following paragraphs and in Table 3-12. Appendix IV.2 describes these programs in more detail and discusses keys to their success and potential applicability to Hawai'i.

*Green Builder Programs.* Well-designed green building programs provide specific actions for C&D waste management, as well as for other environmental goals. They provide an umbrella for contractor/realtor/public technical assistance, education, recognition, and publicity; and facilitate relationship-building between industry and government.

*Liholani Golf Villas Job-Site Recycling Pilot Program.* This pilot job-site recycling project on Maui demonstrated to the builder community both the viability and financial advantages of job-site recycling.

*Private Re-Stores (Kauai Habitat for Humanity Re-Store and Portland Rebuilding Center).* These illustrate highly effective vehicles for finding alternative uses for materials that would otherwise be landfilled. Both programs leverage widespread community support and participation.

*Los Angeles Recycling Specifications for Public Works Projects.* Public works projects in Los Angeles require both a solid waste management plan and recycling of C&D waste to the greatest extent feasible. After nearly five years, the program has been well received and accepted by contractors, and several case studies document highly successful projects.

*Washington State Recycling Association's Construction, Demolition and Landclearing (CDL) Council.* A non-regulatory consortium for sharing public and private resources, the CDL Council addresses a full range of issues related to increasing C&D recovery in the state, primarily by means of education and policy advocacy.

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<sup>24</sup> CCA-treated wood is now outlawed in several European countries.

<sup>25</sup> "Hawai'i Use Only" is an older, locally accepted standard for CCA-treated wood, which is used primarily on Maui. More widely used in Hawai'i and elsewhere are standards issued by the American Wood Preservers Association. For CCA-treated wood, these standards are C2 for lumber and C9 for plywood.

**Table 3-12: Model Programs**

|   |  |
|---|--|
| <p><b>Program(s) Build a Better Kitsap and similar green builder programs; ConstructionWorks, Public Works Department of King County, Washington</b></p> <p><b>Program Type</b> Green Builder Programs</p>  |  |
| <p><b>Key Goals and Attributes</b></p> <p>Voluntary, builder-driven, incentive-based. Emerging consumer and lending community interest and support.</p> <p>Can include multiple environmental goals, including waste reduction and recycling. Provides marketing edge and improved public relations for participating builders.</p> <p>Industry and public education component. Expandable, adaptable.</p>                                  |  |
| <p><b>Program Liholani Villas pilot job-site recycling, conducted by the Maui Recycling Group</b></p> <p><b>Program Type</b> Job-Site Recycling Demonstration</p>   |  |
| <p><b>Key Goals and Attributes</b></p> <p>Documented economic savings for job-site recycling program on actual construction project on Maui. Focused on what could be done within the existing recycling infrastructure.</p> <p>Proven success at obtaining building community buy-in. Paved the way for follow-on, larger scale project.</p> <p>Paved the way for including job-site recycling information in building permit package.</p> |  |
| <p><b>Program(s) The Kauai Habitat for Humanity Re-Store; Portland Rebuilding Center of Portland, Oregon</b></p> <p><b>Program Type</b> Private Re-Stores</p>   |  |
| <p><b>Key Goals and Attributes</b></p> <p>Reduces waste sent to the landfill by providing mechanism for reuse of construction materials. Large volunteer involvement (pick-up, sorting, storage, refurbishment).</p> <p>Wide community support and participation. Large warehouse for storage and computer inventory.</p>   |  |
| <p><b>Program Waste Management Plans as a Requirement for Public Projects, Los Angeles Public Works Department</b></p> <p><b>Program Type</b> Regulatory and Policy Model</p>   |  |
| <p><b>Key Goals and Attributes</b></p> <p>Requires a Solid Resource Management Plan for Public Works projects. Requires summary of solid waste disposal and diversion with request for payment.</p> <p>Requires recycling to the greatest extent feasible. Demonstrates success in reducing waste (Appendix IV.2, case studies for Playa Vista and STAPLES Center).</p>   |  |

**Table 3-12: Model Programs** *(continued)*

|   |  |  |
|---|--|--|
| <b>Program</b>                                | <b>Construction, Demolition, and Landclearing Council<br/>Washington State Recycling Association</b> |  |
| <b>Program Type</b>                           | Non-Regulatory Policy Model  |  |
| <b>Key Goals and Attributes</b>               |  |  |
| Non-regulatory.                               | Facilitates statewide consistency and communication.   |  |
| Diverse public and private sector membership. | Leverages public and private resources through information sharing and coordination.                 |  |

### 3.4.4 Observations and Analysis

Although data to precisely characterize C&D waste in Hawai'i do not currently exist, national research; visual observations, including composition research; and reports from construction, recycling, and disposal entities lead to the following two conclusions:

- C&D makes up a significant proportion of the waste stream in Hawai'i.
- The C&D waste stream includes many recoverable items with potential market value.

Thus, efforts should be made to recover these potentially marketable items.

The C&D waste stream is unique in that it is really a package of waste streams. Each component of the package has its own characteristics affecting how easy or how difficult it is to recover the material, including volume, predictability of flow, chemical and physical composition, market value, and level of potential contamination. In this section, we have identified some high potential C&D waste materials; materials that are generally considered worth recovering.

In Hawai'i, some high potential C&D waste materials are being recovered from the C&D waste stream and some are not. Strong end use markets or outlets exist for metals, growing outlets exist for concrete and asphalt rubble, limited end use markets exist for clean wood and drywall, and no end use markets exist for asphalt roofing or treated wood. Construction wood is an example of a high volume material that is predictably generated and typically can be recycled for a variety of uses. Yet most construction wood used in Hawai'i is chemically treated, making recycling and possibly disposal problematic.

Where materials are not recovered, it is because local end use markets have not been developed, and generally, with the exception of metals, distant end use markets do not offer enough value to offset transportation costs.<sup>26</sup> With few local end use markets for recycled or reused materials, investments in facilities and equipment to handle, process, and transport such materials have been extremely limited. The existing C&D materials recovery infrastructure in Hawai'i is therefore weak. Thus, efforts should be made to identify mechanisms to strengthen local markets and the C&D materials recovery infrastructure.

To enhance recovery of C&D materials in Hawai'i, it will be important to remove barriers to recovering most high-potential components of C&D material. This translates to identifying means of strengthening existing limited market opportunities, and developing market opportunities for materials that are not recovered at this time. This will not merely facilitate recovery of individual

<sup>26</sup> Celia L. Hildebrand. August 1997. *Challenges in Island Recycling*.

components of the C&D waste stream, but will facilitate recovery of the entire C&D package. This is important because for generators, the greater the percentage of the C&D waste stream that can be handled in the same way, the more cost effective it is for them. Training, material handling, procurement, and transportation are then simpler to plan and implement.

Contractors report a uniform belief that recycling takes more time. This is likely because they generally treat recycling as an add-on. Despite this, contractors surveyed in our research also report receptivity to the idea of recycling and willingness to implement waste reduction methods. This attitude appears to be the result of several educational initiatives. In many of these initiatives, case studies have been used to show that, in fact, recycling does not have to be burdensome or treated as an add-on. Additional case studies can provide information about the true cost of waste management and demonstrate positive, credible results. It will be particularly important for the state to provide evidence that C&D recovery, both recycling and reuse, works and is a worthwhile undertaking.

Contractors also indicated receptivity to and interest in technical assistance. As much as possible, technical assistance should be targeted at large-volume generators. Currently, most C&D waste in Hawai'i is produced through demolition activities. Because of this, near term efforts should include developing cost-effective solutions to processing or separating co-mingled materials. Technical assistance should provide demolition contractors with the capacity to build on their existing efforts to reduce waste, while identifying what needs to be done to facilitate value-added recovery of demolition waste.

Contractors also report interest in regulatory initiatives to help level the playing field. The latter is unexpected given the industry's resistance to increased regulation. Given this potential resistance from the industry-at-large, it will be important to develop regulatory elements in close partnership with the industry, such as through trade organizations including the Building Industry Association (BIA) and the General Contractors' Association (GCA), and to couple new regulations with education and incentives.

Strengthening the C&D recovery infrastructure through business, regulatory, and policy initiatives will create an environment where C&D recovery helps contractors be more competitive. Demonstrations and model programs will show them that it can be done. Targeted industry education and technical assistance will show them how.

The solutions to C&D materials recovery reside, therefore, in both the private and public sector. For that reason, the most effective route to significant C&D recovery will be based on private/public partnerships.

Further, the overall approach taken should be flexible. This is important because the conditions in which C&D waste materials are generated can change dramatically, and often do. Existing conditions captured in this section represent only a snapshot in time. When developing programs, planners should keep in mind that C&D waste varies with the level and type of construction activity, which in turn depends on a frequently unpredictable state and global economy. For example, the current emphasis on demolition over new construction can be directly correlated to economic conditions as well as the age of the local built environment.

The nature of C&D waste also changes as construction methods change. For example, the recent trend in Hawai'i toward the increased use of steel in construction will also lead to more steel, which is currently more marketable, and less wood, which is currently less marketable due to the presence of chemical treatments in the C&D waste stream. In addition, the market value of C&D

waste materials tends to fluctuate, which can have significant impacts on the ability and willingness of generators to recover those materials.

For all these reasons, it is difficult to guarantee that any specific measure will by itself result in the level of recovery the state is seeking. However, an approach that addresses multiple aspects of C&D waste generation and recovery can reasonably be expected to produce significant results.

Therefore, tangible gains in recovery will best be assured by a combination of independent but compatible strategies that focus on high potential C&D waste materials and help to achieve the following:

1. Encourage diversion of these materials by the construction industry.
2. Support growth and development of businesses recovering these materials.
3. Discourage disposal of these materials.
4. Use government to take a leadership role in modeling best practices and creating partnerships to promote C&D materials recovery.
5. Conduct further study of treated wood.

Specific recommendations in these five areas are discussed in Chapter 4.

## **3.5 Market Development**

### **3.5.1 Introduction**

This section analyzes the current markets for three recyclable materials: compost, glass and paper. It also assesses the existing recycling community's need for assistance in expanding those markets. Hawai'i's island economy is a major constraint on the expansion of recycling markets and must be fully recognized in the market development program. This section, and the accompanying recommendations in Chapter 4, provides a strategic direction for initiatives by the state to strengthen and expand markets for the three materials investigated.

Each material is addressed separately because market conditions and strategies differ greatly. The recommendations include development of predominately local markets, but where appropriate, include efforts to facilitate overseas trade in the materials. This section also proposes a state market development administrative structure to help develop markets for the three materials. This structure can be applied to other materials in the future.

#### **3.5.1.1 Methodology and Sources**

The SWAC selected market development for recyclable materials as one of the priority areas to be developed in the ISWM Plan. The DOH and DBEDT, in consultation with the SWAC, defined the scope of the market development element and selected the three materials – glass, compost, and paper – for in-depth analysis.

To ensure that the recommendations for strengthening the markets for recycled materials represented a reasonable response to the specific problems and market barriers facing Hawai'i's fledgling recycling industry, the following tasks were undertaken:

- Examine the most current data on volumes of recycled materials being recovered and gather estimates from local industry on the percent increase anticipated over the next four years.
- Interview state employees and industry representatives to gain an understanding of the previous market development activities.
- Determine existing processing capacity on each island and at each processing facility. This information was gathered through discussions with industry members.
- Interview owners of recycling processors and end use manufacturers to determine the strength, vulnerability, and value of their current markets; problems that restrict their ability to penetrate those markets; and views on alternative market opportunities.
- Conduct focus group discussions with businesses involved in the processing and selling of recycled glass, compost, and paper. Discussions were designed to test industry reaction to potential market strategies and opportunities. These discussions were imperative to assure that suggestions made in this report address current challenges facing the industry in Hawai'i.
- Conduct focus group discussions with the County Recycling Coordinators to review information put forth in industry focus group discussions, and obtain their input on public

responsibility in assisting local recycling companies to strengthen and expand their markets.

All the information gathered through the tasks above were reviewed with material-specific recycling experts for their analysis on additional steps that may be taken to strengthen markets.

The sections that follow include estimates of costs for different new material processing scenarios. These are derived from interviews with operators in comparable businesses on the U.S. mainland. The costs provided include those for capital amortization and full-scale operations. Pre-development costs are not included.

The information reflects the current U.S. mainland costs of doing business. Operational costs in Hawai'i are estimated as 4 to 6 percent higher, and vary among islands due to the following factors:

- Shipping expenses for material and equipment.
- Land costs.
- Taxes.
- Labor rates.

### **3.5.1.2 Organization**

The market development section analyzes Hawai'i's current level of recovery, processing and marketing for compost, glass and paper. It describes new opportunities for markets including strategies for action. It provides an analysis of the barriers to increased market capacity, highlighting areas that the state and recycling industry can productively address.

Following the material-specific sections, the report provides a framework to address the need for a statewide market development administration. Recommendations for actions for the specific materials and for a statewide framework are included in Chapter 4 of the ISWM Plan.

## **3.5.2 Compost Market Development**

Green waste, which can be processed into compost or mulch, is the primary organic material being recovered from the Hawai'i waste stream and processed for diversion. Even so, it offers the greatest potential for further increases in diversion. Other recovered organics, including food waste, animal waste and biosolids, should also be examined as part of an integrated organic composting system. These materials can add valuable nutrients to the compost product.

In this section the term "compost" is used to refer to a wide range of soil amendment and cover products produced from organic waste streams. These products exist on a broad and continuous spectrum from products more properly termed "mulch" – a partly decomposed cover material lacking significant soil nutrients – to fully mature and nutrient-enhanced compost that can be used as a soil builder and fertilizer. The appropriate product "specification," including nutrient content, maturity of decomposition, and particle size, is dependent on its intended use.

In order to effectively expand new markets and increase diversion, it is essential to simultaneously increase the quantity of material diverted and development of markets. In Hawai'i, the expansion of green waste compost operations is limited by the lack of supply of

material and a shortage of high-value markets. Thus, in order to increase overall diversion of green waste, market development and increased collection must go hand in hand.

**3.5.2.1 Current Volumes of Composted Organics**

Most of the compost sold locally is produced from green waste. Wood waste is added as a source of carbon in most operations. One operation on Maui, EKO Compost, combines green waste with biosolids. In 1999, EKO composted over 17,500 tons of biosolids. This practice will expand when the C&C enters into a contract for a similar operation on O’ahu. (Because biosolids is not included in the EPA guideline of municipal solid waste, we did not include biosolids tonnages in this report.)

Unisyn, a company on O’ahu that closed in late 1999, produced compost from food waste. On Maui, Ma’ālaea Garden and Maui Composting Company have processed approximately 195 tons of food waste in 1999. Currently there is little composting of food waste anticipated on the islands; some food waste is being diverted to animal feed.

Table 3-13 provides a summary of the volumes of recovered green and wood waste currently composted in the state according to 1999 diversion numbers from the DOH. The pounds per capita portray the relative diversion rates between counties. Those with the lowest current diversion have the greatest need to increase market capacity, which will help to encourage increased diversion.

**Table 3-13:  
Diversion of Green Waste and Wood Waste in Hawai’i (1999)**

| Annual Diversion (tons)                 |        |                     |                     |         |
|---|--------|---------------------|---------------------|---------|
| Statewide                               | O’ahu  | Kaua’i              | Maui                | Hawai’i |
| 68,568                                  | 32,699 | 11,336 <sup>1</sup> | 20,537 <sup>2</sup> | 3,995   |
| Pounds per Capita (de facto population) |        |                     |                     |         |
| 104                                     | 71     | 313                 | 253                 | 45      |

NOTES: <sup>1</sup> Kaua’i green waste diversion is an estimate since quantities are not weighed.  
<sup>2</sup> Maui also composted 17,540 tons of biosolids.

**3.5.2.2 Projections for Potential Future Volumes of Green Waste**

Projections from local recycling coordinators and compost facility managers indicate the volume of organics being processed into compost products will grow exponentially over the next three to five years. O’ahu has experienced a 30 percent growth of green waste composting over the past year, and projections by facilities operators indicate a doubling of the volume of green waste over the next three years.

In addition to the growth in green waste composting on O’ahu, the C&C will soon be implementing curbside collection of green waste and a composting program that incorporates biosolids. It is anticipated that this will generate an additional 100 tons per day of compost for the local market; more than triple the volume of compost now entering the markets on O’ahu.



Hawai'i County is beginning its green waste composting program and anticipates a significant response from residents and a major increase in volume of compost. The county is not able to provide an estimate at the time of this report.

Kaua'i County officials are making plans for major growth in green waste composting. Kaua'i is considering the inclusion of biosolids as an additional component of their organic composting activities. Because the programs are in preliminary stages, reliable estimates of volume cannot be generated at this time.

Maui County has a mature composting infrastructure on the island of Maui. Although compost operators are currently processing over 20,000 tons per year, a significant volume is reported to continue to flow to the landfill. Local composting operators believe additional volumes of 20 to 30 percent per year could be diverted into compost markets, largely due to the amount of green waste not yet recovered.

The estimation of potential volumes that could be recovered in the state is difficult since current waste composition studies do not exist for all islands. In order to provide an estimate, the per-person generation of green waste can be calculated for the C&C, and then a feasible recovery rate can be projected based on programs elsewhere. These programs assume in-place collection systems and mature markets.

As noted above, Hawai'i's generation of green waste is much greater than the national average on a per person per year basis. Based on composition statistics, the U.S. generates (disposed plus diverted) 212 pounds of green waste per person per year with a diversion rate of 41 percent.<sup>27</sup> A community with a very mature diversion rate for green waste is the Portland, Oregon, three-county metro area. That community generates green waste at a rate of 285 pounds per person per year with a diversion rate of 78 percent.<sup>28</sup>

According to composition and diversion statistics for the C&C, Hawai'i generates approximately 389 pounds of green waste per person per year with an approximate diversion rate of 18 percent.<sup>29</sup> Extrapolated to the whole state, Hawai'i's green waste generation could be approximately 240,000 tons per year. Using national and Oregon diversion rates as lower and upper limits for potential diversion, respectively, a fully developed system in Hawai'i could divert between 98,000 and 187,000 tons per year of green waste. This compares with a 1998 diversion of 68,568 tons. Thus, Hawai'i's diversion of green waste could increase between 140 and 270 percent over the current rate. The higher diversion rate assumes widespread curbside collection systems and mature markets.

### **3.5.2.3 Current Composting Operations**

There has been significant turnover in composting businesses in Hawai'i. This is, in part, an outward manifestation of the difficulties facility operators face in producing material that meets market needs at a competitive price.

<sup>27</sup> EPA. July 1999. *Characterization of Municipal Solid Waste in the United States: 1998 Update*. Prepared by Franklin Associates, Ltd., pp. 30, 142.

<sup>28</sup> Oregon Department of Environmental Quality. *1997 Oregon Material Recovery Survey Report*.

<sup>29</sup> R.M. Towill. 1999. *Oahu Municipal Refuse Disposal Alternatives Study, Waste Composition Study*. Prepared for the City and County of Honolulu and the State of Hawai'i Department of Health, 1998-1999 waste generation, disposal and diversion estimates.

As of September 1999, the following major composting facilities were in operation in Hawai'i and accepting green waste or other organics from third-party generators.

**Table 3-14:  
Primary Composting Facilities in Hawai'i**

| Location                      | Materials Processed        | Annual Volume (tons) |
|-------------------------------|----------------------------|----------------------|
| <b>Maui</b>                   |                            |                      |
| EKO Compost                   | Green Waste                | 19,000               |
| Maui Compost                  | Green Waste, Food Waste    | 1,800                |
| Campaign Recycle Maui         | Green Waste                | 6,700                |
| <b>Kaua'i</b>                 |                            |                      |
| Kaua'i County Recycling       | Green Waste                | 10,000               |
| Kaua'i Nursery & Landscaping  | Green Waste                | 1,200                |
| <b>O'ahu</b>                  |                            |                      |
| Hawaiian Earth Products       | Green Waste, Animal Manure | 17,000               |
| Kalaheo Green Waste Recycling | Green Waste, Wood          | 12,000               |
| <b>Hawai'i</b>                |                            |                      |
| Renew Hawai'i                 | Green Waste                | 1,200                |

### 3.5.2.4 Current Markets for Compost Products

A significant fraction of recovered green waste is processed into mulch and other low value products. Only a small fraction of green waste is composted and sold as higher value soil amendments. The bulk sale of compost as soil amendment occurs mostly in private developments, including resorts and golf courses. Public parks and public golf courses are financially constrained, and as a result, only a small fraction of the soil amendment compost is sold to public agencies.

The retail market, which sells bagged compost to individual households for use in home gardens, is relatively robust in Hawai'i. However, compost products from the U.S. mainland dominate this market. Mainland compost products are priced competitively and have a strong brand loyalty. The price of bagged U.S. mainland compost ranges from \$7.75 per 3 cubic feet for mulch to \$14 per 3 cubic feet for quality soil amendment compost. This price translates to approximately \$32 per ton<sup>30</sup> for mulch and \$57 per ton for soil amendment. The cost of producing quality compost locally is between \$35 and \$40 per ton, and the current solid waste tipping fees in Hawai'i range from \$35 to \$67.75 per ton, which can be considered an avoided cost. These dollar figures are approximate, and may not reflect all potential costs or revenues, but they strongly indicate that local companies can compete with compost products produced on the U.S. mainland.

O'ahu and Maui have active island-wide compost industries that are supported by regulations that require generators to divert green waste from landfills and/or contracts from the counties. These

<sup>30</sup> A conversion factor of 900 pounds per cubic yard for finished compost was used to convert cubic feet to tons.

industries sell most of their product in bulk to local contractors. Kaua'i and Hawai'i Counties do not have major composting industries. The bulk of green waste collected by these counties is distributed as mulch to residential users.

The agricultural sector has not proven to be a significant market for compost. Given the tight operating margins of the farmers, current compost facility operators question whether the economics of selling compost to the farming community is viable.

The high-end market currently consists of landscape architects and contractors working on resorts, golf courses and new developments. Landscape architects appear to have a greater appreciation of the benefits of using compost as a soil amendment. However, there are several significant reasons that local compost product has not gained greater penetration in this market, as follows:

The local compost industry markets a wide range of products under the name of compost. No clear standards have been developed to differentiate and guarantee a level of product quality required by landscape architects.

Compost is frequently specified for a project; however, the contractor in-charge often ignores the request.

Hawai'i has a significant economic sector producing nursery products, flowers and other decorative plants for export to the U.S. mainland and other countries. Although the members of this industry represent a significant market for compost, there has been no market penetration into it.

### **3.5.2.5 Barriers to Wider Use of Local Compost in High-End Markets**

Several barriers to greater penetration of the organics markets have been identified. These barriers include the following:

- **Perception of added costs.** There is a perception that greater yield and lower operating costs will not offset additional costs of using compost as soil amendment.
- **Low agricultural profit margin.** The agricultural community generally operates on thin profit margins and considers it too costly to incorporate green waste and/or animal waste into producing a nutrient and nitrogen rich soil amendment.
- **Public park maintenance.** The level of maintenance carried out at public parks would not provide a significant market opportunity for locally produced compost.
- **Brand loyalty to imported products.** Local consumers have developed a strong brand loyalty for compost imported from the U.S. mainland. Mass merchandising, combined with low freight costs, provides mainland compost a significant advantage against locally produced products.
- **Lack of research on locally produced product.** Very little research has been carried out locally to demonstrate the intrinsic value of compost.
- **Regulatory barriers.** No regulations exist defining processing of animal waste as compost. However, when combining green waste with animal waste, DOH regulations (Hawai'i Administrative Rules [HAR] Title 11-58.1) apply. A few compost operators have identified these regulations as onerous and a barrier to producing new products.

- **Lack of product differentiation and quality standards.** A wide range of products is sold under the name “compost.” No differentiation is made concerning the mix of organic materials incorporated into the products. Similarly, there is no differentiation concerning the level of processing carried out among the composted products being sold. This lack of agreed-upon quality standards for product content, contaminant level and nutrient standards causes sufficient uncertainty and lack of confidence in the product to discourage purchase.
- **Exacting standards of specialty markets.** Various potential end markets including the nurserymen’s association and the flower growers associations, have exacting standards. Little research has been conducted on these standards to define the organic materials and level of processing required meeting them.
- **Technical nature of high-end compost production.** Producing quality compost material is complex and technical. Many compost operators lack in-depth technical expertise. The UH Cooperative Extension program provides valuable technical expertise through their extension program. However, recent reductions in UH staff have reduced the access to this expertise.
- **Lack of use in public projects.** Public agencies do not often specify locally produced compost for highways, parks, golf courses, schools and public facility projects. When they do, the applicator may use a different product and project inspectors do not enforce use of local compost.

#### **3.5.2.6 New or Expanded Market Opportunities for Compost Products**

Compost provides numerous benefits ideal for enhancing the soils in Hawai‘i: it has the ability to improve the properties of most soils by improving the soil structure and moisture retention, stabilizing the pH balance, and suppressing soil born pathogens. Mature compost can significantly enhance the thin soil conditions existing in many parts of Hawai‘i. Mature compost, free from most contaminants, can be sold as a high-end soil amendment for resorts, other landscape applications, and agriculture. However, to date, locally produced compost has not made significant penetration into agricultural or residential markets. In order to do so, clear standards and consistent quality will be required by the organics processing industry.

A significant quantity of compost and other soil amendments are imported to all islands. These imports are primarily in 20 to 50 pound bags that are destined for residential users. Hawaiian Earth Products on O‘ahu has experimented with bagging compost for sale to residential markets; however, they are unable to compete on price with large U.S. mainland producers.

A serious effort to develop high-value markets for compost products will require trials of compost products in various applications, and the development of agreed upon product standards. This should be undertaken in cooperation with the Hawai‘i Chapter of the American Society of Landscape Architects.

Following are two specific market opportunities for higher-end, or medium-to-higher end, compost products that could be developed in Hawai‘i:

- Compost usage for commercial and residential landscaping.
- Remediation of marginal agricultural soils with compost.

The first has been tapped by local compost producers, but could be expanded through increased attention to standards for, and promotion of higher-end products. The second opportunity would require overcoming some difficult economics for local agriculture, but, if successful, could greatly enhance agricultural productivity in Hawai'i.

### **Compost Usage for Commercial and Residential Landscaping**

A major market opportunity exists with the large number of resorts and other public buildings seeking to provide lush environments on the thin soil base existing throughout the Islands. Compost used in bedding for shrubs and flowers improves the physical properties of the soil, which in turn strengthens the root structure of the plants. Compost also adds organic nutrient and provides moisture retention properties.

On O'ahu and Maui, this market is supplied to a large degree by locally produced compost. However, Hawai'i and Kaua'i Counties' needs are met primarily by imported compost. Although there are a number of small producers in Hawai'i and Kaua'i Counties, they are unable to meet the demand and in some cases the specifications required by landscape architects and contractors.

**Economic Feasibility.** Compost matured to the quality of plant bedding for commercial applications and home gardening can be produced for \$48 to \$54 per ton. The market price for bedding compost is \$14 for 3 cubic yard feed bags, or \$57 per ton in bulk sales. This market price is \$3 to \$9 per ton above the costs of production. Incorporating a tipping fee for green waste into the equation, which provides an additional source of revenue for the operator, would provide a significant margin to support marketing and other requirements to increase the market for compost. Currently, some Hawai'i compost businesses do charge a tipping fee to accept green waste.

**Role of the State.** The state should assume the role of catalyst to help develop market confidence in using compost as a plant bedding material. The state should play a central role in carrying out all the tasks identified above.

**Implementation Approach.** The state can play an instrumental role in developing opportunities to expand usage of compost in these applications through a three-component approach, as follows:

1. Develop a system for quality assurance for compost use as plant bedding material:
  - Develop quality specifications for Hawai'i for compost use in plant bedding. Convene a working group of interested professionals, including compost operators, nursery operators, tropical agriculture scientists, and landscape architects, to provide input to quality specifications.
  - Develop procedures and protocols for sampling compost to assure it meets the quality specifications.
2. Promote the use of compost as plant bedding material to potential end-users:
  - Prepare and distribute manuals and videos on the benefits of compost for bedding plants based on existing work that has been done elsewhere.
  - Continue to convene annual workshops with landscape architects and hotel/resort owners to promote the benefits of compost.
  - Carry out individual visits with landscape architects and resort managers who indicate an interest in expanding their use of compost to enrich their soils.

- Conduct and promote the results of side-by-side trials in Hawai'i, comparing plant growth using compost to normal practice without compost.
3. Assist compost operators to develop and exploit an expanded market:
    - Provide technical assistance to compost facilities operators, especially in Kaua'i and Hawai'i Counties, to help them produce compost to quality specifications.
    - Investigate the utility of cooperatives that can share the cost of operation to bag and market compost to residential markets. Assist in their creation if merited.

### **Remediation of Marginal Soils with Compost**

Upgrading marginal soils for various crop plantings, and restoring the structure and nutrient value of soils formerly used for sugar cane production, can provide a significant market opportunity throughout Hawai'i.

Agricultural soils that have been depleted of nutritional value can again become productive through the application of compost. Compost provides microbes, aeration and nutritional value allowing for the on-going nutrient cycle to be restored. Applied at a rate of 1 to 3 inches for a period of three years compost can restore long-term soil productivity much more effectively than pelletized fertilizers.

***Economic Feasibility.*** The economics of land restoration is normally calculated as the overall increase in the value of the acreage being transformed from unproductive land to a state ready for crop production. Typically, compost applied to fields for this purpose sells for \$45 to \$50 per ton.

Processing costs for compost to the specifications required for soil remediation typically range between \$34 and \$40 per ton. Costs for land applications will increase the total cost to approximately \$48 to \$52 per ton. Incorporating revenue from the tipping fee into the equation, this application could provide a profitable market for a relatively high quality, mature compost.

Compost products must compete with dissolved or pelletized fertilizers, which can be applied for considerably less expense. However, the benefits of compost in rebuilding soils can outweigh the initial cost, especially for high-value crops. However, this case must be made for each farmer in order to effectively penetrate this potential high-volume market.

***Role of the State.*** Similar to other market initiatives, the state should take the lead responsibility in all of the above tasks. The state can enter the market as a neutral third party, and can help secure the trust and respect of both the market place and the compost producers.

***Implementation Approach.*** The state could play two primary roles in developing opportunities to use compost for soil remediation, as follows:

1. Demonstrate the value of compost for remediation of depleted soils:
  - Compile documentation on the benefits of compost in restoring soils. This information is available through existing literature and through the U.S. Composting Council.
  - Conduct pilot project to collect data on the production benefits of compost. Under such a scheme, fields would plant identical crops with one half of the field incorporating compost, the other being the control.

2. Promote the value of compost to potential end-users:
  - Publicize the results from the pilots in trade journals and newsletters that reach most of the farmers in Hawai'i.
  - Conduct a seminar for compost operators to familiarize them with the benefits of compost in soil restoration and the technical aspects of producing compost to proper specifications.

### 3.5.2.7 Observations and Analysis

#### Higher Value Opportunities for Composted Products

Compost can be used in a variety of applications. The following chart represents the various ranges of uses for compost and the recovery rates for each in 1999.

**Table 3-15:  
Compost Applications in Hawai'i**

| Value  | End Uses  | Percent of Total Recovered |
|--------|---|----------------------------|
| High   | Soil amendment for finished turf (e.g., golf course, resorts)<br>Soil amendment for commercial landscape developments<br>Soil amendment for commercial crop and nursery products<br>Consumers market for family gardens | 15                         |
| Medium | Soil amendment for land remediation<br>Soil amendment for non-food crop plants and trees  | 20                         |
| Low    | Mulch product<br>Soil amendment for non-food crops and trees  | 65                         |
| Lowest | Landfill cover material   | Not available              |

Currently, over 80 percent of the compost in Hawai'i is produced for and sold into the low to medium value market. The additional costs in capital and operating expenses incurred in producing a composted product that achieves the necessary quality for the higher value markets are warranted if these markets can be developed.

To achieve greater penetration in the high value markets requires a product that consistently meets standards established by the industry or market. Steps necessary to produce a higher quality product will vary among existing composting operations. The following are steps required to develop and assure high quality products:

1. Contaminant removal.
2. Size consistency through screening.
3. Strict controls in the mix of organic materials incorporated into the compost, with the addition of nitrogen and phosphate to carbon rich feedstock, such as green waste.
4. Temperature and moisture control to assure the organics are composted evenly throughout.

5. Periodic turning of piles, or forcing of air into the piles, to assure they do not go anaerobic and mature unevenly throughout the pile.

The major capital costs of a composting facility are in the land, buildings, and equipment. The major operating costs are in the labor, utilities, and transportation. The incremental costs to produce quality material are marginal compared to the higher price paid for the composted material. This is presuming the higher value markets can be penetrated.

A typical composting operation can produce a low value mulch product for \$12 to \$14 per cubic yard. Adding the proper turning and screening equipment to produce a higher quality product will increase the operating costs of production to \$34 to \$54 per cubic yard. However, the profit margin (i.e., market price minus production cost) can be increased if an operator goes from producing low to high-grade compost. Table 3-16 illustrates the production costs and market value for low and high-grade compost.

**Table 3-16:  
Compost Sales Margins**

| <b>Compost Grade</b> | <b>Production Cost<br/>(per cubic yard)</b> | <b>Market Price<br/>(per cubic yard)</b> |
|----------------------|---|--|
| Low Grade Mulch      | \$12 - \$14                                 | \$20 - \$28                              |
| High Grade Compost   | \$34 - \$54                                 | \$45 - \$57                              |

Many opportunities exist for compost products in new or existing high-value markets. The following opportunities may be promising in Hawai'i:

- Commercial and residential landscaping.
- Remediation of marginal agricultural soils.

In both cases, the state can play a central role as a catalyst by providing research, coordinating industry input, providing technical assistance, developing protocols for and monitoring product tests, distributing promotional materials to publicize test results, conducting one-on-one promotional visits to potential users, and providing third-party validation for product introductions.

A major restraint for local composting operators to produce a consistent higher quality compost product is the lack of available technical assistance. Producing consistent quality material is complex, requiring a high level of understanding of both the chemical and biological aspects of composting. Support available from UH Cooperative Extension has recently been reduced because of staff reductions, and is not easily accessible to compost operators.

**Confusion and Lack of Confidence in the Market Place**

The local compost industry is causing confusion by selling a broad range of products under a single name, "compost." Guidelines that differentiate compost products must be developed and tailored to meet the needs of the local markets in Hawai'i.

There are two types of standards typically adopted for compost producers and the local compost market. The first are health and safety standards, and the second are quality standards. Health and safety standards set the maximum level of harmful contamination that will be allowed in



compost. These standards may be risk-based and include such common contaminants as heavy metals—lead, cadmium, and mercury—and pathogens or pesticides. The Association of Plant Food Control Officers, an organization of fertilizer control officials, creates non-binding rules in order to establish consistency between states. U.S. EPA also defines standards for heavy metals in biosolids, and Canada has a standard for trace metals in fertilizers. Washington State and Texas have established state compost safety standards using one or the other of these national models.

Quality standards are developed by and for the market place. These standards define a range of product attributes and characteristics that differentiate one product from another. Quality standards not only assure the compost meets or exceeds health and safety standards, but also classifies and rates compost products based on four parameters: physical, inorganic chemical, organic chemical, and biological. The parameters in the standard may include, as follows:

- pH
- Soluble salts
- Nutrient content (N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O, Ca, Mg)<sup>31</sup>
- Water-holding capacity
- Bulk density
- Moisture content
- Organic matter content
- Particle size
- Growth screening
- Maturity or stability

Quality standards are designed to give confidence that consumers are buying products that meet the nutrient needs of their niche market. The standards may either be required for a product sold under a certain label or category, or disclosure of established parameters may be required.

Numerous states can provide Hawai'i with quality standards for compost products, including Florida, Washington and Oregon. Largely due to regional and local market variations, the U.S. Composting Council from Amherst, Ohio has been unable to develop a set of national quality standards, but they are developing a "Quality Assurance" program. Under an EPA grant, they have convened a national forum to develop consensus on principles of testing and disclosure. Under this program, each compost operator defines the feedstock of material composted and the percentage of contaminants and other additives.

Quality standards can either be developed by the compost industry as guidelines for both the producers and consumers, or through the regulatory process by a public authority. Industry developed standards are voluntary, whereas the guidelines adopted by the public body through regulations can be mandatory and apply to all material being sold into a specific marketplace.

Currently, there is national level action to define compost standards, and Hawai'i could base its standards development on this and other state standards.

### **On-Farm Composting Market Opportunities**

On-farm composting is a process where green waste is composted and mixed with the farmers collected animal waste. This can be done by the farmer, or offered as a service by a compost operator. In the latter case, the compost operator monitors the piles, turning as appropriate, and land applies the finished product for the farmer. In the course of the service, the farmer also pays

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<sup>31</sup> N = nitrogen; P<sub>2</sub>O<sub>5</sub> = phosphate; K<sub>2</sub>O = potassium (potash); Ca = calcium; Mg = magnesium.

for the compost. As long as the feedstock is from the farm and the finished product is used on the farm, the current regulations for composting allow the process with minimal, if any, permitting (under HAR 11-58.1). This approach has proven successful in numerous locations outside Hawai'i. The major benefits to the farmer are the improved quality of soil amendment through combining animal and green waste, and removal of the burden of re-generating soils for future crops.

### **Lack of Credible Data on the Benefits of Locally Produced Compost**

Many states provide technical assistance in composting through the Cooperative Extension Service at state universities. For example, Washington State University in Pullman, Washington provides extension agents and conducts demonstration projects throughout the state. Cooperative Extension receives federal funds as well as funds from the state university where it is located. Most state universities have such programs, although the focus of programs and resources varies widely.

A second model of technical assistance is the Clean Washington Center (CWC), which provided a compost specialist as well as specialists in other fields. The Washington State Legislature established the CWC in 1991, with a sunset of 1997. Its annual budget was \$2 million, and its purpose was to assist local industry in incorporating recovered materials into manufacturing.

Potential markets for compost need to be convinced that locally produced material provides significant benefits to crop yield, land restoration, and irrigation requirements. The most convincing approach is providing objective data based on local experience and pilot schemes using locally produced compost. Currently, Hawai'i lacks significant data that the industry could use to approach potential markets. In addition, there is limited state-supported technical assistance.

Additional assistance can be gained by the following projects:

- Public support in gathering important data and carrying out pilot projects will help develop the portfolio of information critical to helping the industry sell their product in local markets.
- How-to manuals are available to help managers of institutions determine whether it is cost effective for a particular institution to compost their food waste.

### **Special Issues**

There are two current issues that affect composting operators that should be addressed.

***Regulations Regarding Animal Waste and Green Waste Composting.*** DOH regulations (HAR 11-58.1) addressing addition of animal waste to green waste may prevent farmers from expanding their composting operations because they appear to add complex regulatory burden to the combination of the two waste streams. Most small farms generate either green waste or animal waste, so they therefore need to bring the other waste from elsewhere to enhance the composting effort. This moving of material from one property to another for composting requires a composting permit that most farmers will not pursue.

***Composting Biosolids.*** The incorporation of biosolids with green waste to produce a compost product has created a significant level of concern among the general public regarding safety. The

public concerns with biosolids are related to heavy metals and other toxic materials, usually from industrial sources that are part of municipal wastewater.

Recent projects using high quality biosolids from communities with little or no industrial input, and hence little contamination, have proven safe and successful in returning nutrients to the soils. Farms in Oregon, Washington, New Zealand, and Australia have conducted this practice for several years.

Compost operators must recognize that properly processed and tested biosolids can produce an organic product that enriches the soil. Introduction of biosolids into the organics market must be carried out slowly and carefully to help build public acceptance of this practice.

### 3.5.3 Recycled Glass Market Development

All the counties have implemented programs for recovering container glass. A strong incentive for this is the state ADF on glass to encourage and fund recovery programs.

This section describes current markets for recycled glass products, potential new markets, and methods to expand the new markets. In Hawai'i, the cost-effective recycling of glass is limited primarily by the shortage of high-value markets. Thus, in order to increase overall diversion of glass containers, market development should play a leading role.

#### 3.5.3.1 Current Volumes of Recovered Glass

Currently, recycling programs in Hawai'i are recovering approximately 38 percent of container glass. Hawai'i's recovery rate for glass is well above the national average of 24.3 percent. Table 3-17 depicts the tons from each county in 1998, and the pounds per capita diverted. Actual diversion rates are not possible to calculate due to the lack of recent waste composition statistics for the neighbor islands. The national diversion rate for glass is approximately 23 pounds per person per year.<sup>32</sup> O'ahu, at 22 pounds per person per year, is close to the national diversion rate for glass.<sup>33</sup>

**Table 3-17:  
Diversion of Container Glass in Hawai'i by County (1998)**

| Diverted (in tons)                      |        |        |       |                    |
|---|--------|--------|-------|--------------------|
| Statewide                               | O'ahu  | Kaua'i | Maui  | Hawai'i            |
| 12,138                                  | 10,141 | 400    | 1,597 | 1,305 <sup>1</sup> |
| Pounds per Capita (de facto population) |        |        |       |                    |
| 19                                      | 22     | 13     | 20    | 17                 |

NOTE: <sup>1</sup> Figure for 1997 was used since tonnage was not reported in 1998.

<sup>32</sup> EPA. July 1999. *Characterization of Municipal Solid Waste in the United States: 1998 Update*. Prepared by Franklin Associates, Ltd.

<sup>33</sup> The difference between the two analyses – the percentage recovery rate and the per-person recovered quantity – is due to differences in overall waste composition. This implies that Hawai'i has a higher generation rate for glass than national rates.

### **3.5.3.2 Projections for Potential Future Volumes of Recycled Glass**

The counties with the lowest current diversion on a per person basis have the greatest potential for increasing diversion. Kaua'i could double its tonnage, while Maui and Hawai'i Counties could increase their tonnage between 15 and 35 percent to match the national average. These improvements in recovery would add an additional 1,200 to 1,400 tons to glass recovery in Hawai'i.

Without an investment in the collection infrastructure, it is reasonable to expect that the level of glass recovery will plateau slightly above current levels. Developing curbside collection, or enhancing drop-off collection, would increase quantities of recovered material. This will require an expanded market capacity. However, the main problem facing the counties and the glass recovery firms is that local and U.S. mainland markets for recycled glass are not adequate to pay a consistently good price for the tons that are currently recovered.

The main barrier to sustainable diversion of glass in Hawai'i is the lack of processing systems that can produce a higher-value end product, and undeveloped higher-value markets. Development of greater capacity in higher-value markets should provide a larger and more reliable revenue stream for recyclers, as well as the potential to profitably consume more recovered glass.

### **3.5.3.3 Current Glass Processing Operations**

Recycled glass processing in Hawai'i is carried out by a small number of operators. The volume of throughput and the level of sophistication in processing vary widely among local operators.

#### **Maui County**

Aloha Glass Recycling processed nearly 1,600 tons of glass in 1998, an increase of 7 percent over the previous year. Based on the capacity of existing equipment, Aloha Glass Recycling could feasibly double their throughput.

#### **Kaua'i County**

Previously, glass containers had been collected by Garden Isle Disposal Inc. and sent to J.C. Sandblasting for processing under a county contract, which ended in 1999. J.C. Sandblasting, which recently received a new county contract for glass recycling, will be collecting and recycling glass on Kaua'i.

#### **Hawai'i County**

Business Services Hawai'i operates a facility that processes 1,200 to 1,300 tons per year of glass. The recovered glass is put through a primary processor, which limits their markets to road sub-base, daily cover on the landfill, and drainage applications. The company is interested in adding screens to increase the level of sophistication in their processing. However, they need confidence that alternative markets will take the processed glass.

#### **City and County of Honolulu**

O'ahu has two glass processing operations. Honolulu Recovery Systems processes over 2,000 tons per year for roadway construction, sandblasting, and shipping to the U.S. mainland markets

for manufacture of new glass bottles or fiberglass insulation. BFI processes over 7,000 tons of glass per year mainly for export to the mainland. Recently, they shipped a small amount of glass to a local cement plant to determine the benefits of incorporation into cement manufacturing.

#### **3.5.3.4 Current Markets for Processed Cullet**

Glass cullet is the broken down recycled glass ready to be used as a raw material. There is a wide variety of quality of, and specifications for, cullet depending on the future uses and markets. Approximately half of the glass collected in Hawai'i is shipped to the U.S. mainland and sold in California where strong markets exist. The other half of the glass goes to end markets in the counties where it is generated.

The largest local market for glass cullet is as sub-base for highway construction projects. Approximately 75 percent of the locally used cullet is incorporated into road construction projects. Maui and Kaua'i Counties have begun to develop an industrial abrasives market, with approximately 300 tons a year of cullet processed and sold to the local industrial abrasives industry. A small market has emerged in fast water filtration systems, with cullet used as a filtration in koi ponds and swimming pools. On O'ahu, a pilot project to test cullet as a gravity-flow water filter for seawater pumped directly from the ocean for farm irrigation is being developed. In Hawai'i County, a small fraction of glass is processed and sold as a medium for artwork by local artisans.

#### **3.5.3.5 New or Expanded Market Opportunities for Recycled Glass Products**

Higher value market opportunities exist in Hawai'i for properly processed cullet. Successful penetration of these markets will require a high quality of glass processing and an aggressive educational outreach and sales campaign. Each end market has exacting specifications and care must be taken to attain those specifications when providing materials to that market.

The major barrier that must be overcome is to convince potential end users to give the material a fair trial. The central goal for the state market development program is to provide credibility, independent testing, and persuasiveness to an aggressive outreach effort.

Opportunities exist for recycled glass products in new high-value markets. The uses that will be explored here include using recycled glass in the following applications:

- Golf course sand.
- Water and wastewater filtration medium.
- Industrial abrasive grit.

An integrated implementation approach for recycled glass is provided following examination of the three uses.

#### **Recycled Glass as Golf Course Sand**

The vast majority of sand imported into Hawai'i is for maintenance and construction of golf courses. It is used for aeration and construction of greens, and for replenishment or construction of bunkers. Bunker sand should be rounded particles of relatively uniform size. Aeration sand (also called greens sand) should be angular and represents a potential application for recycled glass.

The Professional Golfers' Association of America (PGA) specifications for bunker sand are very difficult for most suppliers to meet. Currently, bunker sand is derived from only one quarry in the U.S. Most local golf courses use greens sand in bunkers due to the expense of bunker sand. Greens sand is usually standard #20 silica sand (particle size of greater than 0.55 mm and less than 0.75 mm). Local glass processors using available equipment can produce it.

Recycled glass would provide an excellent substitute for greens sand because particles are angular and may be produced in uniform size ranges. The use of recycled glass as bunker sand may not be advisable due to the potential liabilities from golfers who could get sand particles in their eyes. Even if the specifications for bunker sand were met, knowledge that the sand was derived from recycled glass may provide a tempting target for litigation. Greens sand, however, would be a potential use for recycled glass because it is folded into the soil and is less likely to be construed as a health and safety risk.

The total amount of glass collected by Hawai'i's recycling companies in 1998 was approximately 12,000 tons. Two companies annually import a total of 15,000 to 20,000 tons of golf course sand. Brewer Environmental Industries imports between 5,000 and 10,000 tons per year and Hawaiian Cement imports approximately 10,000 tons per year. The vast majority of imported sand is greens sand. The large quantities of imported golf course sand and the potential to produce a quality product from recycled glass suggest that this should be a high priority for recycled market development.

**Economic Feasibility.** The current retail price for #20 silica is approximately \$260 per ton. The costs of processing cullet to greens sand specifications are approximately \$30 per ton. These costs are higher than for processing glass to sandblasting specifications, but well below the cost of importing natural or other man-made silica to the state. At \$200 per ton, the potential market for greens sand may approach \$3 million annually.

### **Recycled Glass as a Water and Wastewater Filtration Medium**

Silica sand is imported to Hawai'i for rapid sand filters used in swimming pools, irrigation systems, aquaria, koi ponds, and other water features. Some of Hawai'i's wastewater treatment plants use silica in secondary and tertiary treatment for domestic wastewater. Silica used in water filtration applications is regularly replaced when angular surfaces of the particles become eroded causing the filters to lose efficiency. Silica is also lost during normal operations during back flush and cleaning operations.

Rapid sand filters commonly use #20 silica sand imported from the U.S. Mainland or Australia. The potential market for rapid sand filters is 200 to 300 tons per year. Up-flow or trickle sand filters in wastewater treatment plants use between 10 and 24 tons of imported silica sand. The sand is replaced at 10 to 15 year intervals. Sand is replenished at the rate of 5 to 10 percent per year. The total demand for silica for wastewater treatment facilities is likely to be less than 50 tons per year.

Each filter uses sand meeting the criteria specified by the manufacturer. Since each manufacturer has slightly different specifications, the majority of sand for replenishment and replacement is obtained from sources that produce sand under contract to the filter manufacturers.

Properly processed glass has superior filtering characteristics to silica in rapid sand filters and secondary and/or tertiary treatment phase of a wastewater treatment facility. Processed glass has good angular properties and a negative ion on the surface, which accounts for its ability to

remove 25 percent more turbidity than silica in the gravity filtration systems. Further, properly processed glass has greater uniformity in size and therefore the volume of throughput is significantly higher than silica.

Competition for this market would require that producers of recycled glass silica demonstrate that locally produced glass can improve filters' operation and/or reduce the cost of operation.

Another example of a high value market is septic tank filtration. Information needed to support recycled glass use includes analysis of typical flow rates, reduction of turbidity in the water, and removal of bacteriological contaminants. These tests normally occur over a 2-year testing period. Tests and the resulting data were developed under a program with the CWC,<sup>34</sup> and the results were accepted by the Washington State Department of Health.<sup>35</sup> These results may also be acceptable to the DOH. To achieve acceptable performance in this process, the cullet must be properly sized (i.e., 110 mesh size to 45 mesh size) and washed to reduce contamination (e.g., organic material, dirt) that might leach or cause excessive turbidity. Convincing health officials and the septic tank industry to use recycled glass will require technical competence and persistence of local glass processors.

**Economic Feasibility.** The current retail price for #20 silica is \$13.50 per 100-pound bag or approximately \$220 to \$260 per ton. Silica for wastewater treatment plants ranges from \$260 to \$300 per ton depending on the source and quality.

The cost of processing cullet to rapid flow filtration specifications is approximately \$35 to \$45 per ton. The processing costs are higher than for other applications. These higher costs are attributed to the need for tighter specifications and cleaner processed glass. Previous pilots using processed glass at some Hawai'i resorts proved less than successful because of the significant level of dirt, paper, and aluminum foil that was not removed from the glass used in the demonstration. Contamination will foul the backwash systems and impair the performance of the filter.

Despite the relatively small demand, the economic feasibility of producing recycled glass silica for water and wastewater filtration systems is positive because of the wide disparity between the local cost of recycled glass silica and other sources. The processing technology that would be used to upgrade recycled glass to golf course specifications could also be used and enhanced for the processing required for water and wastewater filtration applications.

### **Recycled Glass as Industrial Abrasive Grit**

Properly processed recovered glass can perform as well as, and in some cases better than, other industrial grits currently being used as abrasive material. Recycled glass is softer than many of the abrasives being used, and creates more dust when used in sand blasting operations. Standard respirator precautions must be taken, and equipment adjustments must be made such as nozzle size and pounds per square inch, when using recycled glass in this application. However, there are demonstrated health and safety advantages to recycled glass over silica sand abrasives. Silica sand can cause silicosis, while glass does not since the silicon is bound into a glassy form.

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<sup>34</sup> CWC. 1995. *Crushed Glass as a Filter Media for the On-site Treatment of Wastewater*. Study conducted by Aqua Test, Inc., and Stuth Co., Inc., Maple Valley, Washington 98109.

<sup>35</sup> Washington State Department of Health. October 1996. *Additions to Guidelines for Sand Filters*.

***Economic Feasibility.*** Properly processed cullet can be used as an industrial abrasive, replacing both silica sand and copper slag abrasives. These two types of industrial grit sell for \$13 to \$15 per 100-pound bag, or approximately \$220 per ton. The costs of processing recovered glass to meet the industrial abrasive market specification are approximately \$30 to \$35 per ton. JC Sandblasting has already proven the economic viability of this option on Kaua'i.

There are currently over 20 abrasive companies in the state. The potential market for recycled glass as an abrasive is approximately 10,000 tons per year.

### **Integrated Recycled Glass Implementation Approach**

The state could support three actions in developing opportunities for recycled glass to be used in the three applications identified above. The following actions should be conducted in parallel since they involve comparable expertise and will entail working with the same set of local processors. The approach would include the following:

1. Support processors to produce recycled glass products that can substitute for virgin materials in the three highlighted applications:
  - Obtain specifications for alternative uses, including PGA specifications for greens sand and the appropriate industry specifications for water filtration, wastewater filtration, and industrial abrasives.
  - Assist local glass processors in producing products that meet the specifications. Different processors might target different end uses. Assure that they have the required technical literature, equipment and training.
  - Sponsor pilot projects to test use of recycled glass in new applications. Monitor and publicize results.
2. Help promote the products to potential local end-users:
  - Based on the pilot products, generate cost/benefit data on use of recycled glass versus virgin materials.
  - Gather literature from experience elsewhere regarding the benefits of using processed glass over virgin materials.
  - Produce educational flyers and reports targeted for distribution to the appropriate groups of professionals.
  - Supply distributors of these products with initial quantities of recycled glass products for distribution to customers.
  - Work with the distributors to develop standing production contracts with local producers.
3. Develop public policies and programs that promote the viability of local recycled product industries:
  - Sponsor legislation to provide tax advantages for locally produced products versus imported sand and aggregate materials.
  - Promote local manufacturers to markets in the Pacific region.

***Role of the State.*** The state should serve as the catalyst if these markets are to be successfully penetrated, and take the lead in carrying out all activities. Further, the state should be prepared to



assist the recycled glass industry in making sales presentations to potential users in Hawai'i and the Pacific region.

### **3.5.3.6 Observations and Analysis**

#### **Barriers to Greater Penetration of Existing Markets and Expansion into New Markets**

The most mature market for processed glass in Hawai'i is for sub-base in road construction, which requires the least processing and is of relatively low value. The local glass processors have just begun to develop and penetrate the higher value markets. These include industrial abrasives, fast flow filtration, slow flow filtration, buried utility conduit marker, industrial filler in coating materials, and as a medium for artisans in producing a variety of arts and crafts pieces.

Major demonstration projects are being developed in England that may provide further evidence of the usefulness of processed glass as a filtration medium for drinking water. In pilot tests currently under development, glass appears to filter out microorganisms (smaller than 10 microns) such as *cryptosporidium*. If the demonstration tests prove successful, water companies may retrofit their filters using glass.

Expanding the use of glass in water filtration holds significant promise for Hawai'i. Further research and pilot tests on the performance of glass in filtering salt water for irrigation purposes could open significant new opportunities.

In addition to the glass applications that have been well developed on the U.S. mainland, local processors have identified additional applications unique to Hawai'i that could potentially consume significant volumes of properly processed cullet. Some of these potential applications include bedding for plants that must keep their roots dry, and termite barriers for buildings. However, the processors lack the resources to carry out the tests to validate these applications.

In addition, local companies that could be consumers for these new applications are resistant to the idea of substituting glass in their various operations (e.g., manufacturing, filtration, abrasives). A natural tendency is to rely on a material that has performed effectively for years and is well accepted as an industry standard. Convincing these business owners and engineers to consider a glass substitute requires technical evidence and expertise that supports the benefits of processed glass in various applications. Most Hawai'i-based glass processors lack the depth of technical knowledge necessary to penetrate potential new markets. In addition, ill prepared sales calls and poorly organized trials of recycled material often cause a potential market to quickly decide against the use of recycled materials.

Local processors would benefit from technical support to improve both the efficiency of their operations and the quality of their cullet. Most of these operations are cash strapped and could not afford to pay for the expertise they need.

#### **Achieving Higher Market Value for Recycled Glass**

Hawai'i has a great potential to improve the quality of recovered glass, and to increase the recovery rates through expanding existing markets and gaining the acceptance of cullet in local high value markets. The following table reflects the potential markets in Hawai'i, and the current distribution of processed glass to those markets in 1999.

**Table 3-18:  
Recycled Glass Markets in Hawai'i (1999)**

| Value  | End Uses  | Percent of Total Recovered |
|--------|---|----------------------------|
| High   | Water filtration, wastewater filtration, industrial abrasive, septic tank filtration, golf course sand, tile manufacturing, aquaculture, landscaping, termite barrier | 10                         |
| Medium | Drainage medium, buried utility line markers  | 25                         |
| Low    | Sub-base material in road construction, other aggregate uses  | 65                         |

**Improving the Quality of Processed Cullet**

Achieving a reconfiguration in market penetration of high value markets will require improved practices (e.g., screening, grinding, reduction in contaminants) in processing recycled glass. Higher end markets have tight processing standards that must be achieved on a consistent basis.

Additional costs to meet the needs of higher end markets are relatively marginal compared to the costs already invested in a glass processing facility. The major capital cost in glass processing is the initial investment in land and equipment. The operating costs are primarily in transportation, labor, and utilities. To meet the specifications of the higher value market, recycled glass must meet tight standards by removing both organic and inorganic contaminants, and be screened to assure size consistency. To achieve this quality standard requires additional screening equipment, and increases in the operating costs by an additional 35 to 40 percent. However, the higher value end markets will pay upwards of 300 percent more for the processed glass, making the additional investment and increased operating costs acceptable.

Each of the higher end markets will not accept recycled glass cullet as a substitute material until the market is convinced that all the technical and performance issues have been well documented and proven.

**Penetrating High Value Markets**

To penetrate these markets, the local glass processors need the support and technical assistance of an individual dedicated to opening these markets. The individual must be technically competent in the performance of glass in various applications, and be able to convince local authorities and industries of the superior performance of recycled glass.

The state can play a key role by obtaining information or performing research on product specifications and conditions of use, assembling industry representatives to discuss barriers and opportunities, providing technical assistance, sponsoring pilot product trials and monitoring results, publicizing results, promoting the product one-on-one to potential users, and sponsoring legislation to provide regulatory market advantage to locally produced recycled products.

### 3.5.4 Recycled Paper Market Development

Unlike compost and recycled glass, paper is a globally traded commodity. The ratio between paper prices and transportation costs is much higher than for compost and glass, making it less cost-prohibitive to transport. Further, the pulp and paper industry is a capital-intensive industry with major mills located around the world, and new mill capacity being continuously expanded.

The “bulk grades” of paper (i.e., OCC, ONP) will most likely be recycled in overseas markets. Though overseas markets fluctuate in demand and value, over the middle and long run they are projected to provide a reliable consumption capacity. However, it is always preferable to have local consumption capacity in order to provide a balance to international market forces.

Access to overseas markets is limited in Hawai‘i due to the costs of transportation. This barrier is a high priority for the state to work on directly. However, this topic is not addressed here since activities to address high cost of transportation are currently underway by the state.

The opportunities to develop local markets for paper exist for the mixed fiber stream, which is an inherently low value material and for which high transportation costs are a barrier to sustaining a collection scheme. Opportunities also exist for consuming ONP locally as animal bedding, and OCC in compost.

#### 3.5.4.1 Current Volumes of Recycled Paper

The 1999 data from the DOH for volumes of paper currently being recovered in Hawai‘i are shown in Table 3-19.

**Table 3-19:  
Volume of Recovered Paper in Hawai‘i (1999)**

| Paper Grade           | Maui <sup>1</sup> | Hawai‘i <sup>1</sup> | Kaua‘i <sup>1</sup> | O‘ahu <sup>1</sup> | Statewide <sup>1</sup> |
|-----------------------|-------------------|----------------------|---------------------|--------------------|------------------------|
| ONP                   | –                 | 72                   | 323                 | 11,832             | 12,228                 |
| OCC                   | 2,828             | 1,221                | 730                 | 31,026             | 35,805                 |
| OP/Mixed <sup>2</sup> | 1,451             | 74                   | –                   | 11,166             | 12,692                 |

NOTE: <sup>1</sup> Units are tons per year.

<sup>2</sup> OP/Mixed includes high-grade paper, magazines, and mixed paper that are often collected together.

#### 3.5.4.2 Projections for Potential Future Volumes of Recycled Paper

Hawai‘i’s paper recycling companies have established an infrastructure for collecting OCC from all sectors, though the relatively small number of recycling processors, and the lack of a “mosquito fleet”<sup>36</sup> results in inadequate service coverage. Some small generators use drop off centers. (See Section 3.3 on commercial recycling for further description of paper recycling capacity.)

<sup>36</sup> The “mosquito fleet” is a term used to describe independent recyclable material collectors who generally operate small vehicles, such as pickup trucks, and collect material from small and medium-sized generators. In Honolulu, a mosquito fleet exists for glass container recovery due to the state subsidies, but the mosquito fleet for paper grades is very small.

Compared to national collection rates for papers,<sup>37</sup> Hawai'i recovers less than half in each grade of fiber. Hawai'i's OCC recovery rate, however, does not reflect the fact that several of the large retail chain stores (i.e. Costco, Safeway, and Wal-Mart) directly ship their OCC to U.S. mainland distribution centers in empty containers. Overall, however, growth in the recovery of paper has substantial potential in Hawai'i.

Adding in a factor for the OCC shipped directly back to the U.S. mainland, and assuming that recovery in Hawai'i could increase to a level comparable to that on the mainland, paper recovery could be expected to increase as shown in Table 3-20.

**Table 3-20:  
Projected Potential Quantities of Recovered Paper  
Based on U.S. Mainland Recovery Rates**

| Paper Grade | Statewide<br>(tons per year) |
|-------------|------------------------------|
| ONP         | 18,000                       |
| OCC         | 44,000                       |
| OP/Mixed    | 20,000                       |

#### **3.5.4.3 Current Processing Operations**

With one exception, recycled paper processing in Hawai'i consists of sorting and baling paper for shipment to the U.S. mainland or Asia. The primary companies collecting and baling all grades of paper for export include, as follows:

- Maui County: Maui Scrap Metal.
- Hawai'i County: Business Services Hawai'i and Environmental Recycling.
- Kaua'i County: Garden Island Disposal.
- C&C: BFI, Honolulu Recovery, Island Recycling, and Intech, Inc.

The only company that processes paper beyond baling is Intech, Inc., which produces cellulose mulch products that can be used in a variety of applications, including hydro-seeding and motor-oil absorbing boxes for changing oil. The facility has expanded their operation to produce cellulose insulation.

#### **3.5.4.4 Current Markets for Recovered Paper**

Recovered paper from Hawai'i is exported either to the U.S. mainland or Asia. As a result, the paper recovery companies are susceptible to the volatile price swings that occur in the global fiber market. Prices for all grades of fiber were low during the early 1990s, but began moving upward in mid 1999. All indicators suggest that prices will continue to be strong in 2000. Newspaper for recycling did not increase at the same rate as the other grades, but is now showing an increase in recovery.

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<sup>37</sup> See Section 3.3.2.4.

Unlike the previous narrow market forces, in which one major driver caused significant market fluctuations, the current paper recycling industry has several factors that account for the improved market trend for all grades of fiber, as follows:

- The secondary fibers markets for OCC and sorted office paper have been particularly strong. OCC has been selling for over \$100 per ton in the Pacific Northwest,<sup>38</sup> a 50 percent increase from early 1999.
- A recent study by Jaakko Polyry, North America Consulting (a consulting company located in Tarrytown, New Jersey) shows that recovered paper is now preferred over virgin wood pulp at new mills. The study notes that over the past few years, the demand for paper and paperboard rose several percentage points each year, while the demand for wood pulp went up only 1 percent per annum.
- The introduction of several new technologies in paper recycling has led to the growth in recycled linerboard and liner mill capacity worldwide. This has caused a significant increase in the demand for OCC.
- The market for mixed paper grades has traditionally lagged behind the market for bulk grades (primarily ONP and OCC) and high-grades (e.g., white ledger). Recently, however, the market for the low-grade fibers has increased on par with the other fiber grades. One reason is the new technologies that permit mills to use lower grade fiber than previously thought possible. The new "Abitibi mix"<sup>39</sup> has proven to successfully incorporate between 10 percent and 20 percent of mixed grade fiber into newspaper pulp mills.

Examining the recycled paper market on a macro scale, it appears, from broad-base industry data, that the imbalance between supply and demand has corrected itself. This imbalance was created by the advent of publicly supported U.S. curbside recycling programs and aggressive recovery efforts in Europe. Observers of secondary paper markets have indicated that they believe the paper recycling industry is no longer dominated by oversupply created by government action.

Similarly, the export markets have demonstrated growth trends. With the current rebound in the Asian economy, demand for recovered fiber is anticipated to increase 3 per cent per annum. With new mill capacity coming on line in China, significant new markets will open for U.S. recycled paper. With these new mills, China will surpass Korea as the major fiber market in Asia. In summary, the long-term market for recovered paper appears healthy.

#### **3.5.4.5 Barriers to Greater Market Penetration of Existing Markets and Expansion into New Markets**

The global fiber markets establish a market price for each fiber grade. The markets are indiscriminate concerning the source of the fiber so long as it meets the grade specifications. The costs of collection, sorting and baling, as well as transportation, must be borne by the local recycling programs. In Hawai'i, the added costs of transportation reduces significantly the revenue flowing back to local recycling companies.

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<sup>38</sup> U.S. Pacific Northwest markets are one of the strongest due to the presence of local pulp and paper mills and access to Asian pulp and paper mills. Some fiber from Hawai'i is routinely traded to the Northwest.

<sup>39</sup> Abitibi Consolidated is a major newspaper recycler that has developed a process to use a "curbside mix" in newsprint production. This includes all papers generally collected from residential curbside, including junk mail and other mixed paper, but excluding materials such as brown grades and milk cartons.

The primary barriers to competing in the global fiber markets are transportation impediments, which include the following:

- **High cost of inter-island transport.** Local paper recycling companies are paying \$600 per container to transport recovered paper from the neighbor islands to Honolulu for transport to the U.S. mainland or Asia.
- **Container size restriction on inter-island transportation.** Young Brothers offers a special rate for shipment in 24 cubic yard containers. However, most mills will accept only 40 cubic yard containers.
- **Demurrage rate.** Mills often require shipments of 10 to 20 containers. Given the current volumes of paper recovery, aggregating sufficient fiber to fill 10 containers requires several days. The paper recycling companies are charged a demurrage rate if the containers are not shipped within 10 days of being checked out.
- **Storage rate charged by Port of Honolulu.** Paper recycling companies are required to pay storage costs at the Port of Honolulu while they aggregate the necessary loads. If they store the containers on Port of Honolulu property, they also face a demurrage fee.
- **High cost of shipment from Hawai'i to the U.S. mainland.** Sea-Land Service Co. provides shipping in Hawai'i and Alaska. Both these states have economies that require significant shipment of goods between Islands with little back haul freight. In Alaska, the recycling community and the state negotiated favorable back haul rates with Sea-Land Service for recovered materials. In Hawai'i, the state and the recycling community have not been able to negotiate similar arrangements with Matson Navigation Co. The cost of shipping a container of recovered paper to the U.S. mainland is approximately \$50 per ton.
- **High cost of shipment to Asia.** Sea-Land Service is the only company that ships from Hawai'i directly to Asia. The cost for shipping a container of recovered fiber is \$750 to \$800. Shipments to Asia must originate in Hawai'i. Foreign freighters enroute from the U.S. mainland to Asia are prohibited under the provisions of the "Jones Act" (U.S. Code Title 46, Chapter 24) from stopping in Hawai'i to add additional freight.
- **Minimum load requirements to achieve favorable freight rates.** More favorable rates for shipment to the U.S. mainland could be attained if the paper recycling industry could guarantee Sea-Land Service a minimum shipment of 60 containers per month.

Taken individually, each cost item is manageable. However, the cumulative impact of these rates and fees is a significant barrier to a strong paper recycling program in Hawai'i. It will be difficult for local paper recycling companies to operate a strong paper recovery program without some compromise from the transportation industry.

#### **3.5.4.6 New or Expanded Local Market Opportunities for Recycled Paper**

Development of new local markets for recycled paper will entail the development of small-scale manufacturing operations for the following two opportunities:

- Molded pulp packaging.
- Animal bedding material.

Both these options require an initial feasibility study to explore their potential in Hawai'i. A common implementation approach is provided following the examination of the uses.

### **Mixed Paper Manufactured into Molded Pulp Packaging**

Conventional molded pulping facilities have required a significant capital investment in facilities and molds. Because of this, it has traditionally been critical for a molded pulping operation to produce a large run of the same item. Such an operation is usually not conducive to small amounts of products required for the various niche market opportunities in Hawai'i.

Newer technology now permits the use of low-grade fibers to be used in producing relatively small "batch" runs of molded products. Molds are less expensive and can be changed relatively quickly. Also, these smaller scale facilities can operate at about a 6,000 to 8,000 ton annual capacity. Such an operation might be a suitable market opportunity for some of the low-grade fiber being collected in Hawai'i.

**Economic Feasibility.** Potential markets for molded products include egg and fruit production. Currently, there are over 150 million eggs produced annually in Hawai'i. For health reasons, paper egg cartons can have only a single use. The egg producers are importing the molded egg cartons from the U.S. mainland at a cost of approximately \$0.10 each.

Papaya growers produce over 39 million pounds of papaya annually. Most of the fruit is packed in 20-pound boxes with molded paper inserts. These molded inserts are also imported from the U.S. mainland.

In addition to these two significant molded pulping products, there are numerous other niche market opportunities for packing fruits, flowers, and other products in molded pulping packaging. Each of these applications and the associated production processes, some of which have recently been developed, has their own set of economic considerations. These will need to be explored in greater detail in targeted feasibility studies, as discussed below.

### **Newspaper as Animal Bedding**

Shredded newspaper can make a viable animal-bedding product. Newspaper bedding is suitable for most animals – cattle, horses, hogs, and poultry. The opportunity for a service-based operator to develop the market for this material may exist within the agricultural community of Hawai'i County.

A truck-based mobile processing center could promote the advantages of newsprint or newsprint/straw mixes for animal bedding, and provide the service of delivering animal bedding to where it is needed. The venture would use a mix of straw and paper in response to individual customer specifications.

A second income stream could be derived from collecting and selling the used bedding material. The used fiber bedding can be incorporated into composting operations providing valuable nutrients.

**Economic Feasibility.** Capital investment requirements would include a truck and approximately \$6,000 in equipment including a shredder, distribution cart, forks, spades, and possibly a portable generator. Although a more detailed cost analysis is required for an individual enterprise, the traditional costs for producing and applying a ton of fiber animal bedding is approximately \$47 per ton. This includes costs for paper and straw, diesel, labor and amortization of equipment.

In communities providing paper for animal bedding, the average price received for the bedding material as part of the overall service is approximately \$62 per ton. Although these numbers are based on programs occurring in farming communities, a more specific analysis of costs would be required for Hawai'i.

### **Integrated Recycled Paper Implementation Approach**

The state could support two actions to develop opportunities for recycled paper for either molded pulp packaging or animal bedding. The efforts for the two actions should be conducted in parallel. The approach would include the following components:

1. Assess and document the technical and economic feasibility of developing production capacity for new end uses of recycled paper:
  - Conduct detailed and targeted feasibility studies for recycled fiber used in molded pulp packaging and animal bedding in Hawai'i.
  - If the results of the feasibility study are positive, determine the islands and regions that have the greatest opportunity to develop a small enterprise for each use.
2. Support the development of local businesses to produce the product:
  - Identify an entrepreneur interested in starting a small enterprise.
  - Assist the entrepreneur in developing a business plan.
  - Develop promotional information to delineate the qualities and benefits of locally manufactured recycled paper products.

***Role of the State.*** The state should conduct the feasibility study and serve as the catalyst to examine in greater detail the opportunities that exist for such an enterprise. The state could also prepare promotional materials and assist an interested entrepreneur in developing this business for the farming community.

#### **3.5.4.7 Observations and Analysis**

Recycled paper companies in Hawai'i are dependent on the world market to consume their recovered paper. The long-term market trend for all grades of recovered paper, including the mixed grades, is improving and should therefore improve prospects for paper recycling in Hawai'i. Hawai'i should put first emphasis for improving recovered fiber markets into helping local companies compete internationally.

The largest transaction costs incurred by Hawai'i's recycled paper program are those associated with handling, storage, and transportation of the recovered fibers. Reducing the transaction costs between the local sellers and the fiber market will help the local paper recycling companies compete and increase revenues to local municipalities for the recovered paper. In addition, improvement in the shipping infrastructure is critical in supporting local paper recycling companies compete on a level playing field with U.S. mainland competitors.

An additional barrier to economic access to the Asian fiber market is the provision of the "Jones Act." Under this Act, no "foreign bottom vessel" (a vessel made in a foreign country) can stop at two U.S. ports without first stopping at a foreign port. Consequently, ships leaving the U.S. mainland cannot stop in Hawai'i to add to their loads prior to reaching Asia.



In addition to expanding activity into Asian markets, there are opportunities to expand local use of recycled paper. As with other materials, a local, self-reliant market could serve Hawai'i better in the long run. Intech, Inc. produces hydro-mulch products from recovered fiber. They have plans to expand that technology into cellulose insulation. At present, this is the only local alternative market for fiber in Hawai'i. However, there may be opportunities for additional niche markets to develop.

Most of Hawai'i's export products are individually packed to protect from damage during shipping. The protective dividers are often molded pulp products made from low-grade fibers. Emerging molded pulp technology can produce a variety of packaging products in small batch operations. A flexible, small scale molded pulping facility may be well suited for the economy in Hawai'i, and warrants further investigation.

Another opportunity is to produce animal bedding from ONP. An integrated service that delivers material to the farm, and picks up used material for delivery to a compost operation, may have potential for profitability. Both these options should be investigated in feasibility studies.

In both the above examples (i.e., product molds and animal bedding), the state can play an important role by conducting feasibility studies, identifying the areas in Hawai'i that have the greatest potential use for the new applications, assisting entrepreneurs to develop business plans, and developing product promotional materials.

### **3.5.5 Framework for Implementing Market Development in Hawai'i**

Through interviews with industry members in Hawai'i, it became evident that in order to improve the market outlook for recyclable materials, the state would need to provide assistance to recycling companies and to end users of recycled products. Local recycling companies need technical assistance tailored to their individual commodities and to address immediate problems they face in meeting technical market specifications. In addition, gaining the confidence of end users often requires direct contact with those users to demonstrate that a recycled product can meet their specifications.

The state can play a critical role in market development by providing a central focal point and being a pro-active force in opening potential markets for locally recovered materials. The state's role must include a partnership with private sector recycling and end-user industries, and solicit advice and input from these groups in setting priorities and direction for state actions.

This section addresses options for administrative structures to support this expanded state role in cooperation with private industry.

#### **3.5.5.1 *Products and Services of the Market Development Program***

A central objective of the market development program is to assist existing businesses in Hawai'i with their individual and immediate challenges to business success. Additionally, it is to assist entrepreneurs and other businesses interested in starting or expanding recycling manufacturing operations in Hawai'i.

The products and services that a market development program could provide to Hawai'i recycling businesses include the following:

- **Technology Validation.** Conduct projects to validate the viability of using a recycled material in a specific application, and to identify the required material specifications. These projects could resolve technical issues that currently hamper market expansion. Projects should be based on the presence of real business opportunities that have been successfully demonstrated elsewhere. The information would be available for any company that may desire to enter the market.
- **Process Assessment.** Provide staff or contractors to work with existing businesses to explore methods for incorporating recycled content into manufacturing processes.
- **Feasibility Studies.** Provide funding to determine the economic feasibility of a new facility, technology, or market application for recycled materials.
- **Business Recruitment.** Analyze local market conditions to identify potential opportunities for successful recycling businesses to develop local operations on the islands. Explore the possibilities of joint ventures, franchises, or various licensing arrangements to bring proprietary technologies and processes to Hawai'i.
- **Marketing Assistance.** Provide marketing assistance to existing recycling businesses that are having difficulty penetrating a specific market with their product. This can include refinement of product specifications, development of marketing literature, or promotion of the product to public agencies and/or potential private users.
- **Standards and Specifications.** Develop product standards for recycled products. This strategy is specifically proposed for compost products based on the analysis of barriers to its growth. Staff should proactively seek to change standards and specifications that work against products that contain recycled content.
- **Transportation Rates and Regulations.** Represent the interests of the recycling industry in negotiating changes in rates and regulations that will lead to expansion in market opportunities and improvement in economics of recycling.

### **3.5.5.2 Administrative Structures for Carrying out Market Development Activities**

There are several organizational structures that can support market development. Some of the factors that should be considered in selecting the most appropriate organizational structure include the following desirable characteristics:

- A working public/private partnership that is intrinsic to the organization.
- Sufficient technical expertise and flexibility to deliver the types of products and services that industry requires.
- A structure capable of receiving public and private funds to carry out its mission.
- High visibility to the recycling community and to potential end users of recycled products.

The primary options for an organizational structure that would meet most of these factors, and that are considered here, include the following:

- State employees to carry out market development functions under the guidance of an advisory committee.
- A public-private partnership created as a non-profit organization to contract with the state and others to carry out market development functions.
- State contracting, under the existing state bid system, with a private firm to perform market development functions.

Following are three options for administrative infrastructures for the market development program, with pros and cons identified for each. Recommendations are included in Chapter 4.

### **Option 1 Establish an Advisory Group to Provide Guidance for State Employees**

Under this option, State DOH employees would carry out the primary market development work activities with possible support from subcontractors. An advisory committee, including industry representatives, would oversee their activities. DOH could partner with other state agencies, such as DBEDT, to carry out projects that will focus on different materials and opportunities.

To develop this option, a substantial degree of specialized expertise will be needed for a variety of different materials, technologies and marketing issues. This expertise could be developed through training existing DOH staff, or hiring new staff at DOH to fill specific positions defined to support the marketing priorities. It may be effective to employ management and marketing expertise within the DOH and/or DBEDT, and to hire consultants with specialized expertise to perform specific functions for projects.

For example, the DOH could hire a technical expert on a long-term contract to provide assistance to processors and prospective end-users in developing high-end uses for recycled glass. This contractor could develop product specifications and technical data sheets, and run pilot tests to demonstrate the qualities of the recycled product.

The advisory committee to the DOH would be responsible for providing guidance and direction to DOH employees. A sub-group of the advisory committee could be dedicated to provide oversight and advice on priority market development issues to the DOH.

#### **Pros**

- This arrangement will require no legislative changes and may be implemented in a short timeframe.
- An administratively created advisory committee can be flexible while providing a close relationship between the state and private industry.
- The state would have direct responsibility and authority over quality of the work performed.

#### **Cons**

- The difficulty of attracting and retaining staff with specialized expertise within the DOH. These specialized staff are critical to successful implementation of a market development program.

## **Option 2 Establish a Non-Profit Market Development Commission**

Under this option, the state and the recycling industry would work together to establish a non-profit Market Development Commission. The state would contract with the Commission on a long-term basis to hire staff with the expertise to implement the market development mandate.

The Market Development Commission could operate semi-autonomously from the state. The DOH, with input from the advisory committee, would define an annual set of priorities and objectives to guide the activities of the Commission. The Commission could also have its own advisory board.

If, for example, the DOH established a priority for development of high value end use markets for recycled glass in the agricultural sector, the Commission would be tasked to perform investigations to determine the most promising applications. The Commission would develop an implementation strategy and work with local processors to implement the required processing capabilities. In addition, the Commission would work with end users to demonstrate the value of the recycle product.

### **Pros**

- An independent Commission will have more flexibility in hiring and retaining staff with expertise necessary to carry out the work.
- A Commission will be able to attract and administer funds from the private sector and other public sector funding sources.
- A non-profit organization has greater flexibility in operations to meet unique and ever changing issues that arise in the recycling industry.
- A Commission will allow Hawai'i to establish a public-private partnership to carry out the market development work.

### **Cons**

- Establishing the Market Development Commission would require legislative involvement and cooperative engagement between the state and private industry that may be difficult to develop.
- Establishing a new organization could require additional administrative costs that would deplete funds available to achieve the market development priorities.
- The state will need to provide considerable attention to assure that the Commission adheres to the state priorities and maintains high quality of work performed. This control would be more direct if the personnel were employed by the state.

## **Option 3 Contract with Private Sector for Market Development Activities**

Under this option, the state will prepare and competitively bid a request for proposal to hire a contractor to implement management and technical functions for market development. The DOH would establish specific objectives and work scope elements, and the contractor would serve as an agent of the state in performing the assigned activities.

The responsibilities of the contractor could include soliciting advice from an advisory group to provide guidance in specific programmatic areas. However, the DOH would retain final responsibility for the objectives and priorities, the general strategy, and the specific work elements.

### **Pros**

This may be the most efficient administrative approach to progress in market development. The approach uses traditional contracting functions and requires neither development of internal expertise nor establishment of a public/private partnership.

A contractor with broad resources would have a greater chance of obtaining specialized expertise in a wide variety of areas as needed.

### **Cons**

- This does not build local capacity to assist the recycling industry, and the expertise could disappear as soon as the contract ran out.
- Consulting services can be more expensive than having state employees perform the work.
- Quality control over the work would be maintained through contracting, which is less direct than through internal staff management.
- This does not develop public/private partnership benefits for the program.

## **3.6 Public Education**

This section defines the State of Hawai‘i’s role in public education for waste diversion. It also supports implementation of action plans to increase community awareness and participation in ISWM issues as addressed by the focus topics of this Plan.

### **3.6.1 Introduction**

Public education includes communication with the general public or with a particular target audience, with the purpose of encouraging a specific change of behavior or set of actions. Public education can be performed using a wide variety of media, such as television, radio, newspapers, training courses, school curricula, conferences, booklets, or posters.

Public education campaigns may be planned by a single organization or agency, or through a cooperative effort of several organizations. They may also involve a steering committee or advisory group. The single-agency approach can be the most efficient, but may be less effective in the long run than a campaign that involves broader cooperation. Managing input of several organizations, or a steering committee, can entail significant time and effort. The benefits of the approach, however, include expansion of ideas in planning the campaign, and a built-in support network to help assure success.

#### **3.6.1.1 Purpose**

Public education provides a method for promoting and supporting behavior changes in order to address a variety of ISWM priorities, such as improved recycling and waste reduction, enhanced market development, increased diversion of C&D debris, or reduced illegal dumping. The purpose of this section is to describe an overall framework for public education campaigns and the components that will contribute to success.

#### **3.6.1.2 Organization**

This section identifies existing public education efforts in Hawai‘i, evaluates the strengths and weaknesses of past and current education efforts, and describes model programs locally and nationally. It is organized into the following four sections:

- 3.6.1 Introduction
- 3.6.2 Background and Existing Conditions
- 3.6.3 Program Models (including both Hawai‘i and mainland programs)
- 3.6.4 Observations and Analysis

A recommended approach for state-sponsored public education programs addressing priority ISWM issues is included in Chapter 4.

#### **3.6.1.3 Priorities**

The key elements for public education identified by the state and the SWAC include the following:

- A statewide public education policy on ISWM that is flexible enough so that counties can tailor it to their needs.
- Partnerships and cooperation between and among government agencies and organizations with an interest in ISWM public education.
- Mass media use that includes generic (i.e., appropriate to all islands) messages that address broad environmental issues such as resource depletion and waste management.
- Evaluation process that measures whether a program meets internal (state or county) educational priorities and how effective it is in engaging the target audience and/or addressing the target issues.

#### **3.6.1.4 Methodology and Sources of Information**

Sources of information for this research included notes from the SWAC meetings convened for the Plan Revision, interviews with local and national ISWM and education program personnel, and review of documents and reports on public education programs. A questionnaire was sent to local and national contacts to obtain the following information regarding model programs:

- Goals and objectives.
- Selection process for educational issues.
- Selection process for target audience.
- Input from community or advisory council.
- Effectiveness measurements.
- Positive and negative aspects.
- Funding sources and budget.

As with most public sector programs, funding is an important issue that must be addressed. The levels of funding needed for different types of public education efforts are identified from research on local and national programs. Funding mechanisms are described in detail in Section 3.7.

### **3.6.2 Background and Existing Conditions**

Public education relating to ISWM or broader environmental education (EE) has been undertaken by local and state agencies, and by other environmental and educational organizations in Hawai'i. The efforts range from short-term, broadly focused events (e.g., Earth Day) to ongoing, targeted campaigns (e.g., the C&C Partnership for the Environment, MRG, or Youth for Environmental Service [YES]). Existing programs described in this section include an identification of strengths and weaknesses. Some model Hawai'i programs are described in Section 3.6.3.2.

In addition, numerous conferences have taken place in Hawai'i that promote a variety of EE and ISWM topics. Conferences have included the Hawai'i Environmental Education Association (HEEA) annual conference that focuses on teachers and EE, the Partnership for the Environment annual conference conducted by the C&C (Section 3.6.3.2) that targets business activity, and Green Building conferences and C&D workshops sponsored by DOH and U.S. EPA that target developers and the construction industry. These conferences often bring experts from around the world to Hawai'i to share information and expand awareness of ISWM options, and help to create a broader network of resources from which to draw innovative information.

### **3.6.2.1 State Programs**

State sponsored public education related to ISWM are conducted by the DOH, DBEDT, and the State Department of Education (DOE).

**Department of Health Programs.** Some programs within the DOH Environmental Health Administration include a public education component. The programs exhibit some particularly strong qualities as follows:

- A consistent statewide message.
- Support for local government efforts through coordination and funding.
- Input from business and community leaders.

Areas that could be strengthened in state programs include the following:

- Assignment of dedicated staff directly responsible for public education.
- Organization of consistent efforts coordinated between state and local governments.

The DOH OSWM conducts public education programs to target diversion or reduction of specific solid waste streams. Their approach is to publicize instructive examples of effective programs in visible locations, and to track waste reduction by measuring volumes of waste collected. Three full-time planners share responsibility for public education as one of many responsibilities. The DOH OSWM takes primary responsibility for some programs, and others are performed in cooperation with government, business, or non-profit organizations.

The following programs that have been conducted primarily by the DOH OSWM:

- Residential and commercial (farm-scale) composting workshops and technical documents.
- Annual Christmas Tree-cycling program where trees are collected and chipped for use as mulch in state and county parks.
- C&D workshops and training programs that target builders, architects and developers (see HAbiT program in Section 3.6.3.2).
- Illegal dumping directed at two target groups – communities that have illegal dumping problems and potential dumpers.
- Restaurant waste minimization project, a pilot demonstration program that resulted in a guidebook for restaurants.
- Household hazardous waste (HHW) program which includes a guide to alternatives and disposal opportunities (counties are responsible for the collection programs).
- State office recycling, providing a good example for public and business recycling.

Programs that have been conducted in cooperation with local governments and other entities include the following:

- Boating waste education program that includes a guidebook for Hawai'i boaters, in cooperation with UH Sea Grant Extension Program.



- America Recycles Day, a national campaign that involves radio and newspaper advertisements and public service announcements (PSAs) in each county to promote recycling practices.
- Commercial recycling support, especially with the C&C Partnership for the Environment, and glass recycling programs conducted by the counties with private and non-profit recyclers on each island.
- Advertising support for the C&C television advertisement that features singer Henry Kapono and promotes recycling for each island.
- School recycling challenge that promotes aluminum recycling and competition among Hawai'i's public and private schools.

Educational materials for many of the programs mentioned above are available to the public and are distributed at public events such as county and state fairs.

The DOH Solid and Hazardous Waste Branch has a Waste Minimization Program with one full-time coordinator. This program offers technical assistance and education to businesses that generate hazardous waste. The coordinator conducts workshops, produces a newsletter, and develops technical bulletins and a directory on environmental services available throughout the state. Education programs, such as workshops, are also conducted in cooperation with trade associations and non-profit groups on a demand basis.

Recently DOE offices have been a target audience. The coordinator provides support for curricula on hazardous waste, recycling, pollution prevention, and waste minimization practices for DOE cleaning and cafeteria staff.

**Clean Hawai'i Center.** The CHC housed within DBEDT, has a focus on business and market development and promotes new technologies and practices that are environmentally sustainable. (Refer to Section 2.2.4 for additional information.) The CHC has one full-time staff and three additional staff that lend assistance from the DBEDT Energy Office. Strengths of the program have included the establishment of partnerships with government and private entities to explore business opportunities that involve energy and market development among other issues, and a diverse funding base.

The CHC coordinates projects with DOH OSWM, DBEDT Energy Office, and other local government agencies involved in recycling and reuse activities. Education projects conducted or supported by the CHC include a guide to recycled products and recycling services in Hawai'i, the HABiT workshops, and Green House Hawai'i, which has developed a display of building materials that meet sustainability criteria (e.g., non-toxic, resource efficient, locally produced). Funding for these projects have come from the U.S. Department of Energy, EPA, and the DOH OSWM. The CHC recently partnered with Hawai'i Nature Center, a local non-profit that focuses on natural resource education for children, to produce a Hawai'i recycles activity booklet.

**Other Statewide Programs.** In addition to state programs described above, there are two additional statewide programs that address EE and include some ISWM information. These programs provide an opportunity for state-level partnerships to educate broader audiences (e.g., school children) and address broader issues (e.g., marine resources and solid waste). However, they have limited staff and funding resources.

The DOE promotes EE in public schools and supports one resource teacher who works with many schools to develop and implement EE programs through DOE curricula and teacher training workshops. The ISWM related curricula that DOE uses includes the C&C recycling education kit and the O'hia Project, developed by the Moanalua Gardens Foundation, which emphasizes resource conservation.

The UH Sea Grant Extension Service is a federally funded program supported by the National Oceanic and Atmospheric Administration (NOAA). It provides outreach and education on environmental issues that impact marine resources, such as litter and used oil. Its projects include some performed in cooperation with the DOH OSWM, such as the boater waste guide and household hazardous waste and alternatives guide.

### **3.6.2.2 Local Government Programs**

**City and County of Honolulu.** The C&C runs a variety of public outreach programs from the Recycling Office in the Refuse Division, Department of Environmental Services. Staff in the Recycling Office who conduct public education programs include one coordinator and four full-time recycling specialists. In addition, one staff person performs enforcement to ensure business compliance with the glass, paper and food waste recycling ordinances. These ordinances require glass, paper, and food waste recycling at businesses of a defined size. The C&C programs include a dedicated staff to carry them out and explicit measurements for program effectiveness.

C&C programs that have an education component include the following:

- Recycling teacher kits to support recycling education. The kits include teaching modules and support materials that emphasize ISWM and recycling, and have been distributed by the C&C to every primary, intermediate and secondary school in the state.
- Residential recycling at recycling bins stationed at 60 locations on O'ahu, including primary and secondary schools. Materials to promote this activity include a recycling guide and posters.
- HHW education and collection program run by the C&C Refuse Division. Residents contact the C&C to schedule a HHW drop-off. Educational materials include flyers about safe disposal of HHW, and advertisements promoting safe HHW disposal.
- Composting through hands-on workshops. Workshops and demonstration sites are available to educate residents on composting. Materials include a booklet, *Backyard Composting Handbook*, which provides details on composting composition and equipment. In addition, over 100,000 single-family homes receive curbside collection of green waste as of 1999.
- Condominium and apartment building recycling. Promotion and support for high-density residential units includes a flyer and condominium guide. Guides were distributed to all property managers. In addition, on-site training and posters and door hangers are available to further promote condominium recycling.
- Broad public awareness of ISWM through a mass media campaign that promotes stewardship through proper waste disposal and recycling. Television advertisements, featuring singer Henry Kaponu, aired for two months in 1997 and 1998, and continue to be aired as PSAs. The message addresses statewide recycling priorities and contains local recycling contacts for each county.

- Partnership for the Environment program, which encourages and supports commercial recycling efforts through a peer consulting process, is described in Section 3.6.3.2.

**County of Hawai'i.** The County of Hawai'i Department of Public Works (DPW) coordinates public education addressing ISWM issues. However, the bulk of public education is conducted by organizations contracted by the county. The county's programs have been diverse and flexible and have specifically addressed local priorities. However, they have had limited staff time and resources.

Over the past six years, the county has contracted the services of Recycle Hawai'i for public education related to ISWM (see Section 3.6.3.2). In addition, the county has provided funds to RCAC, and Renew Hawai'i, Inc. RCAC is a non-profit that focuses on rural communities and disadvantaged people to improve quality of life. They provide technical assistance to governments and businesses regarding solid waste and wastewater. The RCAC in Hilo has been involved in ISWM issues as they relate to economic development. Renew Hawai'i is a locally developed for-profit business and has conducted free backyard composting training under contract to the county.

**County of Kaua'i.** Kaua'i County DPW coordinates some ISWM public education, and also works with local organizations that conduct programs. They have one staff to address all ISWM issues, including public education. A strength of the Kaua'i County program is that local priorities are being address through public education.

The county has been directly involved in public education regarding recycling, junk vehicles, and HHW through media advertisements and PSAs. In addition, local non-profit organizations that conduct ISWM education include the Princeville Plastic Recycling (see Section 3.6.3.2) and Kaua'i Resource Conservation and Development (RC&D). Kaua'i RC&D is supported by the Natural Resource Conservation Service, U.S. Department of Agriculture, to conduct training and outreach addressing community development. They receive state funds to help support composting projects.

**County of Maui.** Maui County Department of Public Works and Waste Management (DPW&WM) actively conducts public education for ISWM issues on Maui, Moloka'i, and Lana'i. There are two full-time recycling staff in the Solid Waste Division, and one additional staff in DPW&WM to support waste diversion and ISWM education.

Maui County provides funds and manages state funds to support ISWM projects conducted by MRG (see Sections 3.6.2.3 and 3.6.3.2), YES, and the Community Work Day project. The DPW&WM Grant Program directed 20 percent of the FY 2000 budget to support educational outreach programs conducted by MRG, YES and the Keiki Zoo. The county has a recycling hotline and web site for information dissemination, and has produced educational documents addressing residential and business recycling, community composting, and *Remade on Maui*.

Some of the public education efforts supported by the Maui County include the following:

- Advertising campaign to promote residential and business recycling and used oil recycling. Three advertisements are printed each week in the *Maui News*, and eight brochures are distributed through retail outlets on various recycling and diversion topics.
- Drop off for used motor oil recycling exists at auto shops, schools, retail stores, and landfills. It is promoted through point of purchase brochures and advertisements. Unitek collects the used oil as a community service.

- Christmas tree-cycling conducted by the Community Work Day Program and promoted through advertisements, PSAs, and point of purchase information.
- School education, conducted by YES under a county grant, promotes student and school responsibility in recycling. Used oil recycling promotion also occurs through high school shop classes under this same grant. Students are requested to sign a commitment to recycle, and a contest is conducted to reward the class with the highest number of committed students.
- Commercial recycling for businesses to help manage discarded materials in the work place. A book was developed by the county and mailed to all businesses listed with the Chamber of Commerce.
- Recycling drop box program for residential recycling. Education includes promotion of drop box locations and what can be recycled. Promotional materials include *Remade on Maui* and *How to Recycle*. Plastics recycling portion of the program received support from the American Plastics Council who developed a video to enhance the program.
- Recycling information booths at the County Fair and 12 community events. Educational materials that support recycling and waste diversion projects are distributed. MRG assists with this effort.

Upcoming projects that include an education component are C&D diversion for the construction industry, paint exchange for the community as a whole, an awards program for restaurants, and disaster debris (part of a statewide effort).

### **3.6.2.3 Private and Non-profit Programs**

A number of private, non-profit organizations are involved in public education for the environment. Funding for most of these programs comes primarily from federal, state, and county grants and secondarily from private donations or grants and membership dues. In addition to the two organizations described in the following section, four non-profits that perform or support EE, although not specifically ISWM, are worth mentioning, as follows:

- The Hawai'i Nature Center has programs on O'ahu and Maui, and provides hands-on learning experiences regarding nature and conservation for children.
- The HEEA, a networking organization that holds an annual conference, brings together educators to expand and support EE, including formal and non-formal education, science and art.
- The Nature Conservancy of Hawai'i conducts internship-training programs on natural resources conservation, and is involved in promoting stewardship in Hawai'i and the Pacific.
- YES conducts hands-on EE with school age children on resource conservation and pollution prevention. (See Section 3.6.3.2.)

**Maui Recycling Group.** MRG is a non-profit organization that works on Maui, Moloka'i and Lana'i to promote waste reduction and recycling. (See Section 2.2.6 for additional information.) It has a board of directors and, at present, only voluntary staff. Subcontractors manage some projects with MRG. Strengths of the organization include close interaction and coordination with local and state government agencies through grants and contracts; development of programs that address local priorities due in part of input from the board of directors and government agencies

with whom the organization works; and flexibility and creativity in planning and implementing programs. A weakness for the organization includes inconsistent communication and cooperation on projects. Improved communication and cooperation between MRG and government agencies is vital to the success of projects that MRG manages.

MRG conducts education and outreach programs that include home composting, farm-scale composting, master composter training, restaurant waste minimization, C&D waste recycling, glass recycling, apartment and condominium recycling, and the HIMEX. They have also produced a Maui based recycling guide, statewide reuse directory, and staff the Recycle Maui County Hotline.

County and state funds support much of these programs; during 1999, 90 percent of MRGs budget came from Maui County and 10 percent came from the state. The budget supports specific programs project management (80 percent) and materials and MRG administration (20 percent).

**Recycle Hawai'i.** Recycle Hawai'i is a non-profit organization that conducts outreach and education to promote recycling on Hawai'i. (See Section 2.2.6 for additional information.) It has a board of directors that assists in identifying issues and directions for the organization. Its funding comes from private sources and government agencies, including the County of Hawai'i DPW and DOH. Strengths of the organization include close interaction and coordination with local and state government agencies; development of programs that address local priorities due in part of input from the community, County, and board of directors; flexibility and creativity in planning and implementing programs; and consistent program evaluation due in part to grant reporting requirements. A weakness is the irregular and sometimes insufficient funding from government contracts that can cause breaks in project momentum and reduction in overall project efficiency.

Recycle Hawai'i works closely with DOH OSWM and Hawai'i County DPW on the majority of their programs. The organization conducts programs that include school education, backyard composting, Christmas tree-cycling, HHW, used motor oil, recycling outreach, solid waste management, and assistance to DPW regarding pay-as-you-throw (PAYT) development. The primary focus of programs funded by the county is public education. Most county-contracted programs have some measurement element, including evaluations for presentations, workshops, and school recycling. Recycle Hawai'i has also conducted random phone surveys to assess the level of awareness of recycling opportunities. The largest challenge to public education conducted by Recycle Hawai'i is the lack of uniform recycling policies island-wide.

The county funded Recycle Hawai'i during FY 1998/1999. Of the total budget, 33 percent went for staff with 66 percent for program materials and support activities. Sources of funds for county contracts have included the state's oil tax and DPW recycling programs. Federal and private grants have also provided funds for community programs.

### **3.6.3 Program Models and Approaches**

#### **3.6.3.1 Types and Essential Elements of Campaigns**

Types of Campaigns. Public education campaigns can be either broad or targeted. A broad campaign is one that appeals to a broad audience and/or promotes a broad range of issues. Typically, broad campaigns have the following elements in common:

- Simple and basic messages with a few, uncomplicated action items.

- Use of mass media for communication to a widely dispersed audience.

An advantage of broad campaigns is the ability to heighten awareness and sensitivity of a large number of people in a relatively short time. Disadvantages include the high cost of purchasing mass media advertising, the difficulty in monitoring changes in level of awareness or actions due to the campaign, and lack of direct feedback from or follow-up with the audience.

A targeted campaign is one that focuses on a specific topic (e.g., construction waste recycling), and/or targets a specific industry or audience (e.g., business owners). Common elements of a targeted campaign include the following:

- More complicated messages with in-depth information on how to perform certain practices.
- Direct communication with the audience through mailings, announcements in professional or community newspapers, or meetings.

Advantages of targeted campaigns include the ability to go into depth on an issue and related actions, directly measure campaign impacts, and elicit feedback from the audience and follow-up to support implementation. Disadvantages include a possible decrease in support base or types of funds available due to the narrow focus.

**Essential Elements.** To ensure that an education campaign produces the intended result, it should be planned to include the essential elements identified in Table 3-21.

### **3.6.3.2 Model Hawai'i Programs**

Model programs in Hawai'i were investigated for examples of what is occurring in public education, and to gather information on techniques or lessons that could be applied to ISWM public education conducted or supported by the state. Priority was given to describing programs that address statewide ISWM issues, are flexible, involve cooperation, and/or have an evaluation (i.e., measurement) component.

**Table 3-21:  
Essential Elements of Public Education Campaigns**

| Element                              | Definition   |
|--------------------------------------|--|
| Goal(s)                              | Broad purpose(s) that the campaign is intended to accomplish.  |
| Objectives                           | Specific, measurable actions that support the goal(s).   |
| Target Audience                      | Group that is the focus of the campaign and can best address goal(s) and objectives.   |
| Organizational Approach              | Organization by which planning and implementation of the campaign is developed. Internal approach involves sponsoring organization only with limited input from the outside. External approach includes key audience and agencies or organizations with an interest in the campaign as a steering or advisory committee. |
| Sponsoring Organization(s)           | Agency(ies) and/or organization(s) that are identified as key players in the campaign for public contact, and that carry out ongoing implementation of the campaign.   |
| Outreach and Communication Strategy  | Type of media and outreach developed and used for engaging the target audience.  |
| Desired Behaviors and Actions        | Steps that target audience are encouraged to take to address goal(s) and objectives.   |
| Education Materials and Media        | Materials, whether written, visual, or audio, developed to support the campaign.   |
| Measurements to Assess Effectiveness | Quantitative and/or qualitative measures of target audience involvement and progress toward objectives. Can be used to redirect campaign efforts.  |
| Funding                              | Sources of potential or available money to support the campaign.   |

**HABiT, Clean Hawai‘i Center and U.S. Department of Energy.** HABiT training program was conducted by CHC in 1999 with support from the U.S. Department of Energy. It was a targeted campaign focussing on the construction industry and resource efficient building. Although C&D was not a primary focus of the training, it was addressed as it relates to resource-efficient building. HABiT involved training-the-trainer and industry workshops. Two representatives were selected from each county (Honolulu, Hawai‘i, Maui, and Kaua‘i) to complete the training-the-trainer workshop and help provide technical assistance and resources to each island. After completing the training-the-trainer workshop, they helped to conduct the industry workshops. One workshop was conducted in each county, with two on Hawai‘i (Kona and Hilo). Attendance was between 25 and 35, with 50 people attending the Kaua‘i workshop.

HABiT included the following essential elements (refer to Table 3-21 for detail):

- Goal – To educate the construction industry on principles of resource-efficient building through use of peer trainers.
- Objectives – To teach resource-efficient building (i.e., to increase efficiency in use and reduce disposal of building materials) by highlighting local case studies.
- Target – The building and design construction industry.

- Organization – A steering committee made up of local and national green building experts assisted in the development of the program, and approximately half continue their support through the program implementation.
- Sponsor – CHC and the U.S. Department of Energy with DOH.
- Outreach and Communication – Identification of trainees for the train-the-trainer course and communication with the construction industry to announce the workshops occurred through direct communication with industry trade associations, notices in industry newsletters, and press releases.
- Desired Behaviors and Actions – To implement resource-efficient practices described during the workshop and in the educational materials.
- Education Materials – A guidebook and curriculum workbook to support the workshops.
- Effectiveness Measures – Number of people who attended the workshops, written evaluations to provide feedback on the workshop, and the makeup of the audience (i.e., whether target audience was attracted).
- Funds – Federal and state grants for consultants and materials. Additional funds came from DBEDT and in-kind contributions from DOH for staff support and distribution of materials.

Strengths of this program included the statewide coverage and use of local examples for teaching; multiple agency and organization input that also included national experts; multi-agency funding base and use of in-kind government resources; networking that occurred during workshops particularly between islands; and connection of participants with other resource-efficient projects developed in Hawai'i, such as the Green House Hawai'i exhibit.

A weakness of the program has been a low turnout among the target audience of contractors and developers. Those who did attend were primarily architects and homeowners who have less impact on the large scale construction developments that occur in Hawai'i.

Ongoing challenges include follow-up for the program to support builders and designers who wish to adopt some of the new practices. This requires additional funding since the HABiT program funds were provided only for materials and workshops, and not for follow-up work.

**Home\*A\*Syst, Cooperative Extension Service, University of Hawai'i.** UH Cooperative Extension Service is developing Home\*A\*Syst and Farm\*A\*Syst programs that educate residents on impacts to surface and groundwater resources, and actions they can take to protect water resources. This is a broad campaign that targets Hawai'i residents and protection of natural resources, particularly water. Environmental issues addressed by the program include use of pesticides and disposal of household hazardous waste. The Hawai'i program is based upon an established national program that provides community-based education for rural and urban areas. Cooperative Extension will begin a pilot program in late 1999, and anticipates full development of resource materials in late 2000.

Home\*A\*Syst included the following elements:

- Goal – To help Hawai'i residents identify water related health and environmental risks.
- Objectives – To assist residents in identifying non-point source pollution risks, and direct those with high risk activities to agencies that can provide more specific pollution prevention information.



- Target – Broad residential audience, including rural and urban households.
- Organization – UH Cooperative Extension.
- Sponsor – UH Cooperative Extension.
- Outreach and Communication – It is anticipated that the program will be promoted and educational materials will be copied and distributed through other organizations and agencies involved in public education and pollution prevention.
- Desired Behaviors and Actions – For residents to use educational materials to identify and target areas of risk regarding water resources and pollution. Depending on issues that arise, different actions will be recommended.
- Education Materials – Fact sheets and self-assessment worksheets for rural and urban residents.
- Effectiveness Measures – No specific measurements cited.
- Funds – Funded by grants to UH Cooperative Extension. The program has one staff working 60 percent time, with a 2-year budget that primarily covers staff time for materials development.

Strengths of this program included that it is based upon an already tested model; the pilot phase will be used to tailor the program to meet Hawai'i's needs; and that the project offers a partnership opportunity for organizations to inform urban and rural residents of ISWM priority issues through materials produced through the Home and Farm\*A\*Syst programs.

A weakness was the lack of a local steering committee to both help tailor the project for Hawai'i and to conduct communication outreach and multi-agency coordination for the project.

**KidScience Program, DOE.** The DOE conducts an ongoing and interactive television science program for 5th and 6th grade students that is received by DOE schools that subscribe to it. The program targets primary school children and their teachers to promote science learning. There are presently 90 lessons in KidScience, each with their own goals and objectives.

KidScience included the following elements:

- Goal – To teach school children the science process through hands-on investigations.
- Objectives – Specific to each program.
- Target – Primary level school children and their teachers.
- Organization – Conducted internally by DOE with input from outside sources for specific programs.
- Sponsor – DOE.
- Outreach and Communication – Promoted by advertising to all DOE schools, and teachers sign up for access. Some programs are also advertised nationally and approximately 24 states receive broadcasts.
- Desired Behaviors and Actions – Specific to each program.
- Education Materials – Specific to each program, but includes the televised program and study materials.

- Effectiveness Measures – Measured through surveys to teachers. Feedback is used to change the structure of the program.
- Funds – Funding support comes from the DOE for staff and technical equipment, and from various grants. One full-time teacher runs the program, with technical staff to assist in program production.

Strengths of this program include that it reaches beyond Hawai'i both for input and for sharing programs; provides a variety of educational media (e.g., video and written material) to support learning; uses feedback from the effectiveness measures to change the programs; offers a partnering opportunity for other Hawai'i programs to reach primary school audience and teachers; and that the project has success in obtaining grants.

**Partnership for the Environment, City and County of Honolulu.** The Partnership for the Environment program, run by the C&C, targets commercial sector recycling. It is an outreach element of the C&C's mandatory recycling program and is supported by C&C ordinances, passed in 1996, requiring glass, paper, and food waste recycling (this latter was passed in 1997) for various commercial businesses. Businesses can join the Partnership, become "certified," and act as peer consultants to provide technical assistance to other businesses. Many businesses choose to participate and implement recycling without becoming certified.

Partnership for the Environment included the following elements:

- Goal – To increase recycling in the commercial sector.
- Objectives – For businesses to implement various mandated and voluntary recycling measures.
- Target – The commercial sector. They were targeted because of the concentration of potentially high-quality recyclables.
- Organization – The Partnership began in 1994 with a steering committee of business people and trade industry representatives that had experience and interest in recycling. The steering committee, which devotes volunteer time to the organization, assisted in establishing the framework of the Partnership, and has since evolved into an advisory board that meets once a year.
- Sponsor – C&C Recycling Office, Refuse Division.
- Outreach and Communication – The program is implemented through businesses becoming involved in reducing waste and protecting the environment in Hawai'i. Positive incentives, in addition to being a good business citizen, include free publicity to businesses that meet specific waste reduction and recycling goals. An annual conference also provides additional education opportunities for businesses, as well as highlighting successes of program partners and providing awards to outstanding peer consultants and partners.
- Desired Behaviors and Actions – To become certified, businesses must reduce their wastes by at least 15 percent, buy recycled content products, or develop products or services that promote recycling. When certified, a business is awarded a Partnership Certificate, can use the Partnership logo, and receives free publicity in the Partnerships promotion campaign.
- Education Materials – Promotional materials developed and used by the Partnership include a regular newsletter and a video highlighting successes of partners.

- Effectiveness Measures – Examining annual tonnage of materials recovered for recycling and conducting inspections of businesses for compliance with the C&C’s recycling laws. Additional measures include the turnout at the annual Partnership for the Environment conference, and the numbers of inquiries received by the Recycling Office into becoming a certified partner.
- Funds – The budget for the Partnership program is primarily for one full-time staff with additional funds used for promotion of the Partnership conference, a video, and newsletter development. The program has one primary staff person, but can draw on four other staff in the Recycling Office.

Strengths of this program include the C&C regulations that require recycling of some materials by businesses of a certain size; organizational approach that includes an active steering committee representative of the target audience; clear and well defined criteria for becoming a business partner; positive publicity to reinforce business participation and success in implementing recycling; support for newly joining businesses from peer consultants; and quantitative as well as qualitative effectiveness measures.

**Kaua‘i Plastic Recycling Education Program, Princeville Corporation and Kaua‘i County.** The Kauai Plastic Recycling Education Program is a targeted campaign for plastics recycling that target children as the primary audience. It was started by Princeville Corporation (a private company) to address plastics recycling, and has since expanded to address broader recycling issues in Princeville and Lihue. It is a non-profit project that works with the North Shore Business Council, a registered not-for-profit organization.

Plastic was selected as a focus since it was not being recycled on Kaua‘i. Plastics recycling presents challenges since there are many forms of plastics, and collection and recycling require more intensive monitoring than for other materials such as glass and newspaper. Collected plastics are shipped to Maui for recycling, and plastic park benches made on Maui from recycled plastic have been provided to some schools on Kaua‘i to illustrate closing the loop on recycling.

Kauai Plastic Recycling Education Program included the following elements:

- Goal – To extend the life of the Kaua‘i County landfill.
- Objectives – To identify practical and feasible collection and recycling options for plastics, and educate residents on the benefits of recycling and public involvement.
- Target – School children with secondary targets being parents and the general public.
- Organization – Steering committee of prominent business and service leaders, including the superintendent of schools for Kaua‘i.
- Sponsor – Princeville Corporation.
- Outreach and Communication – Various events and media news releases, including work with a Hawai‘i island-based entertainment group, Jubelieve, to produce a recycling rally, and conduct other promotional and educational activities in the schools.
- Desired Behaviors and Actions – To recycle plastics and other materials at local drop off areas.
- Education Materials – A variety of flyers and materials for schools and promotion of project through mailing, PSAs, press releases, commercials on public access channel, and community banners.

- Effectiveness Measures – No measures specifically cited.
- Funds – Initial funding for the project was from Princeville Corporation. In 1999, the project received grants from Kaua'i County and Wal-Mart. In 2000, the Kaua'i County budget will provide funds for the program, primarily for public education.

Strengths of this program include the external organizational approach that includes a variety of leaders from the community and a creative approach to outreach and communication that includes events and entertainment.

A weakness includes the lack of an effectiveness measurement that could assist in determining new areas for promotion or new audiences to target.

**Home Composting Program, Maui Recycling Group and Maui County.** The home composting program, run by MRG with Maui County funding, targets a broad audience to promote composting. It has been conducted since 1995 to teach residents to divert green and food wastes from the landfill. Green and food wastes were targeted because they constitute 40 percent of the waste stream in Maui County. Over the three-year life of the program, an average of three workshops per month were held on Maui (where over 1,000 participated), Moloka'i (six workshops with average attendance of 30 each) and Lana'i (one workshop with 30 attending).

Home composting program included the following elements:

- Goals – To divert green and food waste from Maui County landfills. Composting bins.
- Objectives – To teach as many Maui County residents as possible about home composting, and to distribute
- Target – All Maui County residents.
- Organization – MRG organized with Maui County assistance. The program was developed based on national programs for home composting, and no local community or advisory group was used.
- Sponsor – Maui County with MRG.
- Outreach and Communication – Workshops publicized through press releases to local newspapers and radio stations.
- Desired Behaviors and Actions – For residents to set up yard trimming composting, food waste composting, and worm bins for food waste. Incorporation of other organic materials, such as paper, was also covered in workshops.
- Education Materials – Workshop handbook with detailed composting information and compost bins.
- Effectiveness Measures – Evaluated through use of a course questionnaire. Workshop effectiveness was measured by the number of attendees at workshops and number of compost bins distributed (more than 1,000 were distributed). Informal follow-up occurred with nearly 400 trainees on Maui to inquire about how the composting was going, and whether trainees wished to participate in a more intensive Master Composter program.
- Funds – Funds were provided by the county over three years and used to purchase compost bins. Approximately 75 percent of the budget is allotted to staff time, with 25 percent for materials and publicity. The workshops ended in November 1998.

Strengths of this program include the strong audience enthusiasm for the course and for implementing behaviors and actions; the provision of educational materials to support implementation at home, including a composting bin; and use of national model programs in developing the Maui program.

A challenge for the program was the lack of a home compost demonstration site. MRG developed one site in Pukalani, Maui, but it was destroyed by vandalism. A secure area has not been provided to ensure that a demonstration site could be developed and maintained for ongoing education and volunteer support.

**Used Oil Collection Program, Recycle Hawai'i and Hawai'i County.** The used oil collection program targets used oil recycling and do-it-yourself oil changers. It is one of the public service programs run by Recycle Hawai'i with funds from Hawai'i County and the state. Collection sites were set up in 1999 at three locations including one in Hilo and two in Kailua-Kona. A fourth location may open in Waimea. In the past, periodic collection events have offered the only opportunity for safe disposal of used oil.

The used oil collection program included the following elements:

- Goal – To prevent environmental damage that results from improper disposal of used oil on the ground.
- Objectives – To encourage the target audience to recycle oil at one of the established sites.
- Target – Do-it-yourself oil changers.
- Organization – An informal advisory group that included the County DPW, DOH, Unitek (the waste hauler), the Fire Department's HazMat team, State Occupational Safety and Health program, motor oil distributors, and staff from the King County, Washington, used oil collection program.
- Sponsor – Hawai'i County with Recycle Hawai'i.
- Outreach and Communication – Paid newspaper and radio advertising, a poster at transfer stations, flyers at point of purchase, and PSAs to the media. The host sites for the oil collection also have door signs and decals to identify them as oil collection sites.
- Desired Behaviors and Actions – To recycle used oil at identified sites.
- Education Materials – Media materials and flyers at stores that sell oil.
- Effectiveness Measures – Business hosts document the number of gallons collected and number of people using the program on a log sheet. Manifests from Unitek for transporting the used oil document the number of gallons taken from Hawai'i County.
- Funds – Program funds are provided from money collected through the state oil fund and disbursed through the DOH to the County of Hawai'i. The county in turn provides it to Recycle Hawai'i. Of the budget, approximately 34 percent goes to advertising, 29 percent to staff, and 10 to 15 percent each is allocated to oil disposal, support materials for businesses, and the reserve fund.

Strengths of this program include the steering committee that includes a representative of a successful used oil recycling program on the mainland, and positive publicity for the businesses that participate in this community service to provide do-it-yourself oil changers with a proper disposal option.

A challenge to the program was getting business partners to host the collection sites. Business fears included becoming responsible for contaminated oil disposal, and people indiscriminately dropping used oil containers at the business property after hours. The first issue was addressed by setting up a reserve fund in the program to cover costs in case of contaminated oil or spills as host businesses. The second issue was addressed by recommending that businesses keep their collection barrels out of public sight.

**Youth for Environmental Service.** YES is a non-profit organization that conducts projects on O'ahu, on Maui, and in San Francisco and Los Angeles, California, and Seattle, Washington. It targets youth with service projects that involve watershed protection, including ecosystem restoration and water pollution prevention. Solid waste issues have not been directly targeted, but are components of the environmental issues that are emphasized.

YES included the following elements:

- Goal – To directly involve students in creating a healthier community and environment.
- Objectives – Educate students about environmental problems and provide service opportunities for students to solve environmental problems.
- Target – Youth.
- Organization – YES has a Board of Directors that mentors the organization. The board is made up of business and government leaders who have an interest in environmental and community issues.
- Sponsor – YES.
- Outreach and Communication - Directs media efforts at school summer programs and does direct presentations to target audience to involve school and youth groups.
- Desired Behaviors and Actions – Environmental protection and responsibility through service projects including storm drain stenciling and stream cleanup and restoration.
- Education Materials – Makes use of materials developed for the projects it partners with, such as the C&C and DOH watershed programs. Also, materials used in service projects are gathered through in-kind donations or working with programs that have designated funding for service projects.
- Effectiveness Measures – Track the number of service events conducted and students involved, trees planted, storm drains stenciled, and the volume of trash collected.
- Funds – From grants and government contracts. Most of the YES 1999 annual budget goes to support eight staff.

Strengths of this program include the organizational structure that involves community leaders in developing and promoting programs; multi-agency cooperation and support for projects conducted; support for tangible actions tied to EE for youth involved in the program; potential for more partnering with agencies and organizations that focus on ISWM; and success in fund raising for special projects.

### **3.6.3.3 Model Programs Outside Hawai'i**

Model programs from the mainland U.S. were investigated to gather input on ISWM public education that might be appropriate for Hawai'i. Although inquiries of model programs included East Coast and Midwest communities, those selected for inclusion here are from the West Coast.

This was not intentional but occurred because the programs addressed some of the priorities for Hawai'i.

**California Integrated Waste Management Board.** The California Integrated Waste Management Board (CIWMB) is a large centralized state agency with approximately 300 employees within the California Environmental Protection Agency. CIWMB provides technical assistance and resources for local governments statewide on a wide variety of solid waste issues. Although the resources and size of CIWMB are very large compared to what would be appropriate for Hawai'i, it has played a role as mentor and supporter of local government agencies in ISWM public education that can provide valuable insight to development of state-level programs in Hawai'i. It is not the number or size of programs conducted by CIWMB, but their quality and the role CIWMB plays in assisting local governments that is of note.

A variety of waste reduction and recycling promotional programs are initiated, run, or funded from the CIWMB. Passage of the California Integrated Waste Management Act of 1989 (AB 939, Chapter 1095, Statutes of 1989), a law that mandates 50 percent waste diversion by the year 2000, has provided a strong incentive for communities and businesses to reduce waste. Communities that do not make efforts to achieve this goal can be fined by the state. This law has served as an impetus for both broad and targeted public education efforts to encourage waste reduction at all levels of government.

Two campaigns initiated and funded by the CIWMB are outlined below. One is a broad-scale campaign and the other is targeted. Both were conducted in partnership with other governmental organizations.

**Waste Prevention Partnership, CIWMB.** A statewide Waste Prevention Partnership project was initiated by CIWMB with the League of California Cities to provide support to each region in California in developing waste prevention campaigns tailored to their needs.<sup>40</sup> Consultants were hired to provide direct support in one of eight regions. The largest region had 86 cities and the smallest had 18 cities. Local governments within a region were encouraged to work together to develop their waste prevention campaigns. Some cities that had not yet established recycling programs were able to get assistance on that as well as make progress toward waste prevention.

Waste prevention partnership included the following elements:

- Goals – To decentralize a public education campaign, to encourage and support waste prevention on a regional scale, to enhance cooperation between cities, and to provide varying levels of support to local government to meet local needs.
- Objectives – Developed specific to each region or city.
- Target – Varied with each region.
- Organization – Consultant selected by CIWMB to work with regions and cities. Beyond this level, organization varied with each region.
- Sponsor – CIWMB with the League of California Cities.
- Outreach and Communication – Varied with each regional project.
- Desired Behaviors and Actions – Varied with each regional project.

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<sup>40</sup> California Integrated Waste Management Board. No date. *Waste Prevention Partnership: Final Report*. Produced in partnership with the League of California Cities.

- Education Materials – Varied with each regional project.
- Effectiveness Measures – Varied with each regional project.
- Funds – Initial funds from CIWMB. In addition, cities could also apply for CIWMB and League of California Cities funds to support waste prevention campaigns developed during the initial project.

Strengths of this program included the state diversion mandate that requires government agencies to implement waste reduction and recycling at all levels, increased cooperation between cities that developed campaigns together, conservation of staff and budget resources through partnering, and enhanced opportunities for regional awareness of waste prevention including more effective and efficient use of regional media.

A weakness was that the initial portion of the project spanned 18 months, which was found to be too short to develop local and regional campaigns in most regions.

**Hotel Waste Reduction Pilot, CIWMB.** The targeted campaign was a Hotel Waste Reduction pilot project funded by a grant from CIWMB to Westside Cities Waste Management Committee in the Los Angeles area.<sup>41</sup> A consultant was selected to develop and carry out the program, and three hotels were identified to take part in the pilot. Program development and implementation included initial and follow-up waste audits, department interviews, waste reduction recommendations for each hotel, education and training of staff, and monitoring of program implementation.

Hotel Waste Reduction pilot included the following elements:

- Goal – To implement waste reduction programs in three hotels.
- Objectives – Hotel specific based upon information collected through waste audit and hotel interviews.
- Target – Hotel management and employees.
- Organization – Hotel management with consultants and Westside Cities Waste Management Committee.
- Sponsor – Westside Cities Waste Management Committee with support from CIWMB.
- Outreach and Communication – Direct contact of hotels to recruit for the pilot phase. Project identified potential benefits to attract hotels to participate such as lower operations and disposal expenses, enhanced public image, increased employee morale, and contribution to improving the environment.
- Desired Behaviors and Actions – For hotels to develop an education and training program for employees on recycling and waste reduction, implement or expand current recycling programs, implement waste reduction and reuse strategies, implement a donation strategy, and promote the program to guests.
- Education Materials – Handbook and training materials for use by hotels, and flyers to inform guests of program.

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<sup>41</sup> California Integrated Waste Management Board. June 27, 1996. *Hotel Waste Reduction Pilot Program: Final Report*. Produced in partnership with the Westside Cities Waste Management Committee. Prepared by The Pick Up Artists, Culver City, California.



- Effectiveness Measures – An initial waste audit and refuse and tonnage survey provided baseline information for the pilot. Program effectiveness was measured through a follow-up waste audit and refuse and tonnage survey, as well as participation levels of staff and management at each hotel.
- Funds – CIWMB funding.

Strengths of this program included involvement of hotels in planning and implementing programs that affected them, hotel specific behaviors and actions to address goals and objectives of the project, and quantitative measurements to determine success of programs.

A challenge was the variation in program success between hotels. It was found that top management support and staff education were key components to successful implementation.

**Waste Prevention “Thinker” Campaign, Metro, Portland, Oregon.** Metro is a regional agency that encompasses the greater Portland metropolitan area, which has 1.3 million residents in 3 counties and 24 cities. The Metro Environmental Management Department includes a recycling and waste prevention program.

In 1997, Metro conducted a broad public education campaign over approximately three months. The Waste Prevention, or Thinker, Campaign, was designed to cause residents to think about waste prevention and provide them with options for preventing waste at home and work.<sup>42</sup> The topic was selected because it is the first priority in the waste management hierarchy for state and local governments.

The Waste Prevention campaign included the following elements:

- Goal – Make Portland residents think about waste prevention.
- Objectives – No objectives specifically cited.
- Target – The adult general public.
- Organization – Planning for the campaign involved a general public focus group for testing messages, and local government input on the themes. These groups participated throughout the campaign, which lasted three to four months, but were disbanded at the end. Metro staff conducted the campaign.
- Sponsor – Portland Metro.
- Outreach and Communication – An advertising campaign was developed for radio and print media.
- Desired Behaviors and Actions – Implement practices in home and office to reduce waste.
- Education Materials – Media advertisements, books marks, and brochures.
- Effectiveness Measures – Documented the reach of the campaign through listener and subscriber numbers for radio and newspaper, respectively. Tracked calls to Metro’s Recycling Information Center, numbers of brochures on waste prevention sent in follow-up of the calls, and numbers of waste prevention bookmarks distributed from libraries.

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<sup>42</sup> Dotten & Associated, Inc. January 19, 1999. *Business Waste Reduction Study 1998*. Prepared for Metro, Portland, Oregon.

- Funds – Funds for the campaign, provided by Portland Metro, went to an advertising agency contracted to develop materials for the campaign and to purchase media packages. Metro staff time also supported the program.

Strengths of this program included use of a focus group to develop the campaign, creative advertising messages, and strong, positive feedback from those who responded to the campaign by contacting Portland Metro's Recycling Information Center for additional information.

A weakness was the low public response to the campaign measured by phone calls to the recycling line and number of flyers and bookmarks distributed.

**Master Recycler Composter, King County, Washington.** King County encompasses 38 cities in an area of more than 2,200 square miles. The population of the county, including Seattle, is 1.5 million. King County government primarily serves people in unincorporated King County, which excludes the City of Seattle, which has a population of approximately 500,000.

The Master Recycler Composter (MRC) program, run by King County Solid Waste Division, is a community education program with a broad target audience addressing resource conservation and waste reduction.<sup>43</sup> It began in 1989, and has been consistently funded since then by King County government. The program recruits and trains volunteers to become MRCs. The trained MRCs perform community education and provide practical information to King County residents to motivate residents to take action in recycling and composting.

The program is flexible and can also address other resource conservation issues, such as salmon habitat and water quality, as priorities in the county change. Volunteers within King County attend MRC training to gain an in-depth understanding of waste prevention, recycling, composting, and resource conservation issues and practices. The 36-hour training course is free of charge to qualified volunteers and is held once a year. Ongoing coordination and tracking of volunteer activities is done by the agency to ensure that MRCs receive ongoing support in their volunteer position and to keep track of community contributions by the MRCs.

MRC included the following essential elements:

- Goal – To reduce the amount of garbage generated in King County through promotion of waste reduction, recycling and composting.
- Objectives – To use MRC volunteers to disseminate information and support recycling and composting activities in home and office.
- Target – King County residents, primarily the adult population.
- Organization – Planned and managed by King County Solid Waste Division and implemented by a contractor.
- Sponsor – King County Solid Waste Division.
- Outreach and Communication – MRC volunteers conduct outreach as a requirement of the course. Forty hours of volunteer time must be performed to become a MRC. Outreach on recycling and composting is conducted through community events, at yard and garden stores, in support of King County agency events, and in a variety of other ways depending on a volunteers interests and community involvement.

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<sup>43</sup> King County Solid Waste Division. 1998. *Master Composter Recycler Annual Report*.

- Desired Behaviors and Actions – To implement recycling and composting at home and business.
- Education Materials – Training manual, flyers and handbook on composting and recycling.
- Effectiveness Measures – Conducted on course materials and presentation and on outreach activities performed by MRCs. Evaluations examine the value of the training and outreach activities, whether outreach events match county priorities, and effectiveness of MRCs as perceived by the community.
- Funds – King County provided the 1998 contract budget. Approximately 90 percent went to labor and 10 percent to materials development and distribution. The MRC training program is contracted to a consultant, and managed by a half-time King County employee.

Strengths of this program included the use of trained volunteers to perform communication and outreach in the community, the support materials developed that identify specific behaviors and actions that related to recycling and composting, and the flexibility of the program to address broader issues of resource conservation that develop as community priorities.

**City of Mountain View, California.** The City of Mountain View is in the San Francisco Bay Area, and its Department of Public Works conducts public education for residential and commercial recycling and waste reduction.<sup>44</sup> Mountain View is urban and affected by the booming Silicone Valley economy. It has 80,000 residents, but daytime population is larger due to people commuting into the City for work.

City run public education programs encourage multi-media recycling and are promoted through a variety of media including the City's web site, outgoing telephone information line, community cable television station, local community newspaper, and presentations at business and community meetings. Programs include compost workshops, a household hazardous waste drop-off, apartment and condominium recycling, multi-family yard trimming collection, curbside trash and recycling collection, recycling drop-off locations, business recycling, and free mulch pickup.

One targeted program the City conducts, which has been ongoing since 1998, is a business recycling campaign. It was developed to help Mountain View meet the 50 percent waste reduction goal by 2000 imposed by AB 939 (see Section 3.6.3.3). The commercial sector accounts for approximately 60 percent of the population in Mountain View.

Mountain View's programs included the following elements:

- Goal – To encourage and support business recycling to meet California's waste reduction goal by the year 2000.
- Objectives – To contact all City businesses within three years, and still allow for follow-up and interaction with the one staff person in charge of the project.
- Target – Commercial businesses. During the early stages of the campaign, businesses were targeted based on size; at later stages, businesses were targeted according to location.

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<sup>44</sup> City of Mountain View, California. No date. *Business Recycling & Resource Guide*. Folder with brochures and fact sheet.  
City of Mountain View, California. Summer 1999. *The Mountain View Resource*. Newsletter.

- **Organization** – The materials for the campaign were developed with advice from a business focus group, and input from the City’s information officer and advisors within City government, including the Chamber of Commerce. It was modeled on similar efforts in neighboring California cities.
- **Sponsor** – City of Mountain View.
- **Outreach and Communication** – To initiate the campaign, a flyer was developed that describes the program and resources businesses would get if they contacted the City. The flyer was mailed directly to businesses that then need to respond to the City if they wish additional information and support.
- **Desired Behaviors and Actions** – For businesses to begin recycling programs for a variety of wastes. Typical office waste streams, such as paper, cardboard, glass, aluminum, and plastics, were targeted as materials for diversion. Data supporting this had been gathered during waste audits conducted by the state and cities in different locations.
- **Education Materials** – Flyers and resource guides.
- **Effectiveness Measures** – The number of business recycling and resource guides mailed out in response to campaign flyers, and the number of recycling dumpster bins requested by businesses as a result of the campaign. Some information is gathered from the recycling hauler who is under contract to the City for collecting recyclables from the commercial sector, but they are not required to report to the City on number of containers they service.
- **Funds** – The program is funded through solid waste revenues from refuse collection. Funds support one full-time staff person and development and distribution of educational materials.

Strengths of this program include the broad, multi-agency and organization input to the program; creative educational materials; and fulfilling the City’s mission of providing valuable services to residents and businesses.

Challenges include addressing the needs of businesses that are getting started in recycling and request City support and assistance in implementing their program.

### **3.6.4 Observations and Analysis**

#### **3.6.4.1 Strengths and Weaknesses of Public Education Programs**

Public education for ISWM and broader environmental issues occurs in Hawai‘i through non-profit organizations and public agencies. There are a number of strong programs, as highlighted in Section 3.6.3. Together, these programs cover a broad range of topics and audiences. Table 3-22 illustrates which of the essential elements identified in Section 3.6.3.1 are incorporated into each model program.

**Table 3-22:  
Model Programs and Essential Elements**

| Element                              | Model Programs <sup>1</sup> |     |     |     |     |     |     |     |     |     |     |     |     |
|--------------------------------------|-----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                                      | 1                           | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  |
| Goal(s)                              | X                           | X   | X   | X   | X   | X   | X   | X   | X   | X   | X   | X   | X   |
| Objectives                           | X                           | X   | X   | X   | X   | X   | X   | X   | X   | X   | X   | X   | X   |
| Target Audience                      | X                           | X   | X   | X   | X   | X   | X   | X   | *   | X   | X   | X   | X   |
| Organizational Approach <sup>2</sup> | E +                         | I X | I X | E + | E + | I X | E + | E + | E X | E X | E + | I X | E + |
| Sponsoring Organization(s)           | X                           | X   | X   | X   | X   | X   | X   | X   | X   | X   | X   | X   | X   |
| Outreach and Communication Strategy  | X                           | X   | X   | +   | +   | X   | +   | +   | *   | X   | X   | +   | X   |
| Desired Behaviors and Actions        | X                           | X   | X   | +   | X   | +   | X   | +   | *   | +   | X   | +   | X   |
| Education Materials and Media        | X                           | X   | +   | X   | X   | +   | X   | X   | *   | X   | X   | X   | +   |
| Measurements to Assess Effectiveness | X                           |     | +   | +   |     | X   | X   | X   | *   | +   | X   | X   | X   |
| Funding                              | +                           | X   | +   | X   | X   | X   | X   | +   | +   | X   | X   | X   | X   |

NOTES:

<sup>1</sup> Model Programs are identified as follows: 1 = HABIT, 2 = Home\*A\*Syst, 3 = KidScience, 4 = Partnership for the Environment, 5 = Kaua'i Plastic Recycling Education Program, 6 = Home Composting Program, 7 = Used Oil Collection Program, 8 = YES, 9 = Waste Prevention Partnership (CIWMB), 10 = Hotel Waste Reduction Pilot (CIWMB), 11 = Waste Prevention "Thinker" Campaign, 12 = Master Recycler Composter, and 13 = City of Mountain View.

X = The element is identified for the model program.

+ = The element is a strength of the model program.

\* = The Waste Prevention Partnership was defined differently in each of the regions it was introduced. From the sources of information compiled on this project, we could not determine how these elements were addressed in each region.

<sup>2</sup> Organizational approaches are identified as internal (I) or external (E). An internal organizational approach is one that does not involve parties outside of the sponsoring organization. An external organizational approach is one that does involve parties outside of the sponsoring organization, such as a steering committee or advisory group.

**Analysis of Existing Conditions and Hawai'i Model Programs.** The strengths identified for model programs in Hawai'i include the following (see Table 3-22):

- External organizational approaches, including local communities and businesses, to develop and implement programs and gain support among the target audience during implementation.
- Input from national programs and local experts in the field.
- Creative outreach and communication strategies that involve events, entertainment, multi-media publications, and direct support and input from the target audience.
- Clear identification of desired behaviors and actions presented in educational materials, workshops, and the media.
- Flexible and creative program formats to address local and regional ISWM priorities.
- Use of qualitative (more common) and quantitative (less common) measurements to analyze and adjust programs.

- Diverse funding sources that both ensure inter-agency coordination and attract federal and private monies to support Hawai'i programs.

An additional strength is the opportunity for some model programs not directly targeting ISWM issues (i.e., Home\*A\*Syst, KidScience, YES) to partner with existing or planned ISWM programs. This would both expand the EE scope of the non-ISWM specific programs, and provide broader audiences (i.e., rural residents, school children, and youth) for ISWM programs.

Challenges highlighted by examining model programs in Hawai'i are as follows:

- Coordination between projects occurs only sporadically. There is not a consistent process for communicating ISWM issues to the public from the state or from some counties. Even when mass media is used to promote a public education program, coordination with other programs that have similar goals or targets is minimal. The lack of broad coordination and communication between projects weakens the overall effort and may confuse the target audience.
- Funds provided for some projects have been limited and sometimes erratic. Budgets and time frames can be so tight as to prevent information gathering and follow-through at the end of project. These steps can be valuable in informing future efforts. Erratic funding can cause a program to be put on hold during a critical time, and require more effort to get it going again after the momentum has been lost.

These challenges can translate into erratic and inconsistent messages to the public regarding the importance of ISWM and relationship to environmental issues in Hawai'i.

**Analysis of National Model Programs.** Strengths apparent in model programs outside of Hawai'i (Section 3.6.3.3) that may offer useful input for improving local ISWM public education efforts include the following:

- The CIWMB provides broad coordination at state and local agency levels; supports local governments with technical expertise, funding, and compiling resources that can be altered and used at the local level; and implements and enforces the state law that mandates waste diversion of 50 percent by 2000. Two of the programs it sponsored had the following attributes:
  - Waste Prevention Partnership provided support for broad waste prevention goals at a regional level and promoted intra-community cooperation to meet local governments' needs regarding waste prevention and recycling, and meet the state's waste diversion goal.
  - Hotel Waste Reduction Pilot directly engaged its target audience by identifying potential benefits and conducting quantitative (waste audits) and qualitative (education) programs to support each hotel selected for pilot implementation.
- Portland Metro's "Thinker" Campaign used a multimedia (radio and print) approach to address source reduction. A focus group representing the general public helped to plan the campaign, and the campaign's reach was measured via the media used and the response to Metro's community hotline.
- King County's MRC program used trained volunteers to promote composting, recycling, and other priority environmental issues in their communities. The program is flexible and topics covered in the training can be altered to address timely or unique community

priorities. The program also provides ongoing support for volunteer outreach, and evaluates the effectiveness of both the training and outreach efforts.

- City of Mountain View developed a variety of multi-media ISWM programs to support businesses and the public in recycling and other priority ISWM issues for the community. They used focus groups to help develop campaigns, tracked progress through various measurements, and developed creative support materials to promote programs. An underlying motivation for their programs is California's waste reduction law.

#### **3.6.4.2 Essential Actions for a State Public Education Program**

There is a need in Hawai'i to coordinate ISWM information, and to ensure regular and consistent communication on issues that are associated with ISWM challenges, such as costs of waste management, problems with illegal dumping, and recycling markets. Strong public education programs exist in Hawai'i. However, the lack of coordination between programs or regular, consistent, and clear communication to the public on how these programs address the larger issues of waste management in an isolated island setting undermines the state's ability to gain public support for solutions to ISWM problems.

The following sections describe approaches to ensuring public education efforts are successful and meet the needs of identified ISWM priorities.

**Planning and Coordination of Public Education Programs and Policies.** A legislative mandate exists to support the DOH in a central role for ISWM public education. In HRS 342G-14(3), it is stated that one of the powers and duties of the DOH OSWM is as follows:

*“Promote source reduction, recycling, and bioconversion, including home composting, through the provision of a comprehensive, innovative, and effective statewide public education and awareness program concerning the value of source reduction and recycling, and the way the public can participate in these areas.”*

Also within HRS 342G-14 are multiple references to coordination with state agencies and county governments.

Additional legislative support for ISWM public education would include strengthening the present waste reduction goals to be enforceable. Examples of this exist both in the C&C requirements for commercial recycling, and in California law (see Section 3.6.3.3). If the state were to pursue strengthening the waste reduction goals, the goals would need to be adjusted to ensure they could be met, and enforcement would need to be identified and implemented at the state and possibly the county level. This would create stronger incentives for public education and tangible waste reduction, which has been achieved in both the C&C and California.

**Organizational Approach.** The core elements of a statewide approach to ISWM public education should include the following:

- A state-sponsored Public Education Steering Committee for overall planning, coordination, and implementation of ISWM education.
- Support of existing public education efforts and integration of ISWM topics into existing programs where feasible.
- State-sponsored campaigns to address high priority ISWM education topics.

- Campaign Action Groups, working under supervision of the Steering Committee, to guide and implement each campaign.
- A sponsoring organization for long-term campaigns.

The goal of the Steering Committee should be to assure coverage and coordination of ISWM public education efforts by different jurisdictions statewide. The membership should include local government, solid waste non-profits, and members of the business community involved in or affected by the ISWM issues. The Committee should undertake tasks that include an annual or biannual public education plan, prioritization of ISWM issues, and development of public education campaigns to address priority issues.

For each campaign, the Committee would identify the goals and objectives, target audience, actions, effectiveness measurements, and other essential elements (see Table 3-21). Once the Committee has agreed on the elements of a campaign, a Campaign Action Group would be developed to carry out the campaign. The Action Group would oversee specific details of the campaign and coordinate implementation.

Three potential campaigns, one broad and two targeted, are described below. These were selected to provide examples of campaigns that could address key elements identified by the state and SWAC during the ISWM Plan process. The emphasis in the descriptions is on the approach and tools. It is recognized that identification of ISWM education priorities and selection of campaigns would be the role of the state and the Steering Committee as described above.

**Funding.** Funding for public education in Hawai'i has been limited and at times erratic. This is not unique to Hawai'i; other states are conducting ISWM public education less frequently than they have in the past, possibly due both to decreased funds and the perception that it becomes less important to do education after programs have become established.<sup>45</sup>

The Steering Committee would need to ensure that funds obtained were sufficient for planning, implementation, and measurement stages of the campaigns. Some of the different funding approaches to support campaigns include the following:

- Pursue partnerships to consolidate funding, volunteer resources, in-kind resources, private donations, and efforts for proposal and grant writing.
- Consolidate existing education programs and identify existing in-kind contributions available among Steering Committee members.
- Identify volunteer resources in the community that overlap with Committee priorities.
- Apply for grant funds from state, federal, and private organizations for specific EE and ISWM projects.

Additional information on funding approaches can be found in Section 3.7.

### **3.6.4.3 A Broad Public Education Campaign**

The DOH OSWM should implement a broad public education campaign with a simple and understandable message that addresses key principles of the ISWM program. The elements of this

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<sup>45</sup> David H. Folz. 1998. *A National Panel Study of Solid Waste Recycling Program Performance*. Department of Political Science, University of Tennessee.



campaign should be developed by the Public Education Steering Committee, and implemented with assistance from a Campaign Action Group. The following information is provided as an example to illustrate the elements of a broad campaign.

The message for a broad campaign to increase recycling and waste reduction, awareness of associated economic opportunities, and awareness of the dangers of litter and illegal dumps could be as follows:

“Recycle – Help maintain a sustainable Hawai‘i by respecting its natural beauty and enhancing its economic vitality.”

The elements of the campaign could include the following:

- Goal: To encourage behavior changes supporting specific ISWM priorities in a broad audience (e.g., illegal dumping and source reduction).
- Objectives:
  - To develop awareness of source reduction practices.
  - To develop awareness of local recycling opportunities.
  - To develop awareness of closing the recycling loop by buying recycled.
  - To develop awareness of the harm caused by littering and illegal dumps.
- Target Audience: Adult general population, inclusive of full-time residents, military, and visitors.
- Desired Behavior and Actions:
  - Purchase products with minimal packaging (link with reducing litter and natural beauty).
  - Collect recyclables and take to your nearest drop-off center (define for each county, or provide phone number; link with reducing litter, landfill expansion, natural beauty, and economic opportunities/vitality).
  - Buy products with the recycle symbol (link with economic opportunities/vitality).
  - Do not litter and report illegal dumps (link with natural beauty).
- Measurement of Effectiveness:
  - Circulation of newspapers that carry the message and number of potential listeners for radio broadcasts.
  - Change in use of drop-off recycling centers.
  - Change in consumption of recycled content materials or locally produced recycled materials.
  - Change in reporting of illegal dumps.
  - Survey of sample population to assess what actions were performed and behavior changes were adopted.

To address the need for coordination and communication statewide, it would be essential to involve county agencies and other entities who may not be represented on the Steering

Committee but could support elements of the broad campaign. This would ensure a strong campaign with a clear message. The approach to the campaign is described in the following sections.

**Organizational Approach.** After all the elements of a broad campaign are identified and agreed upon by the Steering Committee, the Campaign Action Group would put the plans into action. The Action Group would develop the content of the messages, the action items, and the measurements to be applied to the campaign. They would carry the campaign through to closure and report on the successes and challenges to the Steering Committee. DOH OSWM staff would play a key role on the Campaign Action Group to ensure the project is consistent with ISWM priorities and to provide in-kind staff and material resources to the project to ensure it is completed.

Because broad campaigns rely on mass media to get the message out to a broad audience, the Campaign Action Group developed for this campaign should have media and advertising representatives. If a general public survey is selected as a measurement method, a marketing representative with statistical background should be included in the Action Group. The Action Group should be convened at least two months prior to the start of the campaign, and would continue working until the measurements were compiled and final report delivered to the Steering Committee.

**Funding.** Because broad campaigns often rely on media to broadcast messages statewide, the purchase of advertising time, especially if television is selected for the campaign, would constitute the largest single budget item. The lowest possible budget for conducting a broad campaign would rely on PSAs for radio and newspaper and on voluntary efforts of agencies and organizations to communicate the campaign message to their constituents.

Purchasing media time and space can be most efficient when conducted as a centralized effort. This may lead to free media coverage if a diverse group is being represented and the media perceives an opportunity to air (or print) something unique and unusual. Budgets for media efforts in Hawai'i and on the mainland have ranged from \$42,000 for a 1-year program that included video production, advertising, and newsletters to \$74,000 for a 3-month effort in a metropolitan area (Portland Metro's Thinker Campaign where 90 percent of the budget went to purchase print and radio media coverage). These budget amounts do not include staff time for developing the media materials, supporting implementation, or measuring campaign effectiveness. These additional costs would need to be factored into the campaign budget and would depend on the type of organizational approach that is selected.

Sources of funding for broad public education efforts can include national and international foundations that emphasize community education and environmental issues, federal government grants that focus on implementation of pollution prevention and other solid waste reduction topics, and local supporters of specific issues that may be featured in the broad campaign. Cooperative projects between government agencies and non-profit organizations may sometimes increase the access to funding sources, especially federal government and national or international foundations that value community cooperation.

**Implementation.** The Campaign Action Group would carry the campaign through to closure, and report on the successes and challenges to the Steering Committee. They would have full responsibility for the accuracy of the materials, the effectiveness of the chosen communication tools (e.g., mass media), and the compilation of information to measure effectiveness. The

Steering Committee would be available to check the overall campaign and messages, and would support the efforts of the Action Group in implementing the campaign.

**Measures of Effectiveness.** Measurements of effectiveness can be direct (e.g., numbers of people reached through media, number of participants in a program) or indirect (e.g., change in use at recycling drop-offs, change in amount of waste going to a landfill).

Some of the direct measurements applicable to a broad campaign, such as the number of people that may see or hear the media messages, may not yield information on how people are responding to the messages or whether they are adopting new behaviors that the campaign is encouraging. These types of direct measurements may only provide the number of people being exposed to the campaign. A more intensive approach to gaining information for a direct measurement is to design a follow-up survey directed at a sample of people exposed to the message. This can be expensive, but can provide the project with insight into how the general public is responding to the campaign and whether the messages and action items are having the intended impact.

Indirect measurements of program effectiveness can be very valuable to an ISWM project since they allow assessment of changes in what is happening with the waste stream. An increase in use of recycling drop-off programs, increased purchases of recycled content products, or decrease in amount of solid waste going to the landfill may not be directly attributable to a campaign, but may provide clues for assessing effectiveness.

The effectiveness measurement of a campaign can be challenging both to design and implement. In addition, the budget allotted for the measurement will determine how comprehensive the information may be. Measurement is an important component to a campaign because the results provide guidance for later stages of the campaign if any are planned, or for new campaigns undertaken to address other ISWM priorities.

#### **3.6.4.4 Two Targeted Campaigns**

A wide variety of targeted campaigns could be identified to support priority ISWM issues. Targeted campaigns focus on specific types of waste or specific audiences or industries. Two possible campaigns are described below.

##### **Campaign 1 – Targeted Training Program**

A volunteer training program, such as the MRC in King County or Maui's planned Master Composter program, could be developed to address a variety of issues, including residential composting and recycling, commercial recycling, and illegal dumping.

An example of the elements of such a program are provided below:

- Goal: To encourage and support recycling and composting practices among residents and commercial businesses, and enhance community responsibility for environmental priorities.
- Objectives:
  - To train volunteers in recycling and composting practices to become MRCs.
  - To support MRCs in educating their communities (whether residential or commercial) to adopt recycling and composting.

- To support MRCs in assisting communities to identify and address specific community ISWM concerns.
- Target Audience:
  - People who have a strong interest in recycling and composting practices, and community environmental responsibility.
  - The communities represented by the MRCs (whether residential or commercial).
- Actions:
  - For MRCs, to begin recycling and composting in their own homes and offices.
  - For target communities (residential or commercial), to begin recycling, composting, and contacting a MRC to get more information.
  - For target communities (residential or rural) to identify specific community ISWM problems and work with MRCs to gain the resources to address them.
- Measurements of Effectiveness:
  - For the training program, written evaluations by trainees on process and materials.
  - Number of people contacted by MRCs, increase in recycling, increase in composting or purchase of composting containers.
  - Number of MRC initiated projects in communities to address other ISWM priorities.

A long term goal of the MRC training program could be that funds are secured to continue the project as long as it is having a positive impact on residential and/or commercial recycling and composting practices, and on community organization around other ISWM priorities.

### **Campaign 2 - Targeting the Visitor Industry**

The second campaign could be modeled on the Hotel Waste Reduction program developed by CIWMB and Westside Cities Waste Management Committee and draw from existing successes in commercial recycling, such as the C&C Partnership for the Environment.

An illustration of the possible elements of such a program is provided below:

- Goal: To identify and promote source reduction, recycling, and purchase practices to close the recycling loop for hotels and resorts, and encourage environmental stewardship.
- Objectives:
  - To develop a pilot project for hotel waste reduction by recruiting two hotels or resorts (minimum) to implement environmentally and economically sensible source reduction, recycling, and purchasing practices.
  - To develop economic assessments of impacts from source reduction, recycling, and purchasing practices on pilot hotels and resorts.
  - To encourage other hotels and resorts to join the waste reduction campaign.

- **Target Audience:** Hotel and resort management and owners, and visitor industry business owners.
- **Actions:** For hotels and resorts to change a variety of practices to adopt source reduction, recycling and purchasing practices to close the loop. These practices would be identified specifically for the hotel and/or resort community, supported by cost information where possible, and promoted as environmentally responsible for the visitor industry.
- **Measurements of Effectiveness:**
  - Hotels and/or resorts used in pilot will directly evaluate program approach and materials.
  - The number of hotels and resorts that adopt the program.
  - Changes in commercial recycling and waste disposal from the hotel and resort sector.

A long-term goal for the hotel waste reduction campaign could be that the visitor industry accepts responsibility for replicating and supporting the campaign indefinitely. These ideals would only occur if the actions promoted by the campaign proved to be beneficial, either economically or socially (i.e., positive public perception that could yield economic benefits).

The approaches to achieving success in these programs could be quite different, but the organizational approach, funding options, implementation, and measurements to determine effectiveness would involve similar issues. The following descriptions will help to identify common elements to carry out the above targeted campaigns.

**Organizational Approach.** Since these campaigns would possibly be conducted over long periods, and may continue indefinitely depending on funding and state priorities, one or possibly two organizations should be identified to take on the responsibility for managing the project over the long term. The organization, whether an agency office or non-profit group, would be recognized by the target audience and general public as responsible for the project. They would manage the campaign either by using their staff and material resources, or by hiring a contractor to develop and implement the project.

The Steering Committee and Campaign Action Group would be kept informed of the project progress, and the Action Group would assist the responsible organization and/or contractor in planning, implementation, and reporting. However, the organization would manage the project over its life. This would provide consistency for the project and ensure that it is carried through to the final stages of measurement and reporting.

**Funding.** The narrower focus of targeted campaigns changes the types of funds that could be pursued from foundations, government grants, and the private sector. Funds designated for the specific issues that the target campaign addresses would need to be identified and pursued early on in the planning process. The Steering Committee, prior to developing the program, should evaluate the availability of funding for specific targets. This research should be done to ensure that funds would be available for the life of the project, whether it is envisioned as a pilot project over a year or less, or as a longer-term campaign that extends for a year or more. At the early planning stages, it is still possible to adjust the campaign to capture available funds that might be designated for specific ISWM issues.

Budgets for targeted campaigns need a higher proportion for staff and materials than broad campaign budgets that emphasize the use of mass media. Budget items should include staff time, office overhead, program materials, and communication and/or media approaches. Possible budget levels, based on Hawai'i and mainland targeted campaign programs, range from \$10,000 for a 1-year low-cost voluntary campaign for Kaua'i plastic recycling (the budget went primarily to public education activities) to \$135,000 a year for the King County MRC program (contract budget for labor, 90 percent, and materials, 10 percent).

The budgets of longer-term targeted campaigns generally require that more than half of the budget supports staff time, and less than half covers materials and promotion. This holds true as long as mass media is not the preferred communication method for reaching the target audience. Successful communication for the campaign that would be low cost could include involving professional and community networks, attending meetings, and providing articles and announcements to newsletters for the target audience. The anticipated time frame for a project may be constrained by available funds. However, the longer a project continues, the higher the gain in comparison with resources spent since campaign start-up is very resource intensive.

**Implementation.** Implementation can vary greatly, depending on the type of education effort. Three basic implementation tools for targeted campaigns are communication, support, and follow-through.

For the MRC training program, communication with target audiences should occur through direct channels to businesses or communities that have a high potential for a successful MRC project (e.g., high interest in recycling and composting), or have a high need for assistance in ISWM alternatives (e.g., a community where illegal dumping is a problem). Indirect communication, through newspapers and radio PSAs, could also help in recruiting MRC volunteers. Support of the project would come through direct support of the MRC trainees during the training program and of their volunteer activities after they complete the training program. Follow-through would include direct support to MRCs and promotion of successes associated with the program in the communities or businesses targeted.

For the hotel and resort industry, communication should occur through professional management networks, direct contact with owners or managers, and visitor industry professional groups. Direct technical support would be provided to the individual hotels and resorts willing to pilot the project. Documentation of successes, especially financial incentives, would occur during the pilot phase. Follow-through for this program would involve recruiting other hotels and resorts to adopt waste reduction practices that have proven to be beneficial and encouraging professional associations to sponsor the program over the long term.

**Measures of Effectiveness.** As with broad campaigns, measures can be direct (i.e., directly attributable to the campaign) and indirect (i.e., possibly attributable to the campaign). In addition, for the two campaigns described, measures can be internal (e.g., evaluating the training of MRCs or implementation in hotels and resorts) or external (e.g., assessing numbers of people or communities effected or changes in recycling rates).

The internal measures of the targeted campaigns would include assessing the materials, training, and implementation approaches of each campaign through a written evaluation by the initial target audience (e.g., MRCs and pilot hotels and resorts). The external measures would include the numbers of volunteers or hotels and resorts showing an interest in the campaigns. The above measures would provide direct feedback to the programs to aid in improvements.

External measures that are also indirect would include changes in recycling rates, waste disposal, or incidents of illegal dumping in targeted communities. All of the above evaluations would provide input into improving later stages of the campaigns, and would also provide examples of successes for promoting the programs and encouraging increased participation.

## **3.7 State Program Funding**

### **3.7.1 Introduction**

Program funding is one of the most important and abiding issues in solid waste management, especially for waste diversion and recycling programs. The SWAC, in considering the range of topics upon which this plan could focus, ranked funding as the highest priority.

A national study of critical issues in recycling<sup>46</sup> ranked the most important problems as perceived by recycling coordinators around the country. Program funding and securing adequate budget was ranked number one.

#### **3.7.1.1 Purpose**

This section addresses the State of Hawai'i's role in funding solid waste management, including funding for state programs and state actions to support funding of local waste management programs. The section will address the following three key topics:

1. Funding for state programs and services.
2. State funding for local programs and services.
3. State role in defining principles and policies for local funding.

The primary objective is to examine methods of funding that are used by other states, and to identify funding methods for Hawai'i that will provide adequate and stable funding for state programs, while providing the proper incentives for desired and appropriate methods of waste management.

#### **3.7.1.2 Organization**

The section is organized into the following four major sections:

- 3.7.1 Introduction
- 3.7.2 Background and Existing Conditions
- 3.7.3 Program Models and Funding Methods
- 3.7.4 Observations and Analysis

Recommendations for state program funding are included in Chapter 4.

#### **3.7.1.3 Priorities**

During the ISWM planning process, program funding and financial incentives were addressed in separate discussion papers that were then reviewed by the SWAC (see Appendix III). In the October

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<sup>46</sup> David Folz. 1998. *A National Panel Study of Solid Waste Recycling Program Performance*. Department of Political Science, University of Tennessee. (Available at the following web address: <http://web.utk.edu/~dfolz/recycle1.html>.)



1998 SWAC meeting, program funding was given the highest number of votes for further clarification and development. It was recommended that the topic be focussed on and limited to the state's authority in funding, rather than dealing with issues of local funding. It was also suggested that funding and financial incentives should be addressed together.

Some of the key concerns and issues raised in SWAC discussions include the following:

- To consider expanding existing state funding sources via the following:
  - Tipping fee surcharge.
  - Glass ADF.
  - Expand ADF to include other materials.
- Whether or not diversion programs should be supported by public funding, or be expected to be self-sustaining. Most SWAC members believed that diversion programs should receive public funding assistance.
- Whether financial incentives should be used to motivate appropriate waste behavior by residents and businesses. Most SWAC members believed that financial incentives should be developed and implemented.
- Explore PAYT options as user fees for solid waste management.

Written questionnaires were completed by a majority of SWAC members. Responses showed the following areas of majority agreement:

- Continue existing forms of state funding, including tipping fee surcharge and glass ADF.
- Explore new funding sources, specifically residential user fees.
- Develop full cost accounting (FCA) in counties.
- Develop financial incentives, with special support for income or excise tax credits and avoided cost credits.

In consideration of SWAC priorities, the project team focused on the following key topics:

- Sources of funding for state programs, with consideration of possible options to expand funding over time, is an area of focus for the plan.
- Methods that have been used to provide state or federal assistance for local agencies, particularly to achieve defined statewide objectives, such as implementation of waste diversion programs.

Principles that have been established on state and national levels as significant policy issues include the following:

- FCA.
- The user pay principle (e.g., PAYT) and quantity-based variable fees.
- Different funding methods that provide incentives for appropriate waste behavior.

This section will not address funding issues, such as:

- Sources of funding for local programs, which is a primary consideration to be developed in county plans.
- Financial incentives per se, such as tax credits, that are not specifically sources of funding.

The SWAC noted that program funding is an issue that relates to nearly all of the other programs, particularly to financial incentives. How funds are raised to support public programs can provide incentives or disincentives to desired behavior. For example, if funding for recycling programs is derived as a fee for participating in those programs, recycling may be less economically attractive. Likewise, if funding is derived as a surcharge on waste disposal, it will cause disposal to be less economically favorable to recycling options.

Several of the topics of this Plan revision focus on expansion or reduction of certain types of waste behavior, such as commercial recycling, diversion of C&D debris, and illegal dumping. The associated funding program must be designed to enhance the objectives of these programs by providing incentives.

In addition, several of the focus topics, such as public education and market development, may require additional funding to achieve their objectives. The funding program must provide the resources identified as necessary for these programs.

#### **3.7.1.4 Methodology**

These topics are examined based on input from a variety of information sources, including the following:

- Input and ideas provided by the SWAC and other members of the Hawai'i community.
- Review of studies and information sources on solid waste program funding.
- Examination of funding programs in five states that were selected because their funding approaches may include relevant elements for Hawai'i.
- Funding needs and opportunities discovered in the process of developing other topics for the ISWM Plan.

This section briefly evaluates the existing funding methods for state solid waste programs in Hawai'i, specifically those operated by DOH and CHC. It also briefly examines key issues in local funding.

The section then provides an overview of how state solid waste programs are funded across the country, and identifies some key policy issues regarding funding systems for both state and local agencies. It then describes five state-funding models and assesses program elements that may be relevant in Hawai'i.

Recommendations for implementation in Hawai'i are provided in Chapter 4.

#### **3.7.2 Background and Existing Conditions**

This section addresses existing methods of state solid waste program funding, grant programs by which the state provides funding to local governments and organizations, and local efforts relative to user fees and FCA.

### 3.7.2.1 *Funding for State Programs*

Chapter 2, Existing Conditions, describes funding of both state and local solid waste management programs in greater detail. Following, is a brief summary of the major state funding sources in Hawai'i.

**Department of Health, Office of Solid Waste Management.** The major source of funds for the DOH OSWM includes the following:

- **Solid Waste Disposal Surcharge.** A \$0.35 per ton surcharge is assessed on all solid waste disposed in the state at MSW landfills and incinerators. Special purpose landfills, such as C&D landfills, are not excluded. The owner or operator of each facility transfers the funds to the DOH on a quarterly basis.

The monies are deposited in the Environmental Management Fund (EMF), which is dedicated to accomplish the following:

- Fund, in part, the solid waste program operations in DOH.
- Fund statewide education or market development through contracts or grants to counties or state agencies.
- Provide RCRA training for facility operators.

The surcharge was established by the Hawai'i State Legislature in 1994 at \$0.25 per ton for a period of two years. The DOH, in consultation with the counties and upon reporting to the Legislature, was authorized in the original law to propose to the Legislature that the fee be raised, but it was not to exceed \$1.50 per ton. In 1997, the Legislature amended the statute to raise the surcharge to \$0.35 per ton.

Currently this revenue source generates slightly more than \$400,000 per year.

- **Glass Container Advance Disposal Fee.** Glass containers are assessed an ADF of \$0.015 per container. The ADF was established in 1994 and applies only to bottles and jars, but not to glasses, cups, and other glass utensils. It is levied on glass container importers, which includes manufacturers. All glass container importers are required to register with the DOH. Importers are required to report and make payments to the DOH quarterly, or if they are a small quantity importer, either quarterly or annually.

The monies are deposited into a special account in the environmental management special fund. That special account is dedicated to fund the following:

- County glass recovery programs, through contracts to counties that have submitted a county ISWM Plan. The applicable elements of a county glass recovery program are specified in the law and include collection incentives, contracts for collection or processing, subsidies for transportation to market, development of collection facilities, research and development (R&D) programs, public education programs, and glassphalt R&D projects.
- Departmental administration and education, including research and demonstration projects, not to exceed 10 percent of the total fund.

The level of the ADF is tied to recovery rate goals for glass containers. By 1998, the recovery rate should have exceeded 50 percent, and by 2000 be at the "maximum amount practical."

In contrast, glass container recovery in 1998 was at 36 percent. The DOH is instructed to report glass recovery rates to the Legislature on even-numbered years. They are also instructed to make appropriate recommendations for modification of the fee.

Currently this revenue source is generating approximately \$2.2 million per year to fund glass recovery programs.

- **Oil Import Surcharge.** A \$0.05 per barrel surcharge on oil imports currently generates approximately \$200,000 for the Emergency Response Revolving Fund. This is shared by DOH OSWM and the Hazard Evaluation and Emergency Response office to reduce the amount of petroleum that is released into the environment and to support used oil recycling statewide.
- **State General Fund.** The General Fund provided approximately \$8,000 for DOH OSWM office expenses.
- **U.S. Environmental Protection Agency.** The EPA provides variable grant funds on a project-by-project, competitive basis. Most often, the funding received by DOH OSWM has been under the Pollution Prevention funding program. Though this does not explicitly target waste management, several complementary projects have been funded. These include the following:
  - Three efforts were funded in 1993 for a total of \$185,000:
    - ⇒ The HHW Minimization and Alternative Products project to create a pamphlet that clarifies the environmental concerns of improper disposal of HHW and suggests alternatives.
    - ⇒ Support for an interagency Pollution Prevention Working Group to coordinate efforts.
    - ⇒ A Boater Waste Minimization project to create a pamphlet to identify the environmental impacts of improper boat waste management and to identify waste minimization alternatives.
  - In 1996, \$54,000 was provided for the Restaurant Waste Minimization pilot project. This is discussed in Section 3.3, Commercial Recycling.
  - In addition, EPA provided a one-time revenue source to fund RCRA educational workshops for public officials and employees.

**Department of Business, Economic Development, and Tourism, Clean Hawai'i Center.** CHC has received \$220,000 in general funds during its five years of operation. EPA project-specific grants have been a major funding source, providing nearly \$350,000. Those funds have generally been matched by state funds or in-kind contributions from private businesses or organizations. The DOH OSWM has been the largest single funding source providing \$710,000 to support CHC programs.

### **3.7.2.2 State Grant Programs**

Both DOH and CHC have provided substantial funds for local government solid waste programs and for private recycling businesses and organizations. Following is a partial listing of the major grant funds provided.

**DOH Assistance for Local Governments and Private Recycling Businesses.** The DOH OSWM has an active program to provide assistance to local government and recycling businesses. The bulk of the assistance is in the form of ADF funds passed through to local governments to fund glass

recovery programs, and assistance to CHC to provide general support and matching funds for federal grants. Most of the funds provided to CHC end up as grants to local governments, private recycling businesses or recycling organizations. In addition, the DOH OSWM manages EPA grants that are locally contracted.

**CHC Grants to Local Governments and Private Organizations and Businesses.** A central mission of the CHC has been to support development of jobs in recycling. This has been accomplished through a variety of business assistance contracts. These grants have funded projects and services to develop new recyclable material processing systems and new market opportunities. Some examples of contracts follow:

- Development of recycled glass decorative products.
- Development of technical capability and equipment to bag and market green waste compost.
- Purchase of equipment to process waste paper into oil absorbent material.
- Recycled plastic product development.
- Development of a production system for manufacture of hydromulch from recycled paper.
- Development of recycled polystyrene as a soil additive.

**3.7.2.3 Local Funding Programs**

Local governments in Hawai'i fund solid waste programs through a variety of methods. Table 3-23 provides information about local solid waste funding methods.

**Table 3-23: Methods of Local Solid Waste System Funding**

| <b>Hawai'i County</b>  |
|--|
| Tipping fees and the General Fund are the sources of funding for solid waste activities.             |
| The tipping fee for commercial haulers and residents at the landfills is \$35.00 per ton.            |
| There is no charge for residents to dispose at the transfer stations.                                |
| <b>City and County of Honolulu</b>   |
| Tipping fees and the General Fund are the sources of funding for solid waste activities.             |
| The tipping fee for commercial haulers to dispose at the incinerator or landfill is \$67.50 per ton. |
| Recycling programs are funded with a surcharge on the tip fee.                                       |
| There is no charge for disposal at the transfer stations or convenience centers.                     |
| There is no collection fee for residential waste services.   |
| Business waste collection service provided by C&C is billed at \$1.00 per cubic foot.                |

**Table 3-23: Methods of Local Solid Waste System Funding** *(continued)*

| <b>Kaua‘i County</b>   |
|--|
| Tipping fees and the General Fund are the sources of revenues for solid waste activities.  |
| The tipping fee for commercial haulers to dispose at the landfill is \$56.00 per ton.  |
| There is no charge for residents to dispose at the transfer stations or landfill.  |
| There is no collection fee for residential waste services.   |
| Business waste collection service has a variable monthly charge of \$11.00 for one can, \$17.00 for two, \$23.00 for three, and \$6.00 for each additional can thereafter. |
| <b>Maui County</b>   |
| Collection fees, tipping fees and the General Fund are the sources of revenues for solid waste activities.   |
| Residential collection fee is \$6.00 per month for up to six 32-gallon cans.   |
| In the process of installing a two-tier rate system, which is complicated by union negotiations over automation of trash collection.                                       |
| The tipping fee for residents to dispose at the landfill or transfer station is \$6.00 per load. Fourteen free days are provided per year.                                 |
| The tipping fee for commercial haulers to dispose at the landfill is \$43.00 per ton.  |
| The tipping fee for commercial haulers to dispose green waste at the landfill is \$7.00 per ton, and for residents it is free.   |

Throughout Hawai‘i, even where tip fees or collection fees are charged, the solid waste system relies heavily on general funds. Only Maui is in the process of replacing general funds with collection fees. This reliance on general funds has left solid waste programs to compete with other funding needs. In many cases, this has made it difficult to maintain a consistent level of programs, including RCRA Subtitle B compliant landfill operations, planning, and recycling. The trend is that general fund sources for solid waste is declining, as Hawai‘i’s persistently depressed economy places increasing pressure on public funds.

Another impact of the reliance on general funds is that the public perceives that waste management is free or low-cost. Communities that have instituted programs that increase public awareness of the costs of waste management, often through user fees, have shown a dramatic increase in waste reduction and recycling.

Of particular concern are efforts to implement PAYT user fees and FCA. FCA, though not a funding source, is an integral part of the solid waste funding system because it provides the only method to accurately and completely account for funds needed to operate the system.

The 1991 ISWM Plan called for the state DOH to “...support and encourage the consideration and implementation (where appropriate) of user fees at the County level for waste management services...” The following sections briefly describe two Hawai‘i programs that can serve as models for the implementation of these programs in other counties.

**Maui Residential Trash Collection Fees.** Currently, Maui residents pay \$6.00 per month for up to six cans for collection by the county. The County Council recently adopted an ordinance that would

change the rate to \$6.00 per month for one or two cans, and \$8.00 per month for up to six cans for collection by the County, but difficulties in its implementation have arisen. The county also charges \$6.00 per truck for a residential self-haul vehicle. Commercial vehicles pay a tipping fee of \$43.00 per ton. These fees do not fully cover the costs of operating the solid waste program.

A Solid Waste Task Force has been providing advice to the DPW on the fee changes. They have recommended that the solid waste program be operated as a utility that covers its own costs through fees. They have therefore recommended a graduated fee depending on size of container and to raise the overall fee. The county is looking into various systems, such as using tags for extra garbage that would be sold in retail stores.

**City and County of Honolulu FCA System.** The C&C has developed a FCA system that adheres to many of the principles and practices identified in Section 3.7.3.1. The system seeks to identify all costs and places them into the following cost centers:

- Collection.
- Inspection and investigation.
- Incineration, Waipahu (discontinued in 1995).
- Landfill, City-operated, Kapa‘a (discontinued in 1997).
- Landfill, contractor-operated, Waimānalo Gulch.
- Transfer stations.
- Convenience centers.
- H-POWER.
- General recycling.
- Glass recycling.

Within each of the above cost centers, the expenses are identified according to an appropriate set of expense categories, including the following:

- Refuse Division internal expenses, including labor, fringe, and indirect costs.
- Road Maintenance Division support for collection activities.
- Contractor expenses.
- Vehicle and equipment maintenance.
- Capital cost recovery.
- Inspection and investigation.
- Less revenues.

Costs for each cost center are calculated according to overall dollars and the cost per ton that the center handles. Each of the cost centers includes an allocation of indirect costs.

### 3.7.3 Program Models and Funding Methods

This section provides an overview of the way that states fund their statewide solid waste management programs. It describes approaches to the two state funding policy issues that are addressed in this section: FCA and PAYT user fees. Following this are five state program models that have elements relevant to Hawai'i. For each model, the most noteworthy elements are included to provide lessons for Hawai'i.

#### 3.7.3.1 Overview of Funding Methods Used Nationally

This section provides an overview of the following:

- Funding sources for state programs that have been implemented nationally – programmatic funding and capital financing.
- Two types of grant programs – federal grants to states and state grants to local governments.
- Two key policy issues regarding local program funding – FCA and PAYT user fees.

The funding of state solid waste programs is generally very different from local funding. Funds for local programs often are directly tied, either in source or in use, to the provision of waste management services. The two main sources of local funding are therefore tax financing and/or user fees. The most frequently used tax financing includes property taxes, sales taxes, municipal utility taxes or a special tax levy.

Increasingly, user fees are being implemented by local jurisdictions. With pressures on tax revenues for other public functions, user fees for waste management are popular since they are more directly associated with a specific service than many other public activities. Another important reason for their popularity is that they “foster citizen awareness of waste collection, processing and disposal costs and provide an impetus for more efficient consumer behavior.”<sup>47</sup> This latter rationale is especially valid when the fees are structured so that they vary according to the amount of service a resident or business uses.<sup>48</sup>

**State Program Funding Sources.** Tax financing or general fund appropriation is very common for state-level programs. However, 31 states have sources of funding for waste management programs that go beyond general appropriations.<sup>49</sup>

Different funding sources have advantages and disadvantages, and each state has developed their funding mix based on their history, politics and traditional funding methods for other public activities. No one funding method, or mix of methods, stands out as superior in all cases.

There are some important factors to consider when designing a funding mix. For example, one study cited the following key considerations in selecting an appropriate funding method.<sup>50</sup>

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<sup>47</sup> EPA. 1989. *Decision-Makers Guide to Solid Waste Management*. p. 133, EPA 530-SW-89-072.

<sup>48</sup> Ibid. For a detailed description of options for funding of local solid waste programs, refer to pp. 131-141.

<sup>49</sup> “The State of Garbage in America,” *Biocycle*, May 1998, p. 48-52.

<sup>50</sup> Lisa Skumatz. February 1999. *Massachusetts Recycling 2000 Recommendations Summary Report*.



**Table 3-24: Criteria for Evaluation of State Funding Structures**

| Criteria                      | Definitional Questions <sup>1</sup>   |
|-------------------------------|---|
| Equity                        | Is the funding method fair and proportional between different population groups and types of generators?                              |
| Stability                     | Is the funding consistent from year to year so that programs and activities can be budgeted accordingly?                              |
| Predictability                | Do different conditions, such as economic conditions, greatly change the amount of funding received in ways that cannot be predicted? |
| Sufficiency                   | Are the funds received adequate to cover necessary costs?   |
| Simplicity                    | Is the funding system understandable to the public?   |
| Linkage                       | Does the funding method provide a direct and understandable association between the service provided, the payer, and the objectives?  |
| Administrative Considerations | Is the funding system easy and cost-effective to administer?  |

Note: <sup>1</sup>The definitional questions are provided by the authors of the ISWM Plan.

This study especially cautioned against relying heavily on fees that are closely tied to tonnage disposed. Successful diversion programs could potentially cause funds to dry up. A diversified funding base would provide the greatest stability and predictability.

Table 3-25 provides an overview of funding systems used by all 50 states. Surcharges on waste disposal are the most common method of funding state solid waste programs, with Hawai'i joining 18 other states in using this method. The charges per ton range widely from \$0.25 in Arizona to \$4.25 in Iowa. The District of Columbia (D.C.) charges an aberrantly high \$31.59 for private haulers who dispose at D.C. facilities. Not including the D.C. charge, state surcharges average \$1.44 per ton. Hawai'i's is the second-lowest surcharge at \$0.35 per ton.

The level of funds collected from surcharges is directly tied to the weight of waste disposed. Since different communities dispose of different amounts of waste per person, surcharges do not represent an equivalent per person charge between different communities. However, since the charge is greater per person when more waste is disposed, it is an effective incentive to reduce personal waste generation.

**Table 3-25: State Funding Sources**

| State          | Disposal Surcharge (\$/ton) | Product Tax <sup>1</sup> | Solid Waste Service Tax | General Fund |
|----------------|-----------------------------|--------------------------|-------------------------|--------------|
| Alabama        |                             |                          |                         | X            |
| Arizona        | 0.25                        | T,O                      |                         |              |
| California     | 1.34                        |                          |                         |              |
| Colorado       |                             |                          |                         |              |
| Delaware       | 3.00                        |                          |                         |              |
| Washington,    | 31.59                       |                          |                         | X            |
| Florida        |                             |                          |                         | X            |
| Georgia        |                             | T                        |                         |              |
| Hawai'i        | 0.35                        | G,T                      |                         | X            |
| Illinois       | 1.27                        | T                        |                         |              |
| Indiana        | 0.50                        |                          |                         |              |
| Iowa           | 4.25                        |                          |                         |              |
| Louisiana      |                             | T                        |                         |              |
| Maryland       |                             |                          |                         | X            |
| Michigan       |                             |                          |                         |              |
| Minnesota      |                             |                          | X                       |              |
| Mississippi    | 1.00                        | T                        |                         |              |
| Missouri       | 1.74                        |                          |                         |              |
| Montana        |                             |                          |                         | X            |
| Nevada         | 1.25                        |                          |                         |              |
| Nebraska       |                             |                          |                         |              |
| New York       |                             | T                        |                         |              |
| North Carolina |                             |                          |                         | X            |
| North Dakota   |                             | T,WG                     |                         | X            |
| Ohio           |                             |                          |                         |              |
| Oklahoma       | 1.50                        |                          |                         |              |
| Oregon         | 0.90                        |                          |                         |              |
| Pennsylvania   | 2.00                        |                          |                         |              |
| South Carolina |                             | T,O,WG,B                 |                         |              |
| South Dakota   | 1.00                        | T                        |                         |              |
| Tennessee      | 0.80                        | T                        |                         |              |
| Texas          | 1.25                        | O                        |                         |              |
| Utah           |                             | T,O                      |                         |              |
| Vermont        | n/a                         |                          |                         |              |
| Washington     |                             |                          |                         | X            |
| West Virginia  | 2.00                        |                          |                         |              |
| Wisconsin      |                             |                          |                         |              |
| Wyoming        |                             |                          |                         | X            |

NOTES: <sup>1</sup> Source: *Biocycle, Journal of Composting and Recycling*, May 1998, p. 50.  
T = Tires, O = Motor Oil, G = Glass, WG = White Goods, B = Auto Batteries

Another popular funding source is a tax on specific products that have a disproportionately high impact on waste management costs, or require special investments in order to be recycled.

The most common items are tires (11 states, ranging from \$0.25 to \$2.00 per tire), motor oil (4 states), and white goods (2 states). One state has a fee on auto batteries and Hawai'i has the glass ADF. Originally, these fees were targeted to raise funds to be used specifically on these materials, but increasingly the funds have also been used for other solid waste management programs.

Some unique funding methods that are explored in the case studies include Washington State's litter tax, Minnesota's surcharge on solid waste collection services, and Wisconsin's surtax on businesses.

The level of funding of state programs is extremely difficult and misleading to compare, and was therefore not included in Table 3-25. About two-thirds of the states have grant programs for local agencies, and those grant funds are sometimes included and sometimes not included in state solid waste management program budgets. Also, states include very different functions within their budgets. Some states include hazardous waste programs, while others, such as Washington State, do not even include landfill regulatory costs since those functions are delegated to the counties.

**Capital Financing Sources.** Public solid waste agencies, both state and local, have three basic sources of capital for facility construction or major equipment purchase — borrowed funds, current revenues, and private financing.

Borrowed funds for capital projects are most frequently of the following types:

- General Obligation (GO) Bonds – these are the most flexible and least costly public financing because the municipality guarantees the loan with its full resources and taxing authority. Voter approval is generally required. Because of transaction costs, GO Bonds are generally developed for projects that cost greater than one half million dollars. Often, several smaller projects are grouped together into a single bond sale.
- Municipal Revenue Bonds – these use the revenue to be derived from the project to secure the loan. They have a higher risk and therefore a higher interest rate, but they neither affect the municipality's debt limit nor require a public vote.
- Bank Loans – these are generally suitable for short term or small cash borrowing.
- Debt Instruments – for additional information, see the previously referenced Decision- Makers Guide for Management.<sup>51</sup>

**Federal Grant and Assistance Programs.** EPA and other federal agencies have several grant and cooperative agreement programs available for funding of solid waste research and management. Some grants are issued in response to solicitation while others may be initiated by the local jurisdiction. Specific information on the following grant programs may be obtained from *Solid Waste Funding - A Guide to Federal Assistance*.<sup>52</sup> These grant sources are as follows:

- Environmental Education Grants Program – provides annual, 25 percent matching grants for environmental education and training to local or state agencies, educational institutions or non-profit organizations.
- Environmental Protection Consolidation Research – grants available for state and local governments to support research in the environmental effects of hazardous wastes.
- Jobs Through Recycling (JTR) – a 25 percent matching grant program available to states to increase use of recyclable or reusable materials and to contribute to economic development.

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<sup>51</sup> EPA. 1989. *The Decision-Makers Guide for Solid Waste Management*. pp. 136.

<sup>52</sup> EPA. 1998. *Solid Waste Funding - A Guide to Federal Assistance*. Report No. EPA530-F-97-027.

Hawai'i has received JTR grants.

- Solid Waste Disposal Research – provides 5 percent matching grants for public and private agencies to support research in collection, utilization or disposal of solid waste.
- Solid Waste Assistance Cooperative Agreements – require 5 percent matching and promote the use of integrated solid waste management systems.

In addition, for the last several years free technical and funding assistance have been provided for development of recycling technologies and markets by the CWC through funds from the EPA. The EPA is again expected to be soliciting applications in the fall.

**State Grant Programs to Local Governments.** In many states, the state government is able to raise funds in ways that may not be directly accessible to local governments, and then to distribute those funds to local governments in the form of grants. For example, in 1997, 33 states distributed over \$183 million in grants, with some going to non-profit organizations. However, the number of states providing grants, and the total dollar amount, has declined from the 1996 level. Most grant programs are specifically for waste reduction and recycling programs. However, the grants have a number of specific uses, such as planning, capital development, operating costs, and market development.

**Full Cost Accounting.** FCA is an accounting and a cost reporting system that identifies the full and complete costs of waste management.

As stated in the discussion paper on funding (Appendix III), knowing the full costs of municipal solid waste management can help managers and the public to make better decisions about each program element, improve the efficiency of services, and better plan for the future. FCA is purported to have the following benefits:

- Provides the data necessary to structure prices so that an accurate economic picture is developed relative to waste management alternatives.
- Assures that an appropriate economic evaluation can be performed between different waste management alternatives.

As an example of this latter point, the case study interviewee for Indiana reported that traditional cost analysis of recycling had shown recycling in his state to be more expensive than waste disposal. However, after they implemented FCA and reevaluated program alternatives, the recycling alternatives were shown to be significantly cheaper than disposal.

*FCA Accounting Principles.* As generally practiced, FCA employs the following two key accounting principles:

1. Inclusion of the full spectrum of costs, including direct and overhead costs.
2. Accrual based accounting whereby costs are recorded ('recognized' in accounting terminology) when the resources are used or committed, rather than when the moneys are expended. For example, the cost of a facility or piece of equipment would be depreciated over its lifetime, rather than the cost being recognized only in the year that it is purchased.

Inclusion of the full spectrum of costs is the most challenging aspect of FCA, and there is no precise standard as to what should or should not be included. For example, the following types of costs may be included:

- Up-front investments and expenses.

- Operating costs.
- Back-end costs.
- Offsetting revenues from sale of recyclables.
- Remediation costs.
- Contingent, or unknown but estimable costs.
- Environmental and social costs.

The last category represents costs that are traditionally treated as externalities and not incorporated into accounting. However, a public agency may consider these costs, in so far as they can be quantified in evaluating whether to undertake a project or select a specific alternative.

*Avoided Costs.* Another important consideration in using FCA is the determination of avoided costs. Avoided costs are especially relevant in determining the true costs and benefits of recycling programs. It is sometimes asserted that the full per-ton cost of disposal will be avoided by a diversion program. However, it may be only a marginal cost that is avoided, while fixed costs must be allocated among a smaller overall tonnage. On the other hand, the extension of the life of a disposal facility may have considerable long term cost benefits, as well as environmental and social benefits, that should be taken into consideration.

*Overhead Allocations.* Another critical issue is the allocation of overhead or shared costs to specific activities. For example, it can be challenging for public agencies to determine the full cost of a service relative to its cost if privatized. The allocation formula should apply to costs from other departments such as accounting, legal, human resources, executive, council, data processing, personnel, and building and fleet management. An appropriate method of cost allocation must be defined. The most common methods include the following:

- Number of personnel – costs of the human resources department may be allocated to other departments according to the number of employees in each.
- Relative portion of the overall budget – costs of accounting or the policy-making body may be allocated according to the relative budget levels.
- Use of resources such as vehicles, computers, and floor space – costs of fleet maintenance or computer services may be allocated according to the equipment used.

*Reporting of Data.* Reporting of FCA data is an important consideration. The reports must be tailored to the audience since too much detail for one audience may not be enough detail for another. The use of the data is the critical consideration in determining level of detail and method of presentation.

*Full Cost Accounting in Practice.* FCA is generally more applicable on the local level, where a variety of specific solid waste management programs are implemented, than on a state level. However, four states, such as the Indiana case study cited below, require local governments to report their costs on an FCA basis. This provides comparable data across jurisdictions, allowing better comparison of public versus private operations, and allowing accurate comparison of different waste management approaches.

The EPA has developed a series of FCA reports and workbooks<sup>53</sup> for use by states and municipalities to assess rates that reflect the full cost of providing services. The Indiana FCA program, whose methodologies were built largely on the EPA studies, is documented below.

As described above, the C&C uses FCA, and Maui County has decided to adopt FCA for their waste management system as a first step toward making waste management independent from the county's general fund. This process will be implemented over the next few years.

**Pay-As-You-Throw User Fees.** PAYT user fees assign costs of waste management, ideally the full costs, directly to the generators of garbage in proportion to the amount of waste they generate. The primary benefit of PAYT is that it gives generators control over their garbage costs because they pay only for the level of service they actually use. Consequently, it is a motivator for source reduction and recycling since these activities can lower generators' costs. As a part of a full integrated waste management system, PAYT can be a primary contributor to reducing the waste stream by up to 45 percent, but more commonly by 10 to 15 percent. In some communities, it has been credited as an even stronger contributor to achieving high diversion rates than curbside recycling.

PAYT systems are not new. They have been around since 1916 when the first system in the U.S. was implemented in Richmond, CA. During the early 1990s, there was a large increase in PAYT programs. In 1990, fewer than 1,000 communities had implemented PAYT, and by 1995, over 3,400 communities have.<sup>54</sup> Note that some of the case study states require or encourage local governments to implement PAYT.

One of the primary concerns with PAYT is that, at the time that it is implemented, especially in a region where garbage collection had previously been perceived to be free, it could cause an increase in illegal dumping. This is a valid concern that must be managed. However, it is noteworthy that a 1997 Duke University study found that within PAYT communities they surveyed, only 19 percent experienced an increase in illegal disposal, while 47 percent had no change, and 6 percent actually had a decrease (28 percent did not respond).<sup>55</sup>

There are many variations on PAYT user fee systems with different systems for determine pricing. These include:

- Linear pricing – prices are graduated in direct proportion to the amount disposed.
- Two-tiered pricing – two price points are defined.
- Multi-tiered pricing – several different price levels are defined.

In some cases, different sizes of cans are standardized and charged differently; in other cases, tags are sold to be affixed to bags or cans. Maui County has considered implementing a two-tiered PAYT system as discussed in Section 3.7.2.3. Hawai'i County cooperated with Recycle Hawai'i's investigation of how the option could be implemented there.

### **3.7.3.2 State of Minnesota Model Program**

**Noteworthy Elements.** Following are the key elements of the Minnesota state funding program:

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<sup>53</sup> EPA. 1995. *Full Cost Accounting for Municipal Solid Waste Management: A Handbook*. Report No. EPA530-F-95-041.  
EPA. 1998. *Full Cost Accounting in Action: Case Studies of Six Solid Waste Management Agencies*. Report No. EPA 530-F-98-018.

<sup>54</sup> J.L. Canterbury. Nov./Dec. 1997. "Pay-As-You-Throw - Offering Residents a Recycling and Source Reduction Incentive," *MSW Management*, p. 30.

<sup>55</sup> *Ibid.*, p. 32.

- The state solid waste program is well funded by a sales tax on solid waste services collected by private haulers.
- The funding supports closed landfill cleanup and recycling programs.
- Substantial funds are provided to counties as grants.
- The exclusion of recyclables from the tax provides a financial incentive in favor of recycling over waste disposal.
- The state requires haulers to implement volume-based pricing.

**Funding for State Programs and Services.** The Minnesota Office of Environmental Assistance (MOEA), which includes solid waste management responsibilities, is funded by a sales tax on solid waste management services.<sup>56</sup>

In 1989, the Minnesota State Legislature extended the sales tax to cover solid waste services at the same rate as other sales taxes. In addition, a \$2.00 fee per household per year and a \$0.60 fee per cubic yard of capacity were levied and collected by the waste hauler. In 1997, these two taxes were combined into a single Solid Waste Management Tax.

The Solid Waste Management Tax levels are 9.75 percent on the sales price for residential waste, including multi-family, and 17 percent for commercial waste. C&D waste is charged at a rate of \$0.60 per non-compacted cubic yard. The taxes apply to waste collection, transport, processing and disposal. Source separated recyclables and compostables are excluded. The provider of waste management services is responsible for collecting the tax and remitting it to the Department of Revenue. In the case of bag and/or tag programs, the tax is levied on the price of the bag or tag.

The tax is often called the SCORE tax because it was originally recommended by the Select Committee on Recycling and the Environment (SCORE) in 1989 to pay for statewide waste education and recycling programs.

The tax generates approximately \$44.5 million per year. The first \$200,000 is claimed by the Department of Revenue for administration. Half of the revenues are used to clean up closed landfills. The other half are deposited in the state's general fund for appropriation for solid waste programs, including local grants and state programs. Additional funds are provided for the 25 regional household hazardous collection programs.

**State Funding for Local Programs and Services.** In 1998, \$14 million was provided in grants to the 87 counties in Minnesota. Each county received a base grant of \$55,000, and the remainder was allocated according to population. The county grants must be matched by at least 25 percent county money.

Some additional monies, \$1.5 million in year 2000, are available in a competitive grant program for public and private applicants to cover a variety of initiatives, such as market development and problem materials.

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<sup>56</sup> Personal communication, Mr. Bob Meier, Policy Analyst, Minnesota Office of Environmental Assistance, 1999.

**The State Role Relative to Local Funding Policy Issues.** A state statute requires all haulers, via county licenses, to offer volume-based pricing to residential customers. This is generally implemented in a multi-tiered system for 30-, 60-, or 90-gallon cans.

### **3.7.3.3 State of Wisconsin Model Program**

**Noteworthy Elements.** Following are the key elements of Wisconsin's state funding program:

1. The state funds both statewide and local recycling programs from a surcharge on business income taxes.
2. The state implemented a sophisticated grants program that provides funds to local jurisdictions that cover 30 percent of their recycling program costs. Many of the local program elements are specified in state law.
3. The state uses the grants program as an incentive for under-performing recycling programs to institute volume-based fees.
4. The Legislature is currently examining several new options for funding recycling and solid waste programs.

**Funding for State Programs and Services.** The Wisconsin solid waste and recycling program is managed by the Department of Natural Resources (DNR), with market development activities administered by a Market Development Board in the Department of Commerce.<sup>57</sup> The University of Wisconsin is also active in waste reduction and pollution prevention. Several other agencies have focused responsibilities in the statewide recycling system.

DNR and other solid waste management funding has been provided since 1990 by a business income tax surcharge (surtax), originally set at 5.5 percent of the business income tax and recently reduced to 2.75 percent. Businesses with receipts of less than \$4,000 pay nothing; the maximum they are obligated to pay is \$9,800. The revenues are deposited in a state recycling fund.

Several problems have been noted with the surtax. First, it is unrelated to the amount of waste generated, or the waste management choices of the company. Second, it raised more money than was originally expected due to a strong economy.

The Recycling Market Development Board receives \$2.5 million from the fund and other funds for a total of \$4.5 million. They provide business consulting services for recycling businesses, and expend most of their funds in financial assistance for market development.

The surtax sunset as of April 1999, and the Legislature is currently examining several options, including continuation of the surtax to fund recycling.

**State Funding for Local Programs and Services.** The DNR provides grants to over 1,000 local governments for recycling programs. The state instituted mandatory recycling and disposal bans on yard waste, aluminum and glass containers, and newspapers. In exchange, the state agreed to help fund programs. In 1998, they provided \$24 million in grants to the 72 counties, amounting to approximately 30 percent of the cost of local programs. The grants are expense-based or cost-share and the resources are prorated. Thirty-three of the counties provide direct recycling service, and they receive a \$100,000 block grant.

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<sup>57</sup> Personal communication, Mr. John Reindl, Wisconsin Department of Natural Resources (now with Dane County), 1999.



Ten percent of the funds are reserved for counties that have instituted volume-based fee systems. This requirement is flexible. For example, one county has volume-based fees for appliance pick-up only, which qualifies it for a limited amount of grant funds.

The state provided approximately \$3 million per year in market development grants, and approximately \$1 million per year in demonstration grants for waste reduction or recycling.

**The State Role Relative to Local Funding Policy Issues.** Currently, the State of Wisconsin uses the grant programs as an incentive to enforce certain program requirements for counties. Local governments must meet 13 criteria in order to receive approval by DNR as operating an effective recycling program. For example, they must have an ordinance requiring recycling of certain banned materials and must provide a specified level of recycling service.

In addition, an effective recycling program must have a system of volume-based fees in place to generate revenue to cover the local share of the program costs. Local programs are exempted from this if they achieve a 25 percent recycling rate or use a waste-to-energy facility that was in use prior to 1993. Thus the grant program is used as an incentive for under-performing recycling programs to institute volume-based fees.

#### **3.7.3.4 State of Washington Model Program**

**Noteworthy Elements.** Following are the key elements of the Washington State funding program:

1. The Washington Waste Reduction, Recycling and Litter Control Tax is a unique broad-based sales tax that funds state solid waste programs.
2. The combination of litter and waste management issues provides a strong funding basis.
3. This tax was supported by the retail industry as a preferred alternative to a bottle bill.

**Funding for State Programs and Services.** The solid waste section of the Washington State Department of Ecology (WDOE) is funded by two sources:<sup>58</sup>

1. The Waste Reduction, Recycling and Litter Control Tax.
2. The Model Toxics Control Act.

From 1991 until 1995, the program was also funded by a disposal surcharge that generated \$5 to \$6 million annually. This funding source was intended to develop programs that implement the Waste Not Washington Act. Due to the success of recycling, the disposal surcharge was allowed to sunset in 1995, resulting in a major downsizing of the solid waste program at the state level.

The Model Toxics Control Act was created by a citizen initiative and established a tax on petroleum products sold at the first point of possession in the state. It generates approximately \$100 million biennially, only \$2 to \$3 million of which is used for WDOE solid and hazardous waste activities.

The Waste Reduction, Recycling and Litter Control Tax is the primary source of funds for the WDOE. The tax is levied on the gross proceeds of specified products sold by retail businesses that are likely sources of litter, such as grocery, convenience stores, and drug stores. It is levied on the wholesale or retail sale of 13 categories of products as follows:

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<sup>58</sup> Personal communication, Mr. Colin Stevenson, Solid Waste Coordinator, Washington Department of Ecology, 1999.  
Personal communication, Ms. Megan Thomas, Litter Programs Coordinator, Washington Department of Ecology, 1999.

- Food for human or pet consumption.
- Groceries.
- Cigarettes and tobacco products.
- Soft drinks and carbonated waters.
- Beer and malt beverages.
- Wine.
- Newspapers and magazines.
- Household paper and paper products.
- Glass containers.
- Metal containers.
- Plastic or fiber containers.
- Cleaning agents and toiletries.
- Sundry drugstore products (other than drugs).

The tax rate is 0.015 percent. Approximately 13,300 firms paid the litter tax in 1997. However, the tax rate is considered quite low, amounting to less than 0.1 percent of the sales taxes collected in Washington. Consequently, a major retailer with multiple facilities that sell the targeted products, such as Safeway Stores, may pay less than \$400,000 in state litter tax.

Annually, the tax raises approximately \$5 million. The revenues are used in the following proportions:

1. Fifty percent for a litter patrol program employing youth to clean up public places.
2. Twenty percent to local governments for litter control.
3. Thirty percent for WDOE solid waste programs, including public education and awareness programs relating to litter control and recycling, and development of markets for recycled products.

Compliance with the tax is a problem that has persisted, and as a result there are significant fluctuations in collections from year to year. This makes budget planning difficult for WDOE's litter programs. Taxpayer education remains an ongoing task, as firms tend to forget about or ignore their annual liability. In addition, since the tax rate is very small, the amount of tax liability for many businesses is also quite small. For firms with multiple activities, determining the appropriate share of total sales attributable to targeted products can be difficult.

One historical fact is worthy of note. The tax was passed in 1971 with the support of the retail industry. A bottle bill had been proposed and the tax was seen by the retail industry as the preferable alternative.

Note that the WDOE program delegates landfill permitting authority to the counties. Therefore, the state program is focused on waste diversion and litter control activities.

### **3.7.3.5 State of California Model Program**

**Noteworthy Elements.** Following are the key elements of the California state funding program:

1. California has three sources of funding, similar to Hawai'i, including a tip fee surcharge and two product taxes: one on oil and one on tires.
2. The level of funding for California is much higher than Hawai'i.
3. The California tire fee generates funds for clean up of tire piles and recovery of used tires.

**Funding for State Programs and Services.** The CIWMB has a diverse solid waste funding system, and the largest budget in the nation: approximately \$70 million annually.<sup>59</sup> Their funding sources consist of the following:

- A \$1.34 per ton surcharge on the tipping fee for all solid waste being landfilled – this generated approximately \$49 million in 1998.
- A \$0.16 per gallon tax for lubricating oil – this generated approximately \$22 million in 1998.
- A \$0.25 per tire tax for every tire sold by a retailer – this generated approximately \$4.9 million in 1998.

Some of these revenues go to other agencies, such as Water Resources Control Board and the Department of Toxics, for solid waste related expenses.

At present, the tire program is being scrutinized due to persistent problems with tires and difficulties with the tax. California has a major tire problem in that it generates approximately 30 million used tires per year. The state is considering raising the fee from \$0.25 to \$2.00 per tire. They are also considering charging the fee at some other point than the retailer. There are 8,000 retailers in the state and the administrative burden of collecting the fee costs \$500,000 each year.

**State Funding for Local Programs and Services.** The CIWMB provides grants to local agencies of approximately \$1.5 million per year for landfill enforcement, \$3 million per year for household hazardous waste education, and \$5 million per year for a recycled material market development loan program (this latter fund is also available to private companies). In addition, \$5 million per year is dedicated to clean up illegal landfills when no responsible party can be identified.

The state provides block grants to local jurisdictions out of the oil tax revenues. Grants are provided based in part on population and in part on competitive proposals. Projects must include curbside recycling for used oil. These grants may go to public agencies or non-profit organizations.

Of the tire account, most funds are spent by the state to clean up tire piles. However, some goes to local jurisdictions to pay for amnesty days and to clean up small piles.

**The State Role Relative to Local Funding Policy Issues.** The state passed legislation in 1993 (AB 939) setting standards for local solid waste programs and requiring all cities, towns, and counties to develop source reduction and recycling plans and to achieve diversion goals of 25 percent by 1995 and 50 percent by 2000. If a jurisdiction does not achieve these goals, and does not show a good faith effort to do so, the CIWMB can fine them \$10,000 per day.

Last year the first fines were levied, and only one or two jurisdictions were actually fined. Ten to 12 other jurisdictions must follow compliance schedules to meet the legislated reduction goals.

### **3.7.3.6 State of Indiana Model Program**

**Noteworthy Elements.** Following are the key elements of the Indiana state funding program:

1. Mandate that local communities perform FCA (discontinued in 1998).
2. Annual reports from cities and towns provided to the state on cost of waste management. This is compiled for statewide analysis.

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<sup>59</sup> Personal communication, Ms. Karen Fish, Deputy Director, Administration Division, California Integrated Waste Management Board, 1999.

**Funding for State Programs and Services.** The Indiana Department of Environmental Management (DEM) funds its solid waste program through a \$0.50 per ton surcharge at MSW landfills.<sup>60</sup> Half of the money goes to the DEM to fund grants to local governments and non-profit organizations. The other half goes to the Department of Commerce for market development; this portion includes a business loan program.

The surcharge raises between \$4.5 and \$4.8 million per year. The DEM's annual portion is approximately \$2.4 million. The state reports that the fee is accepted by local governments and landfill operators in part because it is low compared with neighboring states.

**State Funding for Local Programs and Services.** The state provides approximately \$2 million a year in grants to local governments for recycling and other solid waste management activities.

**The State Role Relative to Local Funding Policy Issues.** The main purpose of including Indiana as a case study in this Plan revision is that they have had a state policy to require cities and towns to perform FCA for trash and recycling systems. The requirement applied whether public agencies or private haulers delivered services. The state provided accounting guidelines based upon EPA guidelines. This provided comparable data statewide.

Each year, the cities and towns were required to prepare a report that included all their costs in a two- to three-page form submitted to the Indiana Institute on Recycling. The Institute analyzed the data and produced a statewide report.

The DEM identified the following key issues from the annual reports:

- Prices between public and private service providers were competitive.
- Initially recycling appeared to be more expensive than disposal. However, under FCA, recycling was shown to be cheaper than disposal by approximately \$25.00 per ton.

In addition to the above project, the Institute is promoting PAYT under a grant from EPA. They hired a technical assistance contractor to talk with local municipalities about how to implement PAYT and FCA. Fifty of 450 communities have implemented PAYT systems.

The FCA mandate was rescinded by the Indiana General Assembly in 1998, primarily due to political opposition to state mandates in general. Local governments objected to the work involved in preparing the annual FCA report, and felt that the main objectives were accomplished and further reporting was not productive.

### 3.7.4 Observations and Analysis

There are four key questions to ask when evaluating Hawai'i's funding of state waste management programs, as follows:

1. Is Hawai'i's current funding structure a sound one, and how does it compare with that of other states?
2. Is the level of funding adequate to support current activities and to achieve programmatic goals of the ISWM Plan?

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<sup>60</sup> Personal communication, Mr. Bob Gedhart, Recycling Branch Chief, Indiana Department of Environmental Management, 1999.  
Personal communication, Mr. Mark Mehall, Director, Indiana Institute on Recycling, 1999.

3. If additional funding is needed, what options are there for new or enhanced sources?
4. Are there statewide funding policy issues that Hawai‘i should address?

**Evaluation of Hawai‘i’s Current Funding Structure.** As shown in Section 3.7.2.1 and Table 3-25, Hawai‘i’s state level solid waste programs have diverse funding, including a disposal surcharge, glass container ADF, oil import surcharge, general funds, and federal grants. In addition, some DBEDT projects that relate to ISWM have received in-kind contributions from private sources. This diversity of sources compares favorably with funding arrangements from the states that were studied.

Hawai‘i’s funding structure can be evaluated based on the criteria described in Table 3-24, as shown in Table 3-26:

**Table 3-26: Evaluation of Hawai‘i’s State Funding Structure**

| Criteria                      | Evaluation   |
|-------------------------------|--|
| Equity                        | Hawai‘i’s funding is derived primarily from two sources: disposed waste and imported (manufactured) products that become waste. These broad-based sources assure a reasonably equitable distribution of costs among waste generators.  |
| Stability                     | The ADF has varied from year-to-year, and waste quantities have declined with the recent economic decline. However, the overall variation has been within a reasonable range. An additional consideration is that over time, the amount of waste could be reduced if reduction programs are successful, and if the market share of glass containers declines. General fund appropriations could potentially equalize the variations. |
| Predictability                | The level of funding is generally stable year to year. However, over the long run, changes in population and the economy are unpredictable and will influence funding levels.  |
| Sufficiency                   | This is addressed in the following section.  |
| Simplicity                    | State solid waste program funding has several different sources, and is therefore more complex than other states. In addition, the glass ADF is time-consuming for manufacturers to calculate and for the state to track.  |
| Linkage                       | The link with waste reduction is not obvious to most generators, although it causes a modest raise in fees for waste disposal, providing incentive for recycling.  |
| Administrative Considerations | An ADF is administratively complex, which has discouraged many states from adopting one. Hawai‘i’s isolation and economy makes an ADF simpler to administer. However, the ADF relies on voluntary reporting by manufacturers.  |

Overall, the state’s solid waste funding structure rates well due to its diversity and broad base.

**Adequacy of the Current Level of Funding.** The most important question for Hawai‘i is whether the current budget is adequate to support the programs and projects proposed for implementation in this ISWM Plan. A number of funding needs have been identified in this section, and are summarized in Chapter 4. These include the following:

- Additional solid waste full time employees are needed to provide overall direction and coordination for the following:
  - Recycling market development.
  - Commercial recycling and statewide public education.

- Project funding support is needed for the following:
  - Illegal dumping enforcement.
  - Market development for glass, green waste, and C&D.
  - Public education campaigns.
  - Commercial recycling promotion and incentive projects.
  - C&D contractor workshops.
- A training fund to enhance in-state expertise in a number of different areas, including in-state training programs and out-of-state training sponsorships, are needed in the following areas:
  - Illegal dumping inspection and enforcement.
  - Commercial recycling outreach on neighbor islands.
  - C&D management on public works projects.
  - FCA and PAYT system design and implementation.

This reflects an ambitious program designed to create more sustainable patterns of waste management in Hawai'i. DOH will need to set priorities for additional funding, evaluate existing resources that are available, and determine the appropriate level and timing of funding requests to the Legislature.

**Options for Enhanced Funding.** Several options were considered to increase levels of funding for state ISWM programs. Table 3-27 summarizes the evaluation of these options while considering the criteria identified in Table 3-26 and practical constraints in Hawai'i.

Based on this analysis the most effective and optimistic sources of increased state-level funding for Hawai'i are the following:

- An increase in the disposal fee surcharge.
- An increase in the glass container ADF.
- Implementation of an ADF on tires.

Each funding increase should be directly related to enhanced programs and demonstrate statewide benefits. The mix of funding recommended for Hawai'i is summarized in Chapter 4.

**Statewide Solid Waste Funding Issues.** Several key state solid waste policy issues for Hawai'i, which relate to local program funding, were identified in this section. The two that are regularly identified as important to the ISWM system are as follows:

- PAYT.
- FCA.

In addition, the state could implement or expand state solid waste grants to support local solid waste funding programs.

**Table 3-27: Evaluation of Potential State Funding Methods for Hawai'i**

| Potential Funding Source                            | Evaluation  |
|---|---|
| Increase the disposal surcharge                     | PROS: The disposal surcharge is a user fee that provides a modest incentive for diversion over disposal. A surcharge is the most commonly used method of state program funding nationally and the existing Hawai'i surcharge rate of \$0.35 per ton is comparatively low. The State Legislature originally considered the potential to increase the surcharge up to \$1.50 per ton. |
|   | CONS: The counties view the surcharge as simply passing money to the state without receiving support. It needs to be apparent that value will be returned.  |
| Increase the existing glass container ADF           | PROS: The ADF was developed to accomplish a target recovery goal, with legislative assessment if the goal is not met. It has not been met, largely due to lack of high-value markets. Therefore, dedicated funds for glass market development could be justified. An increase sufficient to provide substantial program funds would be relatively small.                            |
|   | CONS: The ADF can be viewed as an economic damper.  |
| Establish a solid waste services surcharge          | PROS: The tax could generate substantial funding, as has been demonstrated in Minnesota. It could be structured to provide an incentive for recycling, such as the San Jose, CA surcharge described in Section 3.3.   |
|   | CONS: This would be perceived as a new tax, and would be unlikely to be adopted. Also, due to the variability of waste services in Hawai'i, it would be challenging to structure it equitably. Since most residents do not pay a user fee in Hawai'i, it would likely be implemented only on commercial generators. This would not be equitable.                                    |
| Establish a sales tax on litter-generating products | PROS: The tax could be structured to effectively target items that create waste management problems, representing a polluter-pays principle. Washington State's tax provides a strong funding level at a low tax rate.  |
|   | CONS: A product tax collected at the retail level would be perceived as a new tax on business, and would not likely be politically popular.   |
| Implement a new ADF                                 | PROS: An ADF on tires has been adopted and could be effective in helping clean up tire disposal problems, as it has been in California.   |
|   | CONS: None of the other high priority materials for increased diversion or management identified in this ISWM Plan (i.e., cardboard, office paper, green waste, food waste) would be easily subject to a new ADF.   |
| Establish a surcharge on business taxes             | PROS: The fee could be set at a low rate and still generate substantial program funds.  |
|   | CONS: A new fee on business would be perceived as a new tax that would discourage business, so it would be unlikely to be adopted. As was the case in Wisconsin, it does not relate directly to the solid waste problem.  |
| Increase the general fund appropriation             | PROS: This option would not require the establishment of a new funding source.  |
|   | CONS: The Hawai'i State General Fund has many competing demands.  |
| Secure additional federal grants                    | PROS: Federal funds can be effectively used to supplement core programs and to undertake special projects.  |
|   | CONS: Though this is an important, though minor, part of current funding, it is not a reliable source for core program operations.  |

*Pay-as-You-Throw User Fees.* User fees are a funding issue for local programs since they relate directly to waste management services. They have been studied for application in Kaua'i, Hawai'i,

and Maui counties and are scheduled to be implemented in Maui County. DOH could promote the implementation of PAYT user fees through different mechanisms, such as:

- Mandate that PAYT user fees be implemented by counties, similar to Minnesota.
- Require that each county develop and submit to the DOH a feasibility study of PAYT user fees.
- Provide technical assistance to counties in planning and implementing PAYT user fees. Workshops could be held on each island to promote the benefits and provide instruction in the mechanics.
- Provide planning and implementation grants to counties to develop PAYT user fee systems.

It must be recognized that user fees can be difficult to institute within some waste management systems, especially where there is concern that they will cause an increase in illegal dumping. Though both problems can be effectively managed, they do present a substantial impediment in Hawai'i.

*Full Cost Accounting.* FCA has been implemented by the C&C and is projected for development in Maui County. A FCA system is especially valuable if user fees are to be implemented. DOH could promote the implementation of FCA through different mechanisms, such as:

- Mandate FCA by counties, similar to Indiana, and require an annual report. The state would compile information into a statewide cost of waste service report. This would provide valuable data across counties.
- Provide technical assistance to counties to implement FCA, using expertise developed by the counties that have implemented it. Workshops could be held on each island with county public works and financial officials to increase understanding of the benefits of FCA.
- Provide planning grants to counties to develop FCA systems.

FCA can be difficult to implement depending on existing accounting systems. It can also add an administrative expense for the capture and analysis of numbers each year. However, the benefits may outweigh the costs if implemented efficiently.

*State Grants Program.* Approximately two-thirds of all states have programs to provide grants to local governments or non-profit organizations in order to stimulate development of waste diversion programs. The primary ISWM state programs in Hawai'i are conducted by DBEDT and DOH using federal EPA funds. Some funds, such as the federal grant to build a Resource Exchange on Kaua'i, come from economic development sources. DOH does not have local grant programs.

Grants are used by some states as an incentive for counties to implement programs, or to make program implementation feasible. Often a grants program is developed after state requirements are implemented to assist local jurisdictions carry out the requirements.

Grants can be specific to planning or implementation. They can create incentives for recycling programs, market development promotion, or facility construction. Grants can be either allocated on a prorated share to each jurisdiction, or awarded on a competitive basis. Minnesota uses both methods to allocate funds. Wisconsin provides state-raised funds through grants to support operation of recycling programs, such as curbside collection. They also use targeted grants to help under-achieving programs become more effective.



## 4.0 RECOMMENDATIONS

This chapter presents recommendations for action that flow from the “Observations and Analysis” sections included throughout this Integrated Solid Waste Management (ISWM) Plan Revision, and from the Discussion Papers in Appendix III. Recommendations are provided for the following topics.

- A. General Recommendations
- B. Illegal Dumping
- C. Commercial Recycling
- D. Construction and Demolition (C&D) Waste Management
- E. Market Development
- F. Public Education
- G. State Program Funding

### A. General Recommendations

General recommendations address system-wide waste management policies and issues. The recommendations fall into the following areas:

| <b>GENERAL RECOMMENDATIONS</b> |   |
|--------------------------------|---|
| 1.                             | Reaffirm Statewide Solid Waste Policy and Goals                     |
| 2.                             | Launch Implementation of this ISWM Plan Revision                    |
| 3.                             | Promote County ISWM Planning  |
| 4.                             | Promote State Agency Recycling                                      |
| 5.                             | Continue a State Solid Waste Advisory Committee (SWAC)              |
| 6.                             | Coordinate Solid Waste Activities of State and Local Governments    |
| 7.                             | Encourage and Assist Not-for-Profit Organizations                   |
| 8.                             | Foster Productive Relationships with Private, For-Profit Businesses |
| 9.                             | Enhance State Solid Waste Funding                                   |
| 10.                            | Improve Statewide Measurement and Reporting Systems                 |
| 11.                            | Promote Source Reduction  |
| 12.                            | Increase the Performance of Diversion Systems                       |
| 13.                            | Make Disposal Strategies More Sustainable                           |
| 14.                            | Continue to Research Certain Areas in Greater Detail                |

### **A.1      *Reaffirm Statewide Solid Waste Policy and Goals***

The state's 50 percent solid waste reduction goal was not achieved in the time frame designated by law in 1991. However, 50 percent reduction of the waste stream is practical and achievable given more time and a dedicated effort.

- A.1.1      The Hawai'i State Legislature should reaffirm its commitment to reducing the solid waste stream by 50 percent.
- A.1.2      The Hawai'i State Legislature should extend the date for achieving 50 percent waste reduction to the year 2010.
- A.1.3      The Hawai'i State Legislature should be asked to reaffirm its commitment to the priorities of solid waste management:
  - 1. Source reduction,
  - 2. Recycling and bio-conversion, and
  - 3. Landfilling and incineration.

### **A.2      *Launch Implementation of this State Integrated Solid Waste Management Plan Revision***

The recommendations in this State ISWM Plan Revision provide a basis for state action and for county ISWM planning.

- A.2.1      The Department of Health (DOH) should analyze the recommendations contained in this Plan Revision and develop an implementation plan and timeline.
  - A.2.1.1      The implementation plan should identify actions that can be readily implemented for immediate action.
  - A.2.1.2      An initial priority for DOH should be projects that develop and foster cooperative working relationships with counties and representatives of the solid waste industry.
- A.2.2      DOH should meet with each county's Public Works Department to discuss:
  - The recommendations of this ISWM Plan Revision,
  - DOH expectations of County Plan revisions,
  - The key solid waste issues for the counties that should be addressed in their Plan revisions, and
  - DOH support and assistance available to the counties.
- A.2.3      DOH should hold public meetings in each county, using this Plan's Executive Summary as a public comment document. Public input should be taken on the key recommendations.

A.2.4 The implementation plan should select priority items requiring legislative action for discussion with legislators during the year 2001 session, or submission through administration channels to the 2002 legislature.

A.2.5 The implementation plan should also examine resource needs and available internal resources, and develop a funding needs assessment for submission to the Hawai'i State Legislature.

### **A.3 *Promote County Integrated Solid Waste Management Planning***

This State ISWM Plan Revision provides the basis for challenging local governments to update their Plans.

A.3.1 Counties should be challenged to identify and address the most critical and promising issues that they face in an ISWM Plan revision.

A.3.2 DOH should direct the counties to review the goals and recommendations of this State ISWM Plan Revision and address relevant issues and opportunities contained herein.

A.3.3 The counties should be asked to examine why the state policy goal of 50 percent reduction has not yet been met, and what initiatives could contribute to meeting that goal on an extended timeline.

A.3.4 DOH should negotiate with each county regarding the intended contents of its Plan and the issues that the state considers should be addressed.

### **A.4 *Promote State Agency Recycling***

The performance of recycling systems in state facilities is the responsibility of building and facility managers. The State of Hawai'i can contribute its part to the development of viable recycling markets by purchasing products manufactured from recycled materials.

A.4.1 Each state facility should develop a recycling plan that identifies the major recyclable materials that are generated at the facility and the waste reduction and recycling programs proposed.

A.4.2 The state should promote recycling by issuing bids for waste hauling services that include recycling.

A.4.3 Annual reports of quantities recycled and quantities disposed, by building, should be submitted to the DOH.

A.4.4 Recycling program success in each facility should be used as a factor in the performance evaluation of facility managers.

A.4.5 Each agency should survey its procurement practices to identify opportunities to procure secondary materials in its operations.

### **A.5 Continue a State Solid Waste Advisory Committee**

The SWAC played a valuable role in this ISWM Plan Revision. An advisory committee can continue to provide ongoing advice and leadership for solid waste planning. It can also help build support for new initiatives and provide accountability for state programs.

A.5.1 DOH should establish and appoint a SWAC, advisory to the Director of Health, to meet at least quarterly and to provide advice to DOH on statewide policies and programs.

A.5.2 The SWAC should consist of representatives from other state agencies and local governments, and should include strong representation of the private sector, such as solid waste and recycling firms, and commercial businesses.

A.5.2.1 In order to defray the costs to private business representatives, and to achieve better representation from the neighbor islands, travel reimbursement for private business members should be offered.

A.5.2.2 Meetings should be rotated between the counties in order to encourage statewide involvement.

A.5.3 The SWAC should establish formal subcommittees to oversee key issue areas. This Plan has identified the need for three specific groups that could be established as subcommittees of the SWAC:

- A C&D Council (see D.4.4)
- A Market Development Steering Committee (see E.1.3)
- A Public Education Coordinating Committee (see F.1.1)

### **A.6 Coordinate Solid Waste Activities of State and Local Governments**

Solid waste management is a shared responsibility between state and local governments. The relationship between DOH and counties needs to be characterized by cooperation and mutual problem solving.

A.6.1 DOH should develop cooperative projects with counties in order to improve their working relationships. For example, they could work together to improve the diversion measurement system and to develop a coordinated public education program.

A.6.2 DOH should coordinate an ongoing investment in state and county staff training to develop essential skills and knowledge. The enrichment of in-state expertise regarding technical issues of waste management is a continuing and essential challenge in Hawai'i.

A.6.2.1 DOH, in consultation with the counties, should identify specific areas of expertise that are needed statewide, and solicit applications for training sponsorships from state or county employees, or even not-for-profit organization representatives. Training could be obtained on the

mainland, or from local expertise. Trainees would commit to sharing their experience in specified ways as appropriate.

A.6.2.2 Typical areas for specialized training might include business waste audits, illegal dumping prevention programs, alternative technologies, or full cost accounting (FCA) and user fee implementation.

A.6.3 DOH should work closely with the counties to develop a coordinated statewide public education program.

### **A.7 Encourage and Assist Not-for-Profit Organizations**

Independent organizations play an extremely valuable role by articulating and representing public concerns and priorities. The public sector can learn from and support these private, not-for-profit organizations. Notably lacking in Hawai'i is a state recycling association.

A.7.1 The recycling and composting industries in the state should come together to re-establish a state recycling association.

A.7.2 If industry forms a state recycling association, DOH and counties should work with and assist that association in its development, possibly including some start-up funding.

A.7.3 DOH and the counties should continue to work with and foster local not-for-profit recycling and environmental organizations by providing project grants and through other means.

### **A.8 Foster Productive Relationships with Private, For-Profit Businesses**

Private, for-profit companies provide a major portion of waste management services in Hawai'i, and nearly all of the waste diversion activities.

A.8.1 The state and counties should recognize the critical importance of for-profit services in waste management, and that nearly all waste and diversion services require a degree of public support. Predictable and reliable relationships between the public and private sectors will permit private companies to make investments and to provide needed services.

### **A.9 Enhance State Solid Waste Funding**

The existing staff of the DOH Office of Solid Waste Management (OSWM) is stretched thin in addressing a great variety of responsibilities. There is also a need for solid waste funding on the local level. The methods that counties use to generate funds can impact how effectively the state achieves its policy goals. The additional responsibilities recommended in this Plan Revision cannot be performed without an enhancement of funding resources.

A.9.1 DOH should submit to the Hawai'i State Legislature a funding request package, modeled on that proposed in Section G, which will provide adequate resources to achieve the goals and objectives adopted in this Plan, while continuing to meet other ongoing responsibilities.

- A.9.2 DOH should promote the adoption of FCA by local public solid waste departments.
- A.9.3 DOH should encourage the counties to develop solid waste user fees as the primary method of generating revenues to cover the full costs of waste management.

**A.10 *Improve Statewide Measurement and Reporting Systems***

The state solid waste measurement and reporting system needs improvement to provide a more reliable and publicly visible measure of state and county progress.

- A.10.1 DOH and the counties should work together to develop and implement a more effective measurement and reporting system. The system for measuring diversion rates should include the following elements and roles:
  - A.10.1.1 DOH should manage a master list of all waste management and recycling companies, created and maintained through a cooperative effort of DOH and the counties. All companies holding solid waste permits should be included, as well as other businesses that are known to divert or ship materials such as retail distribution centers.
  - A.10.1.2 DOH should annually solicit semi-annual data on materials diverted from all companies on the master list, so that data can be aggregated as needed by counties or the state on either a fiscal or calendar year.
  - A.10.1.3 DOH should notify companies of the need to report data by sending a letter and a reporting form with a return-due date. DOH should notify counties of companies that have not reported as of the due date. The letter and form should be developed in consultation with the counties, and may need to differ for permitted companies that are required to report from companies that are requested to report voluntarily.
  - A.10.1.4 Counties should contact non-reporting companies to obtain their data and forward it to DOH.
  - A.10.1.5 DOH should roll the company-specific data together, aggregating individual company data. A county that agrees to keep individual company data confidential may be provided company-specific data.
  - A.10.1.6 DOH should manage data quality by analyzing for double counting of materials that are transferred within the state. Methods should be developed for converting volumetric data, including bale counts, to weight data.
- A.10.2 DOH should adopt an administrative rule that assures recycling companies that their reported proprietary information will be held confidential and that only aggregated data will be reported. If necessary, enabling legislation should be proposed.
- A.10.3 DOH should report diversion data according to both the current methodology and in a manner consistent with national methodologies developed by U.S. Environmental Protection Agency (EPA).

- A.10.4 DOH should adopt and track some leading indicators, which would provide a visible measure of activities that are underway for state and county programs.
- A.10.5 An Annual Solid Waste Management Scorecard should be created and published to make visible the progress the state is making toward its goals, and the activities that are underway, including state agency metrics.

**A.11 Promote Source Reduction**

The state's high per capita solid waste generation rate is an indication that source reduction could be effectively promoted. The programs specifically mentioned in this Plan Revision include:

- A.11.1 DOH should provide broad-based public education regarding the costs and impacts of waste disposal and of illegal dumping.
- A.11.2 DOH should promote the adoption of solid waste user fees by all counties.
- A.11.3 DOH and the counties should promote backyard composting through a variety of methods, including a master composter program and making backyard compost bins available to the public at a reasonable cost.
- A.11.4 DOH and the counties should develop targeted outreach campaigns to specific business sectors to promote waste reduction practices.

**A.12 Increase the Performance of Diversion Systems**

The statewide recycling rate has remained in the 24 to 25 percent range (18 to 19 percent by EPA definitions) for a few years, well below the 50 percent goal for 2000. In order to attain a higher level of recycling it is necessary to address both the commercial and residential sectors.

- A.12.1 DOH and the counties should work to increase recycling in both the commercial and residential sectors.
- A.12.2 Each of the County ISWM Plan revisions should address the challenge of improving residential recycling opportunities and performance.
- A.12.3 The counties should be encouraged to maintain consistent recycling staff and programs in order to assist, promote and support the development of private recycling businesses.

**A.13 Make Disposal Strategies More Sustainable**

Solid waste disposal is a long-term commitment to assure that wastes do not pollute the environment. Technical assistance and training, as well as regulatory oversight, are needed on a continuing basis to assure that this commitment is met.

- A.13.1 The state should continue to support training for county employees and private operators, either through funding or providing training events. Training should address such topics as landfill operations, landfill fire prevention, environmental monitoring and control, and post-closure care.

- A.13.2 DOH should evaluate the impacts of unlined landfills in the state, and prioritize closure of unlined municipal solid waste (MSW) landfills. An exception should be allowed for those with a small quantity exemption.
- A.13.3 DOH should emphasize to the counties the need to implement effective prescreening systems for all wastes in order to divert hazardous or banned wastes from MSW landfills.
- A.13.4 The counties of Kaua'i and Hawai'i both face immediate disposal capacity issues. DOH should support them in their planning efforts to identify and develop integrated waste management options. DOH should help the counties design facility planning and siting processes that address public concerns early, and respond effectively to public opposition that can derail a project and leave the county without a timely solution.
- A.13.5 DOH should encourage and assist counties in exploring alternatives for processing and transformation of solid waste, including emerging technologies.
- A.13.6 DOH should develop special expertise in alternative processing, transformation and disposal alternatives, and provide technical information and assistance to counties in evaluating new and emerging systems.

**A.14 Continue to Research Certain Areas in Greater Detail**

Some specific areas have been identified in this Plan Revision, but will require additional study before effective action can be taken.

- A.14.1 DOH should research special waste management issues and identify key needs for improvement.
- A.14.2 DOH should monitor the development of emerging principles in waste management, including the transition in many communities to “polluter-pays” or “manufacturer-responsibility” systems, whereby producers of products that become waste accept a share of the responsibility for waste management costs.

**B. Illegal Dumping**

The fundamental objectives for prevention of illegal dumping are to eliminate the operation of non-permitted landfill sites and to greatly reduce the incidence of roadside dumping by citizens. The recommendations provided are based on information presented in Section 3.2.

| <b>ILLEGAL DUMPING RECOMMENDATIONS</b> |   |
|--|---|
| 1.                                     | Reduce Economic Benefits of Illegal Dumping                       |
| 2.                                     | Enhance Enforcement   |
| 3.                                     | Coordinate Efforts to Discourage Illegal Dumping                  |
| 4.                                     | Enhance Education and Outreach Programs                           |
| 5.                                     | Build a Sense of Responsibility for Proper Disposal of C&D Wastes |
| 6.                                     | Reduce Roadside Dumping   |



### **B.1 Reduce Economic Benefits of Illegal Dumping**

Proactive measures to eliminate the economic advantages of operating non-permitted dumpsites, and of disposal at those sites, could attack the problem at its source.

- B.1.1 DOH should publicize the *Impacted Sites List*, which includes sites where known or suspected illegal dumping has occurred, or where non-permitted landfills are known to exist. This list should be readily available and known to potentially interested parties.
- B.1.2 DOH and county solid waste departments should improve recycling economics associated with materials that are often illegally dumped. Actions that can be taken at the state and county levels to improve the financial basis for C&D recycling are discussed in Section 3.4. Market development for green waste products is discussed in Section 3.5.

### **B.2 Enhance Enforcement**

Targeted enforcement efforts could send a clear signal to potential illegal dumping violators that illegal dumping will not be tolerated.

- B.2.1 DOH should identify additional funding to support inspection and enforcement activities. Enforcement staff should be enhanced to locate and prosecute operators of non-permitted dumpsites.
- B.2.2 DOH should prioritize non-permitted dumpsites to focus enforcement efforts in ways that will make public the environmental hazards posed by illegal dumps and the risks of being caught.
- B.2.3 DOH should initiate administrative and, if appropriate, legal proceedings against landowners of high-priority non-permitted dumpsites. Although the landowner may not be the operator of the non-permitted dump, the law is clear in placing responsibility for environmental degradation on the landowner.
- B.2.4 DOH should increase public exposure of successful enforcement actions.
- B.2.5 DOH should work with landowners, builders, haulers, contractors, trade associations and community groups to identify illegal dumpsites and violators.
- B.2.6 DOH should offer a reward for evidence. Concerned citizens, legitimate solid waste professionals, or other interested parties providing information or evidence leading to the conviction of non-permitted dump operators would be eligible for rewards.
- B.2.7 DOH should promote a solid waste hotline that can handle reporting of illegal dumping violations.
- B.2.8 DOH should improve hotline response with more coordination between the state and counties. DOH should help identify responses that should be addressed by the state and those that should be addressed by the counties.

### **B.3      *Coordinate Efforts to Discourage Illegal Dumping***

Efforts involving state and local authorities can be better coordinated to discourage illegal dumping and to enforce laws and regulations.

B.3.1      DOH should establish a multi-agency task force consisting of state and county public works agencies, state and county police, fire departments, county building departments, and prosecuting attorneys to improve coordination efforts.

B.3.1.1    The task force should work to improve statewide coordination between agencies responsible for eliminating non-permitted dumps and reducing roadside dumping.

B.3.1.2    DOH OSWM should coordinate these efforts and maintain records on prevention and enforcement activities.

B.3.2      DOH, in coordination with the task force, should create targeted training and promotional materials for state officials, county officials, police and fire officers, sheriffs, and building inspectors.

B.3.2.1    DOH should prepare educational materials that describe solid waste regulations and county ordinances, a summary of public health issues, and investigative techniques and data requirements for enforcement actions against illegal dumpers and non-permitted dump operators.

B.3.2.2    DOH should develop training materials to explain and implement roles and responsibilities in cooperative working relationships to prevent illegal dumping.

B.3.3      The multi-agency task force should work to resolve inconsistencies, loopholes and gray areas between state and local regulations.

B.3.4      DOH should track the progress of illegal dumping prevention programs.

B.3.4.1    DOH OSWM should establish goals for illegal dumping programs, identify performance indicators, and propose a schedule for achieving these goals.

B.3.4.2    DOH OSWM should implement new methods for collecting data if existing data collection methods are insufficient to assess trends in illegal dumping. These data can be included in an annual report.

### **B.4      *Enhance Education and Outreach Programs***

Education is a key element in discouraging the use of illegal dumps.

B.4.1      DOH should inform landowners of the potential legal, environmental, and economic detriments and liabilities associated with illegal dumpsites.

B.4.2      DOH should target educational campaigns toward trade associations, waste haulers, landowners, and environmental groups, using the tools described in Section 3.6.

### **B.5 Build a Sense of Responsibility for Proper Disposal of C&D Wastes**

Implementing the principle of “chain of custody” can promote a sense of responsibility amongst the generators, transporters and dump operators for proper handling and disposal of C&D wastes.

- B.5.1 DOH should amend regulations to require solid waste disposal contractors to maintain chain-of-custody documentation. The program may be a simplified version of the hazardous waste manifest.
- B.5.2 DOH should work with counties to modify demolition permit applications to require disclosure of disposal plans. The county building departments should send a copy of the demolition permit that includes disposal plans to the DOH OSWM.

### **B.6 Reduce Roadside Dumping**

Public education, prompt cleanup of dumping sites, and convenient alternatives for perpetrators are keys to reducing unsightly roadside dumping.

- B.6.1 DOH should deliver frequent educational messages for the general public on the problems of roadside dumping, using the tools described in Section 3.6.
- B.6.2 DOH should create or promote public events that focus on problem materials and inform the public or other target audiences of the alternatives to roadside dumping.
- B.6.3 DOH should encourage prompt cleanup of chronic roadside dumpsites.
  - B.6.3.1 Debris should be quickly removed from chronically used dumpsites.
  - B.6.3.2 Cleanup by responsible parties should be enforced or cost recovery pursued.
  - B.6.3.3 Chronic roadside dumpsites should be secured with physical barriers or other means to discourage repeated use.
- B.6.4 DOH should work with counties to provide convenient diversion opportunities at disposal facilities for the materials that are frequently dumped roadside.

## **C. Commercial Recycling**

Commercial recycling is under-performing relative to its potential in Hawai‘i. As a first priority, businesses can be motivated to recycle if the benefits of recycling are promoted, and if trash collection services are restructured to incorporate recycling services.

Reducing the high costs of operating a recycling business will also increase commercial recycling. State and county programs could help to reduce transportation costs, enhance recycling markets, and help address the high cost of land that is faced by recycling companies in Hawai‘i.

The state can set goals and assess the effectiveness of these programs by monitoring the growth of commercial recycling. If progress is not satisfactory, a contingency plan of more stringent measures such as statewide mandates or service requirements should be considered.

The following recommendations are drawn from Section 3.3.

| <b>COMMERCIAL RECYCLING RECOMMENDATIONS</b> |   |
|---|---|
| 1.  | Target Outreach Programs at Specific Business Sectors       |
| 2.  | Enhance State In-House Recycling                            |
| 3.  | Integrate Waste and Recycling Services and Pricing          |
| 4.  | Improve Economics of Private Recycling                      |
| 5.  | Set Goals and, If Necessary, Implement Contingency Measures |

**C.1 Target Outreach Programs at Specific Business Sectors**

Business recycling is best promoted by outreach that is designed and targeted to reach specific business sectors.

C.1.1 DOH should design and develop a multi-faceted Targeted Business Sector Outreach Program that engages a state-county-private partnership to promote waste reduction and recycling opportunities. The program should focus on developing materials and techniques for specific business sectors.

C.1.1.1 DOH OSWM should coordinate with counties and other stakeholders to select a few key business sectors to target for intensive outreach.

C.1.1.2 DOH OSWM and the counties should sponsor a working group with business representatives for each target sector to provide input on the outreach program.

C.1.1.3 The program should build on successes of the City and County of Honolulu (C&C) Partnership for Environment and the Restaurant Waste Minimization programs.

C.1.1.4 The following options should be considered for first-year targeted sectors:

- State agencies for in-house recycling and procurement of environmentally responsible products,
- Restaurants for continuation of the Restaurant Waste Minimization project,
- Visitor industry for its central importance to Hawai‘i’s economy, and
- C&D waste generators to promote proper waste management practices (see Section 3.4).

C.1.2 DOH, in cooperation with the counties, should develop a business waste audit program. This program will help businesses identify and take advantage of waste and cost reduction opportunities.

- C.1.2.1 The program should be modeled on the best available national business waste audit materials and programs. Individuals with direct experience in those programs should be identified to provide advice and technical assistance.
- C.1.2.2 The program should sponsor training in each county, either through government or non-profit organizations, on business waste audit procedures and practices for selected sectors. Training should include instruction in environmental opportunities and best practices.
- C.1.2.3 DOH OSWM in cooperation with the counties should provide free waste audits to businesses. Coordination and expenses associated with these activities should be shared between DOH and the counties.

## **C.2 Enhance State In-House Recycling**

State in-house recycling must be a model of best practices for other commercial generators. It can also generate a flow of recyclable materials that enhances the capability of the recycling industry to develop infrastructure.

- C.2.1 The state should, in the first year of the Targeted Business Sector Outreach Program, select state buildings and facilities as one of the target sectors.
- C.2.2 Every state facility manager should be challenged by executive leadership to develop internal recycling. Their job performance and reward system should be linked with program success.
- C.2.3 DOH should implement a recycling outreach program, with support from state executive leadership. Technical assistance should be provided to state building managers to establish and operate recycling systems. These programs could be modeled on those developed by the C&C for recycling in public buildings.
- C.2.4 The state should contract with a single or a small number of recycling vendors to serve all state buildings. These contracts may initially be separate from trash collection contracts. However, the best opportunities for capturing costs savings through recycling are realized through integrated services.
- C.2.5 DOH should research and provide information about preferred products and their sources to all employees with purchasing responsibilities. Because state purchasing is increasingly decentralized, it is critical that policies and opportunities for environmental purchasing be established and communicated.

## **C.3 Integrate Waste and Recycling Services and Pricing**

If businesses choose to recycle, they should be encouraged, not penalized. This can be accomplished through encouraging integration of trash and recycling services. Integrated services allow effective capture of the cost savings and assure that businesses do not have to pay more if they recycle.

- C.3.1 DOH should draft and introduce legislation that assures the “Opportunity to Recycle” for businesses that choose to recycle. This can be modeled on elements of the Oregon

statute. The Hawai'i Opportunity to Recycle Act should include the following elements:

- A process to identify priority recyclable materials for which service is required. These materials will be selected using an economic and market availability test.
- Designation of the trash hauler as responsible for assuring that the opportunity to recycle is provided. This could occur either by the trash hauler providing the service directly or assuring that a recycler provides the service.
- Assurance that independent recycling collectors have a full and fair opportunity to provide the required recycling services to businesses.
- Assurance that businesses that source separate and recycle the priority recyclable materials shall not be charged more than businesses that do not.
- Assurance that priority recyclable materials, which are source separated and set out for recycling, shall not be disposed with trash, except for a reasonable percent of residue.
- A process whereby, if recycling service is not provided, businesses may contact their county solid waste authority, and if necessary DOH, for redress.

#### **C.4 Improve Economics of Private Recycling**

Market-driven financial factors can reduce the cost of operating a recycling company. This is vital to address the current economic disadvantages for private recycling in Hawai'i.

C.4.1 DOH should develop a policy to reduce the costs of transporting recyclables to market, both interisland and overseas. To implement this policy, DOH should assign staff to develop and implement a strategy.

C.4.1.1 DOH should explore opportunities to develop lower rates for shipment of scrap materials by making use of back-haul cost reductions, and through regulatory changes to interisland transportation.

C.4.1.2 Development of improved transportation opportunities should be explored in close coordination with stakeholders, including recyclers, counties, transportation companies, regulatory agencies, and the interested public.

C.4.1.3 The program should build from the success of Maui County, which obtained initial approval from private transporters for a reduction of transportation rates to the mainland.

C.4.2 DOH should implement the recommendations for market development to help improve the economics for private recycling businesses (see Section E).

C.4.3 DOH should convene a focused planning and public input process with state leaders and the SWAC to address high operating costs for recyclers, particularly the high costs for land and its limited availability.

C.4.3.1 Establishment of a Recycle Park should be considered on Oah'u. To make it feasible for existing businesses to locate within the Park,

consider a rent credit for pre-existing business improvements that must be constructed at the new site.

- C.4.3.2 The state should clarify that recycling is a maritime use, or other accepted use, to provide greater security for recycling companies on state lands.
- C.4.3.3 A position should be established within DOH, or other appropriate agency, that is empowered to be an advocate for recycling companies. This advocate would work with other state agencies to obtain financial advantages such as reduced rent or longer-term lease commitments.
- C.4.3.4 The Hawai'i Legislature should consider a State Diversion Credit, modeled on the Hawai'i County program, funded through an expanded advance disposal fee (ADF).

### **C.5 Set Goals and, If Necessary, Implement Contingency Measures**

The threat of consequences from not achieving established goals can motivate action. Defining contingency consequences at the beginning can enhance the success of a voluntary program.

- C.5.1 DOH should set a goal that recycling from the commercial sector, excluding multifamily housing, should achieve 45 percent diversion by 2003 and 50 percent by 2005.
- C.5.2 DOH and the counties should monitor recycling from commercial business and publish an annual report to the SWAC that summarizes the status of commercial recycling. Data on commercial recycling should be obtained annually.
  - C.5.2.1 DOH should specifically measure the recycling rate of corrugated cardboard, office paper, and food waste.
  - C.5.2.2 DOH should survey a selected group of businesses to assess their recycling practices and diversion rates.
  - C.5.2.3 DOH should monitor waste audits conducted in each county and compile local findings into a statewide assessment of commercial recycling.
- C.5.3 If the programs proposed above are implemented, and if recycling from the commercial sector does not exceed 45 percent within 3 years, DOH should convene a multi-stakeholder task force to develop a more aggressive plan for commercial recycling.
  - C.5.3.1 The plan should consider the options outlined from Portland, Oregon (see Section 3.3).
  - C.5.3.2 If consensus cannot be reached by the task force on a strategy, the Hawai'i Legislative should adopt a Mandatory Commercial Recycling Act:

- All commercial generators should be required to prepare recycling and waste reduction plans and submit them to their trash haulers, who shall submit them to the appropriate counties and to DOH.
- All commercial generators should be required to achieve a 50 percent or greater recycling rate within 3 years of adoption of the Act.

**D. Construction and Demolition Waste Management**

The fundamental objectives for C&D waste management are to encourage industry to reduce waste generation and increase diversion, support C&D recycling businesses, discourage disposal of C&D materials, and build public sector programs as models of best practices. Treated wood requires further study. The recommendations provided are based on research presented in Section 3.4.

| <b>C&amp;D WASTE MANAGEMENT RECOMMENDATIONS</b> |  |
|---|--|
| 1.  | Encourage Waste Reduction and Diversion by the Construction Industry |
| 2.  | Support C&D Recycling Businesses                                     |
| 3.  | Discourage Disposal of C&D Wastes                                    |
| 4.  | Establish the Public Sector as a Model for the Construction Industry |
| 5.  | Further Study Treated Wood   |

**D.1 Encourage Waste Reduction and Diversion by the Construction Industry**

There is a need to increase awareness of C&D waste management issues and encourage contractors to reduce and recycle more C&D waste.

D.1.1 The state should provide technical assistance on waste reduction and recycling to high-volume generators of C&D waste who can serve as models for other firms. The program should focus on reducing costs and handling co-mingled demolition waste.

D.1.1.1 The state should continue to provide contractor workshops to demonstrate the convenience and cost-effectiveness of waste reduction and recycling. These workshops should provide the following:

- List of resources for setting up job-site recycling, and
- Means for contractors to share information during workshops.

D.1.1.2 The state should develop and distribute case studies and fact sheets of successful job-site waste reduction and recycling projects at workshops and at project sites. These case studies should:

- Highlight respected industry professionals who are leaders, and
- Be stand-alone and/or incorporated into *A Contractor’s Waste Management Guide* (see Section 3.4).



- D.1.1.3 The state should work with existing building industry associations and business organizations to increase awareness of existing resources, such as the Clean Hawai'i Center's *A Contractor's Waste Management Guide*.
- D.1.1.4 The state should package best management practices within a green building program. This program should:
  - Build on work done for the HABiT program,
  - Be developed in partnership with the local building industry, and
  - Be an umbrella for contractor and consumer training, education and outreach.
- D.1.1.5 DOH should provide funding and other support to expand the existing C&C Partnership for the Environment program statewide. This will encourage more recycling by recognizing individuals and firms who do recycle C&D waste.
- D.1.1.6 DOH should work with the State Department of Commerce and Consumer Affairs to modify the contractor licensing process and incorporate training or exams that demonstrate an understanding of best management practices for construction waste. Private industry trade groups should be enlisted in this effort.
- D.1.1.7 DOH should work with technical and vocational construction programs to incorporate waste best management practices in their curricula.
- D.1.1.8 DOH should develop documents (e.g., fact sheets, brochures) on proper disposal of treated wood.
- D.1.2 DOH should make it more convenient and cost effective for contractors to recycle.
  - D.1.2.1 DOH should encourage and assist counties to develop and implement a streamlined permit process (e.g., one-stop shop or priority status) for contractors who use waste management and/or recycling plans.
  - D.1.2.2 DOH should provide a "hotline" for waste management information and assistance.
  - D.1.2.3 DOH should investigate development of portable C&D recycling drop-off stations near three major construction areas on O'ahu. DOH should:
    - Identify potential high activity construction sites in coordination with C&C permitting office.
    - Identify siting, zoning, cost, and safety issues.
    - Develop an implementation plan that incorporates a mechanism to determine when the portable stations should be moved to a different location.

- Determine how the drop-off stations should be provided (i.e., whether as public venture, private venture, or by means of a public/private partnership).
- D.1.3 DOH should encourage the proper and informed use of portable and/or mobile crushers and grinders for on-site handling of C&D waste.
- D.1.3.1 DOH should address potential conflicts between environmental goals and regulations of different branches.
- D.1.3.2 DOH should develop documents (e.g., fact sheets, brochures) that provide information and contacts for regulatory and/or permitting requirements. They should disseminate information by including it in *A Contractor's Waste Management Guide*, and/or in the county building permit package.
- D.1.3.3 DOH should develop best management practices for mobile processing. They should include information and regulations that govern fill and grading.
- D.1.4 DOH should “level the playing field” for all contractors by requiring a waste reduction, management, and recycling plan as a condition of permitting. This action would involve legislative action, intensive coordination with counties, and effective partnerships with industry trade organizations. Any new regulatory initiatives should be coupled with education and incentives.

## **D.2 Support C&D Recycling Businesses**

Viable C&D recycling businesses are essential elements of an effective diversion system.

- D.2.1 The state should encourage formation of new and expansion of existing C&D recycling businesses through market development and business assistance.
- D.2.1.1 The Department of Business, Economic Development, and Tourism’s (DBEDT’s) Enterprise Zone Coordinator should consider a feasibility study for establishing a C&D enterprise zone or park on O‘ahu or a C&D recycling/re-manufacturing park. The study will evaluate the economic viability of a C&D recycling enterprise zone.
- D.2.1.2 The state should evaluate establishment of a re-use store on O‘ahu within the enterprise zone/recycling park or as a stand-alone venture. This would involve a study to answer the following questions:
- Is low-cost warehouse space available?
  - Is there a supply and demand for reused building materials on O‘ahu?
  - Is there a potential for community/volunteer involvement?
  - Is it feasible and advantageous for the state to fund a non-profit pilot venture?

- D.2.1.3 DOH should compile accurate information about what type and how much C&D recoverable material is available in the marketplace and disseminate it to existing and prospective recycling businesses. This effort should include a review of the annual waste handling reporting process to determine if the data is sufficient for use in developing market plans.
- D.2.2 DOH should provide technical and market development assistance to development of recycling options for high volume materials that have high potential for recycling but that currently have limited or no recovery options. At present, these materials include drywall and asphalt roofing.
  - D.2.2.1 DOH should encourage recycling of drywall on O'ahu. Currently, DBEDT is providing funding assistance to one O'ahu composting business to investigate incorporating drywall into their soil amendment product.
- D.2.3 DOH should support prospective and expanding recycling businesses through technical assistance to obtain appropriate facility permits.
  - D.2.3.1 DOH should provide staff and other resources to assist C&D recycling businesses to identify and obtain the required business and environmental permits. If this is not possible within DOH OSWM existing resources, then DOH should provide technical assistance funds through an organization such as the Chamber of Commerce.
  - D.2.3.2 DOH should conduct an internal review of the recycling facility permit process to identify problem areas and potential for streamlining. Where necessary, DOH management will address potential conflicts between environmental goals of different branches and prepare policy documents to clarify priorities.
  - D.2.3.3 DOH should review regulatory developments elsewhere (e.g., Washington State Department of Ecology) that would exempt specific beneficial uses or reuses of solid wastes from the state's solid waste permit requirements.
- D.2.4 DOH should support prospective and expanding recycling businesses through technical assistance to comply with federal Occupational Safety and Health Administration (OSHA) and Hawaii Occupational Safety and Health (HIOSH) requirements. This should include in-depth review of applicable safety requirements.

### **D.3 Discourage Disposal of C&D Wastes**

C&D recovery could be enhanced through discouraging disposal by eliminating illegal disposal and requiring a solid waste disclosure form for contractors.

- D.3.1 DOH should eliminate illegal dumping as a means of C&D disposal. See Section B for recommendations on reducing the occurrence of illegal dumping.

- D.3.2 DOH should work with the counties to require a solid waste disclosure form as a condition of permitting for all demolition contractors.
- D.3.3 DOH should work with county building departments to develop a demolition permit application that requires sufficient disclosure to ascertain whether or not the contractor has considered recycling options and compared recycling costs with disposal costs. The landfill where waste will be disposed should be declared on the form.
- D.3.4 DOH should require that demolition permit applications contain an acceptance line for signature. This form should be forwarded to DOH OSWM by county building agents.

**D.4 Establish the Public Sector as a Model for the Construction Industry**

The state and counties cannot expect private industry to adopt best management practices unless government also does so and serves as a model.

- D.4.1 DOH should encourage C&D waste recovery on public projects by training state and county project and facility managers in C&D waste management. Training should address the following:
- Development and use of C&D waste management plans,
  - Job-site recycling and recycling options, and
  - Proper disposal.
- D.4.2 The State Department of Accounting and General Services (DAGS) and State Department of Transportation (DOT) should encourage C&D waste recovery on public and private projects by creating a state model for C&D diversion. Initially, major, high profile projects should be targeted.
- D.4.2.1 DAGS and DOH should require a waste management/recycling plan as a condition of contracts with the state. Alternatively, DAGS and DOH should give a bidding preference to those contractors who do use a plan. Plans should incorporate applicable actions from *Guidelines for Sustainable Building Design in Hawai'i, A Planner's Checklist*, to the maximum extent feasible.
- D.4.2.2 DAGS and DOH should require contractors to provide economic justification for not recycling.
- D.4.2.3 DAGS and DOH should require proof of proper disposal as a condition of payment for public contracts.
- D.4.3 DAGS, with input from DOH, should improve procurement policies and regulations to support manufacture and use of local recycled content products.<sup>1</sup>

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<sup>1</sup> Note: For public projects that receive federal funding, use of recycled content products may be required for some material categories, pursuant to Section 6002 of the Resource Conservation and Recovery Act (RCRA). EPA lists the affected material products and categories in its Comprehensive Procurement Guidelines (CPG). The CPG can also provide a resource for incorporating recycled-content procurement guidelines into state and local acquisition policies.

- D.4.3.1 DAGS should encourage business development and growth by purchasing recycled content materials for public projects. Existing opportunities include compost, mulch, and recycled concrete aggregate (RCA).
- D.4.3.2 DAGS should coordinate with DOT and C&C to evaluate and encourage the acceptance of RCA in C&C road projects.
- D.4.3.3 DAGS should coordinate with DOT to establish preferences, where affordable, for locally manufactured, recycled-content materials.
- D.4.4 DOH should establish a C&D Council, a working group of the SWAC. This Council should be responsible for identifying and resolving C&D waste management issues on an ongoing basis.
  - D.4.4.1 Participants of the Council should include representatives of state agencies (i.e., DOH, DBEDT, DAGS, and DOT); counties; industry associations (e.g., Building Industry Association, General Contractors Association); and representatives from other interested environmental, engineering, architectural, and property management groups.
  - D.4.4.2 The C&D Council should provide leadership and education to foster the expansion, diversity, and economic vitality of C&D recycling.
- D.4.5 DOH should develop public education and outreach programs (e.g., fact sheets, brochures, public service announcements) to foster an informed public.

#### **D.5 Further Study Treated Wood**

New information is emerging about the hazards that result from disposal of treated lumber and new recycling technologies. This needs to be further investigated and developed as a basis for treated wood management in Hawai'i.

- D.5.1 DBEDT should continue to conduct research and development of technologies for treated wood recycling processes.
  - D.5.1.1 Weigh the risks and potential benefits of investing public funds in market development for treated wood recycling.
  - D.5.1.2 If appropriate, create a market development effort to investigate composite lumber products that use treated lumber along with plastics or polymers to create new building materials.
- D.5.2 DOH should assess the long-term effects of treated wood disposal in unlined landfills in order to address concerns about potential environmental impacts.

- D.5.3 DOH should provide education and information about minimizing use of treated wood, and the proper handling and disposal of treated wood. Such information should incorporate the following recommendations:
- Encourage the reuse of treated wood that has been taken out of service as long as it still meets design requirements.
  - Encourage the use of alternatives to chromated-copper-arsenate (CCA) treated wood (e.g., steel and recycled plastic lumber for some applications). If wood is required, use construction details that minimize its use. Use newer, less environmentally toxic products.

**E. Market Development**

The market development program would build a framework and infrastructure for ongoing market development activities. It would also tackle development opportunities for three target materials – compost, glass and paper. These recommendations reflect the observations and analysis presented in Section 3.5.

| <b>MARKET DEVELOPMENT RECOMMENDATIONS</b> |  |
|---|--|
| 1.  | Develop a Framework for Statewide Market Development |
| 2.  | Develop Organic Compost Markets                      |
| 3.  | Develop Recycled Glass Markets                       |
| 4.  | Develop Recovered Paper Markets                      |

**E.1 *Develop a Framework for Statewide Market Development***

A dedicated, ongoing initiative could strengthen existing markets, open new market opportunities, reduce transportation barriers, and improve the processing efficiency of Hawai‘i’s recycled materials.

- E.1.1 DOH should serve as a focal point to initiate, facilitate and coordinate market development activities by other state agencies, local governments and the private sector.
- E.1.2 DOH should develop the staff capability, either within DOH or within another agency, to manage market development activities and to serve as a focal point for market development activities.
- E.1.3 DOH should establish a Market Development Steering Committee as a subcommittee of the SWAC to ensure that DOH and the recycling industry work in close partnership.
- E.1.4 DOH should provide adequate budget resources for the market development program through the funding strategies outlined in Section G.
- E.1.4.1 An estimated budget of \$250,000 to \$300,000 per annum should be provided for program management; to contract for the expertise needed

to carry out the work identified in the glass, compost and paper market development sections; and to undertake pilot and demonstration projects.

E.1.4.2 Contract funds for pilot projects and material expertise should be budgeted at the following levels:

- Contract for glass expertise \$45,000
- Contract for compost expertise \$53,000
- Contract for pilot and demonstration projects \$85,000

E.1.4.3 Funds from the glass container ADF should be designated to carry out the work with the glass industry. Funds from the disposal surcharge should be designated to carry out work on markets for organics, paper and other materials.

E.1.5 DOH should undertake the following initial work elements. These would be consistent with the material-specific strategies outlined in Sections E.2, E.3, and E.4.

E.1.5.1 DOH should pursue reduction of shipping rates for recycled materials for both interisland and overseas markets.

E.1.5.2 DOH should develop internally, or acquire by contract, material-specific experts who will provide technical and sales assistance to local recycling processors.

**E.2 Develop Organic Compost Markets**

A compost market strategy could systematically increase the percentage of locally produced compost that is manufactured and sold into higher-value markets.

E.2.1 DOH should adopt the goal to raise the grade distribution of marketed compost as outlined in Table 4-1:

**Table 4-1: Compost Grade Goals**

| Compost Grade        | Total Compost Marketed (percent) |                 |                |
|----------------------|----------------------------------|-----------------|----------------|
|                      | Current                          | Three-Year Goal | Five-Year Goal |
| Low-Grade Mulch      | 65                               | 35              | 25             |
| Medium-Grade Compost | 20                               | 40              | 35             |
| High-Grade Compost   | 15                               | 25              | 40             |

E.2.1.1 The strategy should address the following two aspects:

- Improve the quality of the composted product, and
- Assist the industry in developing or expanding acceptance of their product in new or existing high-value markets.

## E.2.2 Specific Recommendations

- E.2.2.1 DOH should develop Compost Quality Standards. It is extremely important that quality standards be developed to provide assurance to users that the compost products meet their quality specifications. This should be done through:
- Development of Hawai'i compost quality standards carried out through collaboration between the state and composting industry in consultation with end markets.
  - Inserting the quality standards into the state regulatory process to assure that they apply equally to imported as well as locally produced compost.
- E.2.2.2 DOH should provide a technical resource for local compost operators. Specific areas of assistance include:
- Technical information to individual operators on facilities management, best practice techniques, newer technologies and equipment.
  - Documented benefits of locally produced compost included in marketing materials.
  - Highly visible demonstration projects for local consumers to observe the benefits of using local compost.
  - Analyses of the depletion of local soil characteristics and of the qualities of local compost that could help improve soil quality.
  - Research on potential new market opportunities.
  - Meetings with markets (e.g., nurserymen, flower growers, landscape architects) to determine their quality requirements and identify compost products and specifications that would meet their needs.
- E.2.2.3 DOH should implement the approaches contained in Section 3.5.2.6 to develop or expand compost markets for:
- Commercial and residential landscaping, and
  - Remediation of marginal soils.
- E.2.2.4 DOH should promote product utilization by working with state agencies and county governments on specific projects to increase public sector use of compost products.
- E.2.2.5 DOH should initiate pilot projects that test the feasibility of moving large volumes of green waste through on-farm composting operations.
- E.2.2.6 DOH should provide demonstration projects in highly visible locations and document the results of using compost in a variety of different applications.



**E.3 Develop Recycled Glass Markets**

The percentage of recycled glass that is sold into higher-value markets can be systematically increased with targeted assistance of the state.

E.3.1 DOH should adopt the goal to increase the volume of recycled glass to higher end markets, as outlined in Table 4-2.

**Table 4-2: Glass Market Goals**

| Grade Cullet        | Total Glass Marketed<br>(percent) |                 |                |
|---------------------|-----------------------------------|-----------------|----------------|
|                     | Current                           | Three-Year Goal | Five-Year Goal |
| Low-Value Market    | 65                                | 40              | 30             |
| Medium-Value Market | 20                                | 30              | 25             |
| High-Value Market   | 15                                | 30              | 45             |

- E.3.1.1 The strategy should address the following two aspects:
- Improve the quality of recycled glass product, and
  - Assist industry in accepting the product into new markets.

E.3.2 Specific Recommendations

E.3.2.1 DOH should contract with a highly motivated individual who is proficient in the technical aspects of recycled glass cullet.

E.3.2.2 DOH should support local processors, through the contracted expertise, to improve the quality of their operation and to convince potential new markets of the performance of properly processed glass.

E.3.2.3 The contracted expert should initially provide the following areas of assistance:

- Pilot projects to provide the necessary data to support use of properly processed cullet in septic tank and drinking water filtration systems. This data should be used to support regulatory changes that would allow for new applications of cullet.
- Marketing of the use of cullet to industrial abrasives companies to convince them of superior performance of cullet.
- Technical support to the local glass processors to enable them to consistently process glass to higher-end market specifications.
- Technical support to the local glass processors to enable them to produce colored cullet for landscaping.
- Pilot projects to test glass in new applications that have great potential in Hawai'i.

- Summaries of technical data for hotels and resorts on the superior performance of glass in swimming pool and pond filtration systems.
  - Marketing of recycled glass to utility companies to use in marking underground utility conduits.
  - Expansion of glass processing capabilities to include coloring additives and use of colored cullet for high value landscape medium and glass art products.
- E.3.2.4 DOH should implement the integrated approach contained in Section 3.5.3.5 to develop or expand recycled glass markets for:
- Golf course sand,
  - Water and wastewater filtration medium, and
  - Industrial abrasive grit.
- E.3.2.5 DOH should work with state agencies and county governments on a project specific basis to increase public sector use of recycled glass products. The DOT and county Transportation Engineers should be encouraged to use recycled glass in higher-value aggregate applications

#### ***E.4 Develop Recovered Paper Markets***

Financial barriers to fiber recovery in Hawai'i, such as high freight, storage and handling rates for local paper recycling companies, could be addressed by state efforts. In addition, some new applications for recovered paper could be developed.

- E.4.1 DOH should task the SWAC Market Development Steering Committee to set priorities for DOH amongst the many areas for which the economic feasibility of paper recovery could be addressed, and to oversee the work and negotiations in those areas.
- E.4.2 DOH should create a working relationship with all members of Hawai'i's transportation infrastructure: Sea-Land Service, Matson Navigation Company, Young Brothers Limited, the Public Utilities Commission, the Port of Honolulu, and the other county ports. DOH should negotiate with these entities to establish rates and regulations that will accommodate the small volume of materials shipped and low margin of profit for the recovered materials industry.

Specific issues to be negotiated include:

- Favorable back haul rates to the mainland for scrap materials,
- Lower freight rates to Asia for scrap materials,
- Lower inter-island rates for scrap materials,
- Lower minimum guarantees required in order to attain lower freight rates,
- Elimination of storage costs at the Port of Honolulu under certain conditions, and
- Elimination of the demurrage charge under certain conditions.

- E.4.3 DOH should determine whether there is sufficient political support to seek amendments to the “Jones Act” to remove this barrier to Asian markets.
- E.4.4 DOH should implement the integrated approach contained in Section 3.5.4.6 to analyze the feasibility of, and, if feasible, assist the development of the following uses of recycled paper:
- Molded pulp packaging for agricultural products, and
  - Newspaper as animal bedding.

**F. Public Education**

The state can enhance public education for ISWM issues by supporting existing public education efforts, integrating ISWM issues into existing programs on related topics, and developing state-sponsored campaigns to address high priority ISWM topics. The following recommendations reflect the observations and analysis presented in Section 3.6.

| <b>PUBLIC EDUCATION RECOMMENDATIONS</b> |   |
|---|---|
| 1.                                      | Improve Coordination of Public Education Activities                     |
| 2.                                      | Conduct a Broad Media Campaign Addressing Waste Reduction and Recycling |
| 3.                                      | Conduct Targeted Campaigns  |

**F.1 Improve Coordination of Public Education Activities**

The state can provide centralized coordination, communication, and support for public education activities.

- F.1.1 DOH should establish a Public Education Steering Committee, as a working group of the SWAC, for overall planning and implementation of ISWM education.
- F.1.1.1 The Steering Committee should coordinate ISWM public education efforts by different jurisdictions statewide and ensure that priority issues are adequately covered.
- F.1.1.2 Membership of the Steering Committee should include:
- A representative of the DOH OSWM,
  - Representatives of each county, and
  - Representatives of non-profit and business organizations.
- F.1.1.3 The Steering Committee should undertake the following tasks annually or biannually:
- Develop a plan for public education that identifies priorities and important messages and themes.

- Identify existing public education programs that could help relay messages and themes to key target audiences.
  - Identify and initiate the planning for two to three public education campaigns addressing ISWM priorities.
  - Identify how efforts in one county could be used to strengthen efforts in others.
  - Identify funding resources.
- F.1.2 A Campaign Action Group should be appointed, as an ad hoc working group of the Steering Committee, to carry out individual campaigns when they are initiated.
- F.1.2.1 The Action Group should oversee and/or provide input on education projects including planning, implementation and final evaluation.
- F.1.2.2 The Action Group should identify and involve individuals with skills specific to the campaign topic and the outreach approach.
- F.1.2.3 The Action Group should apprise the Steering Committee of progress on the campaign.
- F.1.2.4 The Action Group should provide a final report on the campaign.
- F.1.3 DOH should create a new, full-time public participation staff position to coordinate and support the Steering Committee and identify funding and in-kind resources for education campaigns.
- F.1.4 DOH should explore and obtain resources and funding for public education programs, such as the following:
- In-kind staff resources at the state and county levels, and volunteer support from organizations.
  - Staff and funding resources among state and county agencies.
  - Grant applications for government and private funds.

**F.2 *Conduct a Broad Media Campaign Addressing Waste Reduction and Recycling***

It is essential that the public frequently hear messages about waste reduction and recycling in order to develop an awareness of the issues.

- F.2.1 DOH should implement a broad public education campaign with a simple and understandable message that addresses key ISWM priorities.
- F.2.1.1 The campaign should appeal to a broad sector of the general public and be flexible enough to include county priorities.
- F.2.1.2 The Steering Committee should decide on the theme and components of the campaign, and be responsible for ensuring that it is carried out.

**F.3 Conduct Targeted Campaigns**

Campaigns that focus on specific groups of individuals can be very effective in motivating behavior change.

F.3.1 Each targeted campaign should be developed by the Steering Committee and carried out by a Campaign Action Group.

F.3.2 Initially, DOH should implement two targeted campaigns:

- A long-term and ongoing training program to create volunteers throughout the state who have in-depth knowledge of solid waste and recycling issues, and who will spread awareness of source reduction and recycling. This campaign could be similar to the King County’s Master Recycler Composter (MRC) training program (see Section 3.6.3.3),
- A campaign to encourage the visitor industry to become a model for environmental stewardship. It should be modeled on the Hotel Waste Reduction program developed by the California Integrated Waste Management Board (see Section 3.6.3.3). It should also draw from local programs, such as the C&C Partnership for the Environment (see Section 3.6.3.2).

**G. State Program Funding**

This ISWM Plan Revision has identified a number of new and expanded initiatives that will require additional funding. The following recommendations for providing enhanced funding reflect the observations and analysis presented in Section 3.7.

| <b>STATE PROGRAM FUNDING RECOMMENDATIONS</b> |   |
|--|---|
| 1.   | Assess Funding Needs and Strategy Development   |
| 2.   | Enhance Four Funding Sources: <ul style="list-style-type: none"> <li>a. Solid Waste Disposal Surcharge</li> <li>b. Glass Container ADF</li> <li>c. ADF on Tires</li> <li>d. Federal Grants</li> </ul> |
| 3.   | Develop State Solid Waste Funding Policy  |
| 4.   | Develop State Funding Assistance for County Programs  |

**G.1 Assess Funding Needs and Strategy Development**

Funding to implement the recommendations of this Plan Revision must be provided within the state budget process.

G.1.1 DOH should evaluate the opportunities identified in this ISWM Plan Revision, examine current internal agency resource allocation, and develop a funding needs assessment for submission to the Hawai'i State Legislature.

G.1.2 DOH should examine the recommendations for funding sources in this Plan Revision and develop a politically acceptable package of enhancements to the existing solid waste funding.

## **G.2 Enhance Funding Sources**

Three sources offer the greatest opportunity to expand existing funding levels to meet the needs of this ISWM Plan Revision.

- Solid waste disposal surcharge.
- ADFs for glass and tires.
- Federal grants for special projects.

G.2.1 The Hawai'i State Legislature should increase the base level funding from the solid waste disposal surcharge to pay for programs that would provide recognized statewide benefits.

G.2.1.1 DOH should work closely with the counties to identify program improvements that will directly benefit them.

G.2.1.2 In cooperation with the counties, DOH should identify specific state-level programs to be enhanced and the level of funding that will be needed from the disposal surcharge. Programs that may offer the greatest benefits to the counties include:

- Reduction of illegal dumping,
- Development of higher-value markets for locally recycled materials,
- Reduction of transportation costs for recycled materials,
- Increased recovery of recyclable materials from commercial businesses,
- Development of staff expertise statewide in a variety of technical and leading-edge solid waste management areas, and
- Improved effectiveness of public education programs.

G.2.1.3 DOH should propose to the Hawai'i State Legislature an increase in the solid waste disposal surcharge that is adequate to meet the funding needs, and designed such that its value to the counties is apparent.

G.2.2 The Hawai'i State Legislature should provide funding from the glass container ADF to develop higher-value markets for recycled glass using funds.

G.2.2.1 The Hawai'i State Legislature should increase the glass container ADF to fund the glass market development program.

G.2.2.2 The Hawai'i State Legislature should amend the glass container ADF statute to allow a higher percentage of funds to be used for statewide glass market development.

G.2.3 DOH should continue to aggressively pursue federal grants to achieve the objectives of this ISWM Plan Revision.

### **G.3 *Develop State Solid Waste Funding Policy***

Two critical policy issues – FCA and pay-as-you-throw (PAYT) – will support a more effective and reliable system of funding local waste management programs.

G.3.1 DOH should develop a program to educate and promote implementation of FCA in all counties.

G.3.2 DOH should develop a program to educate and promote implementation of PAYT user fees in all counties.

G.3.3 DOH should support the above two programs and include the following elements:

G.3.3.1 In-depth training for individuals in FCA and PAYT.

G.3.3.2 Training workshops on these systems in each county for county public works and financial officials using EPA-developed technical materials.

G.3.3.3 A 3-year fund for annual allocations to local agencies to plan and design PAYT and FCA systems. The county allocations should be made using a proposal or bid process that is proportional to the justified need in each county.

### **G.4 *Develop State Funding Assistance for County Programs***

Some programs recommended by this ISWM Plan Revision will require new initiatives by counties. This may justify allocation of external resources for use by counties.

G.4.1 DOH should encourage and support innovation by counties and non-profit organizations through continuing technical assistance, and by providing funding assistance.

G.4.2 DOH should develop a new biennial grants program for local program priorities.

G.4.2.1 Grants should be awarded on a competitive basis for innovative programs that address the biennial priorities.

G.4.2.2 Limited grants should be provided to local governments that are facing especially challenging waste management problems. Grant awards should be decided using an unsolicited proposal or bid process and be allocated in proportion to the justified need.

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