13. Funding, Organization, and Alternative Scenarios

This chapter provides the County an overview of alternative methods available to fund the County's solid waste services, organize itself to do that, and options to consider implementing for the future. Also, this chapter has an overview of funding options for the County to choose from when implementing a new ISWMP. It also explains the concepts of Full Cost Accounting (FCA) used both in the analysis of the financial data and in how this can be used by managers. There is a description of the types of financial material reviewed for the Full Cost Accounting FCA evaluation of the County's Solid Waste Division.

There are several topics that bear on the County's ISWMP as a whole, and on its implementation. These discussions, which are presented prior to the five alternative scenarios, are:

- Plan Funding Options Overview – different methods of paying for solid waste services
- Facility Procurement
- Public-Private Partnerships – methods of contracting and operating facilities and services, and associated risks
- Analysis of Current Costs

These latter topics impact the efficiency and effectiveness of the facilities and services. For example, when public-private partnerships are applied to the more technical facilities, they offer the County the benefit of single point responsibility for design, permitting, construction and operation of a complex project over a long-term period. They can also help minimize the risk the County takes on such a project.

Alternative solid waste management scenarios for the County are examined for their cost and revenue impact over a 20-year-plus planning period. The SWRAC advised the Solid Waste Division staff on these scenarios at its October 18, 2007 meeting. The five scenarios discussed in this chapter are:

Scenario I – Status Quo

Scenario II – Increase Recycling to 60 Percent

Scenario III – Increase Recycling to 60 Percent plus Waste-to-Energy (WTE)

Scenario IV – Increase Recycling Diversion to 60 Percent with Alternative Conversion Technology and place Lanai and Molokai Landfills on "Standby with Permit"

Scenario V – Increase Recycling Diversion to 75 Percent without WTE and place Hana, Lanai and Molokai Landfills on "Standby with Permit"

The goals are stated for each scenario, and the changes in the County programs, facilities and services are described. When new facilities are proposed, they are described briefly, in a conceptual manner, not in any engineering detail. Markets for the materials recovered under the scenarios are also discussed. For each facility and service, a budgetary cost has been developed and is presented. These costs are conservative and include high contingency factors that are estimated to reflect Maui location costs. Detailed costs will need to be developed from detailed engineering and cost analyses or preferably from actual procurement processes. An implementation timeline has been developed which shows the development tasks and approximate schedule for each project in the selected scenario.

The final portion of the chapter consists of the specifics of the scenario chosen by the Solid Waste Division to be implemented.

13.1 Plan Funding Options Overview

The funding of solid waste activities, particularly in older mainland communities, has historically been paid for through the General Fund with little direct connection to the service levels. But environmental legislation, potential liabilities, and rising cost of equipment and land have created situations where policymakers are looking at solid waste funding anew. U.S.EPA and the Governmental Accounting Standards Board have advised communities to move toward a fee for service basis. Such funding must ensure the following:

1. Sufficient and reliable revenues are generated to cover the operations costs, including debt service, of solid waste system programs;

2. Capital is raised to cover the necessary capital investments;

3. Revenues are generated to cover legacy costs such as closure and post-closure maintenance for closed landfills;

4. Equitable distribution of costs among residents and businesses (e.g., customers);

5. Transparency; and

6. Environmentally responsible practices of waste reduction and recycling.

Communities should evaluate their current and projected costs, anticipated growth, capital improvements and schedule, and any sources of revenue when preparing for a new or modified fee system. If possible, they should set assessments and fees at levels that do not require adjustment after the first few years. It is important to determine a fee's longevity in order to assure its political acceptability. Determining the time between fee increases will depend upon accurate cost data and sound revenue projections.

The goal is to establish a system of charges that is both equitable and predictable for all classes of generators. Just as communities have modified their solid waste

systems to address the evolution of laws, technology, and public perception over recent years, they must also address the way revenues are raised to support the costs of modern solid waste systems. The current best practice is a fee for service approach so that citizens, or "customers," know exactly what their services are and what they cost is, based on the service actually received.

In the following sections, the various methods used by local governments to fund their solid waste systems are discussed.

13.1.1 Tipping Fees

Tipping fees are unit charges that are typically assessed per ton or per cubic yard at point(s) of disposal and/or processing. These are currently assessed at the Maui County landfills. Tipping fees can be set and adjusted based on revenue needs, waste quantity and system cost projections, and each waste hauler pays strictly for the weighed or measured quantity delivered.

Tipping fees have the advantage of being linked to the quantity of waste disposed; the more waste, the more revenue. They can be adjusted to pay for the costs of the entire solid waste system. This has the advantage of being simple but does not inform users of the cost of system components, such as collection or administration. In systems where there is competition for waste disposal, a tipping fee that includes the total system costs may be uncompetitively high, and waste haulers may leave the system for lower cost disposal.

Jurisdictions sometimes provide reduced tipping fees to recycling businesses and non-profit organizations to compensate for the residue of waste when processing materials. This policy is to encourage and foster recycling processing outlets.

Private waste haulers often criticize tipping fees because they may be sized to subsidize other services being provided by the local system, e.g., for those services offered residential waste generators. This occurs when a substantial share of the waste brought to a facility comes from residential, commercial and institutional sources, and when the municipality collects the residential waste and owns the disposal or processing facilities and recovers a portion of its costs through tax revenues or household assessments. The private sector also is concerned when there is a differential in charges between the private companies and the residential self-haulers who, in the case of the County, pay no tipping fee. In these situations, one set of users, usually the customers of commercial collectors, ends up subsidizing others.

13.1.1.1 Differential Tipping Fees

In order to encourage waste/recyclables to be delivered to a facility in a separated form, different tipping fees can be established for different materials, such as:

- Domestic waste
- Vegetative waste
- Pallets
- Tires
- White goods (appliances)
- Clean wood
- Treated wood
- Other

13.1.2 Utility or Service Fee

Utility fees can be charged to all users of the solid waste system. They can be a simple division of the full cost of the system divided by the number of users and billed monthly, quarterly, semiannually or annually. The utility fee can be billed on a separate bill just for solid waste service, or it can be added to an existing bill for taxes, water, sewage or other utility bill.

The City of Seattle has a city utility with departments for water, wastewater, solid waste and electricity, and issues a single itemized bill for all services. Some jurisdictions break the overall system charge into components so that the customers know the cost of each component.

Montgomery County, Maryland, does this and breaks its charges into:

1. System benefit charge,
2. Disposal charge based on a generator assessment,
3. Residential recycling collection charge,
4. Residential waste collection charge, and
5. Leaf vacuuming fee.

These all appear on individual County annual property tax bills, but are fees, not taxes.

Some communities use a similar system for residential customers and have the collection and/or disposal fees vary with the size of the container. For example, the City of San Jose, California provides containers from 20 gallons to 96 gallons and charges variable fees based on these sizes - the bigger the container, the higher the fee. Because San Jose does not charge for recycling collection, this variable rate structure has the result of helping promote recycling as San Jose also provides residences large recycling and yard waste carts without additional charge.

Increasingly, municipalities are exploring some form of variable rate fees based on the volume or weight of refuse. Such fees are called “Pay As You Throw” and are considered to be the least regressive form of payment. These are based on the concept that one who generates the more waste pays the higher fees.

13.1.3 Generator Assessments

Some communities, such as Palm Beach County, Florida, have implemented generator assessments at the residential and/or commercial level based on the class of generator. Generator classes include:

- Single-family households
- Multi-family households
- Commercial-business
- Office-related
- Retail
- Organics generators
- Industrial
- Construction & demolition contractors
- Other

Generation rates are determined for each class of generators based on local surveys or from an analysis of relevant studies. The fees would then be tied to the generation factors. For example, a restaurant operating seven days per week normally could be expected to have a higher rate of waste generation than a typical single-family home, and, accordingly, the fee to manage the restaurant's waste would be higher. Conversely, condominiums generate less than the typical single-family residence and should have a lower fee. In some cases, the factors will not match certain generators. An appeal process is used to adjust those generators who can make a case that the generation rate should be changed for them.

13.1.4 Sticker Fees

Many local governments have implemented sticker fees to fund part or all of their system. There are two types of sticker fees: (1) for the bag or container and (2) for a vehicle.

The by-the-bag or container system is used by Charlottesville, Virginia to fund a portion of its system. Residents or businesses purchase a sticker that they place on the bag or other container. This is a form of the variable rate or "Pay As You Throw" approach: one bag, one sticker; two bags, two stickers, etc.

In the second approach, the user buys a vehicle sticker that allows the user to enter the disposal facility. The stickers are usually valid for one year. In some cases, the jurisdiction may limit the amount of waste a resident may bring to the facility and/or charge an additional fee (for example, a per-bag fee) for excess waste.

The sticker fees are usually added to other fees, charges or taxes that support the system, and may be set to cover the costs of establishing and maintaining the drop-off or convenience center. Sticker fees help allocate the cost of certain solid waste system components to the users who benefit from the component. Usually, the generator avoids the cost of waste collection and benefits from hauling small vehicle loads without paying a tipping fee for each load delivered.

13.1.5 Improved Lot Assessments

Improved lot assessments are typically charged to the owner of an improved residential or commercial lot. They are usually applied as a flat fee in a special assessment on the annual property tax bill or as a special charge on a municipal utility bill, such as one for water or sewer service. These assessments provide a predictable source of revenue and can be applied in addition to or in lieu of a tipping fee. Predictability is important during periods of economic downturn and when increased tipping fees would be non-competitive in the region and promote waste diversion from the system to lower cost alternatives.

Flat fee assessments are reasonably easy to administer. However, the flat fee is not equitable, since each improved lot owner pays the same fee regardless of the quantity or handling difficulty of waste generated at that improved lot.

13.1.6 Impact Fees

Some communities are using development impact fees – scheduled charges applied to new residential and commercial development - to finance infrastructure in high-growth areas. These fees provide revenue for the construction or expansion of facilities.

Although use of these fees to finance solid waste facilities has been limited, they are being considered more frequently as a way to raise money, particularly in rapidly growing communities. Development impact fees may be assessed at the building permit stage to pay for a portion of landfill expansions, collection equipment, recyclables processing, transfer stations and other capital improvements.

Impact fees typically do not cover the major share of capital cost for new or expanded facilities. In some states, they must be authorized by the state legislature. The courts have ruled invalid impact fees that were found to be unreasonable and unrelated to the benefits received by those who pay the fees.

13.1.7 Franchise or Licensing Fees

In some jurisdictions, private haulers are granted exclusive or non-exclusive franchises to collect waste/recyclables in the community or unincorporated area of a county. The rate the hauler charges the customers can include a pre-set franchise fee set as a percentage of service fees charged to its customers. The percentage/fee can be sized to cover actual costs for administering the franchise as well as providing other services to the franchisee. A community may do the billing on behalf of its exclusive franchisee, which is done in Scottsville, VA. In this case, collection of the franchise fee can be made along with the service fee.

When a community licenses private hauler vehicles, it can apply a greater than nominal fee for each vehicle registered as a method to raise revenue. These fees could be sized to account for a portion of the services provided by the local waste management system. Additionally, the vehicle fees should be tied to the volume of the vehicle, i.e., recognizing the amount of waste/recyclables it can collect.

13.1.8 General Funds and Taxes

Traditionally, general funds and taxes, usually property taxes, are used to pay for services provided by local governments. For solid waste services, this has also been the case in many communities. However, as local governments, or authorities, manage solid waste services on an enterprise basis, the continued use of general funds and taxes becomes more limited or even totally eliminated. Nonetheless, general funds/taxes can continue to provide a portion of revenue requirements. Certainly, if an enterprise fund has a shortfall in revenue, having a general fund make-up or rate covenant may be required to come into play to keep the enterprise fund whole.

13.1.9 Bonding

Jurisdictions generally sell bonds to fund their large capital investments. These have lower interest rates than commercial loans or corporate bonds because they have a lower risk due to the stability in the revenue generated from the jurisdiction's taxing

power. Such bonds are called General Obligation Bonds and are the most prevalent type of bonds utilized by jurisdictions. The bonds from a jurisdiction are rated and the rating impacts interest rates. Jurisdictions with a history of financial problems will have a lower rating for their bonds and, hence, a higher interest rate.

Jurisdictions can also issue bonds to finance specific revenue-producing projects, and the repayment of such bonds is financed by the revenue generated by the project and not by the taxing power of the jurisdiction. These are known as revenue bonds.

13.2 Facility Procurement

The scenarios explained in this chapter have items such as fleet maintenance shops, material recovery facilities, office space, waste-to-energy facilities, and other structures in them. *What methods can the County employ to develop and build such structures?* There are three basic approaches used by local governments to procure facilities:

1. A&E - Architect and engineering firm (A&E) develops bid packages. Under this method, the owner or jurisdiction (County) hires an A&E firm to develop detailed specifications and drawings for the new facility. These detail the thickness of concrete, number of reinforcing rods, exact dimensions, etc. Most road procurements follow this method. These specifications are attached to a standard construction contract and advertised for bids to construction firms that do this type of work. The lowest qualified bidder wins. The owner or its A&E firm is responsible for making sure what is built is what was specified. Once the facility is completed, the owner accepts the risk that it will work and would need to decide who is going to operate it.

2. Turnkey – Under this method, the owner and/or its consultant documents the functional requirements for a facility. An example of functional requirements might be: "….a materials recovery facility, for example, that is capable of processing 200 tons of recyclable materials in eight hours, receiving and unloading ten collection vehicles per hour, producing salable products for which specifications are provided and resulting in no more than 10% residue…." These functional requirements are documented usually in a request for proposals. The Proposers would provide all design and engineering, equipment and construction in one "turnkey" package. These allow the owner to review the approach proposed to fulfill the functional requirements and evaluate these against the cost of each approach to decide which is the most cost effective. Before the MRF would be accepted by the owner, the turnkey contractor would conduct an acceptance test to demonstrate that the MRF meets the specifications.

3. Full Service – This method is an extension of the turnkey method. Because of the specialized nature of the facility or for other reasons, the owner adds to the turnkey method the requirement that the contractor will operate the facility for the initial operating period. In this case, the proposals submitted to the owner must include not only the capital cost of providing the facility but the annual operating and maintenance costs for each of the years in the initial operating period.

13.3 Public-Private Partnerships and Risks/Rewards

As can be seen in the procurements methods above, different roles and responsibilities are assigned to different members in a public-private partnership. In addition, the risks associated with the facility are distributed differently in each method. For example, under the A&E method, the risk that the facility will work as desired is shared between the A&E firm and the jurisdiction. In the case of the turnkey and full-service methods, the contractor bears the risk that the facility will work when completed. Also, under the full-service method, the contractor accepts the operational risk associated with the facility on a day-to-day basis.

In the solid waste industry, as in other industries, individuals and companies accept risk when they feel that there is an adequate reward. When the reward is too low, the individual or company will go out of business. In other words, the jurisdiction would have to pay its private partner to take any risk involved in a service or facility. Therefore, the jurisdiction will need to evaluate each potential public-private partnership to determine which risks and rewards it wants to accept and which it believes are best assigned to the private partner.

These risks and rewards, as well as other responsibilities, will need to be fully documented in the project contracts. Drafting of these contracts, especially for the more complex projects, generally is done by specialized law firms and consultants. Table 13-1 shows the assignment of various risk elements under the three procurement methods.

For more complicated and technical projects, the full-service procurement is regarded as a best practice. In many instances, e.g., waste-to-energy, the technology is proprietary and owned by the service provider. Using the full-service procurement method, there is a single point of responsibility for the project performance which minimizes the jurisdiction's risk.

Table 13-1 - Risk Assignment under Alternative Procurement Approaches

	Risk Assumed By		
Risk Element	**A/E Procurement**	**Turnkey Procurement**	**Full-Service Procurement**
	Capital Cost Risks		
Capital costs overruns	Owner	Contractor	Contractor
Additional capital investment to achieve required operating performance	Owner	Contractor	Contractor
Additional facility requirements due to new state or federal legislation	Owner	Owner	Owner
Delays in project completion which lead to delays in revenue flow and adverse effect of inflation	Owner	Contractor	Contractor
	Operation and Maintenance Costs Risks		
Facility technical failure	Owner	Contractor	Contractor
Excessive facility downtime	Owner	Owner[1]	Contractor
Underestimation of facility O&M requirements (labor, materials, etc.)	Owner	Owner[1]	Contractor
Insufficient solid waste stream	Owner	Owner/ Municipalities	Municipalities
Significant changes in the solid waste composition	Owner	Owner	Owner/ Contractor
Changes in state and federal legislation which affect facility operations	Owner	Owner	Owner
Inadequate facility management	Owner	Owner[1]	Contractor
Underestimation of residue disposal costs	Owner	Owner[1]	Contractor
	Recovered Product Income Risks		
Overestimation of energy recovery efficiency of technology	Owner	Contractor	Contractor
Significant change in solid waste composition	Owner	Contractor	Owner/ Contractor
Changes in legislation which affect energy production and/or use	Owner	Owner	Owner
Overestimation of solid waste quantities	Owner	Owner	Municipalities
Significant adverse changes in the market financial condition or local commitment	Owner	Owner	Owner/ Market
Downward fluctuation in the price of products	Owner	Owner	Owner
Inability to meet energy market specifications	Owner	Owner[1]	Contractor
	Tipping Fee Income Risks		
Diversion of waste to other competing facilities	Municipalities	Municipalities	Municipalities
Overestimation of the solid waste stream	Owner/ Municipalities	Owner/ Municipalities	Owner/ Municipalities
Adverse changes in participating communities' fiscal condition	Owner	Owner	Owner

[1]Modified turnkey procurements may provide for intermediate or long-term contractor facility operations, which could lead to further risk assumption by the private contractor.

13.3.1 Management Using FCA

The USEPA recommends the Full Cost Accounting system (FCA) for solid waste management as a best practice. The goal of FCA is to capture all costs and revenues associated with providing solid waste services.

The term "accounting" is an unfortunate term because it conjures up the picture of a person counting invoices, pressing a total button, and the job is done. The USEPA's Full Cost Accounting was never seen to be a static, immutable procedure that, once done, should not be used. It is a tool for managers to understand the components of the costs of an operation, to work with supervisors of these operations so they know the cost components as well, and to regularly seek ways to make the system more efficient.

The application of FCA to activity management on an ongoing basis often leads managers to "discover" unnecessary expenses, increased efficiencies, costs created by doing "work" for other departments, and promotes accountability on the part of supervisors and managers. Managers of solid waste operations may hold monthly meetings with each supervisor of an operation under his or her management and go over, line by line, the expenses and revenues (if any) for the previous month. This is often a learning process for both the manager and the supervisor because the manager will see the details of the operation by way of expenditures, and the supervisor will grasp the financial reality of the decisions made and how those decisions are translated into the financial tracking methodology of the department. This confluence of learning, tracking, and accountability will create ideas to make adjustments to the operations so that the cost-to-benefit ratio is better.

Some managers use FCA as the basis for zero cost budgeting. Some jurisdictions are accustomed to taking the previous year's budget and adding or subtracting a certain percentage for the following year. FCA provides the manager with tools to assume that each budget will be built anew each year. The supervisor, who now is trained on FCA and understands the components of his/her operation's cost/revenue, develops a proposed budget from zero and builds it block by block.

Naturally, at first, the supervisors are resistant to taking on this new task. Yet, many thrive on the knowledge it provides them and the chance to have an influence on making their operations function better. The process may allow the supervisor to prove that a certain program has been under-funded even though the work never diminishes, or that, if a different type of equipment were purchased and used, then productivity would go up and cost per unit would go down.

13.4 Analysis of Current Costs

The FCA model was constructed using USEPA guidelines. It examines the Solid Waste Division's Fiscal Year 2006 expenses and revenues. The financial model was constructed with information gathered during the financial research conducted. The consultants received this information from the Division and supplemented it with information from the Department of Finance. The purchase price of major equipment was collected and depreciation/replacement schedules were created.

In addition, all personnel costs were gathered. These included regular wages, night differential, overtime, standby, temporary assignment, premium pay, and the fringe benefits, which include the retirement system's charges, Social Security and Medicare, unemployment, worker's compensation insurance, public employee health fund, and leave. There were discussions with managers from the Highways Division to ascertain the level of solid waste work performed by its personnel but not directly paid for by the Division. The County provided the land value of its properties based on former appraisals and estimated value of existing structures. The County's Comprehensive Annual Financial Report (CAFR) was reviewed. The Division's object accounts were reviewed. These are account code identifiers where expenses and revenue are charged. Considerable time was spent with Division personnel understanding these object accounts and examining specific expenses to assure that they were correctly placed under the right activity and location.

The costs in the model are allocated to the activities and locations for the Division. This structure is not currently used by the County in its budget, thereby creating differences between the two.

The County's FCA model was developed by looking at the final expenses and revenue that occurred in the County's solid waste operations for the Fiscal Year 2006. All expenses related to administration and operations were taken into account and placed both with the activity performed and the location where it was performed. Since the County's current cost tracking does not provide this level of detail, numerous discussions were held with personnel in both the Division of Solid Waste and the County's Finance Department. In addition, every solid waste management facility in the County was visited to make direct observations and take pictures.

Personnel and equipment costs were allocated to the activity performed and the location where that activity occurred. For example, an employee who spends most of his/her time collecting curbside garbage during the week may spend a certain number of hours collecting white goods each week. The total hours worked were then allocated to specific activities. For example, if an employee spends 80 percent of the work week collecting curbside garbage and the remainder (20 percent) picking up white goods, that employee's cost was allocated 80-20 to these specific activities.

In order to maintain a similar look and feel to the budget currently used by the County, the FCA model consists of the same four activities used today: Collection, Diversion, Disposal, and Administration. Managers can use this activity-based management model from the highest level down to the specifics of activities and locations. This provides the manager with the ability to see how changes in specific locations and activities affect not only overall cost and cost per ton of the individual programs but the effect on the whole solid waste budget. The ability to financially zoom in and out of the Division's operations provides the manager with a greater ability to fine-tune operational activities and enhance efficiencies.

The Status Quo scenario provides the foundation for this FCA financial model. At the lowest level, the model has a matrix structure where costs are allocated by activity and location. Table 13-2 shows the activities and locations where these expenses and revenues are generally tracked in the FCA model.

Table 13-2 - FCA Model Activities and Locations

Activities	Locations
Collection	Hana
Diversion	Lahaina/Olowalu
Disposal	Lanai
Administration	Makawao
	Wailuku/Central Maui
	Molokai

13.4.1 Division Costs in FCA Model Format

Table 13-3 looks at the Division as if it were a balance sheet of a business. (In accounting used by local governments, this is referred to as an "Enterprise.") In short, it looks at the Division to see how the revenue it generates compares to its expenditures. In this display, the activity, Administration, has been allocated to each of the three line activities.

This high-level view does not include revenue to the Division from the County's General Fund. The result is a $5.8-million-dollar shortfall in revenue in FY2006 as shown in Table 13-3. In the scenarios evaluating the County's alternatives, this format without the General Fund contribution will be used. It identifies the Division shortfall and makes no assumptions about which funding approach, discussed in Section 13.1, will be used.

Table 13-3 - Full Cost for FY 2006 without General Fund Revenue

FCA FY 2005-06 Without General Fund Revenue	Collection	Diversion	Disposal	Total
Expense	$4,962,290	$5,454,904	$8,407,707	$18,824,901
Revenue	$3,354,457	$2,858,279	$6,766,345	$12,979,081
General Fund Contribution	$0	$0	$0	$0
Excess/ (Shortage)	($1,607,832)	($2,596,625)	($1,641,363)	($5,845,820)
Number of Employees	49.2	4.4	31.4	85
Number of Accounts	24,106	NA	NA	24,106
Number of Tons	$47,685	101,342	201,889	303,231
Expense per Ton	$104	$54	$42	$62
Excess/(Shortage) per Ton	($34)	($26)	($8)	($19)

When a jurisdiction's budget is reviewed and a transfer of monies from the general fund to the Division is made, making the ending balance between expenditures and revenue $0, it is assumed that all the costs have been covered. Government accounting, however, works differently than a household's or a business' budget. The Division's budget does not include various costs such as facility construction, land cost, debt interest, and the work the Highways Division does for the Solid Waste Division. These cost elements were taken into account in Table 13-3. However, Table 13-3 did not include any revenue made by a General Fund contribution. When the General Fund contribution is added, the shortfall between expenses and revenues is reduced to $3.0 million as shown in Table 13-4.

Table 13-4 - Full Cost for FY 2006 with General Fund Revenue

FCA FY 2005-06 With GF	Collection	Diversion	Disposal	Total
Expense	$4,962,290	$5,454,904	$8,407,707	$18,824,901
Revenue	$3,354,457	$1,685,352	$6,766,345	$11,806,154
General Fund Contribution	$913,095	$1,901,930	$1,177,363	$3,992,388
Excess/ (Shortage)	($694,737)	($1,867,622)	($464,000)	($3,026,359)
Number of Employees	49.2	4.4	31.4	85
Number of Commercial	24,106	NA	NA	24,106
Number of Tons	47,685	101,342	201,889	303,231
Expense per Ton	$104	$54	$42	$62
Excess/(Shortage) per Ton	($15)	($18)	($1)	($10)

Closure and Post-Closure: Active landfill cells fill up and have to be closed. The cost of the labor, material, and engineering are calculated in the closure cost of that cell. When all the cells at the landfill are closed and no burial activity occurs anymore, then the USEPA requires that care after closure takes place for no less than 30 years. Governmental Accounting Standards Board (GASB) Number 18 "Accounting for Municipal Solid Waste Landfill Closure and Post-Closure Care Costs" requires that the responsible governmental owner of the landfill allocate funds for these post-closure activities in their financial statements. GASB 18 means, then, that a municipal government must recognize the expense of these future expenditures on an annual basis.[1]

The FCA model accounts for the closure and post-closure expense discussed in GASB 18. Table 13-5 shows this by showing both the annual and the 30-year total for each of the active landfills managed by the Division.

Table 13-5 – Post-Closure Care Costs

Landfills	Annual	30-Yr Total
Central Maui Landfill	$407,420	$12,222,600
Olowalu	$64,166	$1,924,993
Makani	$47,153	$1,414,578
Kalamaula	$73,955	$2,218,664

When the Full Cost methodology is applied, the Division neither generates enough revenue through its fee for services nor through the General Fund subsidy to cover the costs.

Table 13-6 shows a comparison of expenses of the Division, by activity, to an estimate of integrated municipal solid waste management systems in the U.S. as a whole. It indicates that diversion activities (collection and processing) of the Division are nearly at the national average. Collection of refuse, however, appears to take up a smaller percentage of the Division's budget than the national average because the County

[1]See http://www.gasb.org/st/summary/gstsm18.html for further details on GASB 18.

only collects a fraction of the residences. This could be accounted for by the current limited service - for example, no curbside recycling collection - which will change when the currently planned universal collection is implemented.

Table 13-6 - Comparison of Maui County to U.S. Average Costs

FCA FY 2005-06	Collection	Diversion	Disposal	Total
Expense	$4,962,290	$5,454,904	$8,407,707	$18,824,901
Percentage	26%	29%	45%	100%
US Integrated MSW Management	42%	28%	30%	100%

Collection has historically been a labor intensive activity, and the competition for staff is keen in Maui County. Table 13-7 shows the distribution of labor among the three activities. Collection utilizes the most labor. The Division has been moving toward automated collection for more efficient application of labor. Administrative costs which were $2.2 million in FY2006, amount to 12 percent of the overall expenses.

Table 13-7 - Full Cost for FY 2006 without General Fund Revenue

FCA FY 2005-06	Collection	Diversion	Disposal	Total
Expense	$4,962,290	$5,454,904	$8,407,707	$18,824,901
Labor	$2,733,386	$305,546	$1,562,430	$4,601,362
Percentage Labor	59%	7%	34%	100%

The non-General Fund revenue received by the Division is primarily from two sources: trash collection fees and disposal tipping fees. The residents who elect to have County curbside collection are billed by the Division for this service. Companies who bring waste to the Central Maui Landfill and the other disposal facilities pay tipping fees at the landfills based upon the quantity. In FY2007, the tipping fee was $51 per ton with a $4-per-ton fee for recycling. In FY 2008, this went to $53 for landfill and $10 for recycling resulting in a tipping fee of $63 per ton.

These fees amount to 64 percent of the total revenue needed to cover solid waste costs. The remaining 36 percent is a subsidy from the General Fund; or from the County's taxpayers generally by way of unencumbered property taxes. Table 13-8 shows the Division's sources of revenue and their allocations to the activities.

Table 13-8 - Allocation of Division Revenues

Revenue By Activity 2006						
Object	Description	Collection	Diversion	Disposal	Admin	Total
Grant Revenue		$0	$0	$0	$0	$0
Revenue						
32	Licenses and Permits	$0	$0	$0	$390	$390
34	Charges for Current Services	$0	$0	$0	$0	$0
341	General Government	$0	$0	$0	$250	$250
344	Sanitation	$3,322,220	$0	$6,745,113	$0	$10,067,333
345	Waste Management	$0	$0	$0	$390	$390
37	Other	$0	$0	$0	$55,388	$55,388
Interfund Transfer - Revenue						
740	General Fund	$0	$1,172,927	$0	$0	$1,172,927
741	Special Revenue Funds	$0	$1,610,000	$0	$0	$1,610,000
Total Revenue		$3,322,220	$2,782,927	$6,745,113	$56,418	$12,906,678

13.4.2 FCA Model Assumptions

When long-range projections are made, financial, social, and environmental conditions must be assumed. With an FCA model, the assumptions also delve into the meaning of specific object codes and allocation of expenditures because jurisdictions have not tracked the expenses down to this specific level. What follows is a listing of the assumptions in the financial model. This is a listing of subjects representing where assumptions were made. The model allows for changes to these assumptions if more accurate information is provided. The assumptions are listed under the categories to which they belong. For example, assumptions made in the collection activities are listed under the category of "Collection."

Administration

- Costs associated with administration are accumulated separately and then allocated to the activities and locations areas based on the labor costs of the activities.

- A fringe factor of 63 percent is used and its components are shown in Table 13-9.

Table 13-9 - Fringe Factor Cost Elements and Percentage

Category	Object	Financial Category	Percent
Retirement	6370	Retirement System Charges	13.3
Health, etc.	6320	Hawaii Public Employee Health Fund	15.1
Leave	5101	Regular Wages	18.3
FICA/Medicare			7.7
Unemployment			5.8
Worker's Comp			3.0
Total			63.2
Total Proposed by Finance			63.0

Capital Improvement Projects

- Fleet Vehicle Replacement is allocated based on quantity (tons).

- Annualized capital cost is spread over the useful life of equipment.
- There are some County equipment with unknown purchase dates. The model assumes, then, the purchase date for such equipment to be 2004.
- The solid waste debt is defined as Capital Improvement Project (CIP) costs for land purchases, construction, and equipment bond fund. It does not include Operations and Maintenance capital costs.

Revenue

- Funds are assumed to be transferred from the Division budget to pay the Highways Division for refuse collection.
- License and Permits (Object Code 32) is assumed for Collection Administration.
- General Government (341) is allocated across activities.
- Sanitation (344) is assumed to be allocated to $6.7 million from landfill tip fees and $3.3 million from refuse collection fees allocated by accounts; landfill tip fees are further allocated based on quantity (tons) and for specific material types;
- Waste Management (345) is allocated across activities.
- Other (37) is allocated across activities.

Interfund Transfer Revenue:

- General Fund (740) transfer is allocated to all activities currently performed by Division based on expenditures.
- Special Revenue Fund (741) is payment by Wastewater for co-composting of sludge and is allocated to Diversion at the Central Maui Landfill.

Land/Building

- The allocation of leased land value for facilities with known acreage based on County land appraisal values.
- Leased land is estimated using known acreage and the average appraisal values escalated to 2006 dollars using the CPI;
- Useful life for furniture and other equipment is 10 years; and
- Land capital cost is amortized over 20 years.

Employees – Full-Time Equivalents (FTE)

FTEs are assigned based on known data from Finance or allocated by activities or quantity (tons). For example, Hana is allocated 2.9 FTE because it includes 2 FTE at the Hana Landfill, 0.6 FTE for Hana Collection and 0.3 FTE for Hana Diversion (based on tons diverted).

Consumer Price Index (CPI)

The consumer price index used is published by the U.S. Bureau of Labor Statistics for Honolulu. For the five-year period, 2002 through 2006, it averaged a 3.27 percent increase per year. This five-year average is used to calculate escalation of expenses in the future projections. When applied in the FCA model, the following formula is used: Ax(1+r)^n, where: A= amount, r=rate and n=term in years.

Closure and Post-closure

When a landfill closes and closure costs are known, annual costs are calculated.

Abandoned Vehicle Program

Administrative time is allocated to this activity as is the time by the abandoned vehicle supervisor, coordinator, and clerk III.

Collection

- Lanai Landfill costs provided by Finance include costs for landfill and collection.
- Lanai collection costs are based on one landfill employee collecting refuse one day per week.
- Allocation of Lanai Landfill costs is to collection activity except for object code 6012 “Construction Materials” which is assumed to be landfill activity.
- Hana and Molokai collections are performed by the Highways Division.
- Costs for Hana and Molokai collection are estimated based on costs for rear-loader collections by the Division.
- Although most financial allocations are made using labor hours, the expenses for rolling stock are made on number of equipment items.

Diversion

- Abandoned vehicle/scrap metal costs were allocated to Central Maui, Hana, Lanai, Molokai, and Olowalu based on quantity (tons).
- Site improvements for scrap metal are allocated by quantity (tons).).
- Central Maui Landfill operation costs include a contract with Maui Disposal to operate the Olowalu Convenience Center. The contract expense is allocated to disposal and diversion based on quantity (tons).
- Molokai Landfill operation costs include a contract with Maui Disposal for diversion. A portion of this contract is for scale house operations, and this is allocated to disposal activities based on quantity (tons) and the rest to diversion.
- Diversion and disposal activities at Lanai and Hana Landfills have costs allocated based on quantity (tons).

- Contract with SOS Metals Island Recycling at Hana is allocated to scrap metal in Hana.

- Both 9172652 and 917286 (Solid Waste Alternatives and Alternative Programs, respectively) are diversion program costs.

Disposal

- Disposal quantity (tons) collected at Wailuku, Olowalu, Lahaina, Makawao are placed in Central Maui Landfill.

- Disposal quantity (tons) collected at Lanai are placed in the Lanai Landfill.

- Disposal quantity (tons) collected at Hana are placed in the Hana Landfill.

- Disposal quantity (tons) collected on Molokai are placed in the Molokai Landfill.

Estimated Fuel Use

The Division provided fuel cost by activity when data were available. Otherwise, it was estimated by the kind of activity and the equipment used.

13.5 Organizational Structure

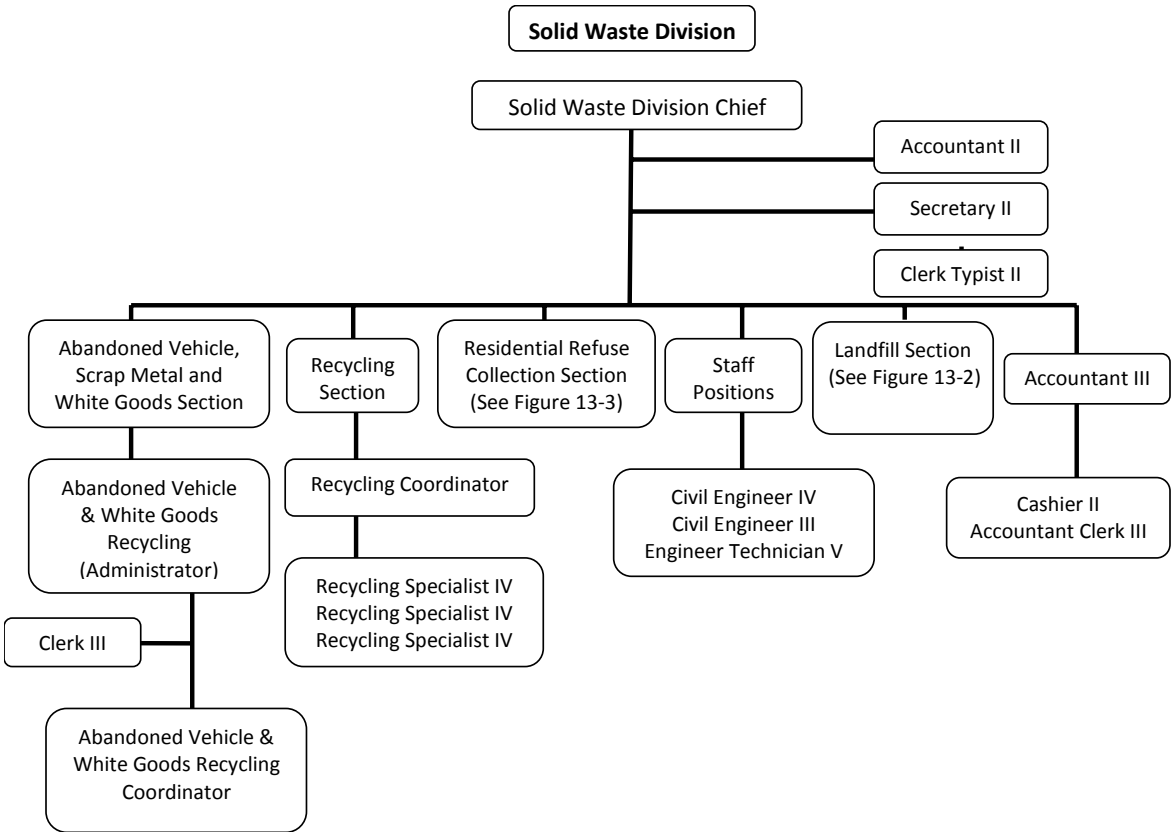
The Solid Waste Division Chief manages the Division and reports directly to the Director of the Department of Environmental Management (DEM). Currently, the Division's and DEM's administrative office is located in leased offices in Wailuku. The Division has five sections:

1. Administration,
2. Recycling Section (Diversion),
3. Residential Refuse Collection Section (Collection),
4. Landfill Section (Disposal), and
5. Abandoned Vehicles.

Each of these sections is described in the following paragraphs, and the linkages are shown in the organization chart in Figure 13-1.

Figure 13-1 - Solid Waste Division Organization

(Source: County of Maui)



Administrative Section: This group includes a combination of diverse positions that support the Chief and Division activities. The engineering group consists of two Civil Engineer positions and an Engineer Technician. There are five remaining positions in the Administrative Section: Accountant III, Secretary II, Clerk, and two Cashiers positions.

The engineering group reports directly to the Division Chief. The engineering group supports the Division Chief in managing all the closed landfills, expansions on the active landfills, and all matters related to the State's Department of Health, with one Engineer housed at the Division's offices and the other at CML. These include the resolution of Notices of Violations (NOV) given to the County by the State Department of Health over the past year and the implementation of corrective action.

The Cashier handles all the payments made by customers for residential refuse collection and landfill disposal. For specified hours each week, residents can come into the Wailuku office and sign up for or discontinue collection services. Representatives of commercial entities can also come in to the office to create or manage their accounts to dump at the landfill.

The Accountant III position handles the invoicing and general account and budget information for the Division.

Recycling Section: The Recycling Coordinator manages this section and reports directly to the Division Chief. Currently, the section staff consists of three Recycling Specialists. One of the Recycling Specialists is responsible for diversion programs on the Island of Lanai and a second for the programs on Molokai. The Section is located in the Division's offices in Wailuku. The responsibilities of the Recycling Section are recycling education, oversight of used motor oil collection sites, oversight and enforcement of ADF glass recycling, contract oversight for drop-off facilities and redemption centers, grants to local groups to benefit diversion, the creation of new recycling programs, the tracking of the quantity of diverted materials by facility both for the County's programs and the private sector. These data are annually used to compute the County's recycling rate.

The Recycling Section provides grants to divert hard-to-divert, post-consumer materials. Examples of such grants include Community Work Day and Habitat for Humanity for electronics recycling and the Puaa family pig farm for commercial food waste. The Recycling Section holds a grant application workshop during the year to help educate the public about the grant program, including application and utilization requirements.

The Recycling Section manages the Recycling Hotline, the recycling website, and answers phone calls and emails from citizens and businesses about recycling and solid waste.

Abandoned Vehicle, Scrap Metal and White Goods Section: This section (Abandoned Vehicles) is included in the Solid Waste Division. The organization chart in Figure 13-1 shows the assignment of Abandoned Vehicles in dashed lines reflecting this status.

Landfill Section: This section manages the active and closed landfills. Figure 13-2 illustrates this section's organization. The engineering group within the Administration provides support on closed landfill monitoring and engineering, as discussed above. The Central Maui Landfill (CML) is assigned a Landfill Worksite Supervisor, Landfill Equipment Operator, Attendant, Laborer, and Cashier positions.

The authorized Hana Landfill staff consists of four positions: a Working Supervisor, Operator, Attendant, and Laborer. These staff report to the Landfill Supervisor at the CML.

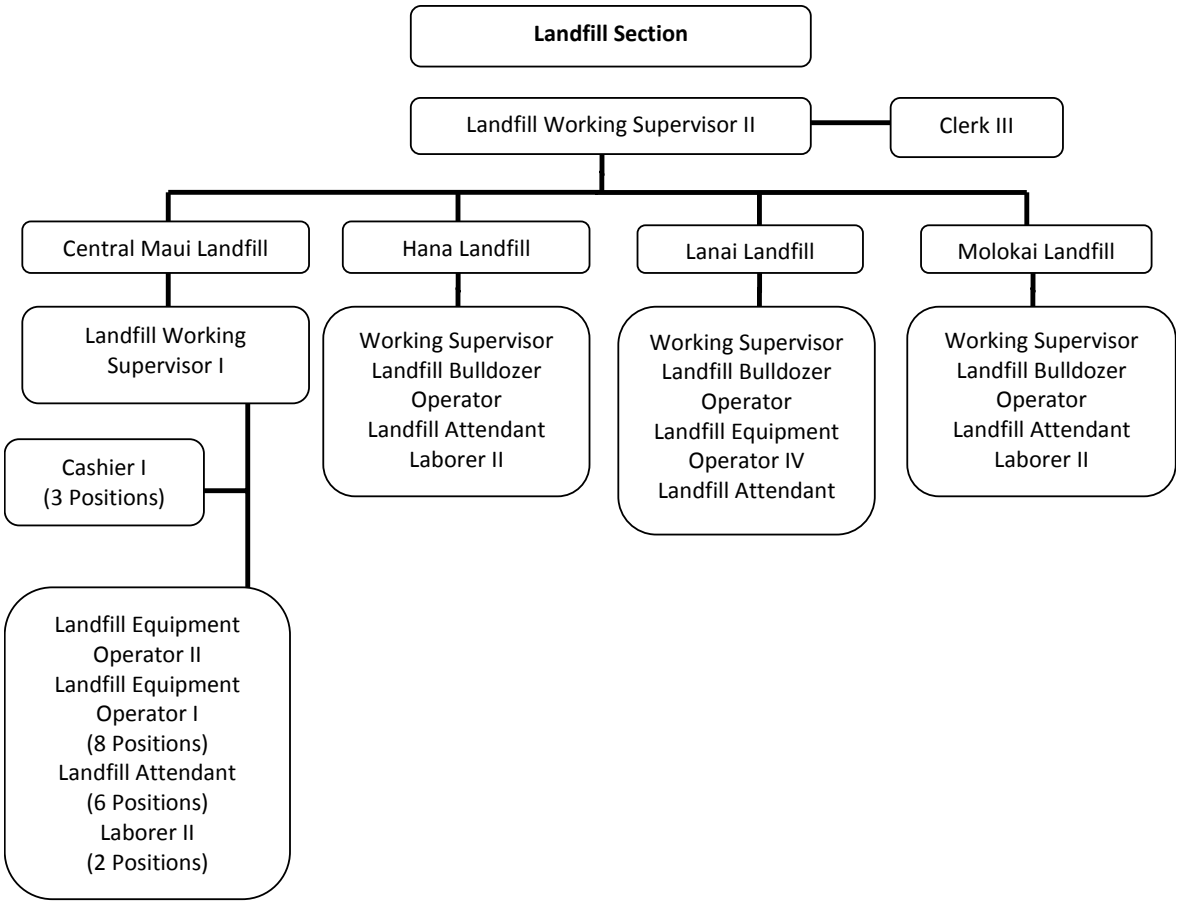
The authorized Lanai Landfill staff consists of three positions: a Working Supervisor, Operator, and Attendant. These staff report to the Landfill Supervisor at the CML. On Lanai, workers under the Disposal Landfill Section perform the curbside collection of garbage.

The authorized Molokai Landfill staff consists of three positions: a Working Supervisor, Operator, and Attendant. However, the Molokai Landfill has a scale and contracts out the scale house activity to a contractor.

The current supervisor of all the landfills is the Landfill Worksite Supervisor of the largest landfill in the County's system, the Central Maui Landfill.

Figure 13-2 - Current Landfill Section Organization Chart

(Source: County of Maui)

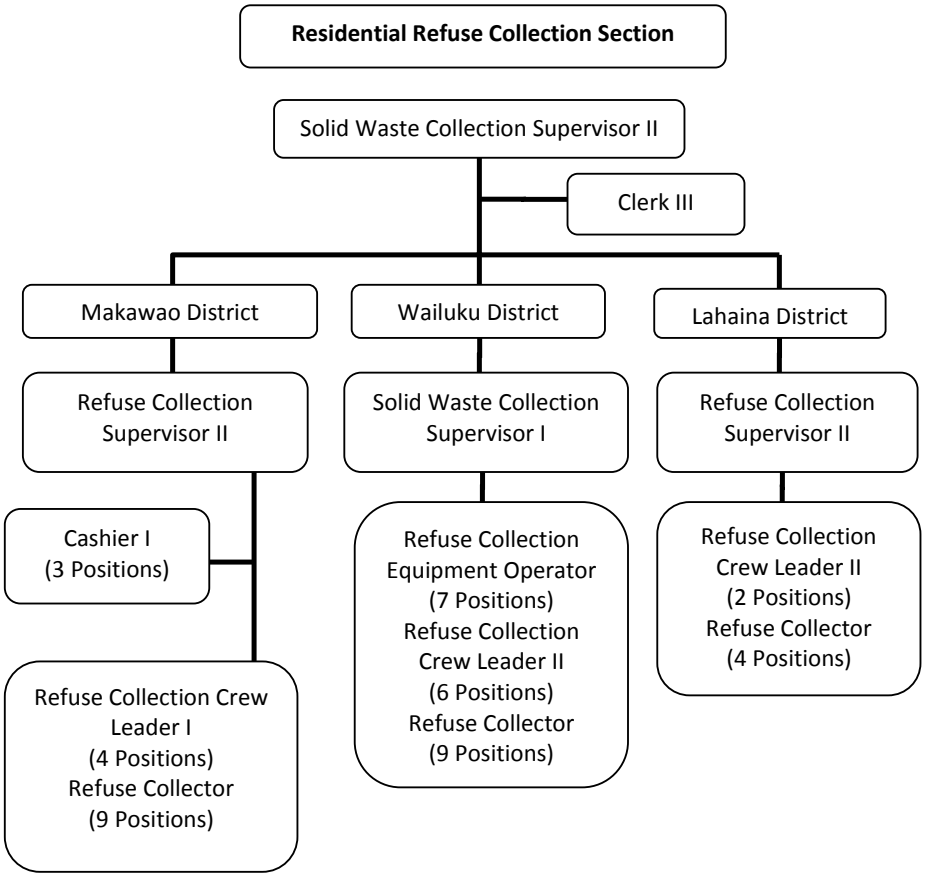


Residential Refuse Collection Section: This Section is responsible for the collection of residential refuse on the Island of Maui with the exception of the Hana region which is collected by Highways Division staff using Solid Waste Division equipment. In addition, the collection of solid waste falls under the Disposal Landfill Section on Lanai and the Highways Division on Molokai.

As illustrated in Figure 13-3, three collection districts are served by the Section: Makawao, Wailuku, and Lahaina. There are Refuse Collection positions in each of these districts with a Refuse Collection Supervisor II in both Makawao and Lahaina. In Wailuku, there is a Solid Waste Collection Supervisor I overseeing the daily work. All three of these districts report to the Solid Waste Collection Supervisor II.

Figure 13-3 - Residential Refuse Collection Section Organization

(Source: County of Maui)



13.5.1 Data Management

> *"I've missed more than 9,000 shots in my career. I've lost almost 300 games. Twenty-six times, I've been trusted to take the game winning shot and missed. I've failed over and over and over again in my life. And that is why I succeed." – Michael Jordan.*

Michael Jordan's quote deftly shows that he tracked results. An MSW operation is no different. Supervisors must be trained and entrusted with the ability to understand budgets, track costs, evaluate performance, and make decisions based on FCA.

The following shows areas that need to be developed and/or enhanced by the Division in order to provide supervisors with the ability to provide quantifiable numbers to evaluate performance.

Route Tracking: Currently, trucks are tracked at the scale house by their truck number. There is no way to track the quantities collected by route, hence, no way to track change over time in the quantities placed out by customers on any specified route. This information can be used to balance routes so work is distributed equally. This lack of information will become more important as the County implements

recycling collection routes. For example, by knowing what routes set out less recyclable material, education activities can be targeted in those areas and results of the educational activities can be tracked.

Currently, the collection of white goods is not tracked. There are no data on the number of stops, work load, or number of callers requesting the service. As recommended in Section 13.5.1, all service requests would go through a customer service center where requests are tracked, appointments tracked, and tons and number of items collected tracked to the number of stops on that route.

When curbside recycling collection is implemented, it will be important to track the setout rate of the customers. Again, this will help establish the participation on any specific route so educational activity can be targeted. It also will provide data to the Collection Supervisor on the performance of that route and whether adjustments to routes need to be made. For example, if participation on a route is consistently low, it may be advisable to allocate more stops to that route in order to make the usage of the truck more efficient. In effect, routes could be consolidated, possibly diminishing the number of trucks used each day. On the other hand, if the usage and tonnage continue to rise, the Collection Supervisor can prepare for the addition of a new route by tracking these data.

Labor: The allocation of labor doing different activities is important in understanding costs. Currently, there is little tracking of how employees spend their time. The employees in collection will collect garbage and white goods. Yet, all of their time is placed under garbage collection. The landfill employees on Lanai also collect garbage at the curb, but their time is not tracked and allocated to the activity.

The Division should implement a system where the hours spent on different activities are identified and charged to that activity. The tracking of this should follow through to all financial reports and budget documents.

Supplies: As with labor, all items, such as fuel, should be tracked by equipment and activity. In some cases, this will be too difficult to perform on a specific basis, so the supervisor should allocate such supplies to activities and make the appropriate budget calculation.

Equipment: The majority of solid waste work is a function of labor and equipment. The allocation of equipment to activities should be performed when significant time is spent by a single piece of equipment on more than one activity. For example, collection vehicles used for both garbage and recycling should have capital and operational costs allocated by the percentage of time spent doing the respective activity.

Allocating the capital cost of equipment to activity means that the original purchase price must be kept along with the useful life and the depreciation. Annualized capital costs will need to be calculated and allocated to the appropriate activity.

Fleet repair should track the parts and the labor spent on each piece of equipment. The data received from the Highways Division had parts but not labor applied to the equipment for repair. There are several off-the shelf software applications that allow fleet shops to track labor per job, and these should be used.

Many of the scenarios discussed in this chapter include a fleet garage with a small parts department. The parts department is the lifeblood of a garage. The inventory must be tracked so that there is neither an overstocking of like parts nor an understocking of needed parts. When mechanics come into the parts room for replacement items, the rate of immediately filled orders should be tracked and kept high. The longer a mechanic is without a needed part, the longer a piece of equipment may be out of service. Parts inventory management must also track warranty conditions with manufacturers. Vehicle parts can now be tracked with fleet software so that performance of these parts can be tracked and compared to those manufactured from different sources.

The amount of time a truck stays in the shop also needs to be tracked and compared to industry standards. Such shop hours for specific tasks can be loaded into software packages so that management can compare its shop activities to industry standards.

Strong emphasis should be dedicated to preventive maintenance (PM). The hours and miles of the Division's equipment must be tracked so that PM activities can be performed before mechanical breakdowns occur.

Tonnage: Tons and customers served are the two major elements to track productivity in the solid waste industry. Currently, the Division has no single data base for either category. The tons are fragmented on individual spreadsheets around the Division. Tonnage for all activities should be collected in one data base, allocated to activity, applied to cost of activity so that a cost per ton for the activity can be performed at the end of each month. Reports should be generated by the Deputy Chief of Administration and provided to the Chief, the Deputy Chief of Operations, and to the supervisors of activities.

Customer Service Center: A specialized customer service call center in needed. The reports this center should generate will identify customer service requests and/or complaints by activity and location. Also, missed collections by route should be tracked and customer requests for information by category. These reports can help determine effectiveness of educational activity, successful completion of collections, and general effectiveness of programs.

13.6 Alternative Scenarios

13.6.1 Purpose and Assumptions

As discussed previously, the consultant team developed an FCA model of its the SWD Fiscal Year 2006 operations and developed five scenarios, drawing from recommendations by the SWRAC that would advance the County's goal to recycle and divert more away from the landfill and provide more services to the public.

The ISWMP has a planning period of 32 years; therefore, each of the scenarios was projected out at least 32 years from 2010 through the year 2042, using 2006 actual data as the base year. Then the analysis is extended to 2042 to correspond to the latest date for closing of the Central Maui Landfill. The cost-of-living escalator was developed as discussed in Section 13.4.2, and that average is used to project costs going forward. The population growth rate was taken directly from the County's 2030 Comprehensive Plan and applied to each scenario. Further, the implementation of the

facilities and services is staged over the period and brought into the year as noted in the scenario descriptions in the sections below.

Presented in Table 13-10 are key assumptions for each of the scenarios, including revenue assumptions. At the end of this chapter are exhibits which provide detailed estimates of capital and operations costs for the facilities in the scenarios.

Table 13-10 – Key Assumptions per Scenario

(Y = Yes; N = No)

	Scenario				
General Assumptions	**I**	**II**	**III**	**IV**	**V**
FY 2006 as base year	Y	Y	Y	Y	Y
CPI at 3.3%	Y	Y	Y	Y	Y
Expense/Revenue Escalated by CPI	Y	Y	Y	Y	Y
Population growth rates based on Maui 2030 Plan (approximately 1.5% per year)	Y	Y	Y	Y	Y
Increased # of employees, accounts, and tons by population growth rate	Y	Y	Y	Y	Y
C&D goes to Maui facility in 2013	Y	Y	Y	Y	Y
Recycling MRF: no tip fees	N	Y	Y	Y	Y
C&D MRF: Same tip fee as landfill	N	Y	Y	Y	Y
Recycle MRF: net revenue per ton = $55.63	N	Y	Y	Y	Y
Universal collection: service fee increased by CPI, population, and additional households served	N	Y	Y	Y	Y
Revenue from electricity: $0.15 per kWh	N	N	Y	Y	N
WTE: same tip fee as landfill	N	N	Y	N	N
Ash monofill: same tip fee as landfill	N	N	Y	N	N
Gasification: same tip fee as landfill	N	N	N	Y	N
2007 per-acre purchase cost: $150,000	Y	N	N	N	N
2007 per-acre cell development: $93,000	Y	N	N	N	N
Year new landfill development expense is shown	2025	N	N	N	N

13.6.2 Scenario I: Status Quo

Scenario I takes the existing solid waste infrastructure and extends it out to 2042. The key activities for this scenario are the following:

1. Collection remains voluntary and automation is expanded;
2. Four active landfills;
3. Redemption and recycling centers;
4. Co-composting operations of green waste and biodiesel;
5. Biodiesel from fats, oils, and grease;

6. Education activities; and
7. White goods collection and drop-off at contractor's place of business.

This scenario does not include any recommendation of the SWRAC for new programs.

The Status Quo scenario provides the foundation for Scenarios II, III, IV, and V. Table 13-11 shows the activities and locations where these expenses and revenues are tracked.

Table 13-11 – Tracked Scenario Activities and Locations

FCA Activities	FCA Locations
Wailuku/Central Collection	Hana
Makawao Collection	Lahaina
Lahaina Collection	Lanai
Lanai Collection	Olowalu
Hana Collection	Makawao
Molokai Collection	Wailuku/Central
Central/Haiku/Kahului/Kihei Landfill Diversion (co-composting)	Administration
Central Maui Scrap Diversion	Molokai
Central Maui Recycling Center Diversion	
Hana Landfill Diversion	
Hana Scrap Diversion	
Lahaina/Olowalu Convenience Center Diversion	
Lahaina Olowalu Scrap Diversion	
Lanai Landfill Diversion	
Lanai Scrap Diversion	
Makawao Recycling Center Diversion	
Molokai Landfill Diversion	
Molokai Scrap Diversion	
Central Maui Landfill	
Molokai Landfill	
Lanai Landfill	
Hana Landfill	

Table 13-12 is a summary of the Status Quo, where the number of accounts refers to those collected by the Division and the number of tons are the quantity collected from those accounts. It shows results of the scenario for FY 2010 and forward in five-year increments, and projects that the solid waste system goes from a negative $27 per ton in 2010 to a negative $17 per ton in 2042.

Table 13-12 – Scenario I - Status Quo - FY2006

Continue with Current Operations

	2006	2010	2015	2020	2025	2030	2035	2040	2042
Expense	$18,824,901	$24,449,324	$30,401,144	$38,154,612	$49,487,585	$55,694,914	$65,860,301	$79,132,846	$86,194,106
Revenue	$12,906,678	$15,659,197	$24,258,572	$30,132,140	$37,397,104	$46,300,817	$57,358,444	$71,093,609	$77,479,414
Excess/ (Shortage)	($5,918,223)	($8,790,127)	($6,142,571)	($8,022,473)	($12,090,481)	($9,394,097)	($8,501,857)	($8,039,236)	($8,714,692)
Number of Employees	85	91	97	104	112	119	127	136	139
Number of Collection Accounts	24,106	25,769	27,528	29,552	31,666	33,805	36,292	38,743	39,770
Number of Tons	303,231	321,663	394,324	416,770	440,208	463,907	489,223	516,249	527,564
Expense per Ton	$62	$76	$77	$92	$112	$120	$135	$153	$163
Excess/(Shortage) per Ton	($20)	($27)	($16)	($19)	($27)	($20)	($17)	($16)	($17)

13.6.3 Scenario II: Increase Recycling Diversion to 60 Percent

This scenario increases diversion from the 30 percent in 2006 to 60 percent. It has the County upgrading its solid waste services and infrastructure so that more recycled material can be processed, collection activities are made more efficient, and reliance on landfilling can be significantly reduced. The scenario projects a new standard of service for collections which are new services to customers of the County and identifies the non-operational but supportive activities. Infrastructure additions for Scenario II are described briefly and their costs estimated. Each element of the scenario is described in the following paragraphs.

1. Collection Service: A universal collection standard of service will be offered to all residents of single-family dwellings who meet the requirements for service on the Island of Maui. Service standards for Lanai and Molokai may vary slightly because of the much lower population and housing density. The standard of service for universal collection is as follows:

    - Curbside collection for all single-family residences served by streets and roads meeting County standards.
    - Refuse collected once per week in a cart; estimated time: in progress
    - Single-sort marketable recyclables collected once every other week in a cart; estimated implementation timeframe is 2012.
    - Yard and large green waste collected in cans, paper bags, or bundled, on a call-in basis[2] if within volume and size restrictions (Carts may be found to be efficient in this application after a pilot program.); estimated time of pilot programs: 2010.
    - Bulky waste collection on a call-in (appointment) basis based on an ordinance which sets limits on quantity of material, number of pickups per year, etc.; estimated implementation timeframe is 2009.
    - White goods collection expanded to include other metals, such as lawn mowers, auto parts, sports equipment, etc., on a call-in basis. The residences that do not meet the County criteria – this includes condos and gated communities – would receive the same services as County serviced residents but provided by licensed private haulers. Estimated implementation timeframe is 2009.

    As shown in Table 13-13, the expanded fleet needed to provide additional collection service such as recycling and to reach the increased number of households will cost approximately $8 million in 2010, assuming all new

[2] Call-in is a system where the customer calls the Division and makes an appointment to have brush, limbs or other waste collected. The customer describes the appropriate collection. These schedules are monitored using customer service software to assure that no collections are missed.

trucks. The expanded collection staff is shown in Table 13-14. Although all new trucks are assumed, there may be opportunities to continue using a portion of the fleet thereby lowering this estimate.

Table 13-13 – Truck Capital Costs

Type	Automated	Manual	Grapple
Unit Cost	$265,000	$190,000	$135,000
Total Cost	$4,020,698	$3,023,226	$810,000
Total Capital Cost		$7,853,925	

Table 13-14 – Labor Costs County

Category	Rate	FTEs	Cost
Foreman	$50,000	2.0	$100,000
Operator	$35,000	27.0	$945,000
Laborer	$30,000	49.0	$1,470,000
Clerk	$31,000	3.0	$93,000
TOTAL		81.0	$2,608,000

2. Materials Recovery Facility (MRF): This new facility will be for processing recyclable materials collected at the curb or in drop-off centers that require processing to meet the specifications of industrial markets and storage to collect sufficient quantity to ensure economical shipping. The facility is explained in further detail in Chapter 5 and Appendix F-1. The following are key elements of the proposed MRF:

   a. It is assumed that this MRF would be located in the vicinity of the Central Maui Landfill at a Solid Waste Division campus;

   b. The MRF will be operated by a contractor; and

   c. The MRF will accept material from residential as well as commercial entities.

   As shown in Exhibit 13-1, the capital cost of the MRF is estimated to be $18 million in 2007 dollars. It is planned to process 205 tons per day (TPD) initially and expand in later years. The building is 30,000 square feet placed on a seven-acre site. The annualized capital cost is estimated at $1.4 million per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at $3.4 million per year (2007 dollars), as shown in Exhibit 13-2. This results in an estimated cost per ton of $75.

   The recovered commodities produced by this facility will be shipped and sold to markets. The County and/or the MRF operator will be eligible to receive the deposits from the HI-5 program for those containers; these revenues were not

included in the FCA model. The FCA model includes estimates of shipping costs and revenues for markets on the west coast. Several brokers who provide services to arrange for the sale of recyclable material and Matson Navigation Company were contacted in order to discern a cost per ton for shipping. Over the past year, the cost for shipping has ranged from $40 to $90 per ton. In the FCA model, the expense for shipping a 40-foot container with 24 tons of post-consumer material separately baled, mixed paper, plastic, aluminum and steel, is $1,785 in 2007 dollars escalated out by CPI.[3] The net revenue per container is $1,335 in 2007 dollars, based upon an average price of $130 per ton delivered to the west coast. This generated an annual net revenue of $3.2 million.

3. C&D MRF: A three-acre site to accommodate a 40,000-square-foot, open-air facility is added in this scenario for the purpose of processing construction and demolition material so that reusable and recycled material can be diverted from the landfill.

   As shown in Exhibit 13-3, the capital cost of the C&D facility is estimated to be $8.7 million in 2007 dollars. It is planned to process 170 TPD initially and expand in later years. The improved area is 40,000 square feet placed on a three-acre site. The annualized capital cost is estimated at $0.7 million per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at $2.8 million per year (2007 dollars), as shown in Exhibit 13-4. Revenue from the sale of recovered products is estimated at $40 per ton net of transportation and generates $1.3 million per year. This results in an estimated cost per ton of $67.

4. Fleet Maintenance Facility: A maintenance facility with four drive-through bays and one bay with a service pit should be built as part of the Central Maui Campus and located adjacent to the Fleet Maintenance facility and operated with mechanics under the management of the Collection Supervisor. There should be one mechanic per ten collection trucks and one mechanic to work on the landfill equipment. One bay must have a floor made of more durable concrete specifically to handle the heavier landfill equipment. There should be a locker and changing room as well as bathroom and showers at the fleet facility and an office for the lead mechanic.

   The purpose of this facility is to perform preventive maintenance and minor repairs. The hours of the facility should be offset from the hours the collection crews are operating on their routes. Having the collection vehicles ready for work in the morning is the primary objective of the maintenance facility. More major repairs such as rebuilding transmissions and engines would be contracted out.

   As shown in Exhibit 13-5, the capital cost of the Fleet Maintenance facility is estimated to be $3.2 million in 2007 dollars. The building is 7,500 square feet placed on a one-and-a-half-acre site. The annualized capital cost is estimated

[3] Personal communication from Matson, December 2007.

at $258,000 per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at $684,000 per year (2007 dollars), as shown in Exhibit 13-6.

5. Central Maui Collection Base Yard. This would result from the recommended consolidation of Makawao and Wailuku base yards and be located adjacent to the Fleet Maintenance Facility at the Central Maui Campus. As with many of these recommendations, there is a level of complexity given the contractual relations the County currently has with the Union workers who handle refuse collection activities. This recommendation to consolidate will save the County money and increase efficiencies, but it must be worked through with the Union. The following outlines the recommendation:

   a. The work forces at both the Makawao and Wailuku base yards would be moved to a single facility located adjacent to the Central Maui-located MRF and Fleet Maintenance Facility. The purpose of this move is to combine work forces and equipment so as to better accommodate the work needs from day to day and to provide direct oversight of each work force.

   b. Since the work conducted is illustrated under "Universal Collection," this portion of Scenario II provides for the new infrastructure, building and offices, to support these workers. It does not include the capital expenditure for the collection vehicles which is also shown under "Universal Collection."

6. Household Hazardous Waste: There should be a central location to process HHW material. Material collected at events on Lanai and Molokai could be shipped to either a contractor or the central HHW facility to be processed. This scenario includes weekly collection at the Olowalu transfer station and Hana regional convenience center. Further information on this scenario may be found in Appendix F, Item 9.

   As shown in Exhibit 13-7, the capital cost of the HHW facility is estimated to be $0.9 million in 2007 dollars. It is planned to process one TPD initially and expand in later years. The building is 720 square feet placed on a half-acre site. The annualized capital cost is estimated at $70,000 per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at $0.3 million per year (2007 dollars), as shown in Exhibit 13-8. This results in an estimated cost per ton of $1,200.

7. Administration: As with the physical infrastructures described above, there also is a need for administrative offices which are included as part of the MRF, see Exhibit 13-1. This infrastructure would help to support the operational staff as well as provide a higher level of customer service. Section 13.5 details these changes. It is recommended that these facilities be grouped into a Solid Waste Campus serving as the headquarters for the Division. Table 13-15 shows the summary of the office space in the complex and where it is located. Table 13-16 shows the estimated parking facility for collection trucks and other vehicles.

Table 13-15 - Land Requirements for Solid Waste Improvements

Facility	Space in Acres	Office Space
MRF/Division Offices	7.0	6,000
C&D Processing	3.0	0
Maintenance Facility	1.5	1,500
HHW Facility	0.5	100
Base Yard	2.5	0
Green Waste Processing	20	0
Total	34.5	7,600

Table 13-16 - Central Maui Parking

	Area per Space	Spaces	Sq. Ft.	Acres
Trucks	600	44	26,400	0.61
Employee Cars	300	97.2	29,160	0.67
Visitor Cars	300	16	4,800	0.11
Buffer Area			24,144	1.11
Total			84,504	2.49

8. Olowalu Transfer Station and Base Yard: This infrastructure improvement will address the lack of facilities in Lahaina for a base yard and will provide more economical transportation of waste and recyclable materials from that area to the Central Maui Landfill or nearby location for processing. This improvement is discussed in more detail in Chapter 5 and Appendix D, Item 2.

   By providing this facility and charging a tipping fee, revenues from the use of the facility by the private sector will help offset the cost of the facility. The tipping fee should be sized to at least cover the cost of adding this infrastructure plus allocable costs for processing and/or disposal at the Central Maui facilities. With the County offering universal collection services for qualified residences in the Lahaina/Westside region, an increase in recyclable material and green waste is projected. This scenario also projects a decrease in self-haul waste as a result of the implementation of universal collection services. It is estimated that this facility would handle 147 TPD.

   Refuse and recyclable materials will be transferred to the single-stream MRF in 53-foot aluminum walking-floor trailers. Each trailer would be legally capable of carrying 20 to 22 tons of materials per load as opposed to the five to nine tons per load currently hauled by route collection vehicles.

   As shown in Exhibit 13-9, the capital cost of the transfer station and base yard is estimated to be $7.1 million in 2007 dollars. It is planned to process 205 TPD initially and expand in later years. The building is 15,000 square feet placed on a five-acre site. The annualized capital cost is estimated at $0.6 million per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at $1.1 million per year (2007 dollars), as shown in Exhibit 13-10. This results in an estimated cost per ton of $56.

9. Hana Convenience Center: This scenario places the Hana Landfill on Standby with Permit. Although the facility would not actively be burying any material, it would handle yard waste and inert material and provide a base for collection vehicles. The following outlines the changes to take place:

   a. A one-acre location at the landfill where citizens and businesses can bring their self-hauled their material for disposal.

   b. Garbage will be placed into the hopper of a rear-loader garbage collection vehicle. (This is discussed in more detail in Chapter 5.)

   c. When needed, the rear-loader will be transported to the Central Maui Landfill and emptied when needed. During these trips, the vehicle can be serviced at the County's fleet maintenance facility while a substitute rear-loader returns to the Hana Convenience Center.

   d. Recyclables will be placed into roll-off containers and, when full, transported to the MRF.

   e. Yard waste would be ground periodically by the County or a contractor or hauled to the compost facility at CML.

   f. The Hana Convenience Center will have a restroom and small office.

   As shown in Exhibit 13-11, the capital cost of the convenience center is estimated to be $0.4 million in 2007 dollars. It is planned to process 6.4 TPD initially and expand in later years. The existing building is planned to be utilized on a one-acre site. . The annualized capital cost is estimated at $28,000 per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at $345,000 per year (2007 dollars), as shown in Exhibit 13-12. This results in an estimated cost per ton of $897.

10. Education: Maui is looking to add new collection programs to its Solid Waste Division, including curbside recycling, yard waste collections, and HHW services. These new programs, will require more educational support to inform residents and businesses of how to handle different materials.

    To provide this educational support for new programs, the budget includes an amount equal to $2.00 per household in 2006 dollars for the year of implementation (escalated forward to the year of implementation) and includes an ongoing budget of $1.00 per household for post-implementation years (also subject to escalation).

11. Ordinances: This scenario implements a package of ordinances that mandates goals and requirements for recycling.

    a. Ordinance to establish the universal recycling requirements for residential generators collected by the private sector. Estimated implementation timeframe is 2012.

b. Ordinance establishing C&D recycling requirement of 50 percent for all commercial and residential demolition and construction projects. Estimated implementation timeframe is 2013.

c. Ordinance establishing recycling mandates on commercial enterprises to ensure 60 percent diversion. This would be implemented in 2013.

Table 13-17 is a summary of this scenario. It shows results of the scenario for FY 2010 and forward in five-year increments, and projects that the solid waste system goes from a negative $30 per ton in 2010 to a negative $27 per ton in 2042.

Table 13-17 – Scenario II - Increase Recycling Diversion to 60% without Waste-To-Energy (WTE)

	2006	2010	2015	2020	2025	2030	2035	2040	2042
Expense	$18,824,901	$25,285,627	$50,415,474	$62,086,535	$76,442,003	$92,082,724	$110,324,308	$135,667,598	$147,147,648
Revenue	$12,906,678	$15,647,615	$31,214,961	$42,457,305	$53,122,394	$66,229,075	$97,909,853	$121,836,264	$132,982,878
Excess/ (Shortage)	($5,918,223)	($9,638,013)	($19,200,513)	($19,629,229)	($23,319,609)	($25,853,649)	($12,414,455)	($13,831,334)	($14,164,771)
Number of Collection Accounts	24,106	25,769	44,407	47,671	51,081	54,532	58,216	62,148	63,795
Number of Tons Generated	303,231	321,663	394,324	416,770	440,208	463,907	489,223	516,249	527,564
Expense per Ton Generated	$62	$79	$128	$149	$174	$198	$226	$263	$279
Excess/(Shortage) per Ton Generated	($20)	($30)	($49)	($47)	($53)	($56)	($25)	($27)	($27)

13.6.4 Scenario III: Increase Recycling Diversion to 60 Percent with a Waste-to-Energy Facility

This scenario is the same as Scenario II with the addition of a waste-to-energy facility (WTE). That means that all the services and facilities described in Scenario II are also a part of Scenario III, and their costs are added into Scenario III costs. The Central Maui Landfill would be continued as a monofill for ash and a Subtitle D cell to handle the unprocessed waste and bypass materials that do not enter the WTE facility.

The following are some key data points concerning Scenario III and the WTE in Maui:

1. The County's waste stream, both current and projected out to the year 2042, can sustain a WTE facility and a 60 percent recycling rate;

2. A WTE facility would have a waste capacity of 360 tons per day at 90 percent availability producing 90 tons of ash per day which has a volume of approximately 10 percent that of the refuse; and

3. It would produce 14 megawatts of electricity.

As shown in Exhibit 13-13, the capital cost of the WTE is estimated to be $86 million in 2007 dollars. It is planned to process 360 TPD initially and expand in later years. The building is 60,000 square feet placed on a seven-acre site. The annualized capital cost is estimated at $6.9 million per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at $10.6 million per year (2007 dollars), as shown in Exhibit 13-14. This results in an estimated cost per ton of $134. When electricity revenue is added, the net cost per ton is reduced to $80.

Table 13-18 is a summary of this scenario. It shows results of the scenario for FY 2010 and forward in five-year increments, and projects that the solid waste system cost is a negative $33 per ton in FY2010 and goes to a negative $122 per ton in 2042.

Table 13-18 – Scenario III - Increase Recycling Diversion to 60% with WTE

	2006	2010	2015	2020	2025	2030	2035	2040	2042
Expense	$18,824,901	$26,222,652	$75,253,525	$89,629,804	$107,519,189	$126,034,644	$142,261,995	$177,532,848	$197,402,525
Revenue	$12,906,678	$15,647,615	$46,173,897	$48,357,889	$60,532,620	$75,501,616	$97,909,853	$121,836,264	$132,982,878
Excess/ (Shortage)	($5,918,223)	($10,575,037)	($29,079,628)	($41,271,915)	($46,986,569)	($50,533,028)	($44,352,142)	($55,696,584)	($64,419,647)
Number of Collection Accounts	24,106	25,769	44,407	47,671	51,081	54,532	58,216	62,148	63,795
Number of Tons Generated	303,231	321,663	394,324	416,770	440,208	463,907	489,223	516,249	527,564
Expense per Ton Generated	$62	$82	$191	$215	$244	$272	$291	$344	$374
Excess/(Shortage) per Ton Generated	($20)	($33)	($74)	($99)	($107)	($109)	($91)	($108)	($122)

13.6.5 Scenario IV: Increase Recycling Diversion to 60 Percent with Alternative Conversion Technology and Place Lanai and Molokai Landfills on "Standby with Permit"

The essential operational and organizational changes detailed in Scenario II exist in Scenario IV, but with the following changes:

1. In addition to having the Hana Landfill placed on standby status per Scenario II, the Lanai and Molokai Landfills are placed on standby in this scenario. The landfills will operate periodically to accept inert and other selected materials thereby keeping their permits active. The key functions of these two landfills will become as follows:

   a. There would be short-term storage and ultimate disposal for debris that is a result of storms and other natural disasters on each respective island.

   b. A compactor would be stationed at each of the landfills to compact garbage into a 40-foot container with a volume of 2,400 cubic feet which would hold approximately 18 tons of refuse if compacted to 400 pounds per cubic yard. Once the container is full, it would be stored until the date of the scheduled shipment. The containers would be taken to the harbor and loaded onto the carrier for disposal elsewhere. Approximately six containers per week would transport waste and recyclables from Lanai and 12 containers per week from Molokai.

   As shown in Exhibit 13-15, the capital cost of the Lanai Convenience Center is estimated to be $1.8 million in 2007 dollars. It is planned to process 28 TPD initially and expand in later years. The building is 2,500 square feet placed on a one-acre site. The annualized capital cost is estimated at $145,000 per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at $0.8 million per year (2007 dollars), as shown in Exhibit 13-16. This results in an estimated cost per ton of $105.

   As shown in Exhibit 13-17, the capital cost of the Molokai Convenience Center is estimated to be $1.9 million in 2007 dollars. It is planned to process 42 TPD initially and expand in later years. The building is 2,500 square feet placed on a one-acre site. The annualized capital cost is estimated at $150,000 per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at $1.1 million per year (2007 dollars), as shown in Exhibit 13-18. This results in an estimated cost per ton of $95.

2. The 40 percent of waste that went into the landfills in Scenario II and into a WTE in Scenario III are, in this scenario, being placed into an alternative resource conversion technology known as gasification. No specific technology is selected and generic processing equipment costs are taken from the range presented in the Los Angeles reports. Gasification is discussed in detail in Chapter 12. Essentially, heat transforms solid biomass into clean-burning, carbon-neutral, natural gas-like flammable fuel. A company called EnTech has a gasification process that produces synthetic natural gas and recyclable plastic. Twenty such facilities are in operation and use MSW. They are located in Europe and Asia but are relatively small in size.

The facility is planned to process 200 TPD initially and expand in later years. The building is 45,000 square feet placed on a seven-acre site. As shown in Exhibit 13-19, the capital cost of the alternative energy gasification system estimated to be $53 million in 2007 dollars. This is based on vendor information as presented to various communities that are considering this technology. Because no full scale facility is operating in the United States and therefore the cost numbers contain a considerable risk. No additional cost has been added to cover this risk. The annualized capital cost is estimated at $4.3 million per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at $8.0 million per year (2007 dollars), as shown in Exhibit 13-20. This results in an estimated cost per ton of $167. The energy revenue, $5.2 million per year, is based on a 20 percent higher energy output per ton than was for the WTE in Scenario III. This also has a significant risk that this output will not be met. The net cost per ton. Including energy revenue is $95 in 2007 dollars.

Table 13-19 is a summary of this scenario. It shows results of the scenario for FY 2010 and forward in five-year increments, and projects that the solid waste system cost is estimated at negative $34 per ton in FY2010 and goes to a negative $113 per ton in 2042.

Table 13-19 – Scenario IV -Increase Recycling Diversion to 60% with Alternative Conversion Technology and Place Lanai and Molokai Landfills on "Standby with Permit"

	2006	2010	2015	2020	2025	2030	2035	2040	2042
Expense	$18,824,901	$26,519,509	$69,291,702	$83,338,041	$100,815,921	$120,516,869	$137,954,035	$174,173,912	$190,443,302
Revenue	$12,906,678	$15,634,676	$38,986,602	$42,666,935	$53,385,656	$66,558,500	$96,285,202	$119,803,312	$130,759,189
Excess/ (Shortage)	($5,918,223)	($10,884,832)	($30,305,100)	($40,671,106)	($47,430,265)	($53,958,369)	($41,668,832)	($54,370,600)	($59,684,114)
Number of Collection Accounts	24,106	25,769	44,407	47,671	51,081	54,532	58,216	62,148	63,795
Number of Tons Generated	303,231	321,663	394,324	416,770	440,208	463,907	489,223	516,249	527,564
Expense per Ton Generated	$62	$82	$176	$200	$229	$260	$282	$337	$361
Excess/(Shortage) per Ton Generated	($20)	($34)	($77)	($98)	($108)	($116)	($85)	($105)	($113)

13.6.6 Scenario V: Increase Recycling Diversion to 75 Percent without WTE and Place Hana, Lanai and Molokai Landfills on "Standby with Permit"

Scenario V has the core functions of Scenario II with additions designed to increase the diversion level to 75 percent. The landfills on Lanai and Molokai would be placed on standby as in Scenarios III and IV; however, no WTE or alternative energy system would be implemented. The planned program elements required to achieve the 75 percent diversion are:

1. Mandatory commercial food waste recycling. Non-residential sources of food wastes in Maui County, and especially on the Island of Maui, have a history of recycling their food waste with local pig farmers who use the material as a substitute for grain. Currently, two such farms receive such food waste. The County has helped assure that food waste recycling continues by providing grant funds to businesses and farms during their early years.

2. The Islands of Lanai and Molokai would begin to recycle food waste from both residents and businesses. In this alternative, the Division would collect this material from residences in a separate route. The material would be taken back to the landfill or to a private processor where it would be composted. The landfill would also accept food waste from commercial generators and process the material into compost. The finished material would be given for free back to the public.

3. Mandatory C&D recycling would be set at 70 percent for both residential and commercial projects. The C&D MRF would handle more material.

4. Mandatory commercial recycling. All businesses would be required to recycle all of their clean and dry paper fiber along with commingled beverage containers. These recyclable materials could be processed at the County's MRF. The businesses would also need to recycle other materials, especially electronics and other materials/durables for which the County provides recycling mechanisms. With these combined efforts, it is expected that businesses will be able to reach a 70 percent diversion requirement. Mandatory reporting by businesses would also be established so that verification to the Division is provided. Waste audits and enforcement would be required. Each hauler would submit weights collected per month, destination of material, and customer list to the Division for the latter to verify recycling activities. Agents of the Division would periodically inspect commercial dumpsters to determine compliance.

5. A routine scrap metal and appliance removal and recycling program for the region of Hana and the Islands of Molokai and Lanai would be implemented. The County would contract for receiving, processing and shipping of scrap automobiles from these three locations. White goods would be handled by the County.

6. The Division would provide free classes to the public to learn how to compost. It would provide everyone who went through the class a compost bin at no cost

to the participant. The County would do an annual survey to project the tons composted by each person who received a compost bin.

All of the above will be a major educational undertaking. The education budget will be $2.00 per capita (escalated out using FY 2005 as the base year) for a period of five years and then be lowered to $1.00 per year per capita, subject to escalation.

The MRF is expanded from that in Scenario II to handle additional material. As shown in Exhibit 13-21, the capital cost of the MRF is estimated to be $24 million in 2007 dollars. It is planned to process 309 TPD initially and expand in later years. The building is 45,000 square feet placed on a seven-acre site. The annualized capital cost is estimated at $2 million per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at $4.8 million per year (2007 dollars), as shown in Exhibit 13-22. This results in an estimated cost per ton of $70.

The recovered commodities produced by this facility will be shipped and sold to markets as in Scenario II. The net revenue per container is $1,335 in 2007 dollars, based upon an average price of $130 per ton delivered to the west coast. This results in net $4.6 million in product revenue.

7. C&D MRF: The C&D facility is expanded to a 45,000-square-foot, open-air facility in this scenario for the purpose of processing the additional construction and demolition material so that reusable and recycled material can be diverted from the landfill. In addition, more revenue is earned from the additional tonnage.

As shown in Exhibit 13-23, the capital cost of the C&D facility is estimated to be $9.8 million in 2007 dollars. It is planned to process 170 TPD initially and expand in later years. The annualized capital cost is estimated at $0.8 million per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at $2.8 million per year (2007 dollars), as shown in Exhibit 13-24. This results in an estimated cost per ton of $66.

Table 13-20 is a summary of this scenario. It shows results of the scenario for FY 2010 and forward in five-year increments, and projects that the solid waste system cost in FY2010 at negative $43 per ton which goes to a negative $60 per ton in 2042.

Table 13-20 – Scenario V - Increase Recycling Diversion to 75% without WTE and Place Hana, Lanai and Molokai Landfills on "Standby with Permit"

	2006	2010	2015	2020	2025	2030	2035	2040	2042
Expense	$18,824,901	$29,862,667	$57,283,862	$69,453,873	$85,731,124	$103,462,625	$123,460,060	$152,804,402	$166,532,401
Revenue	$12,906,678	$16,128,843	$29,201,669	$39,860,807	$49,830,008	$62,076,434	$99,423,017	$123,729,712	$135,053,973
Excess/ (Shortage)	($5,918,223)	($13,733,824)	($28,082,193)	($29,593,065)	($35,901,116)	($41,386,191)	($24,037,043)	($29,074,690)	($31,478,427)
Number of Collection Accounts	24,106	25,769	44,407	47,671	51,081	54,532	58,216	62,148	63,795
Number of Tons Generated	303,231	321,663	394,324	416,770	440,208	463,907	489,223	516,249	527,564
Expense per Ton Generated	$62	$93	$145	$167	$195	$223	$252	$296	$316
Excess/(Shortage) per Ton Generated	($20)	($43)	($71)	($71)	($82)	($89)	($49)	($56)	($60)

13.7 Scenario Summary

13.7.1 Comparison Matrix

Table 13-21 shows the primary elements of each of the five scenarios in a matrix organized for comparison purposes.

13.7.2 Net Results

Table 13-22 shows the FCA model projected expense, revenues, tonnage, and other parameters averaged over the period FY2006 through FY2042. Also, the table shows the quantity of solid waste landfilled at Central Maui Landfill in both tons and cubic yards and year Phase VI closes.

Table 13-21 – Scenario Comparison Matrix

Note: All scenarios components are based on the assumption that it will be reviewed by stakeholders and will need to take legal, financial and union considerations into account prior implementation.

Activity	Scenario I Status Quo	Scenario II Improved Recycling at 60%	Scenario III Improved Recycling at 60% With WasteTEC*	Scenario IV Improved Recycling at 60% With Gasification	Scenario V Most Recycling at 75%
Diversion Rate In 2042	28 %	60%	83%	73%	75%
Residential Collection	Voluntary, mixed system, no recycling collection Some automated Some manual	Universal, all residences on County standard streets: Refuse, Recycling, Green Waste and Bulk Max Automation	Universal, all residences on County standard streets: Refuse, Recycling, Green Waste and Bulk Max Automation	Universal, all residences on County standard streets: Refuse, Recycling, Green Waste and Bulk Max Automation	Universal, all residences on County standard streets: Refuse, Recycling, Green Waste and Bulk Max Automation
Trash Collection	Continue providing a mixture of once a week and twice a week collection using a combination of automated and manual trucks	Eliminate twice a week collection of residential trash; eliminate manual collection; collect with automated or semi automated on all islands & Hana.	Eliminate twice a week collection of residential trash; eliminate manual collection; collect with automated or semi automated on all islands and Hana.	Eliminate twice a week collection of residential trash; eliminate manual collection; collect with automated or semi automated on all islands and Hana.	Eliminate twice a week collection of residential trash; eliminate manual collection; collect with automated or semi automated on all islands and Hana.
White Good Collection: Operational 2009	Yes: only on Island of Maui excluding Hana; by appointment but work is not tracked	Yes: on all islands and Hana; work goes through call center and is tracked.	Yes: on all islands and Hana; work goes through call center and is tracked.	Yes: on all islands and Hana; work goes through call center and is tracked.	Yes: on all islands and Hana; work goes through call center and is tracked.
Estimate Collection Accounts In 2015	27,000	44,000	44,000	44,000	44,000
Land Disposal	Landfill: 4 active landfills • Central Maui • Hana • Lanai • Molokai	Landfill: 3 active land • Central Maui • Lanai • Molokai Hana on standby	Landfill: 3 active land • Central Maui Evaluate Lanai & Molokai for standby status Hana on standby Ash from WTE land filled at CML	Landfill: Only Central Maui landfill active (Hana, Molokai, and Lanai landfills on standby with permit) Residue from gasification land filled at CML	Landfill: Only Central Maui landfill active (Hana, Molokai, and Lanai landfills on standby with permit)
Year CML Closes	2024	2031	2042	2035	2035
Alternative Disposal	None	None	Waste to Energy County sponsored 360 tons per day; Operational in 2014 Capital Cost - $86M Operations - $133 per ton; net revenue $54 per ton Design, build, operate	Alternative Tech. 200 tons per day; Operational in 2014 Capital Cost - $53M Operations - $167 per ton; net revenue $72 per ton Design, build, operate	None
Other Waste Management Facilities	Olowalu Convenience Center	Olowalu converted to transfer station Hana convenience center	Olowalu converted to transfer station Hana convenience center	Olowalu converted to transfer station Hana, Lanai and Molokai convenience centers	Olowalu converted to transfer station Hana, Lanai and Molokai convenience centers
Recyclable Materials Processing	Reliance on private sector facilities	County sponsored MRF; 205 tons per day; Operational in 2012 Capital Cost - $18M Operations - $75 per ton; net revenue $50 per ton Design, build, operate contract assumed	County sponsored MRF; 205 tons per day; Operational in 2012 Capital Cost - $18M Operations - $75 per ton; net revenue $50 per ton Design, build, operate contract assumed Evaluate need for more land to process increased greenwaste collection Lanai & Molokai: Expand collection & processing	County sponsored MRF; 205 tons per day; Operational in 2012 Capital Cost - $18M Operations - $75 per ton; net revenue $50 per ton Design, build, operate contract assumed	County sponsored MRF; 309 tons per day; Operational in 2012 Capital Cost - $24M Operations - $70 per ton; net revenue $45 per ton Design, build, operate contract assumed
C&D Processing and Disposal	C&D disposed in private landfill until filled - 2012 After 2012 C&D goes to CML Some private recycling	County sponsored MRF; 170 tons per day; Operational in 2012 Capital Cost - $8.7M Operations - $66 per ton; net revenue $24 per ton Design, build, operate	County sponsored MRF; 170 tons per day; Operational in 2012 Capital Cost - $8.7M Operations - $66 per ton; net revenue $24 per ton Design, build, operate	County sponsored MRF; 170 tons per day; Operational in 2012 Capital Cost - $8.7M Operations - $66 per ton; net revenue $24 per ton Design, build, operate	County sponsored MRF; 170 tons per day; Operational in 2012 Capital Cost - $9.8M Operations - $69 per ton; net revenue $24 per ton Design, build, operate
Ash Cell at the CML – dedicated cell.	No	No	Yes	Yes	No
Hana Landfill On Standby: the solid waste permit remains active but there is no active MSW burial.	No: Hana Landfill continues operating with a finite source of dirt cover and only 4 tons a day coming through its gates.	Yes: A convenience center is built at Hana Landfill and the 4 tons of MSW is transported to CML for disposal.	Yes: A convenience center is built at Hana Landfill and the 4 tons of MSW is transported to CML for disposal.	Yes: A convenience center is built at Hana Landfill and the 4 tons of MSW is transported to CML for disposal.	Yes: A convenience center is built at Hana Landfill and the 4 tons of MSW is transported to CML for disposal.

Activity	Scenario I Status Quo	Scenario II Improved Recycling at 60%	Scenario III Improved Recycling at 60% With WasteTEC*	Scenario IV Improved Recycling at 60% With Gasification	Scenario V Most Recycling at 75%
Molokai & Lanai Landfills On Standby: the solid waste permit remains active but there is no active MSW burial.	No: both landfills remain open and active.	No: both landfills remain open and active.	Evaluate each landfill remaining open and active OR putting on standby, thereby processing for shipment to markets or disposal points.	Yes: material is processed/separated to a greater degree that is currently; material is compacted into overseas containers and shipped to disposal points.	Yes: material is processed/separated to a greater degree that is currently; material is compacted into overseas containers and shipped to disposal points.
Solid Waste Division Base Facilities	Scattered and some hosted by Highway Division	Centrally Located Division Campus Maintenance Shop, Base Yard, MRF, C&D, HHF and Adm. 15 Acres, 7,600 sq. ft of office space	Centrally Located Division Campus Maintenance Shop, Base Yard, MRF, C&D, HHF, Composting and Adm. 15 Acres, 7,600 sq. ft of office space	Centrally Located Division Campus Maintenance Shop, Base Yard, MRF, C&D, HHF and Adm. 15 Acres, 7,600 sq. ft of office space	Centrally Located Division Campus Facilities at Convenience Centers Lanai & Molokai 15 Acres, 7,600 sq. ft of office space
Household Hazardous Waste	County collects used oil & batteries	Staffed HHW facility at Division Campus	Staffed HHW facility at Division Campus Lanai & Molokai: HHW event-based	Staffed HHW facility at Division Campus	Staffed HHW facility at Division Campus and Lanai and Molokai Convenience Centers
Customer Call Center: operational 2009	No: Division continues to have 7 numbers for services, no tracking of work, and no reporting capabilities	Yes: call center with one number to handle all request for services and information; work orders are opened and closed with activities being tracked.	Yes: call center with one number to handle all request for services and information; work orders are opened and closed with activities being tracked.	Yes: call center with one number to handle all request for services and information; work orders are opened and closed with activities being tracked.	Yes: call center with one number to handle all request for services and information; work orders are opened and closed with activities being tracked.
Generates Electricity: sell to MECO	No	No	Yes	Yes	No
Policy Level	No new ordinances	New Ordinances Universal recycling: 2012; C&D 50% requirement: 2013; Commercial recycling mandate: 2013	New Ordinances Universal recycling: 2012; C&D 50% requirement completed by: 2013; Commercial recycling mandate with enforcement, completed by: 2013	New Ordinances Universal recycling: 2012; C&D 50% requirement: 2013; Commercial recycling mandate: 2013	New Ordinances Universal recycling: 2012; More enforcement C&D 70% requirement: 2013; Commercial recycling mandate with bans and enforcement
Materials Reuse	Private and non-profit facilities some County grants	Private and non-profit facilities some County grants, increased support	Private and non-profit facilities some County grants, increased support	Private and non-profit facilities some County grants, increased support	Private and non-profit facilities some County grants County facility in addition
Commercial Food Waste	Privately done but use of Grant monies and ordinances to assist	County Assistance, privately done but use of Grant monies and ordinances to assist	County Mandated w/enforcement Privately done but use of Grant monies and ordinances or mandates to assist	County Assistance Privately done but use of Grant monies and ordinances to assist	County Mandated Privately done but use of Grant monies Ordinances to enforce
Average Annual Division Budget 2006-2042	$50 million	$80 million	$109 million	$103 million	$91 million
Cumulative Capital Needed	$62 Million	$110 Million	$200 Million	$70 Million	$20 Million

*Because the acronym "WTE" is frequently assumed to mean specifically or only mass burn WTE technology, the DEM coined the term "WasteTEC" to be broadly interpreted as various waste to energy conversion technologies that might be considered appropriate for the County of Maui.

Table 13-22 - Summary and Comparison of Average per Year for Scenarios I-V

Average per Year (2006-2042)

	Scenario I - Base Case	Scenario II - 60%	Scenario III - 60% with WTE	Scenario IV - 60% with Gasification	Scenario V - 75%
Residential Customers	31,843	47,969	47,969	47,969	47,969
FCA Expense	$49,799,970	$79,808,535	$106,742,454	$101,385,090	$89,712,879
FCA Revenue	$41,398,442	$63,811,892	$67,983,257	$64,963,600	$63,134,571
FCA Excess/(Shortage)	($8,401,529)	($15,996,644)	($38,759,197)	($36,421,490)	($26,578,308)
Tons Generated	430,349	430,349	430,349	430,349	430,349
Expense per Ton Generated	$116	$185	$248	$236	$208
Excess/(Shortage) per Ton Generated	($19.52)	($37.17)	($90.06)	($84.63)	($61.76)
Number of Employees	112	197	212	224	209
Tons Landfilled at Central Maui Landfill until Closure of Phase VI	251,076	180,810	125,931	154,884	151,683
Cubic Yards Consumed at Central Maui Landfill Until Closure of Phase VI	404,961	291,628	203,114	249,812	244,651
Year Central Maui Landfill Phase VI Closes	2024	2031	2042	2035	2035
Countywide % Diversion in 2042	28%	60%	83%	73%	75%
Cumulative Barrels of Oil Saved	NA	NA	3.2 Million	2.4 Million	NA

Assumptions made in developing these scenarios:

1) Residential Customers refers to the number of customers receiving collection services from the County;
2) FCA Expense includes labor, operations and maintenance, amortized capital costs;
3) FCA Revenue includes a gate rate for disposal, C&D, WTE, and Gasification; it is assumed the same as the current landfill tip fee escalated by CPI; there is assumed no gate-rate at the MRF;
4) Number of employees may be County or contractors;
5) Number of employees escalates with growth in Scenario I;
6) Added net number of additional employees for new operations in Scenario II-V;
7) No additional employees for ash monofill in Scenario III;
8) Tons landfilled and cubic yards consumed at Central Maui Landfill are through closure of Phase VI, the current last planned Phase;
9) Cumulative capital needed is total capital required for 2006 through 2042;
10) Capital includes landfill closure and post-closure, landfill improvement (i.e. land, design, and construction), site improvement (i.e. land and buildings), and fleet;
11) Total percent diversion going to diversion programs in 2042 excludes residual tonnages from the diversion programs;
12) Percent diverted in 2042 includes residual tonnage from the diversion programs;
13) Cumulative barrels of oil saved is applied only to Scenarios III and IV, where electricity is generated; and
14) WTE or gasification facility operates at full capacity each year.

13.8 Full Cost of New Plan

The SWRAC recommended that the County adopt Scenario III, and the Division selected Scenario III to be the basis of the draft ISWMP forwarded to the Mayor and County Council for approval. The average annual cost of Scenario III over the planning period (2006-2042) is shown in Table 13-3. The detail from the FCA model for Scenario III is provided in Appendix J.

Exhibit 13-1 - Central Maui MRF and Base Yard Capital Cost Estimates

	Size or Number	Cost Factor	Units	Element Cost
Building Size (sq. ft.)	30,000			
Site Size (Acres)	7			
Capacity (TPD, average, 6 days/week)				205
Land (Cost to be Determined)		$150,000	per Acre	1,050,000
Demolition			per sq. ft..	-
Clearing & Rough Grading		$9,000	per Acre	63,000
Site Work, incl. utilities (new)		$90,000	per Acre	630,000
Building & Foundations		$130	per sq. ft..	3,900,000
Mechanical & Electrical		$45	per sq. ft..	1,350,000
Office Building	6,000	$225	per sq. ft..	1,350,000
Scale House	150	$225	per sq. ft..	33,750
Rail Line		$200	per foot	-
A&E Design Engineering & Constr. Mgt		15%	percent	1,099,013
Procurement & Construction Monitoring		5%	percent	366,338
Contingency @ 15%		15%	percent	1,099,013
Subtotal				$10,941,113
Equipment Requirements				
Scale(s), incl. Data Management	2	$90,000	each	180,000
Processing Equipment	1	$4,000,000	each	4,000,000
Front-End Loader(s)	2	$300,000	each	600,000
Grapple(s)	0	$125,000	each	-
Sweeper	1	$115,000	each	115,000
Fork Lift	2	$50,000	each	100,000
Shipping & Misc. Allowance @ 25%		25%	percent	1,248,750
Rolling Stock Units	6			
Subtotal				$6,243,750
Other Capital Costs		5%	percent	859,243
Total Capital Cost				$18,044,106
Annualized Capital Cost, G.O. Bond		20	Year Term	$1,447,906
		5.0%	Interest Rate	

Notes:
1. Costs of siting study are not included.

Exhibit 13-2 - Central Maui MRF and Base Yard O&M Cost Analysis

		205 TPD	
Labor Category	**Salary**	**Labor No.**	**Labor Cost**
Supervisor	65,000	1	65,000
Operations Foreman	55,000	2	110,000
Scale Operator	30,000	2	60,000
Equipment Operators	35,000	3	105,000
Grapple Operators	35,000	1	35,000
Spotters on Tip Floor	31,000	1	31,000
Sorters	22,000	16	352,000
Laborers	22,000	2	44,000
Subtotal		28	802,000
Fringe Benefits	63%		505,260
Overtime Multiplier		15%	120,300
Subtotal Labor			1,427,560
Fuel (On-site only) @ X gph/Unit	6	$4.00	131,040
Equipment Maintenance	6%		374,625
Site/Building Maintenance (% of Capital)	2%		218,822
Utilities (electric, water, sewage)	120,000		120,000
Insurance	1%		180,441
Miscellaneous Supplies/Services (Allowance)			100,000
Residue Disposal	10%	$51	326,214
Security	50,000		50,000
Subtotal Other			1,501,143
Contingency, all costs (15 %)	0.15		439,305
Total Annual Operating Costs			$3,368,008
Total Tons per Day Handled/Transferred			205
Total Tons Per Year Handled/Transferred	312		63,964
Operating/Maintenance Cost, $ per ton			$52.66
Annualized Capital Cost, $ per ton			$22.64
Total Cost, $ per ton			$75.29

Note: Salaries based on Maui information, 2007

Products are baled, 3x4x5 feet, weight in lb.		1,500
Products to be shipped in tons		57,567
Number of bales		76,756
Number of 40 ft. containers at X bales per	32	2,399
Weight of containers in tons		24
Value of container at an average $130 /T	$130	$3,120
Shipping per container, per Matson quote		$1,785
Net revenue per container		$1,335
Annual revenue		$ 3,202,178

Exhibit 13-3 - Central Maui C&D Processing/Recycling System at Base Yard Capital Cost Estimates

	Size or Number	Cost Factor	Units	Element Cost
Paved Site Area for C&D Equipment	40,000			
Site Size (Acres)	3			
Capacity (TPD, average, 6 days/week)				170
Land (Cost to be Determined)		$150,000	per Acre	450,000
Demolition			per sq. ft..	-
Clearing & Rough Grading		$9,000	per Acre	27,000
Site Work, incl. Electric utilities (new)		$90,000	per Acre	270,000
Foundations/Slabs (No Building)		$60	per sq. ft..	2,400,000
Mechanical & Electrical (In Equipment)		$0	per sq. ft..	
Office Building			per sq. ft..	-
Scale House			per sq. ft..	-
Rail Line			per foot	-
A&E Design Engineering & Constr. Mgt		10%	percent	404,550
Procurement & Construction Monitoring		8%	percent	215,760
Contingency @ 15%		15%	percent	404,550
Subtotal				$4,171,860
Equipment Requirements				
Scale(s), incl. Data Management	0	$90,000	each	-
Processing Plant Equipment, incl. parts	1	$2,500,000	each	2,500,000
Front-End Loader(s)	2	$300,000	each	600,000
Excavator w/Grapple	1	$175,000	each	175,000
Sweeper	0	$40,000	each	-
Yard Truck	0	$90,000	each	-
On-Site Containers for Load-In/Products	10	$6,000	each	60,000
Shipping & Misc. Allowance @ 25%		25%	percent	818,750
Rolling Stock Units	14			
Subtotal				$4,153,750
Other Capital Costs		5%	percent	416,281
Total Capital Cost				$8,741,891
Annualized Capital Cost, G.O. Bond		20	Year Term	$701,472
		5.0%	Interest Rate	

Notes:
1. Costs of siting study are not included.

Exhibit 13-4 - Central Maui C&D Processing/Recycling System at Base Yard O&M Cost Analysis

Labor Category		Salary		170 Labor No.	TPD Labor Cost
Supervisor - Included in MRF		65,000		0	-
Operations Foreman		55,000		1	55,000
Scale Operator - Included in MRF		30,000		0	-
FEL Equipment Operators		35,000		2	70,000
Excavator/Grapple Operators		35,000		1	35,000
Spotters on Tip Floor		31,000		1	31,000
Sorters		22,000		8	176,000
Laborers-General Site Cleanup		22,000		2	44,000
Subtotal				15	411,000
Fringe Benefits		63%			258,930
Overtime Multiplier				15%	61,650
Subtotal Labor					731,580
Fuel (On-site only) @ X gph/Unit		6		$4.00	80,640
Equipment Maintenance		6%			249,225
Site/Building Maintenance (% of Capital)		2%			83,437
Utilities (electric, water, sewage)		60,000			60,000
Insurance		1%			87,419
Miscellaneous Supplies/Services (Allowance)					100,000
Non-Recycled C&D Haul/Disposal	40%		$51		1,081,200
Security (Included in MRF)		0			-
Subtotal Other					1,741,921
Contingency, all costs (15 %)		0.15			371,025
Total Annual Operating Costs					$2,844,526
Total Tons per Day Handled/Transferred					170
Total Tons Per Year Handled/Transferred		312			53,000
Operating/Maintenance Cost, $ per ton					$53.67
Annualized Capital Cost, $ per ton					$13.24
Total Cost, $ per ton					$66.91

Note: Salaries based on Maui information, 2007

Product marketed (tons)	31,800
Net revenue per ton	$ 40.00
Annual revenue net of transportation (2007)	$1,272,000

Exhibit 13-5 - Fleet Maintenance Facility Capital Costs

	Size or Number	Cost Factor	Units	Element Cost
Building Size (sq. ft.)	7,500			
Site Size (Acres)	1.5			
Capacity (TPD, average, 6 days/week)				
Land (Cost to be Determined)		$150,000	per Acre	225,000
Demolition		$0	per sq. ft..	-
Clearing & Rough Grading		$9,000	per Acre	13,500
Site Work, incl. utilities (new)		$90,000	per Acre	135,000
Building & Foundations		$130	per sq. ft..	975,000
Mechanical & Electrical		$45	per sq. ft..	337,500
Office Building	1,500	$225	per sq. ft..	337,500
Scale House	0	$225	per sq. ft..	-
Rail Line		$200	per foot	-
A&E Design Engineering & Constr. Mgt		15%	percent	269,775
Procurement & Construction Monitoring		5%	percent	89,925
Contingency @ 15%		15%	percent	269,775
Subtotal				$2,652,975
Equipment Requirements				
Data Management System	1	$90,000	each	90,000
Processing Equipment	4	$60,000	each	240,000
Front-End Loader(s)		$300,000	each	-
Grapple(s)		$125,000	each	-
Sweeper		$115,000	each	-
Yard Truck		$50,000	each	-
Shipping & Misc. Allowance @ 25%		25%	percent	82,500
Subtotal				$412,500
Other Capital Costs		5%	percent	153,274
Total Capital Cost				$3,218,749
Annualized Capital Cost, G.O. Bond		20 Year Term 5.0% Interest Rate		$258,281

Exhibit 13-6 - Fleet Maintenance Facility
O&M Cost Analysis

		- TPD	
Labor Category	**Salary**	**Labor No.**	**Labor Cost**
Supervisor	61,000		-
Operations Foreman	50,000	1	50,000
Scale Operator	30,000		-
Mechanics	34,000	4	136,000
Grapple Operators	34,000		-
Spotters on Tip Floor	30,000		-
Sorters	30,000		-
Laborers	30,000	2	60,000
Subtotal		7	246,000
Fringe Benefits	63%		154,980
Overtime Multiplier		15%	36,900
Subtotal Labor			437,880
Fuel (On-site only) @ X gph/Unit		$4.00	-
Equipment Maintenance	6%		24,750
Site/Building Maintenance (% of Capital)	2%		53,060
Utilities (electric, water, sewage)	30,000		30,000
Insurance	1%		32,187
Miscellaneous Supplies/Services (Allowance)			12,000
Security	5,000		5,000
Subtotal Other			156,997
Contingency, all costs (15 %)	0.15		89,232
Total Annual Operating Costs			$684,109
Total Tons per Day Handled/Transferred			-
Total Tons Per Year Handled/Transferred	312		0
Operating/Maintenance Cost, $ per ton			
Annualized Capital Cost, $ per ton			
Total Cost, $ per ton			

Note: Salaries based on Maui information, 2007

Exhibit 13-7 - HHWF
Capital Costs

	Size or Number	Cost Factor	Units	Element Cost
Building Size (sq. ft.)	1,120			
Site Size (Acres)	0.50			
Capacity (TPD, average, 6 days/week)				1
Land (Cost to be Determined)		$150,000	per Acre	75,000
Demolition		$0	per sq. ft..	-
Clearing & Rough Grading		$9,000	per Acre	4,500
Site Work, incl. utilities (new)		$90,000	per Acre	45,000
Building & Foundations		$130	per sq. ft..	145,600
Mechanical & Electrical		$45	per sq. ft..	50,400
Office Building	100	$225	per sq. ft..	22,500
Awing	500	$75	per sq. ft..	37,500
Supply Building	120	$10	per sq. ft..	1,200
A&E Design Engineering & Constr. Mgt		15%	percent	45,825
Procurement & Construction Monitoring		5%	percent	15,335
Contingency @ 15%		15%	percent	46,005
Subtotal				$488,865
Equipment Requirements				
Scale(s), incl. Data Management	0	$90,000	each	-
Fire suppression/containers/etc	1	$140,000	each	140,000
Fork-Lift	1	$35,000	each	35,000
Grapple(s)	0	$125,000	each	-
Sweeper	0	$115,000	each	-
Box Truck	1	$80,000	each	80,000
Shipping & Misc. Allowance @ 25%		25%	percent	63,750
Rolling Stock Units	1			
Subtotal				$318,750
Other Capital Costs		8%	percent	64,609
Total Capital Cost				$872,224
Annualized Capital Cost, G.O. Bond		20	Year Term	$69,990
		5.0%	Interest Rate	

Notes:
1. Costs of siting study and land acquisition are not included.

Exhibit 13-8 - HHWF
O&M Cost Analysis

		1 TPD	
Labor Category	**Salary**	**Labor No.**	**Labor Cost**
HHW Manager	60,901	1	60,901
HHW Assistants	22,000	1	22,000
Scale Operator	30,000	0	-
Equipment Operators	35,000	0	-
Grapple Operators	35,000	0	-
Spotters on Tip Floor	31,000	0	-
Sorters	22,000	0	-
Laborers	22,000	0	-
Subtotal		2	82,901
Fringe Benefits	63%		52,228
Overtime Multiplier		15%	12,435
Subtotal Labor			147,564
Shipping Costs			10,996
Contractor Cost			80,500
Fuel (On-site only) @ X gph/Unit	0.75	$4.00	4,914
Equipment Maintenance	6%		19,125
Site/Building Maintenance (% of Capital)	2%		9,777
Utilities (electric, water, sewage)	2,000		2,000
Insurance	1%		8,722
Miscellaneous Supplies/Services (Allowance)			20,000
Security	3,000		3,000
Subtotal Other			159,035
Contingency, all costs (15 %)	0.15		-
Total Annual Operating Costs			$306,598
Total Tons per Day Handled/Transferred			1
Total Tons Per Year Handled/Transferred	312		312
Operating/Maintenance Cost, $ per ton			$982.69
Annualized Capital Cost, $ per ton			$224.33
Total Cost, $ per ton			$1,207.01

Exhibit 13-9 - Olowalu Transfer Station & Base Yard Capital Costs

	Size or Number	Cost Factor	Units	Element Cost
Building Size (sq. ft.)	15,000			
Site Size (Acres)	5			
Capacity (TPD, average, 6 days/week)				147
Land (Cost to be Determined)		$150,000	per Acre	750,000
Demolition		$0	per sq. ft..	-
Clearing & Rough Grading		$9,000	per Acre	45,000
Site Work, incl. utilities (new)		$90,000	per Acre	450,000
Building & Foundations		$130	per sq. ft..	1,950,000
Mechanical & Electrical		$45	per sq. ft..	675,000
Office Building	2,000	$225	per sq. ft..	450,000
Scale House	150	$225	per sq. ft..	33,750
Rail Line		$200	per foot	-
A&E Design Engineering & Constr. Mgt		15%	percent	540,563
Procurement & Construction Monitoring		5%	percent	180,188
Contingency @ 15%		15%	percent	540,563
Subtotal				$5,615,063
Equipment Requirements				
Scale(s), incl. Data Management	1	$90,000	each	90,000
Processing Equipment	2	$100,000	each	200,000
Front-End Loader(s)	1	$300,000	each	300,000
Grapple(s)	0	$125,000	each	-
Sweeper	1	$50,000	each	50,000
Transfer Truck	2	$150,000	each	300,000
Shipping & Misc. Allowance @ 25%		25%	percent	235,000
Rolling Stock Units	3			
Subtotal				$1,175,000
Other Capital Costs		5%	percent	339,503
Total Capital Cost				$7,129,566
Annualized Capital Cost, G.O. Bond		20	Year Term	$572,095
		5.0%	Interest Rate	

Notes:

Residential waste	17,500
Commercial waste	28,500
TOTAL Tonnage	46,000
Days of operation per year	312

Exhibit 13-10 - Olowalu Transfer Station & Base Yard O&M Cost Analysis

		147 TPD	
Labor Category	**Salary**	**Labor No.**	**Labor Cost**
Supervisor	60,000	0	-
Operations Foreman	50,000	1	50,000
Scale Operator	30,000	2	60,000
Equipment Operators	34,000	2	68,000
Grapple Operators	34,000	0	-
Spotters on Tip Floor	30,000	0	-
Laborers	30,000	1	30,000
Subtotal		6	208,000
Fringe Benefits	63%		131,040
Overtime Multiplier		15%	31,200
Subtotal Labor			370,240
Fuel (On-site only) @ X gph/Unit	6	$4.00	170,352
Equipment Maintenance	6%		70,500
Site/Building Maintenance (% of Capital)	2%		112,301
Utilities (electric, water, sewage)	35,000		35,000
Insurance	1%		180,441
Miscellaneous Supplies/Services (Allowance)			30,000
Security	10,000		10,000
Subtotal Other			608,594
Contingency, all costs (15 %)	0.15		146,825
Total Annual Operating Costs			$1,125,659
Total Tons per Day Handled/Transferred			147
Total Tons Per Year Handled/Transferred	312		46,000
Operating/Maintenance Cost, $ per ton			$24.47
Annualized Capital Cost, $ per ton			$31.48
Total Cost, $ per ton			$55.95

Exhibit 13-11 - Hana Convenience Center
Capital Costs

	Size or Number	Cost Factor	Units	Element Cost
Building Size (sq. ft.)	-	Existing		
Site Size (Acres)	1.0			
Capacity (TPD, average, 6 days/week)				6.4
Land (Cost to be Determined)		$0	per Acre	-
Demolition		$0	per sq. ft..	-
Clearing & Rough Grading		$9,000	per Acre	9,000
Site Work, incl. utilities (new)		$90,000	per Acre	90,000
Building & Foundations		$130	per sq. ft..	-
Mechanical & Electrical		$45	per sq. ft..	-
Office Building	0	$225	per sq. ft..	-
Scale House	0	$225	per sq. ft..	-
Rail Line		$200	per foot	-
A&E Design Engineering & Constr. Mgt		15%	percent	14,850
Procurement & Construction Monitoring		5%	percent	4,950
Contingency @ 15%		15%	percent	14,850
Subtotal				$133,650
Equipment Requirements				
Scale(s), incl. Data Management	0	$90,000	each	-
Containers	6	$6,000	each	36,000
Front-End Loader(s)	0	$300,000	each	-
Grapple(s)	0	$125,000	each	-
Sweeper	0	$50,000	each	-
Transfer Truck	1	$125,000	each	125,000
Shipping & Misc. Allowance @ 25%		25%	percent	40,250
Rolling Stock Units	1			
Subtotal				$201,250
Other Capital Costs		5%	percent	16,745
Total Capital Cost				$351,645
Annualized Capital Cost, G.O. Bond		20	Year Term	$28,217
		5.0%	Interest Rate	

Notes:
1. Costs of siting study and land acquisition are not included.

Exhibit 13-12 - Hana Convenience Center
O&M Cost Analysis

		6.4 TPD	
Labor Category	**Salary**	**Labor No.**	**Labor Cost**
Supervisor	60,000	0	-
Operations Foreman	50,000	1	50,000
Scale Operator	30,000	0	-
Equipment Operators	34,000	2	68,000
Grapple Operators	34,000	0	-
Spotters on Tip Floor	30,000	0	-
Laborers	30,000	1	30,000
Subtotal		4	148,000
Fringe Benefits	63%		93,240
Overtime Multiplier		15%	22,200
Subtotal Labor			$263,440
Fuel (On-site only) @ X gph/Unit	1	$4.00	10,920
Equipment Maintenance	6%		12,075
Site/Building Maintenance (% of Capital)	2%		2,673
Utilities (electric, water, sewage)	2,500		2,500
Insurance	1%		3,516
Miscellaneous Supplies/Services (Allowance)			5,000
Security	0		-
Subtotal Other			$36,684
Contingency, all costs (15 %)	0.15		45,019
Total Annual Operating Costs			$345,143
Total Tons per Day Handled/Transferred			6
Total Tons Per Year Handled/Transferred	312		2,000
Operating/Maintenance Cost, $ per ton			$172.57
Annualized Capital Cost, $ per ton			$723.95
Total Cost, $ per ton			$896.52

Exhibit 13-13 - Waste-to-Energy Facility
360-Ton-Per-Day Rated Capacity Modular Technology
Capital Costs

	Size or Number	Cost Factor	Units	Element Cost
Building Size (sq. ft.)	60,000			
Site Size (Acres)	7			
Capacity (TPD, average, 7 days/week)				360
Land		$150,000	per Acre	1,050,000
Demolition			per sq. ft..	-
Clearing & Rough Grading		$9,000	per Acre	63,000
Site Work, incl. utilities (new)		$90,000	per Acre	630,000
Building & Foundations		$120	per sq. ft..	7,200,000
Mechanical & Electrical		$55	per sq. ft..	3,300,000
Office Building	3,000	$225	per sq. ft..	675,000
Scale House	150	$100	per sq. ft..	15,000
Combustion Equipment				17,200,000
Air Pollution Control Equipment				11,000,000
Power Island				9,000,000
Power Interconnect				3,500,000
Balance of Plant				11,000,000
Start Up and Testing				1,654,000
A&E Design Engineering, Permit & Constr. Mgt		8%	percent	4,768,725
Procurement & Construction Monitoring		4%	percent	2,842,243
Contingency @ 10%		10%	percent	7,000,573
Subtotal				$80,898,541
Equipment Requirements				
Scale(s), incl. Data Management	2	$90,000	each	180,000
Front-End Loader(s)	2	$300,000	each	600,000
Grapple(s)	1	$125,000	each	125,000
Sweeper	1	$115,000	each	115,000
Yard Truck		$90,000	each	-
Misc. Allowance @ 20%		20%	percent	204,000
Rolling Stock Units	3.5			
Subtotal				$1,224,000
Other Capital Costs				
Bond Issuance (2%) and Misc. (3%)		5%	percent	4,106,127
Total Capital Cost				$86,228,667.95
Annualized Capital Cost, G.O. Bond		20	Year Term	$6,919,211.41
		5.0%	Interest Rate	

Notes:
1. Costs of siting study are not included.

MRF curbside residue	68,000	7.5%	5,100
Refuse			45,333
C&D Materials			20,000
Tires	11,154	38.5%	29,000
Shredded excess wood from EKO			18,850
TOTAL Tonnage			118,283
Days of operation per year			365

Exhibit 13-14 - Waste-to-Energy Facility
O&M Cost Analysis

		360 TPD	
Labor Category	**Salary**	**Labor No.**	**Labor Cost**
Supervisor	75,000	1	75,000
Engineer	75,000	1	75,000
Operations Foreman	55,000	3	165,000
Scale Operator	30,000	3	90,000
Mobile Equipment Operators	34,000	5	170,000
Grapple Operators	34,000	2	68,000
Spotters on Tip Floor	22,000	1	22,000
Equipment Operators	40,000	10	400,000
Mechanics	40,000	6	240,000
Clerk	30,000	1	40,000
Laborers	22,000	3	66,000
Subtotal		36	1,411,000
Fringe Benefits	63%		888,930
Overtime Multiplier		15%	211,650
Subtotal Labor			2,511,580
Fuel (On-site only) @ X gph/Unit			
Equipment Maintenance	6	$4.00	214,620
Rolling Stock Maintenance	4%		1,488,000
Site/Building Maintenance (% of Capital)	6%		73,440
Utilities (electric, water, sewage)	2%		236,100
Reagents cost base on thruput in tons	600,000		600,000
Ash Disposal, 25% at a per ton cost of		$4.00	525,702
Insurance	90.0 tpd	$55	1,807,101
Miscellaneous Supplies/Services (Allowance	1%		808,985
Security			250,000
	15,000		15,000
Subtotal Other			6,018,949
Management fee and Profit (15%)			
Contingency, all costs (10 %)	15%		1,279,579
	10%		853,053
Total Annual Operating Costs			$10,663,161
Total Tons per Day Handled/Transferred			360
Total Tons Per Year Handled/Transferred			131,426
Operating days per year	365		
Operating/Maintenance Cost, $ per ton			$81.13
Annualized Capital Cost, $ per ton			$52.65
Total Cost, $ per ton			$133.78
Net electrical energy produced for sale at	400 KWHr		47,313,200
Electrical revenue sold at	$0.150 per KWHr		$7,096,980
Revenue Per Ton			$54
Net Cost Per ton			$79.78

Note: Salaries and fringes based on Maui information, 2007

Exhibit 13-15 - Lanai Convenience Center
Capital Costs

	Size or Number	Cost Factor	Units	Element Cost
Building Size (sq. ft.)	2500	Existing		
Site Size (Acres)	1.0			
Capacity (TPD, average, 6 days/week)				28
Land (1)		$0	per Acre	-
Demolition		$0	per sq. ft..	-
Clearing & Rough Grading		$9,000	per Acre	9,000
Site Work, incl. utilities (new)		$90,000	per Acre	90,000
Building & Foundations		$130	per sq. ft..	325,000
Mechanical & Electrical		$45	per sq. ft..	112,500
Office Building		$225	per sq. ft..	-
Scale House		$225	per sq. ft..	-
Rail Line		$200	per foot	-
A&E Design Engineering & Constr. Mgt		15%	percent	80,475
Procurement & Construction Monitoring		5%	percent	26,825
Contingency @ 15%		15%	percent	80,475
Subtotal				$724,275
Equipment Requirements				
Scale(s), incl. Data Management	0	$90,000	each	-
Containers	18	$6,000	each	108,000
Front-End Loader(s)	1	$100,000	each	100,000
Compactor	1	$400,000	each	400,000
Sweeper	0	$50,000	each	-
Transfer Truck (2)	1.5	$125,000	each	187,500
Shipping & Misc. Allowance @ 25%		25%	percent	198,875
Rolling Stock Units	2			
Subtotal				$994,375
Other Capital Costs		5%	percent	85,933
Total Capital Cost				$1,804,582.50
Annualized Capital Cost, G.O. Bond		20	Year Term	$144,804.37
		5.0%	Interest Rate	

Notes:

TOTAL Tonnage	8,700
Days of operation per year	312
Tons per day	27.9

Exhibit 13-16 - Lanai Convenience Center
O&M Cost Analysis

		8,700 TPD	
Labor Category	**Salary**	**Labor No.**	**Labor Cost**
Supervisor	60,000	0	-
Operations Foreman	50,000	1	50,000
Scale Operator	30,000	0	-
Equipment Operators	34,000	1.5	51,000
Grapple Operators	34,000	0	-
Spotters on Tip Floor	30,000	0	-
Laborers	30,000	1	30,000
Subtotal		3.5	131,000
Fringe Benefits	63%		82,530
Overtime Multiplier		15%	19,650
Subtotal Labor			233,180
Fuel (On-site only) @ X gph/Unit	6	$4.00	104,832
Equipment Maintenance	6%		59,663
Site/Building Maintenance (% of Capital)	2%		14,486
Utilities (electric, water, sewage)	10000		10,000
Insurance	1%		18,046
Miscellaneous Supplies/Services (Allowance)			10,000
Shipping by barge per container		$500	217,500
Security	3000		3,000
Subtotal Other			437,526
Contingency, all costs (15 %)	0.15		100,606
Total Annual Operating Costs			$771,312
Total Tons per Day Handled/Transferred			27.88
Total Tons Per Year Handled/Transferred	312		8,700
Operating/Maintenance Cost, $ per ton			$88.66
Annualized Capital Cost, $ per ton			$16.64
Total Cost, $ per ton			$105.30

(1) Includes half of driver in Maui to move containers to MRF and CML

Exhibit 13-17 - Molokai Convenience Center
Capital Costs

	Size or Number	Cost Factor	Units	Element Cost
Building Size (sq. ft.)	2,500	Existing		
Site Size (Acres)	1.0			
Capacity (TPD, average, 6 days/week)				42
Land (1)		$0	per Acre	-
Demolition		$0	per sq. ft..	-
Clearing & Rough Grading		$9,000	per Acre	9,000
Site Work, incl. utilities (new)		$90,000	per Acre	90,000
Building & Foundations		$130	per sq. ft..	325,000
Mechanical & Electrical		$45	per sq. ft..	112,500
Office Building		$225	per sq. ft..	-
Scale House	0	$225	per sq. ft..	-
Rail Line		$200	per foot	-
A&E Design Engineering & Constr. Mgt		15%	percent	80,475
Procurement & Construction Monitoring		5%	percent	26,825
Contingency @ 15%		15%	percent	80,475
Subtotal				$724,275
Equipment Requirements				
Scale(s), incl. Data Management	0	$90,000	each	-
Containers	26	$6,000	each	156,000
Front-End Loader(s)	1	$100,000	each	100,000
Compactor	1	$400,000	each	400,000
Sweeper	0	$50,000	each	-
Transfer Truck (2)	1.5	$125,000	each	187,500
Shipping & Misc. Allowance @ 25%		25%	percent	210,875
Rolling Stock Units	3			
Subtotal				$1,054,375
Other Capital Costs		5%	percent	88,933
Total Capital Cost				$1,867,582.50
Annualized Capital Cost, G.O. Bond		20	Year Term	$149,859.65
		5.0%	Interest Rate	

Notes:
(1) Costs of siting study and land acquisition are not included.
(2) Includes half of truck in Maui to move containers to MRF and CML

TOTAL Tonnage	13,000
Days of operation per year	312
Tons per day	41.7

Exhibit 13-18 - Molokai Convenience Center
O&M Cost Analysis

		42 TPD	
Labor Category	**Salary**	**Labor No.**	**Labor Cost**
Supervisor	60,000	0	-
Operations Foreman	50,000	1	50,000
Scale Operator	30,000	1	30,000
Equipment Operators (1)	34,000	2.5	85,000
Grapple Operators	34,000	0	-
Spotters on Tip Floor	30,000	0	-
Laborers	30,000	1	30,000
Subtotal		5.5	195,000
Fringe Benefits	63%		122,850
Overtime Multiplier		15%	29,250
Subtotal Labor			347,100
Fuel (On-site only) @ X gph/Unit	6	$4.00	157,248
Equipment Maintenance	6%		63,263
Site/Building Maintenance (% of Capital)	2%		14,486
Utilities (electric, water, sewage)	10,000		10,000
Insurance	1%		18,676
Miscellaneous Supplies/Services (Allowance)			10,000
Shipping by barge per container		$500	325,000
Security	3,000		3,000
Subtotal Other			601,672
Contingency, all costs (15 %)	0.15		142,316
Total Annual Operating Costs			$1,091,088
Total Tons per Day Handled/Transferred			42
Total Tons Per Year Handled/Transferred	312		13,000
Operating/Maintenance Cost, $ per ton			$83.93
Annualized Capital Cost, $ per ton			$11.53
Total Cost, $ per ton			$95.46

(1) Includes half of driver in Maui to move containers to MRF and CML

Exhibit 13-19 - Alternative: Gasification
360-Ton-Per-Day Rated Capacity
Capital Costs

	Size or Number	Cost Factor	Units	Element Cost
Building Size (sq. ft.)	45,000			
Site Size (Acres)	7			
Capacity (TPD, average, 6 days/week)				200
Land		$150,000	per Acre	1,050,000
Demolition			per sq. ft..	-
Clearing & Rough Grading		$9,000	per Acre	63,000
Site Work, incl. utilities (new)		$90,000	per Acre	630,000
Building & Foundations		$120	per sq. ft..	5,400,000
Mechanical & Electrical		$55	per sq. ft..	2,475,000
Office Building	600	$225	per sq. ft..	135,000
Scale House	150	$100	per sq. ft..	15,000
Installed facility				29,530,179
Start Up and Testing				1,654,000
A&E Design Engineering & Constr. M		8%	percent	2,868,613
Procurement & Construction Monitori		4%	percent	1,752,840
Contingency @ 10%		10%	percent	4,277,079
Subtotal				$49,850,711
Equipment Requirements				
Scale(s), incl. Data Man	1	$90,000	each	90,000
Front-End Loader(s)	1	$300,000	each	300,000
Grapple(s)	1	$125,000	each	125,000
Sweeper	0.5	$115,000	each	57,500
Yard Truck		$90,000	each	-
Misc. Allowance @ 20%		20%	percent	114,500
Rolling Stock Units	3.5			
Subtotal				$687,000
Other Capital Costs				
Bond Issuance		5%	percent	2,526,886
Total Capital Cost				53,064,597
Annualized Capital Cost, G.O. Bond		20	Year Term	4,258,041
		5.0%	Interest Rate	

Notes:
1. Costs of siting study are not included.

Exhibit 13-20 - Alternative: Gasification
O&M Cost Analysis

		200 TPD	
Labor Category	**Salary**	**Labor No.**	**Labor Cost**
Supervisor	65,000	1	65,000
Operations Foreman	55,000	2	110,000
Scale Operator	30,000	2	60,000
Mobile Equipment Operators	34,000	3	102,000
Grapple Operators	34,000	2	68,000
Spotters on Tip Floor	22,000	1	22,000
Equipment Operators	34,000	8	272,000
Mechanics	34,000	2	68,000
Clerk	30,000	1	34,000
Laborers	22,000	2	44,000
Subtotal		24	845,000
Fringe Benefits	63%		532,350
Overtime Multiplier		15%	126,750
Subtotal Labor			1,504,100
Fuel (On-site only) @ X gph/Unit	6	$4.00	183,960
Equipment Maintenance	4%		1,181,207
Rolling Stock Maintenance	6%		41,220
Site/Building Maintenance (% of Capital)	2%		997,014
Utilities (electric, water, sewage)	400,000		400,000
Reagents cost base on thruput in tons		$4.00	292,000
Residual Disposal, 25% at a per ton cost of	50.0 tpd	$55	1,003,750
Insurance	1%		498,507
Miscellaneous Supplies/Services (Allowance)			250,000
Security	15,000		15,000
Subtotal Other			4,862,659
Management fee and Profit (15%)	15%		955,014
Contingency, all costs (10 %)	10%		636,676
Total Annual Operating Costs			$7,958,448
Total Tons per Day Handled/Transferred			200
Total Tons Per Year Handled/Transferred	365 days		73,000
Operating/Maintenance Cost, $ per ton			$109.02
Annualized Capital Cost, $ per ton			$58.33
Total Cost, $ per ton			$167.35
Net electrical energy produced for sale at	480 KWHr		35,040,000
Electrical revenue, sold at	$0.150 per KWHr		$5,256,000
Revenue Per Ton			$ 72.00
Net Cost Per ton			$95.35

Exhibit 13-21 – Central Maui MRF and Base Yard Capital Cost Estimates

	Size or Number	Cost Factor	Units	Element Cost
Building Size (sq. ft.)	45,000			
Site Size (Acres)	7			
Capacity (TPD, average, 6 days/week)				309
Land (Cost to be Determined)		$150,000	per Acre	1,050,000
Demolition			per sq. ft..	-
Clearing & Rough Grading		$9,000	per Acre	63,000
Site Work, incl. utilities (new)		$90,000	per Acre	630,000
Building & Foundations		$130	per sq. ft..	5,850,000
Mechanical & Electrical		$45	per sq. ft..	2,025,000
Office Building	6000	$225	per sq. ft..	1,350,000
Scale House	150	$225	per sq. ft..	33,750
Rail Line		$200	per foot	-
A&E Design Engineering & Constr. Mgt		15%	percent	1,492,763
Procurement & Construction Monitoring		5%	percent	497,588
Contingency @ 15%		15%	percent	1,492,763
Subtotal				$14,484,863
Equipment Requirements				
Scale(s), incl. Data Management	2	$90,000	each	180,000
Processing Equipment	1	$6,000,000	each	6,000,000
Front-End Loader(s)	3	$300,000	each	900,000
Grapple(s)	0	$125,000	each	-
Sweeper	1	$115,000	each	115,000
Fork Lift	2	$50,000	each	100,000
Shipping & Misc. Allowance @ 25%		25%	percent	1,823,750
Rolling Stock Units	3.5			
Subtotal				$9,118,750
Other Capital Costs		5%	percent	1,180,181
Total Capital Cost				24,783,793
Annualized Capital Cost, G.O Bond		20	Year Term	1,988,716
		5.0%	Interest Rate	

Notes:
1. Costs of siting study are not included.

Exhibit 13-22 - Central Maui MRF and Base Yard O&M Cost Analysis

		309 TPD	
Labor Category	**Salary**	**Labor No.**	**Labor Cost**
Supervisor	65,000	1	65,000
Operations Foreman	55,000	2	110,000
Scale Operator	30,000	2	60,000
Equipment Operators	35,000	4	140,000
Grapple Operators	35,000	0	-
Spotters on Tip Floor	31,000	2	62,000
Sorters	22,000	24	528,000
Laborers	22,000	3	66,000
Subtotal		38	1,031,000
Fringe Benefits	63%		649,530
Overtime Multiplier		15%	154,650
Subtotal Labor			1,835,180
Fuel (On-site only) @ X gph/Unit	6	$4.00	183,456
Equipment Maintenance	6%		547,125
Site/Building Maintenance (% of Capital)	2%		289,697
Utilities (electric, water, sewage)	180,000		180,000
Insurance	1%		247,838
Miscellaneous Supplies/Services (Allowance)			100,000
Residue Disposal	15%	$51	736,808
Security	50000		50,000
Subtotal Other			2,334,924
Contingency, all costs (15 %)	0.15		625,516
Total Annual Operating Costs			$4,795,620
Total Tons per Day Handled/Transferred			309
Total Tons Per Year Handled/Transferred	312		96,315
Operating/Maintenance Cost, $ per ton			$49.79
Annualized Capital Cost, $ per ton			$20.65
Total Cost, $ per ton			$70.44

Note: Salaries based on Maui information, 2007

Exhibit 13-23 – Central Maui C&D Processing/Recycling System at Base Yard Capital Cost Estimates

	Size or Number	Cost Factor	Units	Element Cost
Paved Site Area for C&D Equipment	45,000			
Site Size (Acres)	3			
Capacity (TPD, average, 6 days/week)				170
Land (Cost to be Determined)		$150,000	per Acre	450,000
Demolition			per sq. ft..	-
Clearing & Rough Grading		$9,000	per Acre	27,000
Site Work, incl. Electric utilities (new)		$90,000	per Acre	270,000
Foundations/Slabs (No Building)		$60	per sq. ft..	2,700,000
Mechanical & Electrical (In Equipment)		$0	per sq. ft..	
Office Building			per sq. ft..	-
Scale House			per sq. ft..	-
Rail Line			per foot	-
A&E Design Engineering & Constr. Mgt		10%	percent	449,550
Procurement & Construction Monitoring		8%	percent	239,760
Contingency @ 15%		15%	percent	449,550
Subtotal				$4,585,860
Equipment Requirements				
Scale(s), incl. Data Management	0	$90,000	each	-
Processing Plant Equipment, incl. parts	1	$3,000,000	each	3,000,000
Front-End Loader(s)	2	$300,000	each	600,000
Excavator w/Grapple	1	$175,000	each	175,000
Sweeper	0	$40,000	each	-
Yard Truck	0	$90,000	each	-
On-Site Containers for Load-In/Products	10	$6,000	each	60,000
Shipping & Misc. Allowance @ 25%		25%	percent	943,750
	1.5			
Subtotal				$4,778,750
Other Capital Costs		5%	percent	468,231
Total Capital Cost				9,832,841
Annualized Capital Cost, G.O Bond		20	Year Term	789,013
		5.0%	Interest Rate	

Notes:
1. Costs of siting study are not included.

Exhibit 13-24 – Central Maui C&D Processing/Recycling System at Base Yard O&M Cost Analysis

				170	TPD
Labor Category		**Salary**		**Labor No.**	**Labor Cost**
Supervisor - Included in MRF		65,000		0	-
Operations Foreman		55,000		1	55,000
Scale Operator - Included in MRF		30,000		0	-
FEL Equipment Operators		35,000		2	70,000
Excavator/Grapple Operators		35,000		1	35,000
Spotters on Tip Floor		31,000		1	31,000
Sorters		22,000		11	242,000
Laborers-General Site Cleanup		22,000		2	44,000
	Subtotal			18	477,000
Fringe Benefits		63%			300,510
Overtime Multiplier				15%	71,550
	Subtotal Labor				849,060
Fuel (On-site only) @ X gph/Unit		6		$4.00	78,624
Equipment Maintenance		6%			286,725
Site/Building Maintenance (% of Capital)		2%			91,717
Utilities (electric, water, sewage)		60,000			60,000
Insurance		1%			98,328
Miscellaneous Supplies/Services (Allowance)					100,000
Non-Recycled C&D Haul/Disposal		15,900	tons	$51.00	$810,900
Security Included in MRF		0			-
	Subtotal Other				1,526,295
Contingency, all costs (15 %)		0.15			356,303
Total Annual Operating Costs					$2,731,658
Total Tons per Day Handled/Transferred					170
Total Tons Per Year Handled/Transferred		312			53,000
Operating/Maintenance Cost, $ per ton					$51.54
Annualized Capital Cost, $ per ton					$14.89
Total Cost, $ per ton					$66.43
Recovery Rate		70%			

Note: Salaries based on Maui information, 2007