



Review & Assessment of the Solid Waste Division

Prepared for:
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Summary

The Office of Council Services, on behalf of the Maui County Council, commissioned this study to assess and evaluate the Solid Waste Management Division (SWD). The study was commissioned as the result of questions raised during the FY2015 budget process. During that budget process, the Division requested an increase of 6 positions to assist with regulatory compliance. Initially, the Council authorized 2 of the 6 requested positions, and the remaining 4 positions were subsequently approved in the FY2016 budget.

The Maui County Council established two objectives for the assessment of the SWD:

1. Determine whether the personnel and funding authorized for the Division in the FY2015 Budget were sufficient to maintain acceptable levels of regulatory compliance, consistent with the Division's goals and objectives.
2. Assess whether implementation of the Maui County Integrated Waste Conversion and Energy Project (Contract M1016) will result in a net cost savings to the County compared to current operating practices.

Based on the analysis contained in this report, CB&I makes the following principal findings with respect to the first question:

- Staffing levels in the Solid Waste Division are consistent with staffing in other publicly-operated solid waste systems (relative to system tonnage).
- Operating costs for the Solid Waste Division are generally consistent with other publicly-operated systems, though somewhat higher than the overall trend. This may stem in part from varying levels of indirect costs (i.e., County administration and overhead) allocated to solid waste departments, which are beyond the control of the departments. We also note that SWD operates 4 landfills (on 3 separate islands, and including the remotely-located Hana Landfill on Maui), a higher number than other systems.
- The requested positions included 4 operations personnel and 2 engineering staff. After reviewing the compliance history of SWD, we believe the added personnel have been allocated proportional to the compliance issues they would be responsible for addressing.
- Given the 6 approved positions and approved funding levels, CB&I believes that the Solid Waste Division is positioned to operate its solid waste facilities to maintain acceptable levels of regulatory compliance.

Based on the analysis contained in this report, CB&I makes the following principal findings with respect to the second question:

- The County's Department of Environmental Management (DEM) performed an internal analysis of the IWCEP project. The DEM analysis projected that the IWCEP project would result in cost savings of approximately \$916,500 per year (versus the current landfill). The cost savings were predicated on significant reductions in labor, operating and construction costs at the Central Maui Landfill.



- Based on our review of the DEM cost model and our own analysis, CB&I believes that the cost savings projected by DEM were overstated, and that the IWCEP project will result in *higher* costs of \$835,000 per year (relative to the current landfill), and still assuming that significant reductions to staff and operations costs are made at the Central Maui Landfill.

Our analysis supporting these findings is discussed in detail in the remainder of this report, along with additional findings and recommendations.



Introduction

Background

The Office of Council Services, on behalf of the Maui County Council, commissioned this study to assess and evaluate the Solid Waste Management Division (SWD), which is a division within the County's Department of Environmental Management (DEM). The study was commissioned as the result of questions raised during the FY2015 budget process. During that budget process, the Division requested an increase of 6 positions to assist with regulatory compliance. Initially, the Council authorized 2 of the 6 requested positions.

Following this budget process, the Division reduced landfill hours and cancelled holiday refuse collection services for an approximately 5-week period of time, reportedly as the result of the budget constraints imposed by the Council. Service was ultimately restored to prior levels, but the impacts to the community were large enough to cause the Council to commission the proposed study and more fully investigate the budgetary issues and the operations of the Solid Waste Division. Subsequently, the Council approved the other 4 positions in the FY2016 budget.

Prior to the FY2015 budget process, the Department of Environmental Management began exploring the development of a waste-to-energy project. In November, 2012, DEM issued a Request for Proposals (RFP) to technology vendors interested in providing an Integrated Waste Conversion and Energy Project (IWCEP), and ultimately selected Anaergia Services, LLC (Anaergia) as its preferred vendor. A services agreement was executed with Anaergia on January 8, 2014.

The IWCEP was also brought up during the FY2015 budget discussions. DEM had previously indicated to Council that the IWCEP would reduce internal resource needs for maintaining regulatory compliance. Council was therefore concerned about the request to add 6 new positions to the Solid Waste Division (to maintain regulatory compliance), given the planned implementation of the IWCEP.

The Maui County Council established two objectives for the review/assessment of the Solid Waste Division:

1. Determine whether the personnel and funding authorized for the Division in the FY2015 Budget were sufficient to maintain acceptable levels of regulatory compliance, consistent with the Division's goals and objectives.
2. Assess whether implementation of the Maui County Integrated Waste Conversion and Energy Project (Contract M1016) will result in a net cost savings to the County compared to current operating practices.

These two questions are addressed in Section 1 and Section 2 of this report.



Methodology

To address the first question, concerning Solid Waste Division (SWD) staffing and funding resources, CB&I performed the following activities:

- Reviewed the FY2014, FY2015 and FY2016 budgets for DEM and SWD.
- Reviewed correspondence between DEM/SWD and various Council committees during the FY2015 budget process¹. These committees include the Policy and Intergovernmental Affairs Committee, the Infrastructure and Environmental Management Committee, and the Budget and Finance Committee. (We appreciate and acknowledge the efforts of Council Services staff in compiling these documents and providing them to CB&I in response to our information requests).
- Reviewed documentation provided by SWD including staffing schedules, organization charts, position descriptions, facility permits, facility operating plans, contracts for services, solid waste fee schedules, compliance history, and facility tonnage reports. (We appreciate and acknowledge the efforts of SWD staff in compiling these documents and providing them to CB&I in response to our information requests).
- Reviewed historical operating cost information for the Central Maui Landfill and other operating units of the SWD for the period FY2012-FY2015. (This information was provided by the Department of Finance, and we appreciate and acknowledge the efforts of Department staff in making the information available to CB&I.)
- Researched benchmark comparison data on solid waste departments (staffing and operating costs) for other publicly-operated solid waste systems in the State of Hawaii and, to provide a larger dataset, the State of Florida.
- Interviewed SWD and DEM staff and conducted site tours of the Central Maui Landfill, Olowalu Convenience Center and various drop-off facilities during a two-day meeting.
- Analyzed the above information, as further described in Section 1.

To address the second question, concerning the IWCEP project, CB&I performed the following activities:

- Interviewed current (and former) DEM staff to obtain background information on the IWCEP.
- Reviewed the Request for Proposals for the IWCEP project.



¹ Council Services has posted these documents to a project website (<http://mauicounty.us/solidwasteaudit/>).

- Reviewed the contract executed with Anaergia².
- Reviewed a cost analysis of the IWCEP project previously prepared by DEM. (We appreciate and acknowledge the efforts of DEM staff in making this analysis available to CB&I).
- Analyzed the above information, as further described in Section 2.

Finally, a draft version of this report was provided to SWD and DEM for management to review and comment on. The comments from SWD and DEM are provided in Attachment E, and CB&I's responses to those comments are contained in Attachment F.



² Although CB&I reviewed the contract and has a general understanding of the proposed facility, we did not perform a technical assessment of the IWCEP or the Anaergia technology. Our review was limited to assessing the potential cost impacts of the IWCEP versus the current operations of the Central Maui Landfill.

Section 1

Review of SWD Personnel and Funding

This section provides CB&I's review of staffing and operating expenses for Maui County's Solid Waste Division (SWD). The objective of the review is to determine whether FY2015 employment and funding for the SWD are sufficient to maintain regulatory compliance. To make this determination, CB&I reviewed FY2014, FY2015, and FY2016 budget and actual expense data for the SWD. This data was compared to staffing and expenses for other publicly-operated solid waste systems to benchmark personnel and costs for SWD versus these other public systems. We also reviewed the 6 additional personnel requested during the FY2015 budget process with respect to the historical compliance issues SWD has faced.

1.1 Identification of Solid Waste Systems for Benchmark Comparison

CB&I performed a benchmark comparison of SWD with other publicly-owned and primarily publicly-operated solid waste systems. The key parameters evaluated include employment, operating expenses, and tons managed. The number and type of facilities owned and operated by each system were also considered, as this impacts employment and operating expenses. Disposal, recycling, and administrative operations for each solid waste system were included in the analysis; collection operations were excluded, because the scope of this assessment was to address disposal operations only (although we note below what types of collection services are provided for each system included in the analysis).

CB&I first considered other solid waste systems in the State of Hawaii, because they reflect the unique characteristics of island solid waste operations as well as State-specific conditions. Information was obtained and evaluated from two of the three other Hawaiian counties (Hawaii and Kauai). Honolulu was excluded because insufficient information was available to segregate collection operations from solid waste disposal, recycling and administrative operations. To provide a larger dataset, solid waste systems in Florida were also considered. Much of the solid waste infrastructure in Florida is publicly-owned and operated, and many counties rely on landfills for disposal; as a result, these Florida waste systems had general similarities to the Hawaiian systems noted above.

Table 1.1 presents summary information on the number and types of facilities owned by each system, as well as the tonnage handled by each system³. As is evident from Table 1.1 (and as further described below), each solid waste system is unique, having a different mix of facilities and managing different tonnages. The Florida waste systems, for example, handle greater quantities of waste because they serve larger populations. The Hawaii systems tend to have a greater number of transfer station and drop-off recycling facilities; this is to provide more convenient access to residents that self-haul materials and to service more remote areas of the islands. In Florida, by contrast, the counties have universal curbside collection of waste materials, and there is comparatively less self-hauling by residents and comparatively fewer transfer and drop-off facilities.



³ The tonnage includes waste that is disposed as well as diverted through recycling and/or composting programs.

TABLE 1.1. SUMMARY OF PUBLICLY-OWNED SOLID WASTE SYSTEMS

County	System Tons	Landfill	Transfer / Conv. Ctr.	Drop-off Recycling	Compost / Mulch	Permanent HHW
Hawaii	246,000	2	22	-	2	-
Kauai	107,000	1	4	7	-	-
Maui	221,000	4	2	4	2	-
Brevard (FL)	1,150,000	2	2	-	1	3
Orange (FL)	940,000	2	2	1	1	2
Seminole (FL)	382,000	1	1	-	1	1
Volusia (FL)	473,000	1	1	-	-	-

Notes:

1. Transfer / Conv. Ctr. = transfer station/convenience center. For Maui County, this includes Olowalu and Recycle Molokai.
2. Drop-off Recycling represents stand-alone facilities; drop-off services may also be provided at landfills and transfer stations. For Maui County, the stand-alone facilities include Haiku, Kihei, WHMC, and Makawao. The Orange County facility is a material recovery facility that processes recyclables.
3. Compost/Mulch represents a permanent location. For Maui County, the count includes the greenwaste operations at Central Maui Landfill and Recycle Molokai. Kauai shreds greenwaste at landfill and transfer stations, but does not have a stand-alone facility for that purpose.
4. Permanent HHW represents a permanent location for household hazardous waste (as opposed to collection events for household hazardous waste).

Source:

1. County Comprehensive Annual Financial Reports (FY2014), budget documents and County websites.

The systems in Table 1.1 are further described below. Note that for any operations that are contracted to a private company, the employees of the contractor are not included in the subsequent analysis of system staffing levels.

- Maui County owns and operates four active landfills. The Central Maui Landfill and Hana Landfill are located on Maui, while the Molokai Landfill and Lanai Landfill are located on other islands. The Central Maui Landfill operates 6 days per week, while the smaller landfills each operate 5 days per week. The County also owns the Olowalu Transfer Station/Convenience Center and contracts operation to a private company. A Convenience Center is also provided on Molokai (Recycle Molokai), which is privately-operated. The County hosts a privately-operated composting facility at the Central Maui Landfill, and greenwaste processing services are provided (under contract) at Recycle Molokai. In addition, four drop-off recycling facilities are provided on Maui, which are serviced by private contractors; drop-off recycling services are also provided at the Central Maui Landfill, Olowalu Convenience Center, and Recycle Molokai. The County also monitors and maintains four closed landfills and two closed phases of the Central Maui Landfill (this is a greater number of legacy landfills than for the other systems). In addition, Maui County performs residential refuse collection for a significant portion of the households on Maui, Lanai and Molokai (employees and expenses associated with the collection operation are excluded in the remainder of this analysis).



- Hawaii County owns two active landfills and is responsible for long-term care of two closed landfills. The South Hilo Landfill is operated by County employees and operates 7 days per week, while the West Hawaii Landfill is operated by a mix of County employees and Waste Management of Hawaii (WMH) employees and operates 6 days per week. WMH is responsible for landfill construction, environmental monitoring, and operational oversight at the landfill. Hawaii County also operates 22 staffed transfer stations. Of these, 10 are operated 7 days per week, 12 hours per day. Eleven transfer stations are operated 3 days per week for 12 hours per day, and one transfer station is open on Saturdays only. The County owns two mulch/compost facilities, and contracts operation of the facilities to a private company. The County does not provide any collection services for refuse.
- Kauai County owns one landfill and four transfer stations. In addition, the County owns the Kauai Resource Center and six satellite drop-off recycling centers (drop-off services are also provided at the landfill and one transfer station). The County also performs refuse collection (employees and expenses associated with collection are excluded in this analysis). County staff operate the Kekaha Landfill 7 days per week; the County contracts with Waste Management of Hawaii to provide operations oversight and environmental monitoring and compliance services at the landfill. Transfer stations on Kauai are operated by the County 7 days per week; however, employment and operating expenses for the transfer stations are not included in this analysis because they are included in the County's collection operations. The Kauai Resource Center is operated by a private company.
- Brevard County owns and operates two landfills, the Central Disposal Facility (a municipal waste landfill) and the Sarno Road Landfill (a construction waste landfill). The County also owns and operates two transfer stations, one of which is co-located with the Sarno Road Landfill. In addition, the County operates a mulching facility and three permanent household hazardous waste collection facilities. The County's facilities generally operate 6 days per week. The County has entered into a collection contract with a private company for the collection of refuse and recycling from residents in unincorporated Brevard County; the County manages and administers this collection agreement.
- Orange County owns and operates a municipal waste landfill, a construction waste landfill, and two transfer stations. The landfills are co-located on the same property. The County also owns a recycled materials processing facility on the landfill property which is operated by a private contractor. Composting operations for yard waste are conducted on the landfill property. Facilities for household hazardous waste materials are maintained at the landfill and one transfer station. All facilities generally operate 7 days per week. The County has entered into collection contracts with private companies for the collection of refuse and recycling from residents in unincorporated Orange County; the County manages and administers these collection agreements.
- Seminole County owns and operates a municipal waste landfill, a transfer station, a mulching facility, and a household hazardous waste facility. The landfill and mulching facility are located on the same property and operate 7 days per week. The transfer station and co-located household hazardous waste facility operate 6 days per week. The County has entered into collection contracts with private companies for the



collection of refuse and recycling from residents in unincorporated Seminole County; the County manages and administers these collection agreements.

- Volusia County owns and operates a landfill and a transfer station. The County's facilities are operated 6 days per week. The County also provides long-term care and maintenance of one closed landfill site. The County contracts with a private company for the collection of refuse and recycling from residents in unincorporated Volusia County; the County manages and administers the contract.

Though each solid waste system is unique and there are variations in the systems evaluated herein, it is possible to compare systems at a high level on parameters such as overall operating costs and employment. For this study, the number of full-time equivalent (FTE) employees and operating expenses⁴ were compiled, and compared against the system tonnage managed. All data presented reflects actual expenditures for FY2014, the most recent period for which data is available for all the systems. FY2014 data was obtained from Comprehensive Annual Financial Reports (CAFRs) or from FY2016 budget documents that provided FY2014 actual expense data⁵.



⁴ Collection operations are excluded from FTE employees and operating expenses.

⁵ Review and comparison of FY2015 expenses for all counties may be possible when FY2015 CAFRs are published.

1.2 Benchmark Analysis of Staffing Levels

Figure 1.1 shows a comparison of solid waste department staffing levels versus system tonnage managed for the three Hawaiian counties, including an overall trend line. Based on these data, the following observations are made:

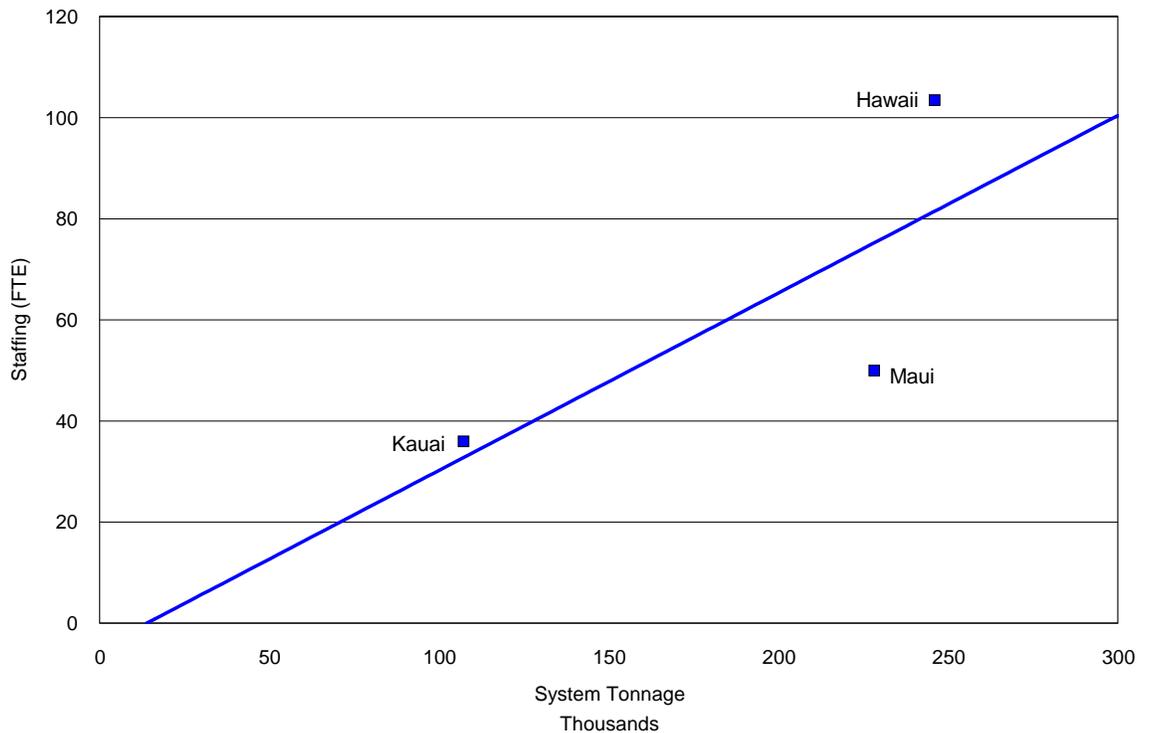
- Considering the three county systems reviewed, Maui County's FY2014 employment for solid waste services was below the overall trend.
- The trend is impacted by the notably higher employment in Hawaii County, resulting from their operation of a larger number of transfer stations relative to the other counties. While Maui County and Kauai County both own transfer stations, transfer station employment is not reflected in Figure 1.1 for either county because operations are either contracted to a private company (Maui) or included as a collection operation (Kauai). It was not possible to obtain separate estimates of transfer station and landfill employees in Hawaii County, because personnel are assigned to "response centers" instead of specific landfill or transfer station facilities⁶.
- Kauai County's system is more similar to Maui County's system. In FY2014, Maui County managed twice as many tons as Kauai County. Maui County also operates four landfills, while Kauai County operates one landfill. Despite managing double the tonnage and operating 3 additional landfills, Maui County only had 45% more employees than Kauai County, indicating that Maui County achieves certain economies of scale and efficiencies in its operations compared to Kauai County.

Although not evident from the summary data in Figure 1.1, we note that staffing at the Central Maui Landfill is less than staffing at Kauai's Kekaha Landfill. Kauai County allocates 20 employees to landfill operations, versus the 22 employees at Central Maui Landfill. In addition, based on information provided in an interview with Waste Management of Hawaii, an additional 3 personnel are assigned by the private company to provide project management, environmental monitoring, and quality assurance / quality control services under contract to the County. In total, therefore, the Kekaha Landfill is operated by 23 employees, compared to 22 employees operating the Central Maui Landfill (although the Kekaha Landfill is open 7 days per week versus 6 days per week for the Central Maui Landfill). The Kekaha Landfill disposed of 76,600 tons of waste in FY2014, versus 158,000 tons at the Central Maui Landfill; this corresponds to 3,330 landfilled tons per employee at the Kekaha facility versus 7,182 landfill tons per employee at the Central Maui Landfill.



⁶ Personal correspondence with Robin Bauman, Hawaii County Solid Waste Division Business Manager, January, 2016.

FIGURE 1.1. COMPARISON OF HAWAIIAN COUNTY SOLID WASTE SYSTEMS: STAFFING (FTEs) VS. SYSTEM TONNAGE (FY2014)



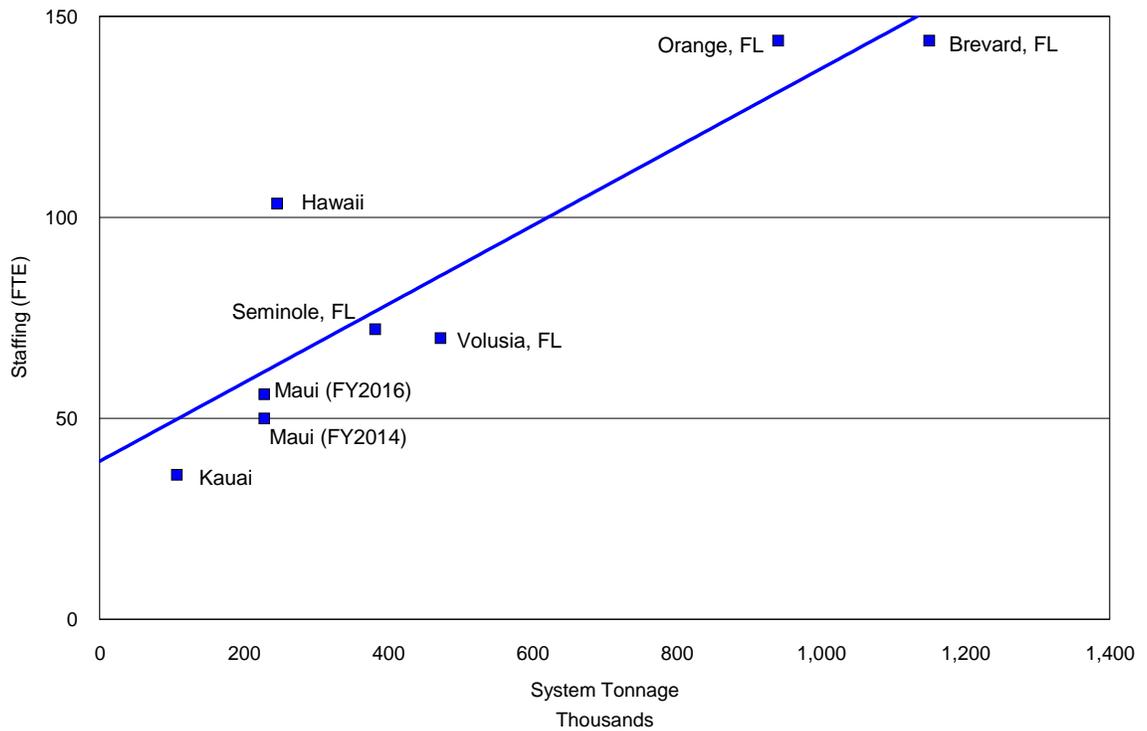
Source: FY2014 CAFR or actuals from budget documents. Data excludes collection personnel.

To provide additional data for comparison, we also considered solid waste systems in the State of Florida. As noted previously, much of the solid waste infrastructure in Florida is publicly-owned and operated, and the systems utilize landfills and transfer stations. Figure 1.2 compares solid waste department staffing levels versus system tonnage for the counties considered in both Hawaii and Florida. This comparison shows:

- Maui County's FY2014 employment was consistent with other systems, and lower than the overall trend line.
- Maui County's FY2016 employment, reflecting the addition of six employees since FY2014, also remains below the trend line.



FIGURE 1.2. COMPARISON OF PUBLICLY-OPERATED SOLID WASTE SYSTEMS: STAFFING (FTEs) VS. SYSTEM TONNAGE (FY2014)



Source: FY2014 CAFR or actuals from budget documents. Data excludes collection personnel.
 Note: Maui's FY2016 staffing is shown for comparison purposes only and is not used to compute the trend.

1.3 Benchmark Analysis of Operating Expenses

CB&I also evaluated operating costs as a function of tonnage handled by the benchmark systems. For purposes of these comparisons, costs associated with the disposal, recycling, and administrative operations of each solid waste system were included. Administration costs include both department-level administration as well as allocated County overhead and administration costs.

Collection costs were excluded, because the scope of this assessment was to address disposal operations only. Depreciation (or debt service) and closure and post-closure care expenses were also excluded, because those expenses are related to the capital investment in the systems, whereas this study is focused on operational parameters⁷.

Figure 1.3 shows a plot of operating expenses versus system tonnage for the three Hawaii solid waste systems. FY2014 data was utilized because, as noted previously, it represents the most recent available data for all counties included in the analysis. (We note that SWD requested and obtained funding for 6 additional staff positions subsequent to FY2014;



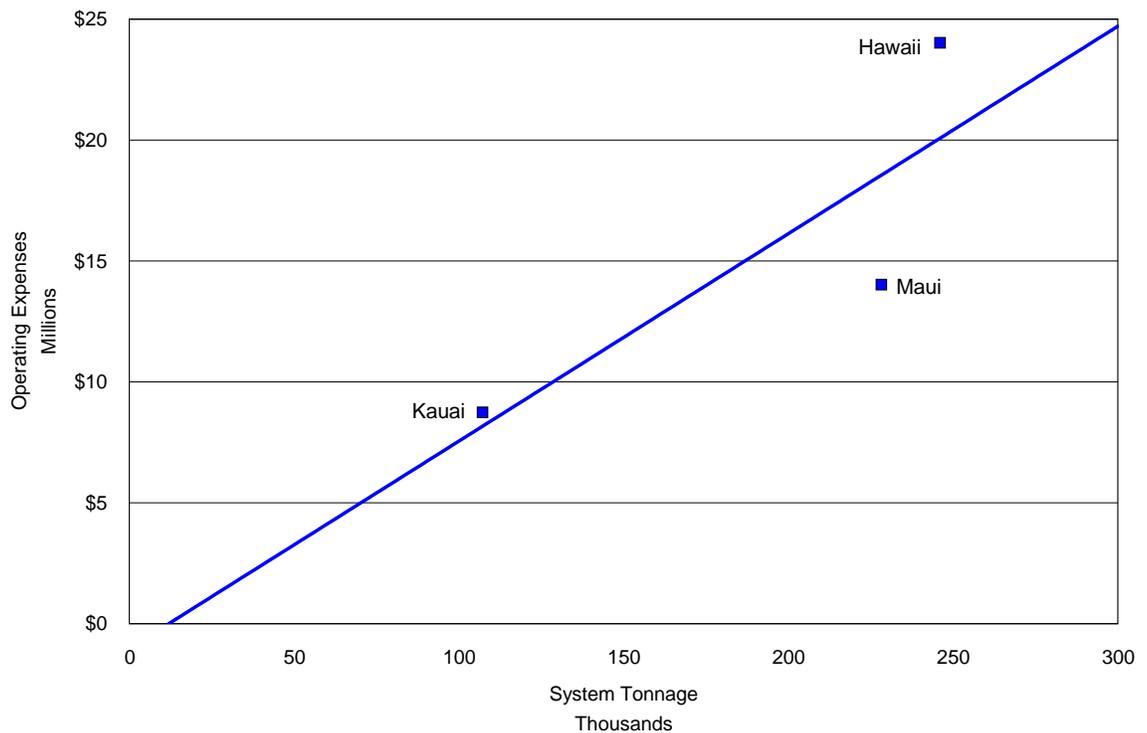
⁷ Additionally, depreciation (or debt service) was reported on a consolidated basis, and therefore may include some collection-related infrastructure for those systems that also provide collection services.

however, other systems may also have added to staff, and the FY2014 data allows all systems to be evaluated on a comparable basis).

Based on this comparative analysis, the following observations are made:

- Maui County's costs fall below the trend line for other systems in Hawaii.
- Hawaii County's system includes a large number of transfer station facilities, which contributes to higher operating expenses and impacts the overall trend line, as was the case in the analysis of staffing levels.
- Kauai County's operating expenses do not include costs associated with its transfer stations and are therefore understated in Figure 1.4 relative to both Maui County and Hawaii County. Kauai reports its transfer station costs combined with collection costs, and the expenses were not able to be segregated.

FIGURE 1.3. COMPARISON OF HAWAIIAN COUNTY SOLID WASTE SYSTEMS: OPERATING EXPENSES VS. SYSTEM TONNAGE (FY2014)



Source: FY2014 expenditures (CAFR or actuals from FY2016 budget documents). Data excludes collection costs, debt service, and depreciation.



To evaluate Maui County's operations against a larger dataset, operating expenses were also considered for publicly-owned and operated systems in Florida, as shown in Figure 1.4. For this comparison, Maui County's operating expenses are presented in two ways: 1) total operating expenses for all disposal, recycling, and administrative operations, and 2) adjusted operating expenses, excluding operating costs at the three smaller landfills. The adjusted total was included to show the relative impact on Maui County's cost base of operating four landfills versus just the Central Maui Landfill. All of the other systems considered operate one or two landfill facilities.

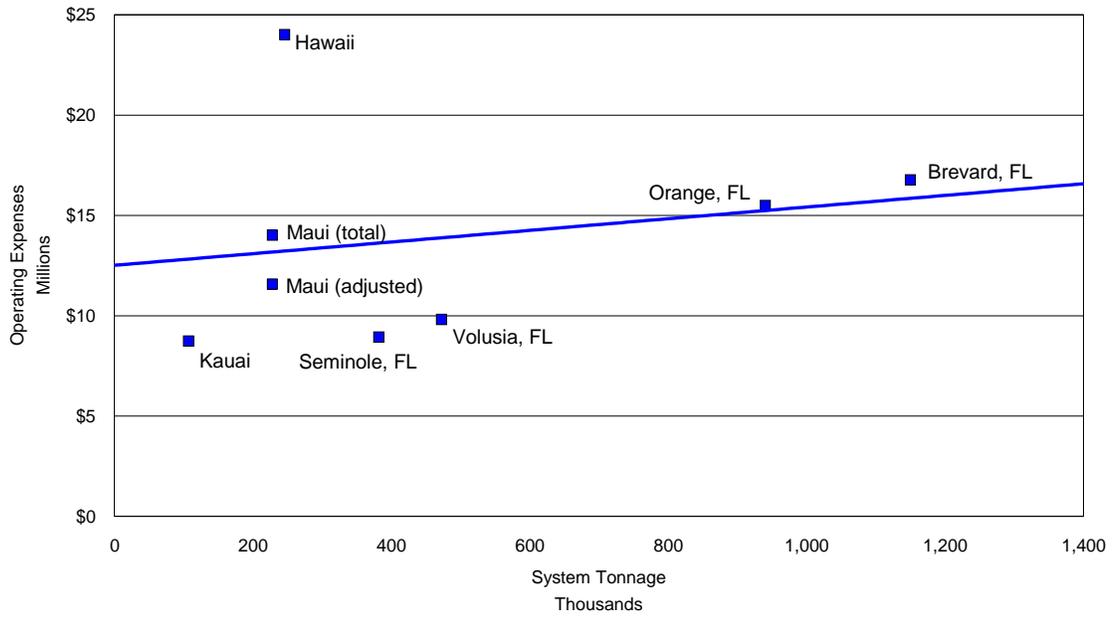
Based on these data, the following observations are made:

- Maui County's total operating costs in FY2014 are somewhat higher (approximately 6 percent) than the overall trend line. On an adjusted basis, excluding the three smaller landfills, the County's operating costs are below the trend line. Hawaii County, Orange County and Brevard County each operate two landfills, while the remaining systems operate one landfill.
- We note again that Hawaii County operates 22 transfer stations, which is why its costs are significantly higher than the other systems. The operating expenses for Kauai County, on the other hand, do not include transfer station operating costs, because Kauai includes those costs in its collection operations.
- We also note that the operating costs are inclusive of allocated County administration and overhead costs. Based on our review of CAFRs and other financial data, specific amounts of these allocated indirect costs were available for 3 systems: Maui County (\$1,788,255, or approximately 13 percent of operating costs); Kauai County (\$900,000, or approximately 10 percent of operating costs); and Orange County (\$608,638, or approximately 4 percent of operating costs).

Because the amounts of allocated County administrative costs were available for only the three systems noted above, we were not able to compute a trendline excluding such costs. It is apparent, however, that these indirect costs vary from system to system, and that a larger allocation was made to the Maui County system than in Kauai County and Orange County. We note that these allocated costs are established at the county-level and therefore are not within the control of solid waste departments.



**FIGURE 1.4. COMPARISON OF COUNTY SOLID WASTE SYSTEMS:
OPERATING EXPENSES VS. SYSTEM TONNAGE (FY2014)**



Source: FY2014 expenditures (CAFR or actuals from FY2016 budget documents). Data excludes collection costs, debt service/depreciation, and closure/post-closure costs.

Notes:

1. Maui (adjusted) excludes operating expenses at outlying landfills.
2. Kauai County owns and operates 4 transfer stations; operating expenses for the transfer stations are not included.
3. Computation of the trend line excludes Maui (adjusted).



1.4 Analysis of 6 FTE Positions Requested by SWD

During the FY2015 budget process, SWD requested 6 expansion positions. Two of these positions were approved by the Council in the initial adoption of the FY2015 budget. Subsequently, the Council approved a supplemental budget request to fund the other 4 positions for the remainder of FY2015. SWD re-submitted a request for these 4 positions during the FY2016 budget process, which were approved and included in the FY2016 budget.

Ultimately, the 6 FTE positions requested and subsequently approved included an equipment operator at the Hana Landfill (increasing the staff from 3 to 4); an equipment operator at the Lanai Landfill (increasing the staff from 3 to 4); an equipment operator at the Molokai Landfill (increase the staff from 4 to 5); a landfill attendant at the Central Maui Landfill (although an expansion position, the staff remained at 22 because an existing technical engineer position was shifted to the engineering section); and two new engineering positions (the engineering section grew from 3 staff to 6 including the 2 new positions along with the position moved from the Central Maui Landfill). For clarity, we note that there is a supervisor position for the Hana, Molokai and Lanai Landfills with an office at the Central Maui Landfill; this supervisor position is not included in the 22 staff at the Central Maui Landfill or the 5 staff at the Molokai Landfill noted above⁸.

We note initially that 3 of the FTE positions were added at the smaller landfills (one each at Hana, Molokai and Lanai). Table 1.2 shows the staffing levels at these landfills before and after the requested positions were approved.

TABLE 1.2. ADDITIONS TO SMALL LANDFILL STAFF						
Position	Hana Landfill		Molokai Landfill		Lanai Landfill	
	Prior	New	Prior	New	Prior	New
Working Supervisor	1	1	1	1	1	1
Equipment Operator	0	1	0	1	1	2
Landfill Attendant	1	1	1	1	1	1
Laborer	1	1	1	1	-	-
Cashier	-	-	1	1	-	-
Total	3	4	4	5	3	4

Notes:

1. Total excludes 1 supervisor position that oversees Hana/Molokai/Lanai and has an office at Central Maui Landfill.
2. Lanai landfill staff also performs solid waste collection on 2 days per week.



⁸ In the FY2016 budget, this supervisor position was assigned to the Molokai Landfill cost center, and the FY2016 budget documents therefore show 6 positions at Molokai.

Prior to the approval of a dedicated equipment operator at each landfill in FY2016, the single Working Supervisor position indicated in Table 1.2 for each landfill was responsible for both equipment operations and site management activities (including personnel, compliance, site inspections, planning, budgeting and scheduling). During the FY2015 budget discussions, SWD noted that due to vacation time as well as needing to allow for absences due to illness, it was challenging to operate the landfills without a dedicated operator. Further, the Working Supervisor had to forego most management duties in order to be the sole operator at the working face of the landfill. The dedicated equipment operator requested for each landfill would allow the operator to focus on compacting trash, and provide the Working Supervisor more time to perform management responsibilities as well as serve as a backup equipment operator.

CB&I finds that these were reasonable concerns on the part of SWD. A Working Supervisor acting as the sole equipment operator would necessitate that the supervisor work every day the landfill was open and forego some management duties. We believe that the addition of a dedicated equipment operator at each of the three landfills will provide greater operational flexibility and greater capacity of the Working Supervisor to manage the landfill and address compliance requirements.

We would also note that the Olowalu Convenience Center is privately operated under contract, and that facility utilizes two staff (a third employee is used to haul materials from the convenience center). The convenience center is a drop-off facility for residents, and the work duties of the landfill staff include activities (e.g., compacting trash, applying daily cover) that are not required at the convenience center. The contract operator of the convenience center also has an operations manager, not included in the three employees noted above, that inspects the site and operations on a weekly basis (daily, if necessary).

This private contractor also currently operates (under contract) the Recycle Molokai facility, and in a recent proposal to the County, the contractor noted that staff had been increased from 4 to 9 employees⁹. The current contract includes operation of the HI5 redemption center, drop-off recycling facility, and inspection of incoming recyclable materials. Although not directly comparable to the County's landfill operations because it includes different activities, we note that the private operator has also expanded staff in the past.

Much of the discussion on the 6 positions during the FY2015 budget session centered around compliance. SWD's basis for requesting the additional positions was to provide sufficient staffing to operate the County's 4 active landfills, as well as the system generally, at a greater level of compliance. SWD noted that, since 2000, the County has received a number of compliance violations from the State Department of Health and other regulatory agencies, and that between 2006 and 2014, these violations resulted in compliance costs (fines and corrective actions) amounting to \$7,069,125, or \$883,641 per year¹⁰.

⁹ The proposal was dated 2010 and listed greenwaste drop-off and processing as well as operation of the scalehouse as services provided at Recycle Molokai. These additional services may have been included in the previous operating contract. SWD notes that currently the scalehouse is operated by County personnel and that another private contractor operates the greenwaste drop-off and processing area.

¹⁰ We note that the period 2006 to 2014 includes 9 years, suggesting a corrected annual average of \$785,458 .



CB&I reviewed the historical compliance violations, and analyzed the data by categorizing the violations into three principal categories (refer to Attachment A):

- Operations related, which would include such issues as applying daily cover, vectors, litter, vegetation maintenance, dust, cover maintenance, surface water best management practices, leachate handling, and waste acceptance procedures.
- Environmental/design related, which would include such issues as stormwater management, landfill gas, and groundwater.
- Reporting related, which would include such issues as timely filing of required reports on stormwater, landfill gas, and groundwater monitoring.

The operations-related compliance matters are issues that need to be addressed through daily operating practice by the personnel assigned to each landfill. The reporting-related compliance matters are issues that would typically be addressed by engineering staff. The environmental/design related matters represent issues that are typically less under the control of landfill and engineering staff and may require outside consulting support and/or capital improvements (e.g., provision of an all-weather access road, updating of stormwater pollution control plans, installation of landfill gas collection and control system by required date).

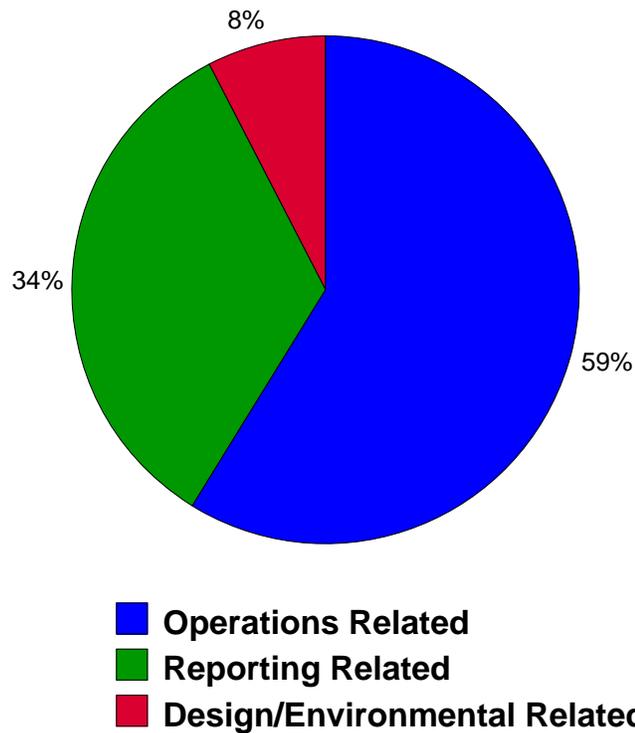
Based on our review of SWD's compliance history, CB&I found that approximately 59 percent of compliance issues were operations related, 34 percent were reporting related, and 8 percent were design/environmental related (refer to Figure 1.5 and Attachment A). Excluding the design/environmental issues, the operating and reporting issues occur in a proportion of 63 percent (operations) and 37 percent (reporting).

The 6 requested new positions, which consisted of 4 operations staff and 2 engineering staff¹¹, are generally in the same proportion (67 percent/33 percent) as the compliance issues those staff would be expected to address (63 percent/37 percent). Thus, the added positions should allow the Solid Waste Division to better address the compliance issues that have historically been cited by State regulatory agencies.



¹¹ We note that the engineering positions were requested to perform other duties in addition to compliance-related activities, such as managing CIP projects.

FIGURE 1.5. SUMMARY OF COMPLIANCE ISSUES BY TYPE



Source: Solid Waste Division.

Following the approval of the 2 requested engineering expansion positions, the Engineering Section of SWD includes 6 personnel. Based on our review of benchmark data for other publicly-operated systems, a staff of 6 is within the range of engineering departments employed at other systems, although it is at the higher end of the range. Volusia County, in Florida, has 1 engineer (that system, however, has one landfill and one transfer station). Kauai County has two county-employed engineers, but the County contracts with Waste Management for compliance, monitoring and project management of the Kekaha Landfill; Waste Management provides 3 employees for its services, and therefore Kauai County's system relies on 3-5 staff for compliance support. Hawaii County has two engineering staff, but receives compliance support from Waste Management, which is contracted to assist in operating the West Hawaii Landfill. The engineering section in Orange County, Florida has 6 personnel; that system handles larger quantities of waste than Maui County, but includes fewer facilities (two co-located landfills and two transfer stations)

The County also has four closed landfills which must be maintained (and which have been subject to compliance actions in the past). In a letter from DEM to the Council's Budget and Finance Committee on May 1, 2015, SWD presented construction and operations and maintenance cost information to remediate the closed landfills (refer to Table 1.3). It is our understanding that in April, 2015, SWD commissioned on consultant study to prepare closure and post-closure maintenance plans for the closed landfills (when CB&I met with DEM and SWD staff in September, 2015, the results of this study were not yet available).



TABLE 1.3. ESTIMATED CLOSED LANDFILL COSTS

Closed Landfill	Estimated Remedial/Cover Construction Costs			Post FY2016 6-Year O&M
	Total	Through FY2016	Remaining	
Makani	\$542,850	\$399,850	\$143,000	\$120,000
Kalamaula	\$2,142,250	\$550,550	\$1,591,700	\$198,000
Waikapu	\$1,137,400	\$411,400	\$726,000	\$162,000
Olowalu	\$2,558,160	\$409,200	\$2,148,960	\$192,000
Total	\$6,380,660	\$1,771,000	\$4,609,660	\$672,000

Source:

1. DEM Letter to County Council Budget and Finance Committee, May 1, 2015.

Note:

1. Costs through FY2016 represent budgeted costs and activities expected to be completed (or partially completed) in FY2016.

We believe that the assessment of the closed landfills is an important planning tool, although we don't know if the results of that study will impact the cost estimates in Table 1.3. Most of the capital costs for the closed landfills are associated with performing topographic surveys, importing and placing soils to improve drainage, hydroseeding to establish vegetative cover, and repairing or replacing perimeter fencing. It appears that DEM is planning to provide for the proper closure and long-term maintenance of the 4 closed landfills.

Following completion of the construction activities, SWD has also estimated 6-year operations and maintenance costs to maintain the closed landfills. These costs include repairs to the cover soil for erosion, regrading areas that have settled, maintaining the vegetation and stormwater collection system, and repairing perimeter fencing. These are typical costs in maintaining a closed landfill. It is unclear, however, whether these operation and maintenance costs are labor-related or materials-related, and further whether the activities would be performed by in-house personnel or as contracted services. CB&I recommends that the Council obtain clarification from SWD on these questions.

As noted in the Introduction, one of the concerns of the Council during the FY2015 budget discussions was the request of the Solid Waste Division for 6 new positions, when DEM had previously represented that the IWCEP would reduce internal resource needs to maintain regulatory compliance. While the IWCEP (as discussed in Section 2) is intended to reduce the amount of waste disposed in the Central Maui Landfill, the Landfill will continue to operate. In addition, the Solid Waste Division will continue to operate the 3 smaller landfills and is responsible for the 4 closed landfills. It appears that the 6 requested positions were intended to address Division-wide regulatory compliance, and not compliance solely at the Central Maui Landfill.



1.5 Future Financial Planning

During our review of the extensive documentation provided by SWD and Council Services pertaining to the FY2015 budget process and solid waste operations generally, we observed that considerable information has been developed on the operations and costs to manage the County's solid waste system. Due to the nature of the budget process, the questions asked by Council are detailed and specific, as are the responses from SWD. In addition to questions pertaining directly to position expansion and equipment requests, Council has requested information on historical costs to operate the County's landfills, costs to provide for maintenance of the closed landfills, and costs of diversion (e.g., recycling or composting) programs. SWD has provided detailed information in response to these background type requests.

It appears that although this detailed, valuable information exists and has been presented to Council, an overall summary of the costs within the Solid Waste Division, current as well as projected, is not available (outside the 6-year CIP projections developed during the budget process)¹². The operations of the SWD encompass multiple activities (e.g., landfills, collection, diversion programs) as well as active and closed landfills. There are also debt service and County overhead costs which impact the SWD budget. Developing a summary financial model to address the projected costs of operating and maintaining the solid waste system (including legacy landfills) would be a helpful tool for communicating near-term budget requests in the context of the long-term goals and responsibilities of the SWD.



¹² We note that in an April 24, 2015 letter to the Council Budget and Finance Committee, DEM did provide two graphs of 6-year projected costs for what DEM termed reactive and proactive operating management models. This suggests that DEM is thinking along a similar line, although the data provided in the letter was summarized at a very high level.

1.5 Findings and Recommendations

Findings:

- The Solid Waste Division's FY2014 staffing levels are consistent with other solid waste systems in both Hawaii and Florida, relative to system tonnage.
- Although SWD added 6 positions between FY2014 and FY2016, the higher level of staffing remains consistent compared to other public waste systems.
- Operating costs for SWD are generally consistent with other publicly-operated systems, though approximately 6 percent higher than the overall trend line. This may stem in part from varying levels of indirect costs (i.e., County administration and overhead) that are established at the county-level and therefore are not within control of solid waste departments. SWD also operates 4 landfills, a higher number than the other systems included in the comparison.
- The 6 positions added to SWD included 4 operations personnel and 2 engineering staff. After reviewing the compliance history of SWD, we believe the added personnel have been allocated proportional to the compliance issues they would be responsible for addressing.
- Given the approved 6 positions and current funding levels, CB&I believes that the Solid Waste Division is positioned to operate its solid waste facilities to maintain acceptable levels of regulatory compliance.

Recommendations:

- The County is responsible for 4 active and 4 closed landfills. The Solid Waste Division has started to address the proper closure and long-term maintenance of the closed landfills, and has identified remedial costs for the closed facilities as well as operations and maintenance costs. The Council should request further clarification of the projected operations and maintenance costs, as it is unclear whether those activities would be performed by in-house staff or contracted services.
- We also recommend that the Solid Waste Division prepare a long-range (e.g., 6-year or 10-year) financial forecast for the Division. Such a forecast would be useful in communicating future budget requests to the Council, as it would provide the context for near-term requests based on a long-range financial plan. Although developing such a financial plan might require additional resources for the Solid Waste Division, we believe it would facilitate both the budget process and management of the solid waste system.



Section 2

Cost Assessment of Integrated Waste Conversion and Energy Project (IWCEP)

This section provides CB&I's analysis of the potential cost impacts of the IWCEP project. In preparing this analysis, CB&I reviewed the RFP for the IWCEP, the contract executed with Anaergia¹³, and data from the County on solid waste tonnages and current program costs. In addition, we reviewed an analysis prepared by the Department of Environmental Management (DEM) which compares the projected costs of the IWCEP project versus current conditions (refer to Attachment B). The DEM analysis projected that the IWCEP project would result in net cost savings for the County.

2.1 Summary of the IWCEP Project

In November, 2012, DEM issued a Request for Proposals (RFP) to technology vendors interested in providing an Integrated Waste Conversion and Energy Project (IWCEP). The purpose of the RFP was to select a project developer to finance, plan, design, permit, construct, own, operate and maintain a waste to value facility to produce energy, fuel, recycled materials and/or other products. The County would deliver waste materials under its control, as well as landfill gas from the Central Maui Landfill, to the project developer.

DEM selected Anaergia Services, LLC (Anaergia) as its preferred vendor, and a services agreement was executed on January 8, 2014. The facility to be developed by Anaergia will include several components including a materials recovery facility (to sort and recover recyclable materials); an anaerobic digester (to convert the organic fraction of the incoming waste into biogas); and a solid fuel facility (to convert the remaining fraction of the incoming waste into a solid fuel product). The facility will also utilize landfill gas from the Central Maui Landfill to generate fuel and/or electricity, primarily for use in providing power to the facility.

The contract states that the facility will be designed to divert 85 percent of the incoming "acceptable waste" from landfill disposal, and 65 percent of the incoming construction and demolition waste. Acceptable waste is defined in the contract as commercial and residential trash, fats/oil/grease (FOG), construction and demolition waste, agricultural plastic, greenwaste, tires, source separated recyclables, sewage sludge, and residuals from water and wastewater treatment. Acceptable waste does not include "unprocessibles", which is defined to include materials that cannot be processed at the IWCEP facility. These would include bulky items (such as appliances), hazardous waste or household hazardous waste. The contract notes that the diversion rates of 85 percent and 65 percent are target rates that depend on the composition of the incoming waste; the performance guarantees in the contract require that 70 percent of the incoming waste be diverted from disposal.

¹³ As noted previously, although CB&I reviewed the contract and has a general understanding of the proposed facility, we did not perform a technical assessment of the IWCEP or the Anaergia technology. Our review was limited to assessing the potential cost impacts of the IWCEP versus the current operations of the Central Maui Landfill. Further, although we reviewed the contract to understand its terms, CB&I offers no legal findings or conclusions.



2.2 Review of Waste Quantities

Section 6.03 of the contract with Anaergia includes what is commonly termed a “put-or-pay” agreement, in which the County commits to initially deliver a minimum of 125,000 tons per year of acceptable waste. Under a put-or-pay agreement, the County would pay for any tonnage that falls below the threshold. For example, if waste deliveries were 110,000 tons, the County would pay the tipping fee on both the 110,000 tons actually delivered and the 15,000 tons of shortfall. If, on the other hand, waste deliveries were 130,000 tons, the County would pay the tipping fee on 130,000 tons of waste. As discussed in this section, the language of Section 6.03 is somewhat unclear as to whether the 125,000 tons per year is fixed over the term of the contract or will change over time.

As an initial step in our review of the IWCEP project, CB&I reviewed historical data on waste quantities managed by the County, for comparison with the annual put-or-pay tonnage commitment.

Table 2.1 summarizes historical waste quantities received at the Central Maui Landfill for the past five fiscal years. Quantities of municipal solid waste (i.e., residential and commercial trash) that are disposed in the Landfill are shown, as are quantities of waste that are received at the Landfill and diverted from disposal (e.g., greenwaste, sludge, etc.). Table 2.1 also shows tonnages of recyclables collected by the County at other locations in addition to the Central Maui Landfill.

On average, the Central Maui Landfill disposed of approximately 153,000 tons per year of municipal solid waste (MSW) over the past 5 years. Disposal tonnages were approximately 7 percent higher in 2014 and 2015 versus 2011-2013, which may stem from improvements in the economy. On average, MSW quantities have exceeded the initial 125,000 ton threshold by about 28,000 tons, or 22 percent. Further, MSW quantities have exceeded 125,000 tons in each of the past five years.

Because the 125,000 ton initial threshold is based on “acceptable waste”, which includes other materials such as organics and recyclables, the put-or-pay could be addressed with these materials in addition to MSW. In fact, according to Section 5.05 of the contract, the County intends to deliver organics and recyclables in addition to MSW to the IWCEP project:

Delivery of Acceptable Waste. Commencing on the Commercial Operations Date, the County agrees to provide or cause to be provided to MRRF, and MRRF agrees to accept and process all of the Acceptable Waste received by the County at the Central Maui Landfill. As of the Effective Date, the County’s Source Separated Recyclables programs on Maui include the County Residential Recycling Centers (community residential recycling dropboxes) and the County curbside recycling collection program. The County will cause such County-owned Source Separated Recyclables received by these programs after the Commercial Operations Date to be delivered to MRRF, provided that the County may increase, decrease, or cease such programs at its sole discretion.

Table 2.1 shows that deliveries of organic materials (e.g., greenwaste, sludge, cooking oil) to Central Maui Landfill have averaged approximately 46,000 tons per year. County collections of recyclables have averaged approximately 2,800 tons per year. Total



quantities of acceptable waste (including MSW, organics and recyclables) have averaged about 202,000 tons per year, a buffer of 77,000 tons or 62 percent¹⁴.

TABLE 2.1. MAUI COUNTY WASTE QUANTITIES						
Material/Collector	2011	2012	2013	2014	2015	Average
Central Maui Landfill - Municipal Solid Waste for Disposal						
Commercial Haulers	86,209	86,038	87,608	93,604	94,419	89,576
County Collected	44,653	43,458	42,103	45,070	44,463	43,949
Residential Haulers	13,690	13,640	14,257	15,499	19,304	15,278
County Haulers	2,015	3,479	3,105	1,862	862	2,265
Olowalu	1,911	1,764	1,745	2,044	0	1,493
Subtotal - MSW	148,479	148,379	148,818	158,079	159,048	152,561
Central Maui Landfill - Organic Materials						
Greenwaste - Private Hauler	13,282	13,185	13,530	11,023	13,424	12,889
Greenwaste - County	4,802	4,134	3,841	3,750	3,603	4,026
Sludge	23,455	22,885	22,860	23,751	22,762	23,142
Greasetrap Waste	3,073	5,660	5,741	5,461	5,411	5,069
Cooking Oil	942	1,052	1,101	1,192	1,204	1,098
Subtotal - Organics	45,553	46,916	47,073	45,178	46,404	46,225
County Recycling						
Central Maui Landfill	0	768	758	1,021	1,224	754
Olowalu	105	142	64	74	161	109
County Drop-off Facilities	2,039	1,958	1,804	1,809	1,846	1,891
Subtotal - Recyclables	2,144	2,868	2,626	2,904	3,231	2,755
Total Materials (MSW, Organics, Recyclables)						
Total	196,176	198,163	198,517	206,161	208,682	201,540
Notes:						
1. Excludes waste materials from three smaller landfills.						
Source:						
1. Solid Waste Division, Facility Annual Tonnage Reports.						

Based on the wording contained in Section 6.03 of the contract, the 125,000 tons per year put-or-pay commitment could be interpreted to mean an initial threshold that would change over time. Under such an interpretation, the threshold would increase or decrease on a 3-year rolling average basis, and therefore the put-or-pay commitment could increase over time (if actual waste deliveries are in excess of 125,000 tons per year), or decrease over time (if actual waste deliveries are below 125,000 tons per year).

¹⁴ During the public comment period at the County's Policy and Intergovernmental Affairs Committee on October 27, 2014, the question was raised whether the County owns certain waste materials (e.g., greenwaste) before it crosses the scale at the Central Maui Landfill, and therefore whether it could be committed to the IWCEP. This is a legal question, and CB&I offers no opinion on that question. As a practical matter, it appears that the County would have control over sludge and recyclables (since those originate from County operations), but does not have control over all of the greenwaste generated with the County.



Section 6.03 of the contract states:

Guaranteed Annual Minimum Tonnage of Acceptable Waste. Beginning on the Commercial Operations Date, the County will deliver or cause to be delivered a minimum of 125,000 tons of Acceptable Waste per Contract Year to MRRF¹⁵, provided that the County does not control and cannot guaranty the quality or composition of said Acceptable Waste or its suitability for any purpose. The Guaranteed Annual Minimum Tonnage of Acceptable Waste shall be measured as the average of the preceding three Contract Years. For example, the Guaranteed Annual Minimum Tonnage for Contract Years 1, 2, and 3 shall be the average of those Contract Years. Thereafter, the Guaranteed Annual Minimum Tonnage for Contract Year 4 shall be the average of Contract Years 2, 3, and 4, and the Guaranteed Annual Minimum Tonnage for Contract Year 5 shall be the average of Contract Years 3, 4, and 5, and so on. If the Guaranteed Annual Minimum Tonnage is not delivered, the County shall compensate MRRF by paying the then-applicable per-ton price for MSW for the tonnage of deficiency as part of the Annual Settlement Process in Section 6.10. if MRRF does not accept up to the per ton limits set out in the definition of Excess Acceptable Waste, as measured on a Contract Year basis, fails to meet any of the Performance Guarantees applicable to the current Contract Year as set out in Article IX or accepts Acceptable Waste from others pursuant to Section 6.01, this Section 6.03 shall not apply.

It appears from this language that while the initial put-or-pay threshold is established at 125,000 tons per year, the applicable threshold during contract years 1-3 won't be known until the end of contract year 3. It is unclear whether the 3-year average tonnage would then be applied retroactively as the put-or-pay amount to contract years 1 and 2. Alternatively, it is unclear whether the 125,000 tons per year threshold was intended as the applicable threshold for contract years 1-3, with the threshold to be adjusted subsequently based on a 3-year rolling average of actual tonnages.

A strict reading of Section 6.03 suggests that the minimum tonnage guarantee during the first 3 years will not be 125,000 tons per year, but rather the average of waste deliveries during those years. This has the potential to result in unintended consequences, which an example calculation will make clear.

Table 2.2 shows two scenarios of waste deliveries, one in which deliveries in year 3 are 150,000 tons (or 25,000 tons above the initial threshold), and one in which deliveries in year 3 are 100,000 tons (or 25,000 tons below the initial threshold). In both scenarios, tonnage deliveries for all other years are 125,000 tons.

In the first scenario, if the applicable put-or-pay threshold for contract years 1-3 is set at actual waste deliveries for those years, then the minimum tonnage guarantee would increase from 125,000 tons per year to 133,333 tons per year ($= [125,000 + 125,000 + 150,000]/3$). If this new minimum tonnage guarantee was applied retroactively to contract years 1 and 2, a short-fall would occur and the put-or-pay provision would be triggered. Short-falls would also occur in contract years 4 and 5 due to the 3-year rolling average calculation of the minimum tonnage guarantee. If Section 6.03 is interpreted in this way, the County could pay for the retro-active shortfall in years 1-2, even though 125,000 tons of waste was delivered in those years. Further, the County could pay on 808,000 tons over



¹⁵ The IWCEP is referred to as the "MRRF" in the contract document.

6 years versus the 775,000 tons actually delivered, even though actual deliveries were 125,000 tons or greater in each year.

Scenario 2 shows similar calculations if waste deliveries in year 3 are below the initial threshold of 125,000 tons. Based on actual waste deliveries for years 1-3, the applicable minimum tonnage guarantee would be calculated as 116,667 tons (= $[125,000 + 125,000 + 100,000]/3$). In years 1 and 2, tonnage deliveries exceeded this amount, and so the County would pay on the 125,000 tons actually delivered. In year 3, a short-fall would occur and the County would pay on the minimum guarantee tonnage of 116,667 tons, not the 100,000 tons actually delivered. In this scenario, over 6 years the County could pay on 741,667 tons of waste, whereas 725,000 tons are actually delivered.

TABLE 2.2. MINIMUM GUARANTEE DELIVERIES - EXAMPLE CALCULATIONS							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Scenario 1							
Actual Tonnage Delivered	125,000	125,000	150,000	125,000	125,000	125,000	775,000
Minimum Guarantee Tonnage	133,333	133,333	133,333	133,333	133,333	125,000	
Short-fall	8,333	8,333	0	8,333	8,333	0	
Tons Paid On	133,333	133,333	150,000	133,333	133,333	125,000	808,333
Scenario 2							
Actual Tonnage Delivered	125,000	125,000	100,000	125,000	125,000	125,000	725,000
Minimum Guarantee Tonnage	116,667	116,667	116,667	116,667	116,667	125,000	
Short-fall	0	0	16,667	0	0	0	
Tons Paid On	125,000	125,000	116,667	125,000	125,000	125,000	741,667

These are hypothetical examples to illustrate the ambiguity in the put-or-pay provision in the contract, and are not intended to forecast what will actually happen. Conceptually, it is fair to adjust the minimum tonnage guarantee over time, as this can provide some protection to the County if waste volumes decrease. However, the current wording of Section 6.03 is unclear, and might be interpreted in such a way that unintended consequences could occur, as illustrated in these examples¹⁶. It is possible that the minimum guarantee provision was never intended to operate in this manner when the contract was negotiated. This matter should be clarified by the DEM and Anaergia.

¹⁶ We also note that “actual tonnage deliveries,” as used in the examples, are not mentioned in Section 6.03, but rather are implied. Section 6.03 could therefore also be interpreted to mean that the minimum tonnage guarantee is always 125,000 tons per year and is not subject to change. This is DEM’s interpretation of the contract (refer to Attachments E and F); however, that interpretation is not clearly stated in the current wording of Section 6.03.



2.3 Cost Analysis

We now turn our attention to the cost impacts of the IWCEP, and whether the project will result in net savings to the County versus the current system. To address this question, we refer to the cost analysis prepared by DEM (see Attachment B) and evaluate the assumptions contained therein.

The DEM analysis consists of two parts: a one-year summary cost analysis, and a 20-year life-cycle cost projection. The DEM considers costs for a “current conditions” scenario, meaning continued landfilling at the Central Maui Landfill, and then comparative costs for the IWCEP scenario¹⁷. For ease of reference, the DEM one-year summary cost analysis is reproduced in Figure 2.1.

The bottom-line result of the DEM one-year summary analysis is an estimate of “Net Annual County MSW Costs” under each scenario, which DEM projects would be \$1,542,500 for the current conditions scenario versus \$626,000 for the IWCEP, DEM’s one-year analysis results in annual cost savings of \$916,500 to the County.



¹⁷ A third scenario addressing curbside recycling is also provided, though not an element of this assessment.

FIGURE 2.1 - SUMMARY DEM COST ANALYSIS

SECTION 1

Assumptions

Commercial Haulers	91,050 tons/year
Residential Haulers	12,000 tons/year
Olowalu	1,750 tons/year
County Haulers	3,100 tons/year
County Residential Refuse Collection	42,100 tons/year
Estimated Total MS Waste	150,000 tons/year

SECTION 2

Tipping Fees

Anaergia Tip Fee	\$68.00 per ton
CML Tip Fee	\$90.00 per ton

SECTION 3

Annual County MSW Costs

	Current	IWCEP
CML Staff	\$1,837,000	\$367,400
CML Operations	\$2,000,000	\$500,000
CML Cover Material	\$1,400,000	\$280,000
CML Space (Volume Usage)	\$4,500,000	\$900,000
Tip Fee to Anaergia	\$0	\$4,008,600
Island-wide Curbside Recycling	\$0	\$0
Annual County MSW Total Costs	\$9,737,000	\$6,056,000

SECTION 4

Annual County MSW Revenues

	Current	IWCEP
Tip fee	\$8,194,500	\$5,430,000
Annual County MSW Total Revenues	\$8,194,500	\$5,430,000

SECTION 5

Net Annual County MSW Costs

\$1,542,500	\$626,000
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CML Diversion Rate

45%

89%

Intangible IWCEP Benefits Not Captured Above

- Reduced GHG Emissions
 - Less Landfilling/Increased Diversion
 - Monetize Environmental Attributes
 - Sustainability from Fuel Production
 - Reduced Landfill Leachate Costs
 - Economic Development (Jobs + tax revenues)
 - Extended Life of CML Equipment (~\$10M capital)
 - Seven Day Landfill
 - Improved Permit Compliance/NOV Reduction
 - Limit on risk of operating escalations
- Assumptions: savings in equipment CIP due to the longer life of the equipment is not captured.

Note: The section number designations on this worksheet were added by CB&I.



For clarity, the DEM analysis focuses on the costs associated with the Central Maui Landfill cost center, and not the Solid Waste Division as a whole. CB&I agrees with this approach. The IWCEP will largely serve as an adjunct facility to the Central Maui Landfill, with the aim of extending the life of the landfill. The three other County landfills (Hana, Lanai and Molokai) would still continue to operate, as would the Olowalu Convenience Center, and therefore the costs associated with those operations will be incurred under either scenario.

The DEM one-year analysis can be broken down into 5 component sections as indicated in Figure 2.1:

1. Assumptions on tonnage deliveries;
2. Tipping fees charged at the Central Maui Landfill and the Anaergia facility;
3. Estimated solid waste management costs under the current conditions scenario versus the IWCEP scenario;
4. Estimates of County revenues collected through tipping fees; and,
5. Estimates of net annual costs to the County (which is calculated by subtracting the costs in section 3 from the revenues in section 4).

In the following sections, the assumptions underlying the cost and revenue projections for the current conditions scenario are evaluated for reasonableness. These assumptions include:

- Tonnage
- Tipping fees
- Operating costs, including labor, operations, and landfill cover
- Landfill space (volume use)
- Tipping fee revenue

Then, the assumptions underlying the change in costs and revenues between the current conditions scenario and IWCEP scenario are evaluated. These assumptions include:

- Comparative costs under the two scenarios
- Comparative revenues under the two scenarios
- Comparative landfill equipment costs under the two scenarios (although not included in the DEM model, CB&I performed an analysis of equipment costs)

2.3.1 Tonnage Assumptions

Table 2.3 provides a comparison of the tonnage assumptions in the DEM analysis (refer to Section 1 of Figure 2.1) with the 5-year historical waste deliveries at the Central Maui Landfill. The DEM analysis assumed tonnages that generally correspond with actual historical waste deliveries¹⁸. These assumed tonnages are therefore judged to be reasonable, although the relative amount of commercial waste to residential waste is somewhat higher in the DEM analysis compared to the FY2011-2015 average.

Since the County only collects a tipping fee on the commercial hauler waste, this difference would impact the revenue projections contained in the DEM analysis. If the 5-year historical average tonnages are used, the DEM model results in Net Annual County MSW costs of



¹⁸ We would expect that DEM also considered historical tonnage information in developing tonnage assumptions for its analysis of the IWCEP.

\$1,751,990 for the current conditions scenario and \$879,380 for the IWCEP scenario, a savings of \$872,610 for the IWCEP. This savings is somewhat lower than initially projected by DEM, demonstrating that savings will be dependent on tonnage overall as well as tonnage from each individual source.

TABLE 2.3. DEM TONNAGE ASSUMPTIONS vs. HISTORICAL ACTUAL TONNAGES

Source of Waste	DEM Analysis Tons Per Year	FY2011-2015 Average Tons Per Year
Commercial Haulers	91,050	89,576
County Residential Refuse Collection	42,100	43,949
Residential Self-Haul (Drop-off at CML)	12,000	15,278
County Misc. Trash	3,100	2,265
Olowalu Convenience Center	1,750	1,493
Subtotal - Residential Waste	58,950	62,985
Total	150,000	152,561

Sources:

1. Department of Environmental Management, IWCEP analysis, undated.
2. Solid Waste Division, Landfill Annual Tonnage Reports.

2.3.2 Tipping Fee Assumptions

The DEM analysis shows a tipping fee at the Central Maui Landfill of \$90/ton (see Section 2 in Figure 2.1). The County adopted fee schedule for FY2016 indicates a disposal fee of \$0.038 per pound, or \$76/ton, plus a recycling surcharge of \$10/ton, for a total tipping fee of \$86/ton. The \$90/ton in the DEM analysis may have been a forward estimate of tipping fees at the Central Maui Landfill, perhaps to FY2017 or beyond, since the IWCEP project will not be operating in FY2016¹⁹. While that would be a reasonable assumption, it does not appear that cost items (e.g., labor, other operating costs) were similarly escalated to a common future year, so that revenues and expenses are stated in comparable dollar terms. Here we will note that using the current \$86/ton landfill tipping fee in the DEM model would result in Net Annual County MSW Costs of \$1,906,700 for the current conditions scenario and \$1,226,000 for the IWCEP scenario, a savings of \$680,700 for the IWCEP. This savings is lower than initially projected by DEM.

Under the IWCEP scenario, the County will pay Anaergia a tipping fee of \$68/ton for waste delivered by the County to the Project (as specified in Section 6.08 of the contract). This rate would be applicable in the first year that the IWCEP commences operations (either in FY2016 or, more likely, some future year), and therefore is both a current tipping fee as well as a “forward-rate” tipping fee.

There is a third tipping fee which is not shown explicitly on the DEM analysis, but which is embedded in a formula in the spreadsheet. The third tipping fee amounts to \$71/ton, and is the rate that the County would charge Anaergia to dispose of residue from the IWCEP. The DEM model assumes that residue will amount to 20 percent of the incoming waste. As



¹⁹ We also note that DEM initially proposed a tipping fee of \$90/ton (inclusive of the recycling surcharge) in its FY2016 budget request.

noted previously, the contract states that the goal of the IWCEP is to divert 85 percent of the incoming MSW, and the performance guarantees require a minimum 70 percent diversion. The assumed 20 percent residue rate implies 80 percent diversion and is a reasonable mid-range estimate between the minimum required and target diversion rates of the IWCEP contract.

2.3.3 Operating Cost Assumptions

Table 2.4 presents historical operating cost data for the Central Maui Landfill. This data was compiled to evaluate the operating cost assumptions contained in the DEM cost analysis. Note that the wage data in Table 2.4 excludes benefits because benefit costs for the entire Solid Waste Division are accumulated in a single account. Additionally, debt service and allocated County administration costs are not included for consistency with the DEM analysis. As noted previously, the DEM analysis did not include these costs because they will be incurred under both the current conditions and IWCEP scenarios, which CB&I agrees is reasonable.

TABLE 2.4. HISTORICAL COST DATA - CENTRAL MAUI LANDFILL					
Cost Category	FY2012	FY2013	FY2014	FY2015	Average
Wages (excl. benefits)	\$1,161,142	\$1,196,275	\$1,162,301	\$1,277,122	\$1,199,210
Other Operating Costs					
Fuel	\$339,336	\$319,193	\$317,041	\$301,902	\$319,368
Equipment	\$326,312	\$136,395	\$26,583	\$118,901	\$152,048
Construction Materials	\$25,937	\$12,354	\$1,839	\$2,615	\$10,686
Repairs & Maintenance	\$661,037	\$878,753	\$804,576	\$712,525	\$764,223
Rent/Rentals	\$6,753	\$2,296	\$331	\$3,610	\$3,248
Transport/Hauling	\$242,599	\$273,571	\$252,282	\$275,761	\$261,053
Other	\$184,969	\$181,464	\$220,074	\$181,422	\$191,982
Contracted Services	\$381,393	\$358,446	\$516,532	\$1,088,902	\$586,318
Subtotal	\$2,168,337	\$2,162,473	\$2,139,256	\$2,685,638	\$2,288,926
Cover Material	\$1,485,403	\$1,363,789	\$1,435,932	\$1,079,060	\$1,341,046
Total	\$4,814,882	\$4,722,536	\$4,737,490	\$5,041,820	\$4,829,182
Source:					
1. Department of Finance records.					

For the current conditions scenario, the DEM analysis assumes wage costs of \$1,100,000, which is approximately 9 percent lower than the four-year historical average shown in Table 2.4. The DEM analysis applied a fringe rate of 67 percent to arrive at a total labor cost (wage and fringe) of \$1,837,000. Based on the historical expense data provided by the Department of Finance, fringe rates within the Solid Waste Division have been increasing and in FY2015 were approximately 69 percent. The FY2015 rate is therefore generally consistent with, but slightly higher than the fringe rate assumed in the DEM analysis.

The DEM analysis also assumed that “other operating costs” were \$2,000,000 per year. These other operating costs would include fuel, repairs and maintenance, contracted services, and other expenses incurred in operating the Central Maui Landfill. Comparison



with Table 2.4 shows that historical operating costs have averaged approximately \$2,289,000 per year, or about 14 percent higher than assumed in the DEM analysis.

Finally, the DEM analysis assumed \$1,400,000 in operating expenses for cover material at the landfill. Actual expenditures have averaged about \$1,341,000 per year, or about 4 percent lower.

Using four-year average historical costs for these parameters (labor with 67 percent fringe, other operating costs, and cover material), the model projects Net Annual County MSW Costs of \$1,938,153 for the current conditions scenario and \$719,577 for the IWCEP, a savings of \$1,218,576 for the IWCEP. This savings is higher than initially projected by DEM.

2.3.4 Landfill Space (Volume Use) Cost Assumptions

It was noted earlier that the DEM analysis did not include debt service. This is both a reasonable and sound basis for conducting the analysis, as debt service represents amortized annual payments for prior cost expenditures (or, alternatively, prior investments) for solid waste infrastructure. Because these prior expenditures are “sunk” costs (i.e., costs that will be paid under both the current conditions scenario as well as the IWCEP scenario), they are properly excluded from a comparative analysis of incremental costs going forward.

There was a capital charge reflected in the DEM analysis, however, in the line item termed “CML Space (Volume Usage)” (refer to Section 3 of Figure 2.1). This line item assumed a volume usage charge of \$30/ton, which is then multiplied by the incoming 150,000 tons per year of waste (in the current conditions scenario), resulting in a total volume use cost of \$4,500,000 per year. For the IWCEP scenario, the volume use charge of \$30/ton was multiplied by an estimated annual landfill tonnage of 30,000 tons, resulting in a total volume use cost of \$900,000 per year. The 30,000 tons represents the 20 percent residue amount remaining after waste is processed through the IWCEP (i.e., 150,000 tons incoming x 0.20 = 30,000 tons of residue).

Conceptually, it is reasonable to include a cost factor for landfill consumption in the analysis. This is because the IWCEP project is intended to divert a significant fraction of the incoming waste from landfill disposal. This would preserve existing landfill capacity at the Central Maui Landfill, and slow the rate at which future disposal “cells” are constructed²⁰. It is also reasonable to calculate a per-ton amortization rate (based on the cost to develop future disposal areas and the tonnage capacity of those disposal areas), as was apparently done in the DEM analysis.

It is important to note, however, that in determining a per ton value for the airspace, the marginal or incremental cost of developing future airspace is the relevant cost parameter to consider, as that is the variable that would change in comparing current conditions costs to IWCEP costs. The marginal cost would include the cost of constructing new liner and

²⁰ The current landfill unit at the Central Maui Landfill includes three phases (Phase IV, Phase V and Phase VI), each of which is further divided into sub-phases. Phase IV is scheduled to be capped, Phase V is currently being filled, and Phase VI will be developed to provide additional disposal capacity. Estimates of remaining capacity at the Landfill are provided in Attachment C; as of January, 2016, it is estimated that the Central Maui Landfill (through Phase VI) will provide approximately 17 years of capacity (at 150,000 tons per year) and approximately 85 years of capacity (at 30,000 tons per year).



leachate collection equipment, the landfill gas collection system, and closure (capping) and post-closure care costs. Any “sunk” costs (e.g., existing debt service) or site-wide improvements (e.g., improvements to the citizen’s drop-off area) are excluded because, as described before, those costs have been (or will be) incurred under both scenarios.

CB&I requested backup information from DEM as to the inputs underlying the airspace valuation of \$30/ton. Although we did not receive a break-out of specific costs, DEM responded to our request by stating “...the \$30/ton number represents the cost of developing that air space so it includes the development cost, the closure costs and the post closure costs for the next 30 years. All averaged out to a per ton basis using the existing compaction rate of the landfill of 0.581 tons per cubic yard”. As previously noted, CB&I agrees that this is an appropriate method for valuing the airspace.

Because detailed cost information underlying the \$30/ton value was not available, CB&I reviewed CIP project data contained in recent County budgets. The Solid Waste Division currently has 4 projects in its 6-year CIP plan that address landfill development costs: 1) construction of the lined cell for Phase VI-A; closure (capping) of Phase IV; expansion of the landfill gas collection system into Phase V; and, acquisition of land for future cells Phase VI-B and VI-C. These are the primary capital costs associated with landfill development, and allow per-ton landfill capital costs to be estimated.

Table 2.5 summarizes the budgeted costs for these construction events, along with the acreage and tonnage capacity of each of the cells where the construction activities will be performed. Based on these data, the primary capital costs for providing disposal capacity at the Central Maui Landfill are estimated at \$10.92/ton.

TABLE 2.5. CENTRAL MAUI LANDFILL DEVELOPMENT COSTS					
Construction Activity	Size (acres)	Capacity (tons)	Estimated Cost	\$/acre	\$/ton
Phase VI-A: Liner/Leachate	5.9786	495,003	\$3,000,000	\$501,790	\$6.06
Phase IV: Capping/Closure	17.8046	809,497	\$2,000,000	\$112,356	\$2.47
Phase V: LFG Collection System	18.6234	1,449,089	\$2,500,000	\$134,240	\$1.73
Phase VI-B & VI-C: Land	16.3211	1,513,291	\$1,000,000	\$61,270	\$0.66
Total	NA	NA	\$8,500,000	\$809,656	\$10.92
Sources:					
1. Cost estimates: FY2016 CIP Budget.					
2. Size and volumetric capacity estimates: Integrated Solid Waste Management Plan, Appendix F-7.					
3. Capacity in tons based on volumetric capacity of cells and assuming utilization factor of 0.581 tons of waste per cubic yard of airspace.					

The \$10.92/ton represents an amortization rate to recover the capital costs of constructing the engineered features of the landfill. Note that for a given phase of the landfill, these costs are not incurred at the same time and will instead occur over time in the following order: first, land acquisition; next, construction of the liner and leachate collection system; next, installation of the landfill gas collection system; and, finally, construction of the landfill cap.



If pay-as-you-go financing²¹ is used to construct these features, then the \$10.92/ton amortization rate captures the cost of landfill development (including the landfill gas collection equipment) and capping events. The FY2016 CIP budget indicates that the Phase IV capping, the Phase V landfill gas collection system expansion, and the Phase VI-B/VI-C land acquisition will be paid out of the Solid Waste Fund (pay-as-you-go), while the Phase VI-A cell construction is planned to be financed through general obligation (GO) debt financing.

Nonetheless, in order to provide a more conservative (i.e., higher) estimate of landfill development costs, CB&I calculated an amortization rate based on a hypothetical future landfill cell that would provide 5 years of capacity²². Such a cell, assuming a throughput of 150,000 tons per year, would have an all-in development cost of \$8,190,000 (= 5 years x 150,000 tons per year x \$10.92/ton), inclusive of land, liner and leachate collection system, gas collection system, and capping. Assuming that the all-in cost was financed at 5 percent interest over 5 years, the amortized cost including interest would amount to \$12.61/ton.

The remaining cost item to be addressed is post-closure care costs. Landfill owners are required to monitor and maintain landfills for a minimum 30-year period (the post-closure period) following the closure of the facility. An annual expense is therefore accrued while the landfill is operating, although the actual cash disbursements to pay for post-closure activities won't occur until after the landfill is closed. Generally, the annual expense includes both post-closure care costs and closure costs.

According to the County's FY2014 CAFR, approximately \$36,300,000 in closure and post-closure care costs had been accrued (i.e., previously expensed) as of June 30, 2014, with the remaining \$16,000,000 in closure and post-closure care costs to be recognized as the remaining landfill capacity is filled. Total post-closure care costs (over 30 years and in current dollar terms) are disclosed as \$27,900,000.

Although these costs apply to all four of the County's landfills, from these data it is apparent that post-closure costs account for approximately 53.3 percent of the total estimated closure and post-closure care liability (= \$27,900,000 / [\$36,300,000 + \$16,000,000]). From this, and based on the estimated capping cost of \$2.47/ton in Table 2.5, CB&I estimates an amortized post-closure care cost for the Central Maui Landfill of \$2.82/ton.

In total, CB&I estimates an airspace value of \$13.74/ton (if pay-as-you-go financing is used) to \$15.43/ton (if land, liner construction, landfill gas collection and capping) are debt financed. If the \$13.74/ton value for landfill space is used in the DEM model (versus the \$30/ton assumed by DEM), the model projects Net Annual County MSW Costs of (\$896,500) for the current conditions scenario -- i.e., net revenue -- and \$138,200 for the IWCEP. In this case, the IWCEP is projected to have higher annual costs of \$1,034,700 versus current conditions.

If, on the other hand, the \$15.43/ton value for airspace is used in the DEM model, the model projects Net Annual County MSW Costs of (\$643,000) for the current conditions

²¹ The FY2016 capital budget states "In an effort to conserve debt capacity, the county shall borrow only when necessary and utilize pay-as-you-go financing to the extent possible."

²² Five years was selected because the FY2014 CAFR indicates an assumed useful life for landfill infrastructure of 5 years. Additionally, Phase VI-A, the next cell scheduled for construction, has a capacity of approximately 495,000 tons and would provide approximately 3 ½ years of capacity which, allowing for time to construct the cell, would be approximately 4-5 years.



scenario -- i.e., net revenue -- and \$188,900 for the IWCEP. In this case, the IWCEP is projected to have higher annual costs of \$831,900 versus current conditions.

Clearly, the DEM model is sensitive to the per-ton value used to estimate landfill development-related capital costs. As noted previously, CB&I requested cost backup information underlying the estimate of \$30/ton. Although we did not obtain such information, DEM indicated that the \$30/ton included landfill development costs (i.e., liner and leachate collection system) and closure and post-closure care costs. This means that CB&I and DEM were in agreement on the cost factors to be included in the calculation of a value for the airspace, though our estimates of the value of these costs do not agree.

We found a possible explanation for the difference in airspace valuation estimates in correspondence that DEM submitted to the County Council on October 1, 2014, in response to Council's request for a breakdown of landfill costs. In that correspondence, DEM provided historical cost information for the Central Maui Landfill for the three prior fiscal years, which is summarized in Table 2.6:

TABLE 2.6. DEM ESTIMATED COST OF LANDFILLING (FULL COST)						
Cost Category	FY2012		FY2013		FY2014	
	Amount	\$/ton	Amount	\$/ton	Amount	\$/ton
Wages	\$1,161,142	\$7.60	\$1,196,274	\$8.02	\$1,162,301	\$7.35
Operations	\$3,063,416	\$20.04	\$3,064,906	\$20.54	\$3,506,443	\$22.16
Equipment	\$400,834	\$2.62	\$36,382	\$0.24	\$93,019	\$0.59
Interfund	\$113,011	\$0.74	\$112,296	\$0.75	\$112,983	\$0.71
SW Admin/Overhead	\$1,373,904	\$8.99	\$1,462,610	\$9.80	\$1,508,171	\$9.53
Subtotal	\$6,112,307	\$39.99	\$5,872,468	\$39.36	\$6,382,917	\$40.34
Development	\$1,089,806	\$7.13	\$1,063,882	\$7.13	\$1,128,101	\$7.13
Closure (FV)	\$408,104	\$2.67	\$398,396	\$2.67	\$422,445	\$2.67
Post-Closure (FV)	\$2,450,153	\$16.03	\$2,391,868	\$16.03	\$2,536,251	\$16.03
Subtotal	\$3,948,063	\$25.83	\$3,854,146	\$25.83	\$4,086,797	\$25.83
Total	\$10,060,370	\$65.82	\$9,726,614	\$65.19	\$10,469,714	\$66.17
Tons Disposed	152,848		149,212		158,219	

Notes:

1. Development = development costs of active landfill (includes interest).
2. Closure (FV) = cost to close active cell.
3. Post Closure (FV) = costs to monitor closed landfill for 30 years.
4. All dollar amounts are in Present Value unless denoted "FV" = Future Value.

Source:

1. DEM Letter to Policy and Intergovernmental Affairs Committee, Maui County Council, October 22, 2014.

DEM estimated that landfill development costs, closure and post-closure care costs amounted to \$25.83/ton. Although still not amounting to the \$30/ton used in the model, it is possible that DEM may have rounded the \$25.83/ton up to \$30/ton in order to be conservative. Notably, however, DEM based the closure and post-closure costs on *future value* (i.e., on the inflation adjusted cost when the closure and post-closure activities are performed years in the future).



If the DEM airspace value estimate of \$30/ton is based on using the future value of closure and post-closure care costs, we do not concur with that method of valuation, for the following reasons:

1. First, in performing a financial analysis, it is not appropriate to combine cost factors stated in present value terms with cost factors stated in future value terms. In present value analyses, dollar amounts expended in future years are recognized as being different from dollar amounts expended in the current year (due to the time value of money as well as potential inflation effects).
2. All other costs in the one-year DEM summary analysis are presented on a current cost basis. Including some costs on a present value basis and other costs on a future value basis results in costs that are not stated on a comparable basis.
3. The Governmental Accounting Standards Board (GASB), in Statement No. 18 ("Accounting for Municipal Solid Waste Landfill Closure and Postclosure Care Costs"), states that annual recognition of closure and post-closure care expenses, while a landfill is operating, should be based on *current costs*. As was noted previously, the County's FY2014 CAFR expresses the liability for closure and post-closure care in current dollar costs.
4. We agree that closure and post-closure care costs may change in the future due to inflation. Both GASB Statement No. 18 and the disclosure notes in the County's CAFR acknowledge this as well. However, GASB Statement No. 18 contemplates that the closure and post-closure care cost estimates will be adjusted annually for inflation. Thus, over time and as the landfill is filled to capacity, the current cost estimate will converge on the future cost estimate at the time of closure. In contrast, the DEM analysis appears to have brought the future, fully-inflated cost back to the present time in one single step.
5. Finally, we would note that under the current conditions scenario, the Central Maui Landfill has a projected remaining life of approximately 17 years (assuming a throughput of 150,000 tons per year). Under the IWCEP scenario, the landfill would have an estimated remaining life of approximately 85 years (assuming a throughput of 30,000 tons per year and that the IWCEP were operating today). The future value of post-closure care costs under the IWCEP scenario would therefore be escalated for inflation for a considerably longer period of time than the current conditions scenario. However, since the total tonnage capacity of the Central Maui Landfill is the same under both scenarios, the per ton cost of post-closure care on a *future value* basis would be higher for the IWCEP scenario versus the current conditions scenario (whereas it appears the DEM analysis assumed the per ton future value would be the same).

2.3.5 Tipping Fee Revenue Assumptions

The DEM cost model assumes a landfill tipping fee of \$90/ton which, consistent with historical practice, is charged only on the commercial hauler waste. Thus, for the current conditions scenario, the DEM model estimates annual tipping fee revenues of \$8,194,500 (= 91,050 tons of commercial hauler waste x \$90/ton). As discussed previously, the DEM analysis appears to have escalated the FY2016 tipping fee of \$86/ton to a forward year; this



may be reasonable given that the IWCEP is not operating in FY2016. Tipping fee projections for the IWCEP analysis are discussed in the next section.

2.3.6 Comparative Costs, Current Conditions vs. IWCEP Scenario

The analysis in the preceding sections focused on assessing the reasonableness of the underlying assumptions for the current conditions scenario in the DEM analysis. This section analyzes the assumptions in the DEM model as they relate to comparative costs between the current conditions and IWCEP scenarios.

Table 2.7 summarizes the primary cost and revenue parameters from the DEM one-year analysis. The IWCEP is projected to reduce the tonnage disposed in the Central Maui Landfill by 80 percent, from 150,000 tons per year to 30,000 tons per year. The DEM analysis projects that there will be proportionate 80 percent reductions in labor, volume usage and cover material costs, and a somewhat lower reduction of 75 percent in operations costs.

TABLE 2.7 DEM SUMMARY FINANCIAL ANALYSIS			
Parameter	Current System	IWCEP	Reduction from Current
Tonnage to Landfill	150,000	30,000	120,000 (80%)
Annual Costs			
CML Staff	\$1,837,000	\$367,400	\$1,469,600 (80%)
CML Operations	\$2,000,000	\$500,000	\$1,500,000 (75%)
CML Cover Material	\$1,400,000	\$280,000	\$1,120,000 (80%)
CML Space (Volume Usage)	\$4,500,000	\$900,000	\$3,600,000 (80%)
Tip Fee to Anaergia	\$0	\$4,008,600	NA
Total	\$9,737,000	\$6,056,000	\$3,681,000 (37.8%)
Annual County MSW Revenues			
Tip Fee	\$8,194,500	\$5,430,000	\$2,764,500 (33.7%)
Net Annual County MSW Costs	\$1,542,500	\$626,000	\$916,500 (59.4%)
Source:			
1. Department of Environmental Management, IWCEP analysis, undated.			

Based on the FY2016 proposed budget and an organization chart provided by the Solid Waste Division (SWD), there were 22 personnel assigned to the Central Maui Landfill cost center, including 9 equipment operators, 6 landfill attendants, 1 laborer, 3 cashiers (scalehouse operators), 2 worksite supervisors²³, and 1 clerk. The 80 percent reduction in labor costs assumed in the DEM analysis would therefore imply a reduction in this staff to 4.4 employees (= 22 FTE x 0.2). While it is generally reasonable to project a reduction in staffing based on the decrease in tonnage handled at the Central Maui Landfill, a reduction to 5 employees (rounded up) appears to be an aggressive estimate for the following reasons:



²³ A third supervisor has an office at the Central Maui Landfill, but provides oversight to the other 3 County landfills and is included in the Molokai cost center in the FY2016 proposed budget.

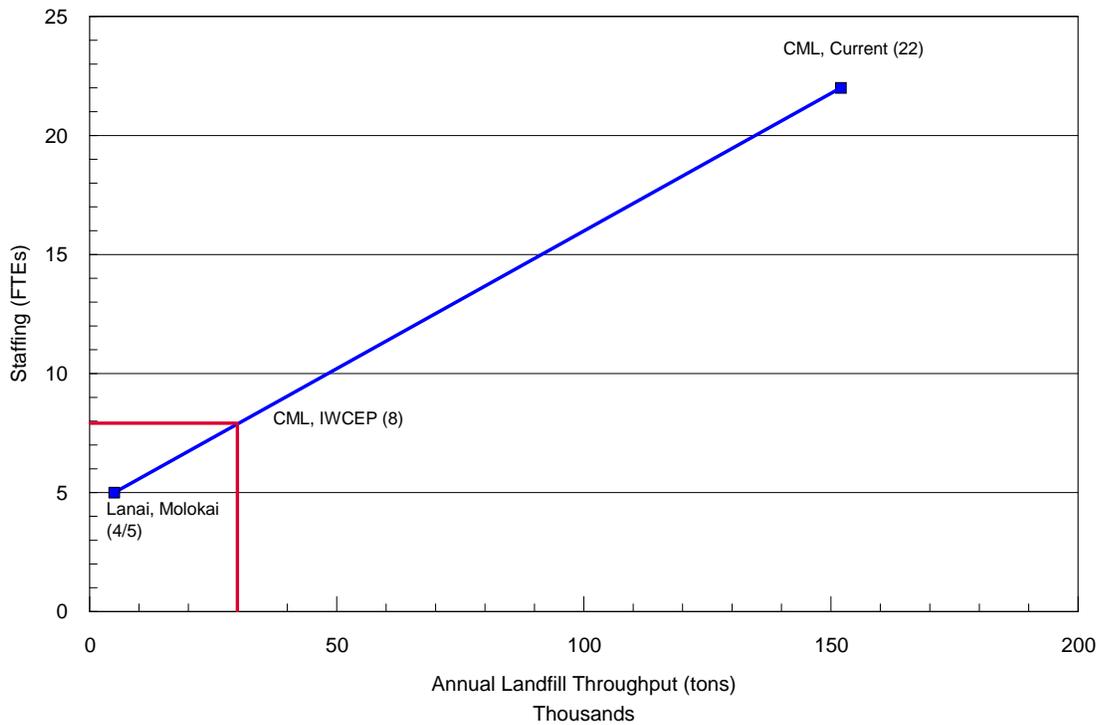
- Staffing levels at the 3 smaller landfills range from 4-5 employees. These other landfills handle approximately 1,000 to 5,000 tons per year of waste (for disposal), compared to the 30,000 tons to be handled at the Central Maui Landfill under the IWCEP scenario. This would suggest a “floor” of 4-5 employees, but for a smaller operation than 30,000 tons per year.
- The DEM model considered only reductions in total labor costs and did not detail which positions would be retained. Based on the current staffing, it might be assumed that the 5 positions would include 1 supervisor, 1 equipment operator, 1 landfill attendant, 1 laborer and 1 cashier. Such an assumption is challenged, however, by the current scheduling of staff at the Landfill. Landfill equipment operators and landfill attendants are scheduled for 10 hour workdays, 4 days per week. On a given day, the scheduling is staggered such that some of the operators/attendants start two hours earlier and finish two hours earlier during the day. Additionally, the Landfill operates 6 days per week.
- Based on the operating hours of the Landfill and the 6-day per week schedule, a staffing level of 5 employees would imply that some reduction in daily operating hours and/or days of operations is required. (Staff are assigned at the 3 smaller landfills on a 5 day schedule, for instance.) While reduced hours and days of operation may be warranted based on the reduced tonnage handled at the Landfill, it would also represent a reduction in current service levels.

A more reasonable estimate of staffing might include 1 supervisor, 2 equipment operators, 2 landfill attendants, 1 laborer and 2 cashiers (8 total staff). Even this staffing level may not be feasible given operating practices and goals (management from the Solid Waste Division would have to concur), and might still require a reduction in landfill operating times, but it would provide greater assurance of having backup personnel and greater flexibility in providing service to the community. The 8 positions would also be consistent with the staffing trendline for existing County landfill operations, as shown in Figure 2.2.

Based on an adjusted staffing level of 8 employees at the Central Maui Landfill (versus the 5 implied by the DEM analysis), the estimated reduction in labor costs would be 64 percent, not 80 percent as assumed in the DEM model. Making this change to the model would result in Net Annual County MSW Costs of \$1,542,500 for the current conditions scenario and \$919,920 for the IWCEP scenario, a savings of \$622,580 for the IWCEP. This savings is lower than initially projected by DEM.



FIGURE 2.2. STAFFING AT MAUI COUNTY LANDFILLS



Note:
1. Lanai/Molokai operate 5 days/week. CML operates 6 days per week.

As noted previously, DEM projected a 75 percent reduction in landfill operation costs under the IWCEP scenario. Historical operations cost data for the Central Maui Landfill were previously presented in Table 2.4. This data is summarized again in Table 2.8, where CB&I has additionally classified costs as fixed or variable. Variable costs (e.g., fuel, repairs and maintenance) are costs that typically might see a proportionate reduction with tonnage. Fixed costs (e.g., office supplies, professional services, dues) are costs that will likely be incurred under both the current conditions and IWCEP scenarios at generally the same level. We acknowledge that there is some judgement required in classifying expenses as variable or fixed, but believe the allocation presented in Table 2.8 is reasonable.



TABLE 2.8. HISTORICAL OPERATIONS COST DATA - CENTRAL MAUI LANDFILL

Cost Category	FY2012	FY2013	FY2014	FY2015	Average
Operations Costs					
Fuel (V)	\$339,336	\$319,193	\$317,041	\$301,902	\$319,368
Equipment (V)	\$326,312	\$136,395	\$26,583	\$118,901	\$152,048
Construction Materials (V)	\$25,937	\$12,354	\$1,839	\$2,615	\$10,686
Repairs & Maintenance (V)	\$661,037	\$878,753	\$804,576	\$712,525	\$764,223
Rent/Rentals (V)	\$6,753	\$2,296	\$331	\$3,610	\$3,248
Transport/Hauling (V)	\$242,599	\$273,571	\$252,282	\$275,761	\$261,053
Other (F)	\$184,969	\$181,464	\$220,074	\$181,422	\$191,982
Contracted Services (F)	\$381,393	\$358,446	\$516,532	\$1,088,902	\$586,318
Subtotal - Fixed	\$566,362	\$539,910	\$736,605	\$1,270,324	\$778,300
Subtotal - Variable	\$1,601,975	\$1,622,562	\$1,402,651	\$1,415,314	\$1,510,626
Total	\$2,168,337	\$2,162,473	\$2,139,256	\$2,685,638	\$ 2,288,926
% Fixed	26%	25%	34%	47%	34%

Notes:

1. F = fixed cost, V = Variable cost.

Source:

1. Historical cost data: Department of Finance records.

2. Classification of expenses as fixed or variable performed by CB&I.

We note that the relative proportion of fixed to variable costs has varied from year to year. This might be expected generally, but in this particular instance also stems from differences in annual expenditures for the “Contracted Services” category. Since some portion of Contracted Services may represent temporary project-specific work²⁴, we believe that a reasonable estimate of the fixed cost percent is 25 percent (as occurred in FY2012 and FY2013), versus the 4-year average of 34 percent.

On that basis, CB&I estimates that the reduction in landfill operation costs under the IWCEP scenario would be 60 percent, assuming that fixed costs amount to 25 percent of total landfill operations cost and that variable costs would be reduced by 80 percent due to the reduced tonnage handled at the landfill (60 percent = 25 percent + 0.2 x 75 percent). Making this change to the DEM model would result in Net Annual County MSW Costs of \$1,542,500 for the current conditions scenario and \$926,000 for the IWCEP scenario, a savings of \$616,500 for the IWCEP. This savings is lower than initially projected by DEM.

Cover material costs were discussed previously. The DEM model assumed that there would be an 80 percent reduction in daily cover costs, proportionate to the reduction in landfill tonnages. CB&I finds this to be a reasonable assumption.

The DEM model also employed a per-ton amortization rate to account for landfill development and closure costs and the cost of post-closure care. Conceptually, CB&I agrees that such an amortization rate can be used to assess the impacts of differential



²⁴ Other contracted services, such as landfill monitoring services, will be more routine and annually recurring.

landfill consumption under the two scenarios; however, CB&I estimated a lower amortization rate as discussed previously in Section 2.3.4.

Finally, under the IWCEP scenario, the DEM model includes a new cost category representing tipping fees paid to Anaergia. The formula used to calculate the \$4,008,600 in tipping fee costs is based on the tonnage of residential waste and excludes commercial hauler waste ($\$4,008,600 = 58,950 \text{ tons of residential waste} \times \$68/\text{ton}$). A tipping fee will be charged for commercial waste, but the DEM model treats that tip fee as a “pass-through” cost to the commercial haulers and not as a cost incurred by the County.

2.3.7 Comparative Revenues, Current Conditions vs. IWCEP Scenario

As discussed earlier, the DEM model predicted tipping fee revenues of \$8,194,500 under the current conditions scenario assuming 91,050 tons of commercial hauler waste, multiplied by a landfill tipping fee of \$90/ton.

The tipping fee revenue under the IWCEP scenario (\$5,430,000) consists of two components:

- First, the differential between the landfill tip fee (\$90/ton) and the Anaergia tip fee (\$68/ton) is applied to all 150,000 tons of incoming waste. This results in revenue of \$3,300,000 ($= [\$90/\text{ton} - \$68/\text{ton}] \times 150,000 \text{ tons}$). This is plausible in that DEM will continue to control the gatehouse and may assess its own tipping fee on incoming waste, and then subsequently pay the processing fee on that tonnage to Anaergia, keeping the difference as net revenue to the County. However, this calculation also implies that a disposal charge amounting to \$22/ton ($= \$90/\text{ton} - \$68/\text{ton}$) will be assessed on residential waste, whereas no such charge is currently collected.
- Second, pursuant to the IWCEP contract, Anaergia will pay a tipping fee of \$71/ton to dispose of residue at the Central Maui Landfill. As discussed earlier, the DEM model assumes such process residue will be 20 percent of the incoming waste, or 30,000 tons. Thus, the revenue to the County for landfilling the residue waste materials is estimated at \$2,130,000 ($= 30,000 \text{ tons} \times \$71/\text{ton}$).

2.3.8 Comparative Landfill Equipment Costs

The notes to the DEM model (refer to Attachment B) state that the IWCEP project will provide the additional benefit of prolonging the life of landfill rolling-stock equipment. However, this savings in future equipment costs is not quantified in the DEM model.

CB&I agrees that there will be comparatively less utilization of landfill equipment under the IWCEP scenario. This could result in longer operating life for existing equipment and/or a reduction in the number of pieces of operating equipment, and provide potential cost savings.

The current primary heavy equipment used at the Central Maui Landfill is summarized in Table 2.9. Also shown in the table is the estimated current cost of new equipment (based on a review of recent budget requests from DEM as well as CB&I research into procurement of similar equipment by other public jurisdictions).



Table 2.9 also shows a CB&I estimate of the reduced fleet of equipment that might be employed under the IWCEP scenario. Due to the reduction in landfill tonnage, fewer pieces of compacting equipment (i.e., bulldozers and compactors) would be required. Further, if the residue from the IWCEP is more homogeneous than MSW, or consists of primarily inorganic materials, then the compactors may no longer be necessary.

The remaining types of equipment (loader, backhoe, etc.) however, would likely still be used under the IWCEP scenario to conduct landfill operations. The roll-off trucks, for instance, are used to service the residential drop-off area, which is assumed to be maintained under the IWCEP scenario to receive self-hauled waste.

TABLE 2.9. COMPARATIVE EQUIPMENT SCENARIOS						
Equipment Type	Current Conditions Scenario			IWCEP Scenario		
	Number	Cost/Unit	Total	Number	Cost/Unit	Total
Bulldozer (D8)	3	\$915,000	\$2,745,000	2	\$915,000	\$1,830,000
Bulldozer (D5/D6)	2	\$420,000	\$840,000	0	\$420,000	\$0
Compactor	2	\$790,000	\$1,580,000	0	\$790,000	\$0
Wheel Loader	1	\$350,000	\$350,000	1	\$350,000	\$350,000
Backhoe	1	\$100,000	\$100,000	1	\$100,000	\$100,000
Water Truck	1	\$300,000	\$300,000	1	\$300,000	\$300,000
Dump Truck	1	\$645,000	\$645,000	1	\$645,000	\$645,000
Roll-off Truck	4	\$250,000	\$1,000,000	4	\$250,000	\$1,000,000
Total	15		\$7,560,000	10		\$4,225,000
Annual Amortized Cost			\$979,055			\$547,157
Annual LF Tonnage			150,000			30,000
Cost/Ton			\$6.53			\$18.24
Notes:						
1. Annual Amortized Cost based on 10-year average equipment life and assuming 5 percent interest. The FY2014 CAFR notes a useful life for equipment of 5-10 years.						
Source:						
1. Current Conditions equipment levels: Operations Plan for Central Maui Landfill, prepared by A-Mehr, Inc., Revised January 2014.						
2. IWCEP Scenario: CB&I estimate.						
3. Equipment costs: Letter from DEM to County Council Budget and Finance Committee detailing equipment CIP budget requests, May 1, 2015; Maui County Department of Finance - Purchasing Division, Bid Results - CAT D8T, November 10, 2015; CB&I research of other public procurement of landfill operating equipment and costs.						

To compute the comparative equipment costs under each scenario, CB&I assumed an average useful life for the equipment of 10 years, and that the equipment would be financed over 10 years at 5 percent interest. We note that this may result in a conservatively high estimate of actual near-term equipment costs, because the estimate assumes that all of the equipment is purchased new and at the same time (whereas existing equipment would likely continue to be utilized under both scenarios). The annual amortized costs in Table 2.9



are therefore more appropriately viewed as an estimate of long-term average equipment costs.

Based on the comparative equipment schedules in Table 2.9, CB&I estimates that average landfill equipment costs are \$979,055 per year under the current conditions scenario and \$547,147 under the IWCEP scenario, a savings of \$431,908 per year for the IWCEP. Note that although there are overall savings in equipment costs, the cost per ton is higher in the IWCEP scenario because less tonnage will be handled at the landfill.

2.3.9 Sensitivity Analysis

The analysis contained in the preceding sections identified several modifications to the assumptions in the DEM model. CB&I performed a sensitivity analysis of the DEM analysis, using the following parameters (refer to Attachment D):

- Tonnage: commercial waste estimated at 89,576 tons per year, residential waste estimated at 62,805 tons per year, and total waste estimated at 152,561 tons per year (based on 5-year historical average of tonnages).
- Tipping Fees: tipping fees maintained as assumed in the DEM analysis (Central Maui Landfill = \$90/ton, IWCEP tipping fee = \$68/ton, residue disposal from IWCEP = \$71/ton).
- Labor Cost: current conditions labor estimated at \$2,002,681 based on 4-year historical average of wage costs and assuming 67 percent fringe rate. Labor for IWCEP scenario estimated at 36 percent of labor costs for current conditions scenario.
- Operations Cost: current conditions operations cost estimated at \$2,288,926 based on 4-year historical average. Operations cost for IWCEP scenario estimated at 40 percent of cost for current conditions scenario.
- Cover Material Cost: current conditions cover material cost estimated at \$1,341,046 based on 4-year historical average. Cover material cost for IWCEP scenario estimated at 20 percent of cost for current conditions scenario.
- Airspace (Volume Usage) Cost: current conditions airspace consumption cost estimated at \$15.43/ton, multiplied by 152,561 tons of incoming waste. Airspace consumption cost for IWCEP scenario also based on \$15.43/ton, but assuming tonnage to landfill is reduced by 80 percent (to 30,512 tons per year).
- Landfill Equipment Cost: This cost parameter was not included in the DEM analysis. Equipment costs for the current conditions scenario were estimated at \$979,055 per year, and for the IWCEP scenario at \$547,157 per year.
- All other assumptions from the DEM analysis were retained.

Under these modified cost parameters, CB&I estimates Net Annual County MSW Costs of \$903,884 for the current conditions scenario, and \$1,739,319 for the IWCEP scenario. Whereas DEM projected the IWCEP will have a net cost savings of \$916,500 per year, CB&I estimates the project will have net higher costs to the County of \$835,435 per year.



2.4 Findings and Recommendations

Based on our analysis of the DEM cost model and current costs at the Central Maui Landfill, CB&I has the following findings and recommendations:

Findings:

- The DEM cost model compares costs and revenues for the current landfill versus the IWCEP. The model focuses on the costs of the Central Maui Landfill (and not overall Solid Waste Division costs). CB&I agrees that this is an appropriate conceptual model for evaluating the impacts of the IWCEP, as other system costs are likely to be incurred under either scenario.
- The DEM cost model includes 5 principal cost parameters: labor, operations, cover material, landfill airspace, and tipping fees paid to Anaergia. CB&I concurs that these are appropriate cost parameters to include in the analysis.
- The DEM model assumes that tonnage handled at the Central Maui Landfill will decrease by 80 percent (from 150,000 tons per year to 30,000 tons per year) following implementation of the IWCEP. The contract with Anaergia states that the project will be designed to divert 85 percent of the incoming waste, but that actual diversion will depend on the composition of the waste. The contract includes a performance guarantee that 70 percent of the incoming waste will be diverted. The DEM model assumption appears to be reasonable.
- The DEM model assumes that labor costs at the Landfill will decrease by 80 percent with the IWCEP, proportionate to the reduction in tonnage. CB&I believes that an estimated reduction of 64 percent is more reasonable and consistent with the staffing at the 3 small landfills operated by the county. In either case, staffing reductions could require reductions in operating hours at the Central Maui Landfill.
- The DEM model assumes that operation costs at the Landfill will decrease by 75 percent with the IWCEP, generally proportionate (although somewhat lower) than the 80 percent reduction in tonnage. After reviewing historical operation costs and classifying them into fixed and variable categories, CB&I believes that a reduction of 60 percent is more reasonable.
- The DEM model assumes that cover material costs at the Landfill will decrease by 80 percent with the IWCEP, proportionate to the reduction in tonnage. Since cover material requirements are directly tied to the amount of waste handled, CB&I concurs with this assumption.
- The DEM model includes a per-ton cost of \$30/ton for airspace consumption to reflect the cost of landfill development and closure and post-closure care costs. CB&I agrees that it is appropriate to include such a cost factor, but estimates the per-ton cost at \$13.74/ton to \$15.43/ton, depending on financing assumptions. CB&I based its estimate on a current cost basis, whereas DEM may have estimated closure and post-closure care costs on a future value basis.



- CB&I performed an analysis of landfill equipment costs for the current Landfill operation as well as under the IWCEP scenario. The DEM model noted that there would be savings in equipment costs but did not quantify those savings. Based on our analysis, CB&I estimates that equipment costs would be reduced from \$979,055 per year (current conditions) to \$547,157 per year (IWCEP scenario).
- The DEM model assumes a tipping fee of \$90/ton for the Central Maui Landfill, and that pursuant to the IWCEP contract a tipping fee of \$68/ton will be paid to Anaergia to process incoming waste. The DEM model assumes that the County will retain the difference in these tipping fees (\$22/ton) as revenue to support the County's solid waste operations. The calculations in the DEM model imply that a \$22/ton disposal charge will be applied to residential waste, whereas no such charge is currently collected at the Landfill on residential waste. If it was intended that this disposal charge be assessed on residential waste, CB&I concurs with the revenue projections in the DEM analysis.
- The DEM model estimated that the IWCEP would result in net annual cost savings (versus the current landfill) of \$916,500. Based on the modified cost estimates noted in the previous findings, CB&I estimates that the IWCEP would result in higher net annual costs of \$835,435.

We note that this difference stems from two primary reasons: 1) CB&I estimated that cost reductions at the Central Maui Landfill would not be directly proportional to the reduction in Landfill tonnage, as was assumed in the DEM model; and, 2) CB&I estimated a lower cost for the airspace consumption compared to the DEM model.

- The IWCEP contract contains a “put-or-pay” provision that requires the County to deliver 125,000 tons of acceptable waste to the IWCEP, or pay for any shortfall. A review of historical waste quantities indicates that the County manages higher levels of waste to provide a buffer of as much as 77,000 tons over the threshold guarantee of 125,000 tons.

Recommendations:

- The “put-or-pay” provision in the IWCEP contract is not entirely clear as to whether the 125,000 tons per year waste commitment is fixed or will adjust over time based on a 3-year rolling average of actual waste deliveries. The contract language governing the adjustment should be clarified with Anaergia as to intent and application.
- Council should review the status of the IWCEP at least annually with DEM. The IWCEP contract contains project milestones that require the IWCEP to commence operations by April, 2019 (unless an extension is granted). This annual review would be warranted to facilitate transition planning and to keep abreast of when the IWCEP will start operating, which will influence future CIP at the Central Maui Landfill as well as other solid waste program costs (i.e., current contracts for processing greenwaste, sludge, recyclables and other source separated materials).



- Council should further review both the DEM analysis and the CB&I analysis with the Solid Waste Division to determine if the projected reductions in labor, operational, cover and airspace costs under both analyses can be achieved.
- CB&I estimates that IWCEP implementation would increase overall costs by approximately \$835,000 annually, which still assumes that significant reductions are made to staff and operating expenses at the Central Maui Landfill. Should those reductions in staff and operating expense not be achieved, the overall cost increase would be greater. The IWCEP is intended to increase waste diversion and preserve landfill capacity, both of which may be County objectives. It is therefore recommended that the Council evaluate the projected cost increase in relation to County and community solid waste management and sustainability goals.
- The Council should also review the County's rights under the IWCEP contract (i.e., right to modify terms, rights with respect to project milestones, etc.) with its legal counsel. An understanding of the County's contractual rights is important and will aid in monitoring the implementation of the IWCEP and planning for future budgets.



ATTACHMENT A
SUMMARY OF COMPLIANCE MATTERS



SUMMARY OF VIOLATION OCCURRENCES (BY FACILITY AND INSPECTION DATE)

Inspection Location and Date			Operations									Design/Environmental				Reporting				Total		
Violation Date	Facility	Status	Daily Cover	Vectors	Litter	Vegetation	Dust	Cover Maint.	Surface Water BMP	Leachate	Waste Acceptance	Other	Stormwater	Gas	Groundwater	Other	Stomwater	Gas	Groundwater	Other	Occurences	
7/21/2001	Central Maui (Ph. I and II)	Open	1	1	1				1		1											5
3/7/2001	Lanai Landfill	Open		1	1		1									1						4
10/1/2004	Lanai Landfill	Open									1						1			3		5
3/9/2006	Kalamaula, Molokai	Closed				1		1											1	1		4
3/15/2006	Naiwa, Molokai	Open			1				1			5					1					8
3/30/2006	Central Maui Landfill	Open										1					2			1		4
6/16/2006	Naiwa, Molokai	Open			1				1	1		1								3		7
9/5/2006	Lanai Landfill	Open	1		1				1		1	1				1				1		7
9/5/2006	Central Maui (Ph I and II), Lanai Ph. IV	Open	1	1	1				1		1									1		6
2/2/2007	Molokai	Open							1				1				1					3
2/2/2007	Hana	Open							1				1				1					3
2/2/2007	Lanai Landfill	Open							1								1					2
6/6/2007	Central Maui Landfill	Open												2						1		3
6/8/2007	Central Maui Landfill	Open			1			1				1						1				5
4/30/2009	Hana	Open										2							1	1		4
8/6/2009	Lanai Landfill	Open										1						1		2		4
5/23/2011	Kalamaula, Molokai	Closed							2													2
10/24/2011	Molokai	Open	1		1			1														3
5/25/2011	Hana	Open			1				1			1								1		4
1/8/2013	Waikapu Landfill	Closed						1	1									1	1			4
1/8/2013	Olowalu Landfill	Closed						1	1										1	1		5
1/8/2013	Kalamaula, Molokai	Closed						1	1										1	1		4
1/8/2013	Makani Landfill	Closed						1	1										1			3
1/25/2013	Central Maui Landfill	Open								2										1		3
1/25/2013	Naiwa, Molokai	Open	1		1																	2
5/6/2013	Lanai Landfill	Open									1											1
9/30/2013	Hana	Open														1						1
7/29/2014	Central Maui Landfill	Open										2										2
9/15/2014	Lanai Landfill	Open							1								2					3
3/25/2015	Olowalu Convenience Center	Open			1							1										2
9/6/2015	E-Cycling Facility	Open									1	1								2		4
6/12/2015	Central Maui Landfill	Open																2				2
# Occurrences			5	3	11	1	1	7	16	3	6	17	2	2	0	5	9	9	4	18	119	
											Total in Category:		70	Total in Category:		9	Total in Category:		40			
											% of All Occurrences		59%	% of All Occurrences		8%	% of All Occurrences		34%			

Source: Solid Waste Division.

ATTACHMENT B

DEM COST MODEL



SECTION 1

Assumptions

Commercial Haulers	91,050 tons/year
Residential Haulers	12,000 tons/year
Olowalu	1,750 tons/year
County Haulers	3,100 tons/year
County Residential Refuse Collection	42,100 tons/year
Estimated Total MS Waste	150,000 tons/year

SECTION 2

Anaergia Tip Fee	\$68.00 per ton
CML Tip Fee	\$90.00 per ton

SECTION 3

Annual County MSW Costs

	Current	IWCEP	Current + Curbside
CML Staff	\$1,837,000	\$367,400	\$1,837,000
CML Operations	\$2,000,000	\$500,000	\$2,000,000
CML Cover Material	\$1,400,000	\$280,000	\$1,400,000
CML Space (Volume Usage)	\$4,500,000	\$900,000	\$4,500,000
Tip Fee to Anaergia	\$0	\$4,008,600	\$0
Island-wide Curbside Recycling	\$0	\$0	\$1,600,000
Annual County MSW Total Costs	\$9,737,000	\$6,056,000	\$11,337,000

SECTION 4

Annual County MSW Revenues

	Current	IWCEP	
Tip fee	\$8,194,500	\$5,430,000	\$8,194,500
Annual County MSW Total Revenues	\$8,194,500	\$5,430,000	\$8,194,500

SECTION 5

Net Annual County MSW Costs

\$1,542,500	\$626,000	\$3,142,500
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CML Diversion Rate	45%	89%	50%
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Intangible IWCEP Benefits Not Captured Above

- Reduced GHG Emissions
- Less Landfilling/Increased Diversion
- Monetize Environmental Attributes
- Sustainability from Fuel Production
- Reduced Landfill Leachate Costs
- Economic Development (Jobs + tax revenues)
- Extended Life of CML Equipment (~\$10M capital)
- Seven Day Landfill
- Improved Permit Compliance/NOV Reduction
- Limit on risk of operating escalations

Assumptions: savings in equipment CIP due to the longer life of the equipment is not captured.

Note: The section number designations on this worksheet were added by CB&I.

ATTACHMENT C

**CENTRAL MAUI LANDFILL
CAPACITY ESTIMATES**



CENTRAL MAUI LANDFILL: DISPOSAL CAPACITY MASTER PLAN (PHASES IV - VI)

Phase	Lined Area (acres)	Gross Airspace (cy)	3' LCRS (cy)	4' Final Cover (cy)	Net Airspace (cy)	Capacity (tons)	Capacity (tons/acre)
IV-A	9.8051	485,000	47,457	63,276	374,267	217,449	22,177
IV-B	7.9955	1,109,312	38,698	51,598	1,019,016	592,048	74,048
V-A	6.2213	912,435	30,111	40,148	842,176	489,304	78,650
V-B	6.1086	862,048	29,566	39,421	793,062	460,769	75,430
V-C	6.2935	929,966	30,461	40,614	858,891	499,016	79,291
VI-A	5.9786	919,504	28,936	38,582	851,985	495,003	82,796
VI-B	7.2725	1,076,810	35,199	46,932	994,679	577,908	79,465
VI-C	9.0486	1,712,143	43,795	58,394	1,609,954	935,383	103,373
Total	58.7237	8,007,218	284,223	378,965	7,344,030	4,266,881	72,660

Notes:

1. Utilization Rate (tons of waste per cubic yard): 0.581

Source:

1. Volumetric capacity and areas: Integrated Solid Waste Management Plan, Appendix F-7, 2009.
2. Utilization Rate: DEM email correspondence, January 22, 2016.

Estimated Remaining Capacity

Estimated Capacity (as of 07/01/2014)

Phase	% Filled	% Remaining	Tons Remaining
IV	94%	6%	48,570
V	50%	50%	724,544
VI	0%	100%	2,008,295
			=====
Total			2,781,409

Less,

Est. Tons Disposed (07/2014 - 12/2015) 241,830 tons

Equals,

Est. Remaining Capacity (as of 01/2016) 2,539,579 tons

Estimated Remaining Years of Capacity:

@ 150,000 tons per year disposed 16.9
 @ 30,000 tons per year disposed 84.7

Notes:

1. Disposal tonnage from 07/2014 to 01/2016 estimated at 150% of FY2015 reported disposal tons (161,220 tons).

Source:

1. Capacity (as of 07/01/2014) estimated based on landfill use reported in FY2014 CAFR.

ATTACHMENT D

**CB&I COST MODEL
(ADPATED FROM DEM COST MODEL)**



SECTION 1**Assumptions**

Commercial Haulers	89,576 tons/year
Residential Haulers	15,278 tons/year
Olowalu	1,493 tons/year
County Haulers	2,265 tons/year
County Residential Refuse Collection	43,949 tons/year
Estimated Total MS Waste	152,561 tons/year

SECTION 2

Anaergia Tip Fee	\$68.00 per ton
CML Tip Fee	\$90.00 per ton

SECTION 3**Annual County MSW Costs**

	Current	IWCEP	Current + Curbside
CML Staff	\$2,002,681	\$720,965	NA
CML Operations	\$2,288,926	\$915,570	NA
CML Cover Material	\$1,341,046	\$268,209	NA
CML Space (Volume Usage)	\$2,354,016	\$470,803	NA
Tip Fee to Anaergia	\$0	\$4,282,980	NA
CML Equipment Costs	\$979,055	\$547,157	NA
Annual County MSW Total Costs	\$8,965,724	\$7,205,685	NA

SECTION 4**Annual County MSW Revenues**

	Current	IWCEP	
Tip fee	\$8,061,840	\$5,466,366	NA
Annual County MSW Total Revenues	\$8,061,840	\$5,466,366	NA

SECTION 5**Net Annual County MSW Costs**

Net Annual County MSW Costs	\$903,884	\$1,739,319	NA
CML Diversion Rate	45%	89%	NA

Intangible IWCEP Benefits Not Captured Above

- Reduced GHG Emissions
- Less Landfilling/Increased Diversion
- Monetize Environmental Attributes
- Sustainability from Fuel Production
- Reduced Landfill Leachate Costs
- Economic Development (Jobs + tax revenues)
- Extended Life of CML Equipment (~\$10M capital)
- Seven Day Landfill
- Improved Permit Compliance/NOV Reduction
- Limit on risk of operating escalations

Assumptions: savings in equipment CIP due to the longer life of the equipment is not captured.

Note: The section number designations on this worksheet were added by CB&I.

ATTACHMENT E

**REVIEW COMMENTS ON DRAFT REPORT:
SWD / DEM**



Summary

The Office of Council Services, on behalf of the Maui County Council, commissioned this study to assess and evaluate the Solid Waste Management Division (SWD). The study was commissioned as the result of questions raised during the FY2015 budget process. During that budget process, the Division requested an increase of 6 positions to assist with regulatory compliance. Initially, the Council authorized 2 of the 6 requested positions, and the remaining 4 positions were subsequently approved in the FY2016 budget.

The Maui County Council established two objectives for the assessment of the SWD:

1. Determine whether the personnel and funding authorized for the Division in the FY2015 Budget were sufficient to maintain acceptable levels of regulatory compliance, consistent with the Division's goals and objectives.
2. Assess whether implementation of the Maui County Integrated Waste Conversion and Energy Project (Contract M1016) will result in a net cost savings to the County compared to current operating practices.

Based on the analysis contained in this report, CB&I makes the following principal findings with respect to the first question:

- Staffing levels in the Solid Waste Division are consistent with staffing in other publicly-operated solid waste systems (relative to system tonnage).
- Operating costs for the Solid Waste Division are generally consistent with other publicly-operated systems, though somewhat higher than the overall trend. This may stem in part from varying levels of indirect costs (i.e., County administration and overhead) allocated to solid waste departments, which are beyond the control of the departments. We also note that SWD operates 4 landfills, (on three separate islands including remotely located Hana Maui) a higher number than other systems.
- The requested positions included 4 operations personnel and 2 engineering staff. After reviewing the compliance history of SWD, we believe the added personnel have been allocated proportional to the compliance issues they would be responsible for addressing.
- Given the 6 approved positions and approved funding levels, CB&I believes that the Solid Waste Division is positioned to operate its solid waste facilities to maintain acceptable levels of regulatory compliance.

Based on the analysis contained in this report, CB&I makes the following principal findings with respect to the second question:

- The County's Department of Environmental Management (DEM) performed an internal analysis of the IWCEP project. The DEM analysis projected that the IWCEP project would result in cost savings of approximately \$916,500 per year (versus the current landfill). The cost savings were predicated on significant reductions in labor, operating and construction costs at the Central Maui Landfill.



- Based on our review of the DEM cost model and our own analysis, CB&I believes that the cost savings projected by DEM were overstated, and that the IWCEP project will result in *higher* costs of \$835,000 per year (relative to the current landfill), and still assuming that significant reductions to staff and operations costs are made at the Central Maui Landfill.

Our analysis supporting these findings is discussed in detail in the remainder of this report, along with additional findings and recommendations.



Introduction

Background

The Office of Council Services, on behalf of the Maui County Council, commissioned this study to assess and evaluate the Solid Waste Management Division (SWD), which is a division within the County's Department of Environmental Management (DEM). The study was commissioned as the result of questions raised during the FY2015 budget process. During that budget process, the Division requested an increase of 6 positions to assist with regulatory compliance. Initially, the Council authorized 2 of the 6 requested positions.

Following this budget process, the Division reduced landfill hours and cancelled holiday refuse collection services for an approximately 5-week period of time, reportedly as the result of the budget constraints imposed by the Council. Service was ultimately restored to prior levels, but the impacts to the community were large enough to cause the Council to commission the proposed study and more fully investigate the budgetary issues and the operations of the Solid Waste Division. Subsequently, the Council approved the other 4 positions in the FY2016 budget.

Prior to the FY2015 budget process, the Department of Environmental Management began exploring the development of a waste-to-energy project. In November, 2012, DEM issued a Request for Proposals (RFP) to technology vendors interested in providing an Integrated Waste Conversion and Energy Project (IWCEP), and ultimately selected Anaergia Services, LLC (Anaergia) as its preferred vendor. A services agreement was executed with Anaergia on January 8, 2014.

The IWCEP was also brought up during the FY2015 budget discussions. DEM had previously indicated to Council that the IWCEP would reduce internal resource needs for maintaining regulatory compliance. Council was therefore concerned about the request to add 6 new positions to the Solid Waste Division (to maintain regulatory compliance), given the planned implementation of the IWCEP.

The Maui County Council established two objectives for the review/assessment of the Solid Waste Division:

1. Determine whether the personnel and funding authorized for the Division in the FY2015 Budget were sufficient to maintain acceptable levels of regulatory compliance, consistent with the Division's goals and objectives.
2. Assess whether implementation of the Maui County Integrated Waste Conversion and Energy Project (Contract M1016) will result in a net cost savings to the County compared to current operating practices.

These two questions are addressed in Section 1 and Section 2 of this report.



Methodology

To address the first question, concerning Solid Waste Division (SWD) staffing and funding resources, CB&I performed the following activities:

- Reviewed the FY2014, FY2015 and FY2016 budgets for DEM and SWD.
- Reviewed correspondence between DEM/SWD and various Council committees during the FY2015 budget process¹. These committees include the Policy and Intergovernmental Affairs Committee, the Infrastructure and Environmental Management Committee, and the Budget and Finance Committee. (We appreciate and acknowledge the efforts of Council Services staff in compiling these documents and providing them to CB&I in response to our information requests).
- Reviewed documentation provided by SWD including staffing schedules, organization charts, position descriptions, facility permits, facility operating plans, contracts for services, solid waste fee schedules, compliance history, and facility tonnage reports. (We appreciate and acknowledge the efforts of SWD staff in compiling these documents and providing them to CB&I in response to our information requests).
- Reviewed historical operating cost information for the Central Maui Landfill and other operating units of the SWD for the period FY2012-FY2015. (This information was provided by the Department of Finance, and we appreciate and acknowledge the efforts of Department staff in making the information available to CB&I.)
- Researched benchmark comparison data on solid waste departments (staffing and operating costs) for other publicly-operated solid waste systems in the State of Hawaii and, to provide a larger dataset, the State of Florida.
- Interviewed SWD and DEM staff and conducted site tours of the Central Maui Landfill, Olowalu Convenience Center and various drop-off facilities during a two-day meeting.
- Analyzed the above information, as further described in Section 1.

To address the second question, concerning the IWCEP project, CB&I performed the following activities:

- Interviewed current (and former) DEM staff to obtain background information on the IWCEP.
- Reviewed the Request for Proposals for the IWCEP project.



¹ Council Services has posted these documents to a project website (<http://mauicounty.us/solidwasteaudit/>).

- Reviewed the contract executed with ~~Anergia~~Anaergia².
- Reviewed a cost analysis of the IWCEP project previously prepared by DEM. (We appreciate and acknowledge the efforts of DEM staff in making this analysis available to CB&I).
- Analyzed the above information, as further described in Section 2.

² Although CB&I reviewed the contract and has a general understanding of the proposed facility, we did not perform a technical assessment of the IWCEP or the Anaergia technology. Our review was limited to assessing the potential cost impacts of the IWCEP versus the current operations of the Central Maui Landfill.



Section 1

Review of SWD Personnel and Funding

This section provides CB&I's review of staffing and operating expenses for Maui County's Solid Waste Division (SWD). The objective of the review is to determine whether FY2015 employment and funding for the SWD are sufficient to maintain regulatory compliance. To make this determination, CB&I reviewed FY2014, FY2015, and FY2016 budget and actual expense data for the SWD. This data was compared to staffing and expenses for other publicly-operated solid waste systems to benchmark personnel and costs for SWD versus these other public systems. We also reviewed the 6 additional personnel requested during the FY2015 budget process with respect to the historical compliance issues SWD has faced.

1.1 Identification of Solid Waste Systems for Benchmark Comparison

CB&I performed a benchmark comparison of SWD with other publicly-owned and primarily publicly-operated solid waste systems. The key parameters evaluated include employment, operating expenses, and tons managed. The number and type of facilities owned and operated by each system were also considered, as this impacts employment and operating expenses. Disposal, recycling, and administrative operations for each solid waste system were included in the analysis; collection operations were excluded, because the scope of this assessment was to address disposal operations only (although we note below what types of collection services are provided for each system included in the analysis).

CB&I first considered other solid waste systems in the State of Hawaii, because they reflect the unique characteristics of island solid waste operations as well as State-specific conditions. Information was obtained and evaluated from two of the three other Hawaiian counties (Hawaii and Kauai). Honolulu was excluded because insufficient information was available to segregate collection operations from solid waste disposal, recycling and administrative operations. To provide a larger dataset, solid waste systems in Florida were also considered. Much of the solid waste infrastructure in Florida is publicly-owned and operated, and many counties rely on landfills for disposal; as a result, these Florida waste systems had general similarities to the Hawaiian systems noted above.

Table 1.1 presents summary information on the number and types of facilities owned by each system, as well as the tonnage handled by each system³. As is evident from Table 1.1 (and as further described below), each solid waste system is unique, having a different mix of facilities and managing different tonnages. The Florida waste systems, for example, handle greater quantities of waste because they serve larger populations. The Hawaii systems tend to have a greater number of transfer station and drop-off recycling facilities; this is to provide more convenient access to residents that self-haul materials and to service more remote areas of the islands. In Florida, by contrast, the counties have universal curbside collection of waste materials, and there is comparatively less self-hauling by residents and comparatively fewer transfer and drop-off facilities.



³ The tonnage includes waste that is disposed as well as diverted through recycling and/or composting programs.

TABLE 1.1. SUMMARY OF PUBLICLY-OWNED SOLID WASTE SYSTEMS

County	System Tons	Landfill	Transfer / Conv. Ctr.	Drop-off Recycling	Compost / Mulch	Permanent HHW
Hawaii	246,000	2	22	-	2	-
Kauai	107,000	1	4	7	-	-
Maui	221,000	4	2	4	2	-
Brevard (FL)	1,150,000	2	2	-	1	3
Orange (FL)	940,000	2	2	1	1	2
Seminole (FL)	382,000	1	1	-	1	1
Volusia (FL)	473,000	1	1	-	-	-

Notes:

1. Transfer / Conv. Ctr. = transfer station/convenience center. For Maui County, this includes Olowalu and Recycle Molokai.
2. Drop-off Recycling represents stand-alone facilities; drop-off services may also be provided at landfills and transfer stations. For Maui County, the stand-alone facilities include Haiku, Kihei, WHMC, and Makawao. The Orange County facility is a material recovery facility that processes recyclables.
3. Compost/Mulch represents a permanent location. For Maui County, the count includes the greenwaste operations at Central Maui Landfill and Recycle Molokai. Kauai shreds greenwaste at landfill and transfer stations, but does not have a stand-alone facility for that purpose.
4. Permanent HHW represents a permanent location for household hazardous waste (as opposed to collection events for household hazardous waste).

Source:

1. County Comprehensive Annual Financial Reports (FY2014), budget documents and County websites.

The systems in Table 1.1 are further described below. Note that for any operations that are contracted to a private company, the employees of the contractor are not included in the subsequent analysis of system staffing levels.

- Maui County owns and operates four active landfills. The Central Maui Landfill and Hana Landfill are located on Maui, while the Molokai Landfill and Lanai Landfill are located on other islands. The Central Maui Landfill operates 6 days per week, while the smaller landfills each operate 5 days per week. The County also owns the Olowalu Transfer Station/Convenience Center and contracts operation to a private company. A Convenience Center is also provided on Molokai (Recycle Molokai), which is privately-operated. The County hosts a privately-operated composting facility at the Central Maui Landfill, and greenwaste processing services are provided (under contract) at Recycle Molokai. In addition, four drop-off recycling facilities are provided on Maui, which are serviced by private contractors; drop-off recycling services are also provided at the Central Maui Landfill, Olowalu Convenience Center, and Recycle Molokai. The County also monitors and maintains four closed landfills and two closed phases of the Central Maui Landfill (this is a greater number of legacy landfills than for the other systems). In addition, Maui County performs residential refuse collection for ~~a portion of the most~~ households on Maui, Molokai, and on Lanai (employees and expenses associated with the collection operation are excluded in the remainder of this analysis).



- Hawaii County owns two active landfills and is responsible for long-term care of two closed landfills. The South Hilo Landfill is operated by County employees and operates 7 days per week, while the West Hawaii Landfill is operated by a mix of County employees and Waste Management of Hawaii (WMH) employees and operates 6 days per week. WMH is responsible for landfill construction, environmental monitoring, and operational oversight at the landfill. Hawaii County also operates 22 staffed transfer stations. Of these, 10 are operated 7 days per week, 12 hours per day. Eleven transfer stations are operated 3 days per week for 12 hours per day, and one transfer station is open on Saturdays only. The County owns two mulch/compost facilities, and contracts operation of the facilities to a private company. The County does not provide any collection services for refuse.
- Kauai County owns one landfill and four transfer stations. In addition, the County owns the Kauai Resource Center and six satellite drop-off recycling centers (drop-off services are also provided at the landfill and one transfer station). The County also performs refuse collection (employees and expenses associated with collection are excluded in this analysis). County staff operate the Kekaha Landfill 7 days per week; the County contracts with Waste Management of Hawaii to provide operations oversight and environmental monitoring and compliance services at the landfill. Transfer stations on Kauai are operated by the County 7 days per week; however, employment and operating expenses for the transfer stations are not included in this analysis because they are included in the County's collection operations. The Kauai Resource Center is operated by a private company.
- Brevard County owns and operates two landfills, the Central Disposal Facility (a municipal waste landfill) and the Sarno Road Landfill (a construction waste landfill). The County also owns and operates two transfer stations, one of which is co-located with the Sarno Road Landfill. In addition, the County operates a mulching facility and three permanent household hazardous waste collection facilities. The County's facilities generally operate 6 days per week. The County has entered into a collection contract with a private company for the collection of refuse and recycling from residents in unincorporated Brevard County; the County manages and administers this collection agreement.
- Orange County owns and operates a municipal waste landfill, a construction waste landfill, and two transfer stations. The landfills are co-located on the same property. The County also owns a recycled materials processing facility on the landfill property which is operated by a private contractor. Composting operations for yard waste are conducted on the landfill property. Facilities for household hazardous waste materials are maintained at the landfill and one transfer station. All facilities generally operate 7 days per week. The County has entered into collection contracts with private companies for the collection of refuse and recycling from residents in unincorporated Orange County; the County manages and administers these collection agreements.
- Seminole County owns and operates a municipal waste landfill, a transfer station, a mulching facility, and a household hazardous waste facility. The landfill and mulching facility are located on the same property and operate 7 days per week. The transfer station and co-located household hazardous waste facility operate 6 days per week. The County has entered into collection contracts with private companies for the



collection of refuse and recycling from residents in unincorporated Seminole County; the County manages and administers these collection agreements.

- Volusia County owns and operates a landfill and a transfer station. The County's facilities are operated 6 days per week. The County also provides long-term care and maintenance of one closed landfill site. The County contracts with a private company for the collection of refuse and recycling from residents in unincorporated Volusia County; the County manages and administers the contract.

Though each solid waste system is unique and there are variations in the systems evaluated herein, it is possible to compare systems at a high level on parameters such as overall operating costs and employment. For this study, the number of full-time equivalent (FTE) employees and operating expenses⁴ were compiled, and compared against the system tonnage managed. All data presented reflects actual expenditures for FY2014, the most recent period for which data is available for all the systems. FY2014 data was obtained from Comprehensive Annual Financial Reports (CAFRs) or from FY2016 budget documents that provided FY2014 actual expense data⁵.



⁴ Collection operations are excluded from FTE employees and operating expenses.

⁵ Review and comparison of FY2015 expenses for all counties may be possible when FY2015 CAFRs are published.

1.2 Benchmark Analysis of Staffing Levels

Figure 1.1 shows a comparison of solid waste department staffing levels versus system tonnage managed for the three Hawaiian counties, including an overall trend line. Based on these data, the following observations are made:

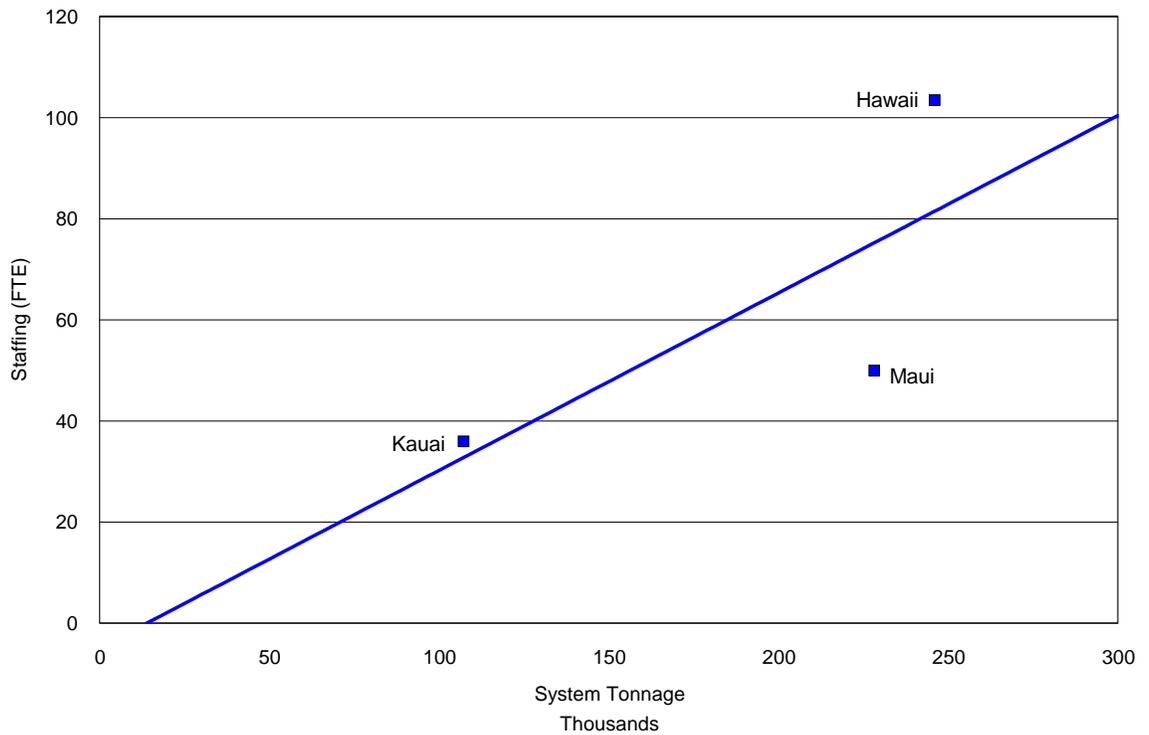
- Considering the three county systems reviewed, Maui County's FY2014 employment for solid waste services was below the overall trend.
- The trend is impacted by the notably higher employment in Hawaii County, resulting from their operation of a larger number of transfer stations relative to the other counties. While Maui County and Kauai County both own transfer stations, transfer station employment is not reflected in Figure 1.1 for either county because operations are either contracted to a private company (Maui) or included as a collection operation (Kauai). It was not possible to obtain separate estimates of transfer station and landfill employees in Hawaii County, because personnel are assigned to "response centers" instead of specific landfill or transfer station facilities⁶.
- Kauai County's system is more similar to Maui County's system. In FY2014, Maui County managed twice as many tons as Kauai County. Maui County also operates four landfills, while Kauai County operates one landfill. Despite managing double the tonnage and operating 3 additional landfills, Maui County only had 45% more employees than Kauai County, indicating that Maui County achieves certain economies of scale and efficiencies in its operations compared to Kauai County.

Although not evident from the summary data in Figure 1.1, we note that staffing at the Central Maui Landfill is less than staffing at Kauai's Kekaha Landfill. Kauai County allocates 20 employees to landfill operations, versus the 22 employees at Central Maui Landfill. In addition, based on information provided in an interview with Waste Management of Hawaii, an additional 3 personnel are assigned by the private company to provide project management, environmental monitoring, and quality assurance / quality control services under contract to the County. In total, therefore, the Kekaha Landfill is operated by 23 employees, compared to 22 employees operating the Central Maui Landfill. The Kekaha Landfill disposed of 76,600 tons of waste in FY2014, versus 158,000 tons at the Central Maui Landfill. [This shows 3330 landfilled tons/employee at Kekaha vs. 7182 landfilled tons/employee at the Central Maui Landfill.](#)



⁶ Personal correspondence with Robin Bauman, Hawaii County Solid Waste Division Business Manager, January, 2016.

FIGURE 1.1. COMPARISON OF HAWAIIAN COUNTY SOLID WASTE SYSTEMS: STAFFING (FTEs) VS. SYSTEM TONNAGE (FY2014)



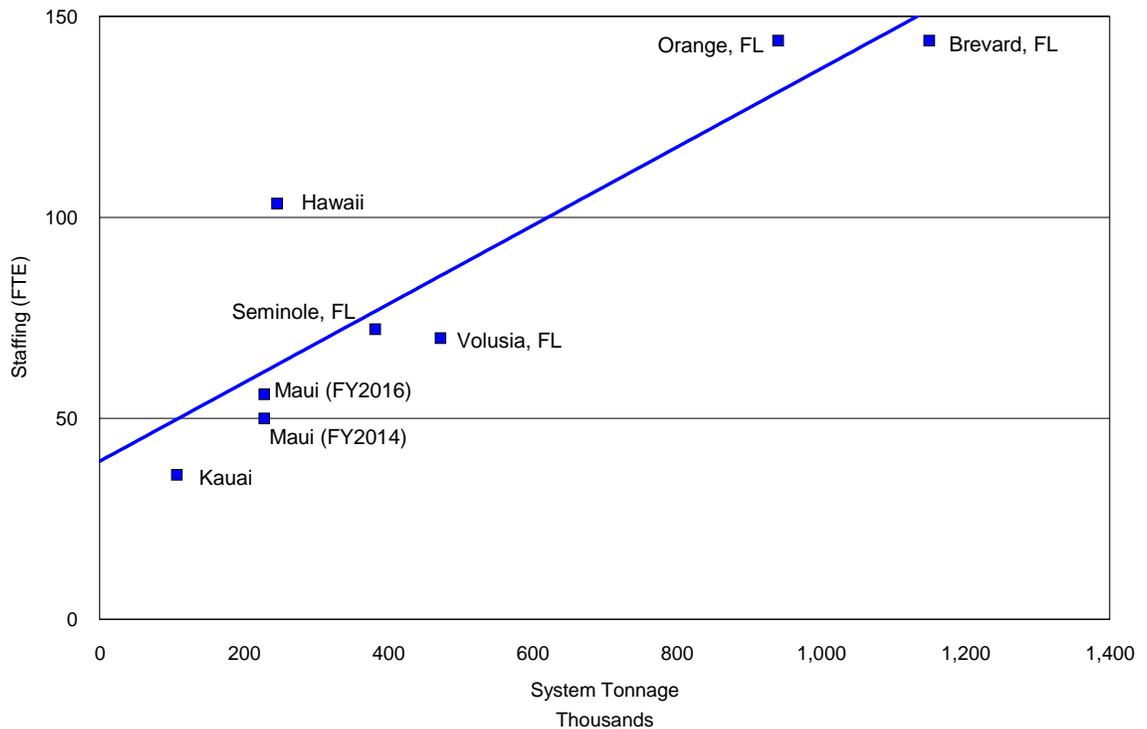
Source: FY2014 CAFR or actuals from budget documents. Data excludes collection personnel.

To provide additional data for comparison, we also considered solid waste systems in the State of Florida. As noted previously, much of the solid waste infrastructure in Florida is publicly-owned and operated, and the systems utilize landfills and transfer stations. Figure 1.2 compares solid waste department staffing levels versus system tonnage for the counties considered in both Hawaii and Florida. This comparison shows:

- Maui County's FY2014 employment was consistent with other systems, and lower than the overall trend line.
- Maui County's FY2016 employment, reflecting the addition of six employees since FY2014, also remains below the trend line.



FIGURE 1.2. COMPARISON OF PUBLICLY-OPERATED SOLID WASTE SYSTEMS: STAFFING (FTEs) VS. SYSTEM TONNAGE (FY2014)



Source: FY2014 CAFR or actuals from budget documents. Data excludes collection personnel.

Note: Maui's FY2016 staffing is shown for comparison purposes only and is not used to compute the trend.

1.3 Benchmark Analysis of Operating Expenses

CB&I also evaluated operating costs as a function of tonnage handled by the benchmark systems. For purposes of these comparisons, costs associated with the disposal, recycling, and administrative operations of each solid waste system were included. Administration costs include both department-level administration as well as allocated County overhead and administration costs.

Collection costs were excluded, because the scope of this assessment was to address disposal operations only. Depreciation (or debt service) and closure and post-closure care expenses were also excluded, because those expenses are related to the capital investment in the systems, whereas this study is focused on operational parameters⁷.

Figure 1.3 shows a plot of operating expenses versus system tonnage for the three Hawaii solid waste systems. FY2014 data was utilized because, as noted previously, it represents the most recent available data for all counties included in the analysis. (We note that SWD requested and obtained funding for 6 additional staff positions subsequent to FY2014;



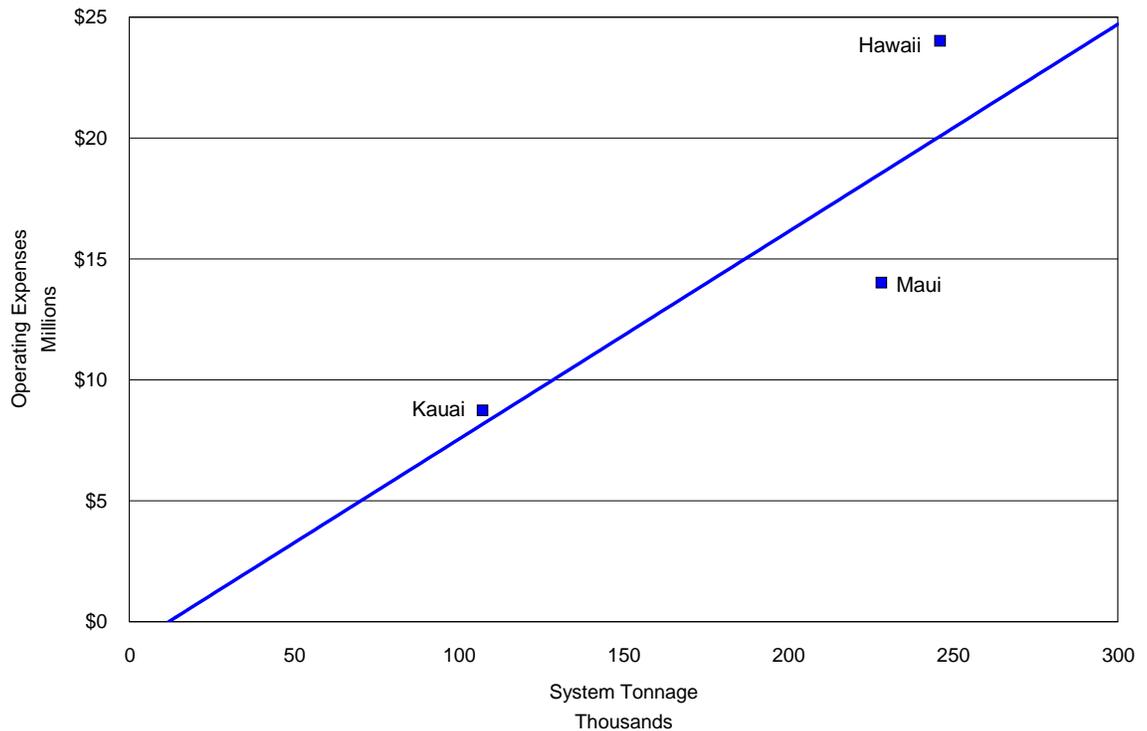
⁷ Additionally, depreciation (or debt service) was reported on a consolidated basis, and therefore may include some collection-related infrastructure for those systems that also provide collection services.

however, other systems may also have added to staff, and the FY2014 data allows all systems to be evaluated on a comparable basis).

Based on this comparative analysis, the following observations are made:

- Maui County's costs fall below the trend line for other systems in Hawaii.
- Hawaii County's system includes a large number of transfer station facilities, which contributes to higher operating expenses and impacts the overall trend line, as was the case in the analysis of staffing levels.
- Kauai County's operating expenses do not include costs associated with its transfer stations and are therefore understated in Figure 1.4 relative to both Maui County and Hawaii County. Kauai reports its transfer station costs combined with collection costs, and the expenses were not able to be segregated.

FIGURE 1.3. COMPARISON OF HAWAIIAN COUNTY SOLID WASTE SYSTEMS: OPERATING EXPENSES VS. SYSTEM TONNAGE (FY2014)



Source: FY2014 expenditures (CAFR or actuals from FY2016 budget documents). Data excludes collection costs, debt service, and depreciation.



To evaluate Maui County's operations against a larger dataset, operating expenses were also considered for publicly-owned and operated systems in Florida, as shown in Figure 1.4. For this comparison, Maui County's operating expenses are presented in two ways: 1) total operating expenses for all disposal, recycling, and administrative operations, and 2) adjusted operating expenses, excluding operating costs at the three smaller landfills. The adjusted total was included to show the relative impact on Maui County's cost base of operating four landfills versus just the Central Maui Landfill. All of the other systems considered operate one or two landfill facilities.

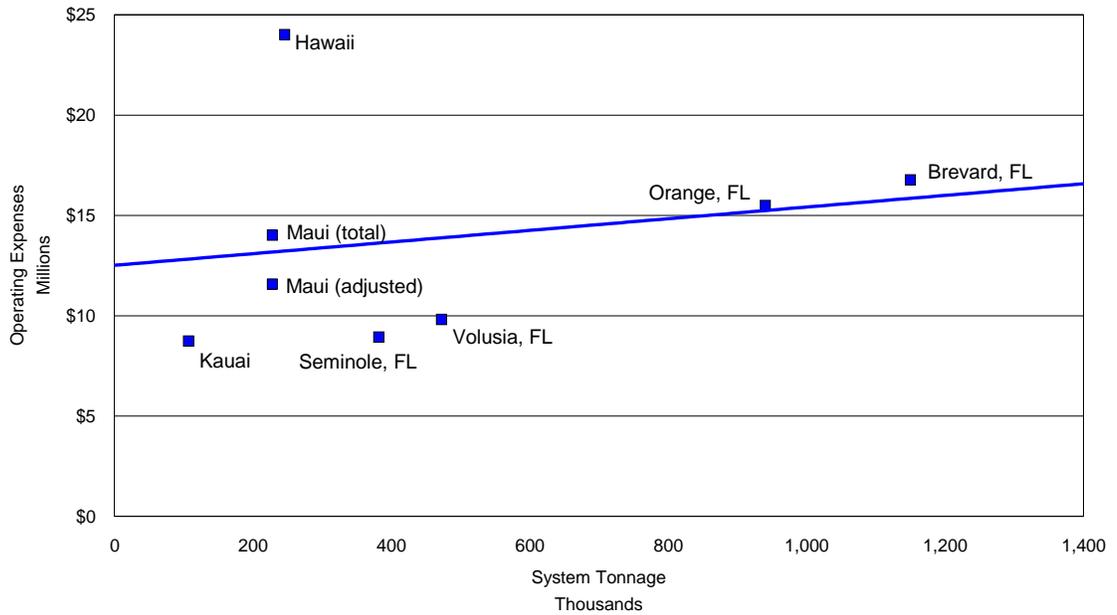
Based on these data, the following observations are made:

- Maui County's total operating costs in FY2014 are somewhat higher (approximately 6 percent) than the overall trend line. On an adjusted basis, excluding the three smaller landfills, the County's operating costs are below the trend line. Hawaii County, Orange County and Brevard County each operate two landfills, while the remaining systems operate one landfill.
- We note again that Hawaii County operates 22 transfer stations, which is why its costs are significantly higher than the other systems. The operating expenses for Kauai County, on the other hand, do not include transfer station operating costs, because Kauai includes those costs in its collection operations.
- We also note that the operating costs are inclusive of allocated County administration and overhead costs. Based on our review of CAFRs and other financial data, specific amounts of these allocated indirect costs were available for 3 systems: Maui County (\$1,788,255, or approximately 13 percent of operating costs); Kauai County (\$900,000, or approximately 10 percent of operating costs); and Orange County (\$608,638, or approximately 4 percent of operating costs).

Because the amounts of allocated County administrative costs were available for only the three systems noted above, we were not able to compute a trendline excluding such costs. It is apparent, however, that these indirect costs vary from system to system, and that a larger allocation was made to the Maui County system than in Kauai County and Orange County. We note that these allocated costs are established at the county-level and therefore are not within the control of solid waste departments.



**FIGURE 1.4. COMPARISON OF COUNTY SOLID WASTE SYSTEMS:
OPERATING EXPENSES VS. SYSTEM TONNAGE (FY2014)**



Source: FY2014 expenditures (CAFR or actuals from FY2016 budget documents). Data excludes collection costs, debt service/depreciation, and closure/post-closure costs.

Notes:

1. Maui (adjusted) excludes operating expenses at outlying landfills.
2. Kauai County owns and operates 4 transfer stations; operating expenses for the transfer stations are not included.
3. Computation of the trend line excludes Maui (adjusted).



1.4 Analysis of 6 FTE Positions Requested by SWD

During the FY2015 budget process, SWD requested 6 expansion positions. ~~Just two~~ of these were approved by the Council in the ~~initial~~ adoption of the FY2015 budget. Subsequently, the Solid Waste Division had to re-submit in FY 16 for the remaining 4 positions left unapproved by Council in FY 15. ~~approved a supplemental budget request fund—these other 4 positions for the remainder of FY2015, and all 6 positions were subsequently included in the~~ approved in the FY2016 budget.

Ultimately, the 6 FTE positions requested and subsequently approved included an equipment operator at the Hana Landfill (increasing the staff from 3 to 4); an equipment operator at the Lanai Landfill (increasing the staff from 3 to 4); an equipment operator at the Molokai Landfill (increase the staff from 4 to 5); a landfill attendant at the Central Maui Landfill (although an expansion position, the staff remained at 22 because an existing technical engineer position was shifted to the engineering section); and two new engineering positions (the engineering section grew from 3 staff to 6 including the 2 new positions along with the position moved from the Central Maui Landfill). For clarity, we note that there is a supervisor position for the Hana, Molokai and Lanai Landfills with an office at the Central Maui Landfill; this supervisor position is not included in the 22 staff at the Central Maui Landfill or the 5 staff at the Molokai Landfill noted above⁸.

We note initially that 3 of the FTE positions were added at the smaller landfills (one each at Hana, Molokai and Lanai). Table 1.2 shows the staffing levels at these landfills before and after the requested positions were approved.

TABLE 1.2. ADDITIONS TO SMALL LANDFILL STAFF

Position	Hana Landfill		Molokai Landfill		Lanai Landfill	
	Prior	New	Prior	New	Prior	New
<u>Working Supervisor</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>
Equipment Operator	04	12	04	12	12	23
Landfill Attendant	1	1	1	1	1	1
Laborer	1	1	1	1	-	-
Cashier	-	-	1	1	-	-
Total	3	4	4	5	3	4

Notes:

1. Total excludes 1 supervisor position that oversees Hana/Molokai/Lanai and has an office at Central Maui Landfill.
2. Lanai landfill staff also performs solid waste collection on 2 days per week.

During the FY2015 budget discussions, SWD noted that due to vacation time as well as needing to allow for absences due to illness, it was challenging to operate the landfills with out a dedicated ~~—a single~~ operator (although there were 12 operators at the Lanai Landfill, those staff also provided solid waste collection services). Operating the landfills in compliance was also challenged because a single operator is needed to ~~had to~~ focus on



⁸ In the FY2016 budget, this supervisor position was assigned to the Molokai Landfill cost center, and the FY2016 budget documents therefore show 6 positions at Molokai.

~~compacting trash. The Working Supervisors (WS) have management, personnel, compliance, site inspections, planning, budgeting, setting schedules, and back up operator responsibilities, and therefore the WS's have little time to perform Operator duties. However, with no dedicated operator positions prior to FY 16 approvals, the supervisor had to forgo most management duties, in order to be the sole Operator at the working face. had less time to address other site responsibilities.~~

CB&I finds that these were reasonable concerns on the part of SWD. A Working Supervisor acting as the sole single operator would necessitate that the ~~supervisor~~~~employee~~ work every day the landfill was open as an operator and forgo his/her management duties. We believe that the addition of a dedicated n additional operator at each of the three landfills will provide greater operational flexibility and greater capacity of the Working Supervisor to manage and address compliance requirements.

We would also note that the Olowalu Convenience Center is privately operated under contract, and that facility utilizes two staff (a third employee is used to haul materials from the convenience center). The convenience center is a drop-off facility for residents, and the work duties of the landfill staff include activities (e.g., compacting trash, applying daily cover) that are not required at the convenience center. The contract operator of the convenience center also has an operations manager, not included in the three employees noted above, that inspects the site and operations on a weekly basis (daily, if necessary).

This private contractor also currently operates under contract, the Recycle Molokai facility, and in its most recent proposal to the County, the contractor noted that staff had been increased from 4 to 9 employees. The contract includes operation of the HI5 redemption center, drop-off recycling facility, ~~greenwaste drop-off and processing, and inspection of incoming waste and~~ recyclable materials, ~~and operation of the Molokai Landfill scalehouse~~^[ce1]. Although not directly comparable to the County's landfill operations because it includes different activities, we note that the private operator has also expanded staff.

Another private contractor operates the greenwaste drop-off and processing area. The contractor is responsible for processing greenwaste and removing from the site.

Much of the discussion on the 6 positions during the FY2015 budget session centered around compliance. SWD's basis for requesting the additional positions was to provide sufficient staffing to operate the County's 4 active landfills, as well as the system generally, at a greater level of compliance. SWD noted that, since 2000, the County has received a number of compliance violations from the State Department of Health and other regulatory agencies, and that between 2006 and 2014, these violations resulted in compliance costs (fines and corrective actions) amounting to \$7,069,125, or \$883,641 per year⁹.

CB&I reviewed the historical compliance violations, and analyzed the data by categorizing the violations into three principal categories (refer to Attachment A):

- Operations related, which would include such issues as applying daily cover, vectors, litter, vegetation maintenance, dust, cover maintenance, surface water best management practices, leachate handling, and waste acceptance procedures.



⁹ We note that the period 2006 to 2014 includes 9 years, suggesting a corrected annual average of \$785,458 .

- Environmental/design related, which would include such issues as stormwater management, landfill gas, and groundwater.
- Reporting related, which would include such issues as timely filing of required reports on stormwater, landfill gas, and groundwater monitoring.

The operations-related compliance matters are issues that need to be addressed through daily operating practice by the personnel assigned to each landfill. The reporting-related compliance matters are issues that would typically be addressed by engineering staff. The environmental/design related matters represent issues that are typically less under the control of landfill and engineering staff and may require outside consulting support and/or capital improvements (e.g., provision of an all-weather access road, updating of stormwater pollution control plans, installation of landfill gas collection and control system by required date).

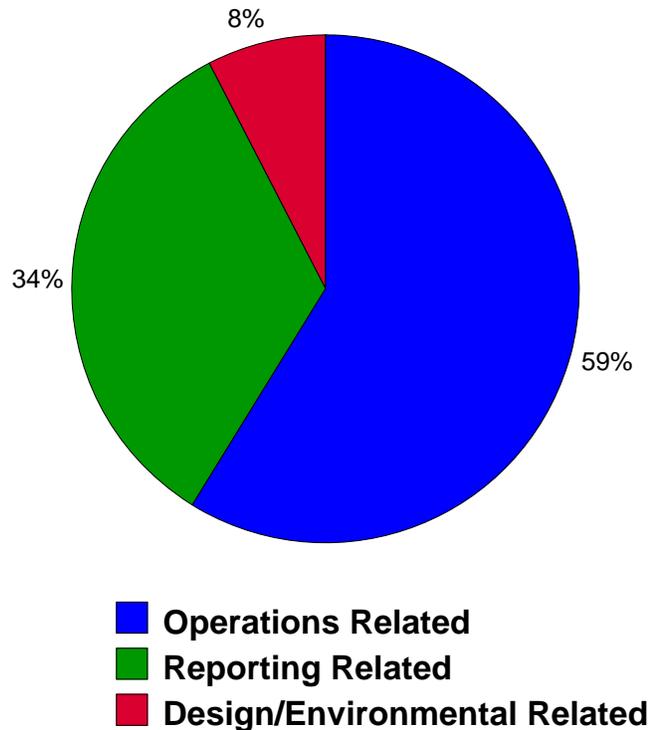
Based on our review of SWD's compliance history, CB&I found that approximately 59 percent of compliance issues were operations related, 34 percent were reporting related, and 8 percent were design/environmental related (refer to Figure 1.5 and Attachment A). Excluding the design/environmental issues, the operating and reporting issues occur in a proportion of 63 percent (operations) and 37 percent (reporting).

The 6 requested new positions, which consisted of 4 operations staff and 2 engineering staff¹⁰, are generally in the same proportion (67 percent/33 percent) as the compliance issues those staff would be expected to address (63 percent/37 percent). Thus, the added positions should allow the Solid Waste Division to better address the compliance issues that have historically been cited by State regulatory agencies.



¹⁰ We note that the engineering positions were requested to perform other duties in addition to compliance-related activities, such as managing CIP projects.

FIGURE 1.5. SUMMARY OF COMPLIANCE ISSUES BY TYPE



Source: Solid Waste Division.

Following the approval of the 2 requested engineering expansion positions, the Engineering Section of SWD includes 6 personnel. Based on our review of benchmark data for other publicly-operated systems, a staff of 6 is within the range of engineering departments employed at other systems, although it is at the higher end of the range. Volusia County, in Florida, has 1 engineer (that system, however, has one landfill and one transfer station). Kauai County has two county-employed engineers, but the County contracts with Waste Management for compliance, monitoring and project management of the Kekaha Landfill; Waste Management provides 3 employees for its services, and therefore Kauai County's system relies on 3-5 staff for compliance support. Hawaii County has two engineering staff, but receives compliance support from Waste Management, which is contracted to assist in operating the West Hawaii Landfill. The engineering section in Orange County, Florida has 6 personnel; that system handles larger quantities of waste than Maui County, but includes fewer facilities (two co-located landfills and two transfer stations)

The County also has four closed landfills which must be maintained (and which have been subject to compliance actions in the past). In a letter from DEM to the Council's Budget and Finance Committee on May 1, 2015, SWD presented construction and operations and maintenance cost information to remediate the closed landfills (refer to Table 1.3). It is our understanding that in April, 2015, SWD commissioned a consultant study to prepare closure and post-closure maintenance plans for the closed landfills (when CB&I met with DEM and SWD staff in September, 2015, the results of this study were not yet available).



TABLE 1.3. ESTIMATED CLOSED LANDFILL COSTS				
Closed Landfill	Estimated Remedial/Cover Construction Costs			Post FY2016 6-Year O&M
	Total	Through FY2016	Remaining	
Makani	\$542,850	\$399,850	\$143,000	\$120,000
Kalamaula	\$2,142,250	\$550,550	\$1,591,700	\$198,000
Waikapu	\$1,137,400	\$411,400	\$726,000	\$162,000
Olowalu	\$2,558,160	\$409,200	\$2,148,960	\$192,000
Total	\$6,380,660	\$1,771,000	\$4,609,660	\$672,000

Source:
1. DEM Letter to County Council Budget and Finance Committee, May 1, 2015.

Note:
1. Costs through FY2016 represent budgeted costs and activities expected to be completed (or partially completed) in FY2016.

We believe that the assessment of the closed landfills is an important planning tool, although we don't know if the results of that study will impact the cost estimates in Table 1.3. Most of the capital costs for the closed landfills are associated with performing topographic surveys, importing and placing soils to improve drainage, hydroseeding to establish vegetative cover, and repairing or replacing perimeter fencing. It appears that DEM is planning to provide for the proper closure and long-term maintenance of the 4 closed landfills.

Following completion of the construction activities, SWD has also estimated 6-year operations and maintenance costs to maintain the closed landfills. These costs include repairs to the cover soil for erosion, regrading areas that have settled, maintaining the vegetation and stormwater collection system, and repairing perimeter fencing. These are typical costs in maintaining a closed landfill. It is unclear, however, whether these operation and maintenance costs are labor-related or materials-related, and further whether the activities would be performed by in-house personnel or as contracted services. CB&I recommends that the Council obtain clarification from SWD on these questions.

As noted in the Introduction, one of the concerns of the Council during the FY2015 budget discussions was the request of the Solid Waste Division for 6 new positions, when DEM had previously represented that the IWCEP would reduce internal resource needs to maintain regulatory compliance. While the IWCEP (as discussed in Section 2) is intended to reduce the amount of waste disposed in the Central Maui Landfill, the Landfill will continue to operate. In addition, the Solid Waste Division will continue to operate the 3 smaller landfills and is responsible for the 4 closed landfills. It appears that the 6 requested positions were intended to address Division-wide regulatory compliance, and not compliance solely at the Central Maui Landfill.



1.5 Future Financial Planning

During our review of the extensive documentation provided by SWD and Council Services pertaining to the FY2015 budget process and solid waste operations generally, we observed that considerable information has been developed on the operations and costs to manage the County's solid waste system. Due to the nature of the budget process, the questions asked by Council are detailed and specific, as are the responses from SWD. In addition to questions pertaining directly to position expansion and equipment requests, Council has requested information on historical costs to operate the County's landfills, costs to provide for maintenance of the closed landfills, and costs of diversion (e.g., recycling or composting) programs. SWD has provided detailed information in response to these background type requests.

It appears that although this detailed, valuable information exists and has been presented to Council, an overall summary of the costs within the Solid Waste Division, current as well as projected, is not available (outside the 6-year CIP projections developed during the budget process)¹¹. The operations of the SWD encompass multiple activities (e.g., landfills, collection, diversion programs) as well as active and closed landfills. There are also debt service and County overhead costs which impact the SWD budget. Developing a summary financial model to address the projected costs of operating and maintaining the solid waste system (including legacy landfills) would be a helpful tool for communicating near-term budget requests in the context of the long-term goals and responsibilities of the SWD.



¹¹ We note that in an April 24, 2015 letter to the Council Budget and Finance Committee, DEM did provide two graphs of 6-year projected costs for what DEM termed reactive and proactive operating management models. This suggests that DEM is thinking along a similar line, although the data provided in the letter was summarized at a very high level.

1.5 Findings and Recommendations

Findings:

- The Solid Waste Division's FY2014 staffing levels are consistent with other solid waste systems in both Hawaii and Florida, relative to system tonnage.
- Although SWD added 6 positions between FY2014 and FY2016, the higher level of staffing remains consistent compared to other public waste systems.
- Operating costs for SWD are generally consistent with other publicly-operated systems, though approximately 6 percent higher than the overall trend line. This may stem in part from varying levels of indirect costs (i.e., County administration and overhead) that are established at the county-level and therefore are not within control of solid waste departments. SWD also operates 4 landfills, a higher number than the other systems included in the comparison.
- The 6 positions added to SWD included 4 operations personnel and 2 engineering staff. After reviewing the compliance history of SWD, we believe the added personnel have been allocated proportional to the compliance issues they would be responsible for addressing.
- Given the approved 6 positions and current funding levels, CB&I believes that the Solid Waste Division is positioned to operate its solid waste facilities to maintain acceptable levels of regulatory compliance.

Recommendations:

- The County is responsible for 4 active and 4 closed landfills. The Solid Waste Division has started to address the proper closure and long-term maintenance of the closed landfills, and has identified remedial costs for the closed facilities as well as operations and maintenance costs. The Council should request further clarification of the projected operations and maintenance costs, as it is unclear whether those activities would be performed by in-house staff or contracted services.
- We also recommend that the Solid Waste Division prepare a long-range (e.g., 6-year or 10-year) financial forecast for the Division. Such a forecast would be useful in communicating future budget requests to the Council, as it would provide the context for near-term requests based on a long-range financial plan. Although developing such a financial plan might require additional resources for the Solid Waste Division, we believe it would facilitate both the budget process and management of the solid waste system.



Section 2

Cost Assessment of Integrated Waste Conversion and Energy Project (IWCEP)

This section provides CB&I's analysis of the potential cost impacts of the IWCEP project. In preparing this analysis, CB&I reviewed the RFP for the IWCEP project, the contract executed with Anaergia¹², and data from the County on solid waste tonnages and current program costs. In addition, we reviewed an analysis prepared by the Department of Environmental Management (DEM) which compares the projected costs of the IWCEP project versus current conditions (refer to Attachment B). The DEM analysis projected that the IWCEP project would result in net cost savings for the County.

2.1 Summary of the IWCEP Project

In November, 2012, DEM issued a Request for Proposals (RFP) to technology vendors interested in providing an Integrated Waste Conversion and Energy Project (IWCEP). The purpose of the RFP was to select a project developer to finance, plan, design, permit, construct, own, operate and maintain a waste to value facility to produce energy, fuel, recycled materials and/or other products. The County would deliver waste materials under its control, as well as landfill gas from the Central Maui Landfill, to the project developer.

DEM selected Anaergia Services, LLC (Anaergia) as its preferred vendor, and a services agreement was executed on January 8, 2014. The facility to be developed by Anaergia will include several components including a materials recovery facility (to sort and recover recyclable materials); an anaerobic digester (to convert the organic fraction of the incoming waste into biogas); and a solid fuel facility (to convert the remaining fraction of the incoming waste into a solid fuel product). The facility will also utilize landfill gas from the Central Maui Landfill to generate fuel and/or electricity, primarily for use in providing power to the facility.

The contract states that the facility will be designed to divert 85 percent of the incoming "acceptable waste" from landfill disposal, and 65 percent of the incoming construction and demolition waste. Acceptable waste is defined in the contract as commercial and residential trash, fats/oil/grease (FOG), construction and demolition waste, agricultural plastic, greenwaste, tires, source separated recyclables, sewage sludge, and residuals from water and wastewater treatment. Acceptable waste does not include "unprocessibles", which is defined to include materials that cannot be processed at the IWCEP facility. These would include bulky items (such as appliances), hazardous waste or household hazardous waste. The contract notes that the diversion rates of 85 percent and 65 percent are target rates that depend on the composition of the incoming waste; the performance guarantees in the contract require that 70 percent of the incoming waste be diverted from disposal.

¹² As noted previously, although CB&I reviewed the contract and has a general understanding of the proposed facility, we did not perform a technical assessment of the IWCEP or the Anaergia technology. Our review was limited to assessing the potential cost impacts of the IWCEP versus the current operations of the Central Maui Landfill. Further, although we reviewed the contract to understand its terms, CB&I offers no legal findings or conclusions.



2.2 Review of Waste Quantities

Section 6.03 of the contract with Anaergia includes what is commonly termed a “put-or-pay” agreement, in which the County commits to initially deliver a minimum of 125,000 tons per year of acceptable waste. Under a put-or-pay agreement, the County would pay for any tonnage that falls below the threshold. For example, if waste deliveries were 110,000 tons, the County would pay the tipping fee on both the 110,000 tons actually delivered and the 15,000 tons of shortfall. If, on the other hand, waste deliveries were 130,000 tons, the County would pay the tipping fee on 130,000 tons of waste. Notably, the 125,000 tons per year threshold is an initial minimum tonnage guarantee; the contract specifies that the threshold quantity will change over time based on a 3-year rolling average of actual tonnage deliveries.

As an initial step in our review of the IWCEP project, CB&I reviewed historical data on waste quantities managed by the County, for comparison with the annual put-or-pay tonnage commitment.

Table 2.1 summarizes historical waste quantities received at the Central Maui Landfill for the past five fiscal years. Quantities of municipal solid waste (i.e., residential and commercial trash) that are disposed in the Landfill are shown, as are quantities of waste that are received at the Landfill and diverted from disposal (e.g., greenwaste, sludge, etc.). Table 2.1 also shows tonnages of recyclables collected by the County at other locations in addition to the Central Maui Landfill.

On average, the Central Maui Landfill disposed of approximately 153,000 tons per year of municipal solid waste (MSW) over the past 5 years. Disposal tonnages were approximately 7 percent higher in 2014 and 2015 versus 2011-2013, which may stem from improvements in the economy. On average, MSW quantities have exceeded the initial 125,000 ton threshold by about 28,000 tons, or 22 percent. Further, MSW quantities have exceeded 125,000 tons in each of the past five years.

Because the 125,000 ton initial threshold is based on “acceptable waste”, which includes other materials such as organics and recyclables, the put-or-pay could be addressed with these materials in addition to MSW. In fact, according to Section 5.05 of the contract, the County intends to deliver organics and recyclables in addition to MSW to the IWCEP project:

Delivery of Acceptable Waste. Commencing on the Commercial Operations Date, the County agrees to provide or cause to be provided to MRRF, and MRRF agrees to accept and process all of the Acceptable Waste received by the County at the Central Maui Landfill. As of the Effective Date, the County’s Source Separated Recyclables programs on Maui include the County Residential Recycling Centers (community residential recycling dropboxes) and the County curbside recycling collection program. The County will cause such County-owned Source Separated Recyclables received by these programs after the Commercial Operations Date to be delivered to MRRF, provided that the County may increase, decrease, or cease such programs at its sole discretion.



Table 2.1 shows that deliveries of organic materials (e.g., greenwaste, sludge, cooking oil) to Central Maui Landfill have averaged approximately 46,000 tons per year. County collections of recyclables have averaged approximately 2,800 tons per year. Total quantities of acceptable waste (including MSW, organics and recyclables) have averaged about 202,000 tons per year, a buffer of 77,000 tons or 62 percent¹³.

TABLE 2.1. MAUI COUNTY WASTE QUANTITIES						
Material/Collector	2011	2012	2013	2014	2015	Average
Central Maui Landfill - Municipal Solid Waste for Disposal						
Commercial Haulers	86,209	86,038	87,608	93,604	94,419	89,576
County Collected	44,653	43,458	42,103	45,070	44,463	43,949
Residential Haulers	13,690	13,640	14,257	15,499	19,304	15,278
County Haulers	2,015	3,479	3,105	1,862	862	2,265
Olowalu	1,911	1,764	1,745	2,044	0	1,493
Subtotal - MSW	148,479	148,379	148,818	158,079	159,048	152,561
Central Maui Landfill - Organic Materials						
Greenwaste - Private Hauler	13,282	13,185	13,530	11,023	13,424	12,889
Greenwaste - County	4,802	4,134	3,841	3,750	3,603	4,026
Sludge	23,455	22,885	22,860	23,751	22,762	23,142
Greasetrap Waste	3,073	5,660	5,741	5,461	5,411	5,069
Cooking Oil	942	1,052	1,101	1,192	1,204	1,098
Subtotal - Organics	45,553	46,916	47,073	45,178	46,404	46,225
County Recycling						
Central Maui Landfill	0	768	758	1,021	1,224	754
Olowalu	105	142	64	74	161	109
County Drop-off Facilities	2,039	1,958	1,804	1,809	1,846	1,891
Subtotal - Recyclables	2,144	2,868	2,626	2,904	3,231	2,755
Total Materials (MSW, Organics, Recyclables)						
Total	196,176	198,163	198,517	206,161	208,682	201,540
Notes:						
1. Excludes waste materials from three smaller landfills.						
Source:						
Solid Waste Division, Facility Annual Tonnage Reports.						

According to the contract, the amount of the put-or-pay tonnage commitment will change over time. Generally, the threshold will increase or decrease on a 3-year rolling average basis. It appears, therefore, that the put-or-pay commitment could increase over time (if actual waste deliveries are in excess of 125,000 tons per year), or decrease over time (if actual waste deliveries are below 125,000 tons per year).

¹³ During the public comment period at the County's Policy and Intergovernmental Affairs Committee on October 27, 2014, the question was raised whether the County owns certain waste materials (e.g., greenwaste) before it crosses the scale at the Central Maui Landfill, and therefore whether it could be committed to the IWCEP. This is a legal question, and CB&I offers no opinion on that question. As a practical matter, it appears that the County would have control over sludge and recyclables (since those originate from County operations), but does not have control over all of the greenwaste generated with the County.



The actual calculation of the 3-year rolling average is somewhat unclear, however. Section 6.03 of the contract states:

Guaranteed Annual Minimum Tonnage of Acceptable Waste. Beginning on the Commercial Operations Date, the County will deliver or cause to be delivered a minimum of 125,000 tons of Acceptable Waste per Contract Year to MRRF¹⁴, provided that the County does not control and cannot guaranty the quality or composition of said Acceptable Waste or its suitability for any purpose. The Guaranteed Annual Minimum Tonnage of Acceptable Waste shall be measured as the average of the preceding three Contract Years. For example, the Guaranteed Annual Minimum Tonnage for Contract Years 1, 2, and 3 shall be the average of those Contract Years. Thereafter, the Guaranteed Annual Minimum Tonnage for Contract Year 4 shall be the average of Contract Years 2, 3, and 4, and the Guaranteed Annual Minimum Tonnage for Contract Year 5 shall be the average of Contract Years 3, 4, and 5, and so on. If the Guaranteed Annual Minimum Tonnage is not delivered, the County shall compensate MRRF by paying the then-applicable per-ton price for MSW for the tonnage of deficiency as part of the Annual Settlement Process in Section 6.10. if MRRF does not accept up to the per ton limits set out in the definition of Excess Acceptable Waste, as measured on a Contract Year basis, fails to meet any of the Performance Guarantees applicable to the current Contract Year as set out in Article IX or accepts Acceptable Waste from others pursuant to Section 6.01, this Section 6.03 shall not apply.

It appears from this language that while the initial put-or-pay threshold is established at 125,000 tons per year, the applicable threshold during contract years 1-3 won't be known until the end of contract year 3. It is unclear whether the 3-year average tonnage would then be applied retroactively as the put-or-pay amount to contract years 1 and 2. Alternatively, it is unclear whether the 125,000 tons per year threshold was intended as the applicable threshold for contract years 1-3, with the threshold to be adjusted subsequently based on a 3-year rolling average of actual tonnages.

A strict reading of Section 6.03 suggests that the minimum tonnage guarantee during the first 3 years will not be 125,000 tons per year, but rather the average of waste deliveries during those years. This has the potential to result in unintended consequences, which an example calculation will make clear.

Table 2.2 shows two scenarios of waste deliveries, one in which deliveries in year 3 are 150,000 tons (or 25,000 tons above the initial threshold), and one in which deliveries in year 3 are 100,000 tons (or 25,000 tons below the initial threshold). In both scenarios, tonnage deliveries for all other years are 125,000 tons.

In the first scenario, if the applicable put-or-pay threshold for contract years 1-3 is set at actual waste deliveries for those years, then the minimum tonnage guarantee would increase from 125,000 tons per year to 133,333 tons per year (= $[125,000 + 125,000 + 150,000]/3$). If this new minimum tonnage guarantee was applied retroactively to contract years 1 and 2, a short-fall would occur and the put-or-pay provision would be triggered. Short-falls would also occur in contract years 4 and 5 due to the 3-year rolling average calculation of the minimum tonnage guarantee. If Section 6.03 is interpreted in this way, the



¹⁴ The IWCEP is referred to as the "MRRF" in the contract document.

County could pay for the retro-active shortfall in years 1-2, even though 125,000 tons of waste was delivered in those years. Further, the County could pay on 808,000 tons over 6 years versus the 775,000 tons actually delivered, even though actual deliveries were 125,000 tons or greater in each year.

Scenario 2 shows similar calculations if waste deliveries in year 3 are below the initial threshold of 125,000 tons. Based on actual waste deliveries for years 1-3, the applicable minimum tonnage guarantee would be calculated as 116,667 tons ($= [125,000 + 125,000 + 100,000]/3$). In years 1 and 2, tonnage deliveries exceeded this amount, and so the County would pay on the 125,000 tons actually delivered. In year 3, a short-fall would occur and the County would pay on the minimum guarantee tonnage of 116,667 tons, not the 100,000 tons actually delivered. In this scenario, over 6 years the County could pay on 741,667 tons of waste, whereas 725,000 tons are actually delivered.

TABLE 2.2. MINIMUM GUARANTEE DELIVERIES - EXAMPLE CALCULATIONS							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Scenario 1							
Actual Tonnage Delivered	125,000	125,000	150,000	125,000	125,000	125,000	775,000
Minimum Guarantee Tonnage	133,333	133,333	133,333	133,333	133,333	125,000	
Short-fall	8,333	8,333	0	8,333	8,333	0	
Tons Paid On	133,333	133,333	150,000	133,333	133,333	125,000	808,333
Scenario 2							
Actual Tonnage Delivered	125,000	125,000	100,000	125,000	125,000	125,000	725,000
Minimum Guarantee Tonnage	116,667	116,667	116,667	116,667	116,667	125,000	
Short-fall	0	0	16,667	0	0	0	
Tons Paid On	125,000	125,000	116,667	125,000	125,000	125,000	741,667

These are hypothetical examples to illustrate the ambiguity in the put-or-pay provision in the contract, and are not intended to forecast what will actually happen. Conceptually, it is fair to adjust the minimum tonnage guarantee over time, as this can provide some protection to the County if waste volumes decrease. However, the current wording of Section 6.03 is unclear, and might be interpreted in such a way that unintended consequences could occur, as illustrated in these examples¹⁵. It is possible that the minimum guarantee provision was never intended to operate in this manner when the contract was negotiated. This matter should be clarified by the DEM and Anaergia.

¹⁵ We also note that “actual tonnage deliveries,” as used in the examples, are not mentioned in Section 6.03, but rather are implied. Section 6.03 could therefore also be interpreted to mean that the minimum tonnage guarantee is always 125,000 tons per year. That interpretation seems unlikely, however, because if it that was the intent then the contract would have said the minimum tonnage guarantee is always 125,000 tons per year and not included language about a 3-year moving average.



2.3 Cost Analysis

We now turn our attention to the cost impacts of the IWCEP, and whether the project will result in net savings to the County versus the current system. To address this question, we refer to the cost analysis prepared by DEM (see Attachment B) and evaluate the assumptions contained therein.

The DEM analysis consists of two parts: a one-year summary cost analysis, and a 20-year life-cycle cost projection. The DEM considers costs for a “current conditions” scenario, meaning continued landfilling at the Central Maui Landfill, and then comparative costs for the IWCEP scenario¹⁶. For ease of reference, the DEM one-year summary cost analysis is reproduced in Figure 2.1.

The bottom-line result of the DEM one-year summary analysis is an estimate of “Net Annual County MSW Costs” under each scenario, which DEM projects would be \$1,542,500 for the current conditions scenario versus \$626,000 for the IWCEP, DEM’s one-year analysis results in annual cost savings of \$916,500 to the County.



¹⁶ A third scenario addressing curbside recycling is also provided, though not an element of this assessment.

FIGURE 2.1 - SUMMARY DEM COST ANALYSIS

SECTION 1

Assumptions

Commercial Haulers	91,050 tons/year
Residential Haulers	12,000 tons/year
Olowalu	1,750 tons/year
County Haulers	3,100 tons/year
County Residential Refuse Collection	42,100 tons/year
Estimated Total MS Waste	150,000 tons/year

SECTION 2

Tipping Fees

Anaergia Tip Fee	\$68.00 per ton
CML Tip Fee	\$90.00 per ton

SECTION 3

Annual County MSW Costs

	Current	IWCEP
CML Staff	\$1,837,000	\$367,400
CML Operations	\$2,000,000	\$500,000
CML Cover Material	\$1,400,000	\$280,000
CML Space (Volume Usage)	\$4,500,000	\$900,000
Tip Fee to Anaergia	\$0	\$4,008,600
Island-wide Curbside Recycling	\$0	\$0
Annual County MSW Total Costs	\$9,737,000	\$6,056,000

SECTION 4

Annual County MSW Revenues

	Current	IWCEP
Tip fee	\$8,194,500	\$5,430,000
Annual County MSW Total Revenues	\$8,194,500	\$5,430,000

SECTION 5

Net Annual County MSW Costs **\$1,542,500** **\$626,000**

CML Diversion Rate **45%** **89%**

Intangible IWCEP Benefits Not Captured Above

- Reduced GHG Emissions
 - Less Landfilling/Increased Diversion
 - Monetize Environmental Attributes
 - Sustainability from Fuel Production
 - Reduced Landfill Leachate Costs
 - Economic Development (Jobs + tax revenues)
 - Extended Life of CML Equipment (~\$10M capital)
 - Seven Day Landfill
 - Improved Permit Compliance/NOV Reduction
 - Limit on risk of operating escalations
- Assumptions: savings in equipment CIP due to the longer life of the equipment is not captured.

Note: The section number designations on this worksheet were added by CB&I.



For clarity, the DEM analysis focuses on the costs associated with the Central Maui Landfill cost center, and not the Solid Waste Division as a whole. CB&I agrees with this approach. The IWCEP will largely serve as an adjunct facility to the Central Maui Landfill, with the aim of extending the life of the landfill. The three other County landfills (Hana, Lanai and Molokai) would still continue to operate, as would the Olowalu Convenience Center, and therefore the costs associated with those operations will be incurred under either scenario.

The DEM one-year analysis can be broken down into 5 component sections as indicated in Figure 2.1:

1. Assumptions on tonnage deliveries;
2. Tipping fees charged at the Central Maui Landfill and the Anaergia facility;
3. Estimated solid waste management costs under the current conditions scenario versus the IWCEP scenario;
4. Estimates of County revenues collected through tipping fees; and,
5. Estimates of net annual costs to the County (which is calculated by subtracting the costs in section 3 from the revenues in section 4).

In the following sections, the assumptions underlying the cost and revenue projections for the current conditions scenario are evaluated for reasonableness. These assumptions include:

- Tonnage
- Tipping fees
- Operating costs, including labor, operations, and landfill cover
- Landfill space (volume use)
- Tipping fee revenue

Then, the assumptions underlying the change in costs and revenues between the current conditions scenario and IWCEP scenario are evaluated. These assumptions include:

- Comparative costs under the two scenarios
- Comparative revenues under the two scenarios
- Comparative landfill equipment costs under the two scenarios (although not included in the DEM model, CB&I performed an analysis of equipment costs)

2.3.1 Tonnage Assumptions

Table 2.3 provides a comparison of the tonnage assumptions in the DEM analysis (refer to Section 1 of Figure 2.1) with the 5-year historical waste deliveries at the Central Maui Landfill. The DEM analysis assumed tonnages that generally correspond with actual historical waste deliveries¹⁷. These assumed tonnages are therefore judged to be reasonable, although the relative amount of commercial waste to residential waste is somewhat higher in the DEM analysis compared to the FY2011-2015 average.

Since the County only collects a tipping fee on the commercial hauler waste, this difference would impact the revenue projections contained in the DEM analysis. If the 5-year historical average tonnages are used, the DEM model results in Net Annual County MSW costs of



¹⁷ We would expect that DEM also considered historical tonnage information in developing tonnage assumptions for its analysis of the IWCEP.

\$1,751,990 for the current conditions scenario and \$879,380 for the IWCEP scenario, a savings of \$872,610 for the IWCEP. This savings is somewhat lower than initially projected by DEM, demonstrating that savings will be dependent on tonnage overall as well as tonnage from each individual source.

TABLE 2.3. DEM TONNAGE ASSUMPTIONS vs. HISTORICAL ACTUAL TONNAGES

Source of Waste	DEM Analysis Tons Per Year	FY2011-2015 Average Tons Per Year
Commercial Haulers	91,050	89,576
County Residential Refuse Collection	42,100	43,949
Residential Self-Haul (Drop-off at CML)	12,000	15,278
County Misc. Trash	3,100	2,265
Olowalu Convenience Center	1,750	1,493
Subtotal - Residential Waste	58,950	62,985
Total	150,000	152,561

Sources:

1. Department of Environmental Management, IWCEP analysis, undated.
2. Solid Waste Division, Landfill Annual Tonnage Reports.

2.3.2 Tipping Fee Assumptions

The DEM analysis shows a tipping fee at the Central Maui Landfill of \$90/ton (see Section 2 in Figure 2.1). The County adopted fee schedule for FY2016 indicates a disposal fee of \$0.038 per pound, or \$76/ton, plus a recycling surcharge of \$10/ton, for a total tipping fee of \$86/ton. The \$90/ton in the DEM analysis may have been a forward estimate of tipping fees at the Central Maui Landfill, perhaps to FY2017 or beyond, since the IWCEP project will not be operating in FY2016¹⁸. While that would be a reasonable assumption, it does not appear that cost items (e.g., labor, other operating costs) were similarly escalated to a common future year, so that revenues and expenses are stated in comparable dollar terms. Here we will note that using the current \$86/ton landfill tipping fee in the DEM model would result in Net Annual County MSW Costs of \$1,906,700 for the current conditions scenario and \$1,226,000 for the IWCEP scenario, a savings of \$680,700 for the IWCEP. This savings is lower than initially projected by DEM.

Under the IWCEP scenario, the County will pay Anaergia a tipping fee of \$68/ton for waste delivered by the County to the Project (as specified in Section 6.08 of the contract). This rate would be applicable in the first year that the IWCEP commences operations (either in FY2016 or, more likely, some future year), and therefore is both a current tipping fee as well as a “forward-rate” tipping fee.

There is a third tipping fee which is not shown explicitly on the DEM analysis, but which is embedded in a formula in the spreadsheet. The third tipping fee amounts to \$71/ton, and is the rate that the County would charge Anaergia to dispose of residue from the IWCEP. The DEM model assumes that residue will amount to 20 percent of the incoming waste. As



¹⁸ We also note that DEM initially proposed a tipping fee of \$90/ton (inclusive of the recycling surcharge) in its FY2016 budget request.

noted previously, the contract states that the goal of the IWCEP is to divert 85 percent of the incoming MSW, and the performance guarantees require a minimum 70 percent diversion. The assumed 20 percent residue rate implies 80 percent diversion and is a reasonable mid-range estimate between the minimum required and target diversion rates of the IWCEP contract.

2.3.3 Operating Cost Assumptions

Table 2.4 presents historical operating cost data for the Central Maui Landfill. This data was compiled to evaluate the operating cost assumptions contained in the DEM cost analysis. Note that the wage data in Table 2.4 excludes benefits because benefit costs for the entire Solid Waste Division are accumulated in a single account. Additionally, debt service and allocated County administration costs are not included for consistency with the DEM analysis. As noted previously, the DEM analysis did not include these costs because they will be incurred under both the current conditions and IWCEP scenarios, which CB&I agrees is reasonable.

TABLE 2.4. HISTORICAL COST DATA - CENTRAL MAUI LANDFILL					
Cost Category	FY2012	FY2013	FY2014	FY2015	Average
Wages (excl. benefits)	\$1,161,142	\$1,196,275	\$1,162,301	\$1,277,122	\$1,199,210
Other Operating Costs					
Fuel	\$339,336	\$319,193	\$317,041	\$301,902	\$319,368
Equipment	\$326,312	\$136,395	\$26,583	\$118,901	\$152,048
Construction Materials	\$25,937	\$12,354	\$1,839	\$2,615	\$10,686
Repairs & Maintenance	\$661,037	\$878,753	\$804,576	\$712,525	\$764,223
Rent/Rentals	\$6,753	\$2,296	\$331	\$3,610	\$3,248
Transport/Hauling	\$242,599	\$273,571	\$252,282	\$275,761	\$261,053
Other	\$184,969	\$181,464	\$220,074	\$181,422	\$191,982
Contracted Services	\$381,393	\$358,446	\$516,532	\$1,088,902	\$586,318
Subtotal	\$2,168,337	\$2,162,473	\$2,139,256	\$2,685,638	\$2,288,926
Cover Material	\$1,485,403	\$1,363,789	\$1,435,932	\$1,079,060	\$1,341,046
Total	\$4,814,882	\$4,722,536	\$4,737,490	\$5,041,820	\$4,829,182
Source: 1. Department of Finance records.					

For the current conditions scenario, the DEM analysis assumes wage costs of \$1,100,000, which is approximately 9 percent lower than the four-year historical average shown in Table 2.4. The DEM analysis applied a fringe rate of 67 percent to arrive at a total labor cost (wage and fringe) of \$1,837,000. Based on the historical expense data provided by the Department of Finance, fringe rates within the Solid Waste Division have been increasing and in FY2015 were approximately 69 percent. The FY2015 rate is therefore generally consistent with, but slightly higher than the fringe rate assumed in the DEM analysis.

The DEM analysis also assumed that “other operating costs” were \$2,000,000 per year. These other operating costs would include fuel, repairs and maintenance, contracted services, and other expenses incurred in operating the Central Maui Landfill. Comparison



with Table 2.4 shows that historical operating costs have averaged approximately \$2,289,000 per year, or about 14 percent higher than assumed in the DEM analysis.

Finally, the DEM analysis assumed \$1,400,000 in operating expenses for cover material at the landfill. Actual expenditures have averaged about \$1,341,000 per year, or about 4 percent lower.

Using four-year average historical costs for these parameters (labor with 67 percent fringe, other operating costs, and cover material), the model projects Net Annual County MSW Costs of \$1,938,153 for the current conditions scenario and \$719,577 for the IWCEP, a savings of \$1,218,576 for the IWCEP. This savings is higher than initially projected by DEM.

2.3.4 Landfill Space (Volume Use) Cost Assumptions

It was noted earlier that the DEM analysis did not include debt service. This is both a reasonable and sound basis for conducting the analysis, as debt service represents amortized annual payments for prior cost expenditures (or, alternatively, prior investments) for solid waste infrastructure. Because these prior expenditures are “sunk” costs (i.e., costs that will be paid under both the current conditions scenario as well as the IWCEP scenario), they are properly excluded from a comparative analysis of incremental costs going forward.

There was a capital charge reflected in the DEM analysis, however, in the line item termed “CML Space (Volume Usage)” (refer to Section 3 of Figure 2.1). This line item assumed a volume usage charge of \$30/ton, which is then multiplied by the incoming 150,000 tons per year of waste (in the current conditions scenario), resulting in a total volume use cost of \$4,500,000 per year. For the IWCEP scenario, the volume use charge of \$30/ton was multiplied by an estimated annual landfill tonnage of 30,000 tons, resulting in a total volume use cost of \$900,000 per year. The 30,000 tons represents the 20 percent residue amount remaining after waste is processed through the IWCEP (i.e., 150,000 tons incoming x 0.20 = 30,000 tons of residue).

Conceptually, it is reasonable to include a cost factor for landfill consumption in the analysis. This is because the IWCEP project is intended to divert a significant fraction of the incoming waste from landfill disposal. This would preserve existing landfill capacity at the Central Maui Landfill, and slow the rate at which future disposal “cells” are constructed¹⁹. It is also reasonable to calculate a per-ton amortization rate (based on the cost to develop future disposal areas and the tonnage capacity of those disposal areas), as was apparently done in the DEM analysis.

It is important to note, however, that in determining a per ton value for the airspace, the marginal or incremental cost of developing future airspace is the relevant cost parameter to consider, as that is the variable that would change in comparing current conditions costs to IWCEP costs. The marginal cost would include the cost of constructing new liner and

¹⁹ The current landfill unit at the Central Maui Landfill includes three phases (Phase IV, Phase V and Phase VI), each of which is further divided into sub-phases. Phase IV is scheduled to be capped, Phase V is currently being filled, and Phase VI will be developed to provide additional disposal capacity. Estimates of remaining capacity at the Landfill are provided in Attachment C; as of January, 2016, it is estimated that the Central Maui Landfill (through Phase VI) will provide approximately 17 years of capacity (at 150,000 tons per year) and approximately 85 years of capacity (at 30,000 tons per year).



leachate collection equipment, the landfill gas collection system, and closure (capping) and post-closure care costs. Any “sunk” costs (e.g., existing debt service) or site-wide improvements (e.g., improvements to the citizen’s drop-off area) are excluded because, as described before, those costs have been (or will be) incurred under both scenarios.

CB&I requested backup information from DEM as to the inputs underlying the airspace valuation of \$30/ton. Although we did not receive a break-out of specific costs, DEM responded to our request by stating “...the \$30/ton number represents the cost of developing that air space so it includes the development cost, the closure costs and the post closure costs for the next 30 years. All averaged out to a per ton basis using the existing compaction rate of the landfill of 0.581 tons per cubic yard”. As previously noted, CB&I agrees that this is an appropriate method for valuing the airspace.

Because detailed cost information underlying the \$30/ton value was not available, CB&I reviewed CIP project data contained in recent County budgets. The Solid Waste Division currently has 4 projects in its 6-year CIP plan that address landfill development costs: 1) construction of the lined cell for Phase VI-A; closure (capping) of Phase IV; expansion of the landfill gas collection system into Phase V; and, acquisition of land for future cells Phase VI-B and VI-C. These are the primary capital costs associated with landfill development, and allow per-ton landfill capital costs to be estimated.

Table 2.5 summarizes the budgeted costs for these construction events, along with the acreage and tonnage capacity of each of the cells where the construction activities will be performed. Based on these data, the primary capital costs for providing disposal capacity at the Central Maui Landfill are estimated at \$10.92/ton.

TABLE 2.5. CENTRAL MAUI LANDFILL DEVELOPMENT COSTS					
Construction Activity	Size (acres)	Capacity (tons)	Estimated Cost	\$/acre	\$/ton
Phase VI-A: Liner/Leachate	5.9786	495,003	\$3,000,000	\$501,790	\$6.06
Phase IV: Capping/Closure	17.8046	809,497	\$2,000,000	\$112,356	\$2.47
Phase V: LFG Collection System	18.6234	1,449,089	\$2,500,000	\$134,240	\$1.73
Phase VI-B & VI-C: Land	16.3211	1,513,291	\$1,000,000	\$61,270	\$0.66
Total	NA	NA	\$8,500,000	\$809,656	\$10.92

Sources:

1. Cost estimates: FY2016 CIP Budget.
2. Size and volumetric capacity estimates: Integrated Solid Waste Management Plan, Appendix F-7.
3. Capacity in tons based on volumetric capacity of cells and assuming utilization factor of 0.581 tons of waste per cubic yard of airspace.

The \$10.92/ton represents an amortization rate to recover the capital costs of constructing the engineered features of the landfill. Note that for a given phase of the landfill, these costs are not incurred at the same time and will instead occur over time in the following order: first, land acquisition; next, construction of the liner and leachate collection system; next, installation of the landfill gas collection system; and, finally, construction of the landfill cap.



If pay-as-you-go financing²⁰ is used to construct these features, then the \$10.92/ton amortization rate captures the cost of landfill development (including the landfill gas collection equipment) and capping events. The FY2016 CIP budget indicates that the Phase IV capping, the Phase V landfill gas collection system expansion, and the Phase VI-B/VI-C land acquisition will be paid out of the Solid Waste Fund (pay-as-you-go), while the Phase VI-A cell construction is planned to be financed through general obligation (GO) debt financing.

Nonetheless, in order to provide a more conservative (i.e., higher) estimate of landfill development costs, CB&I calculated an amortization rate based on a hypothetical future landfill cell that would provide 5 years of capacity²¹. Such a cell, assuming a throughput of 150,000 tons per year, would have an all-in development cost of \$8,190,000 (= 5 years x 150,000 tons per year x \$10.92/ton), inclusive of land, liner and leachate collection system, gas collection system, and capping. Assuming that the all-in cost was financed at 5 percent interest over 5 years, the amortized cost including interest would amount to \$12.61/ton.

The remaining cost item to be addressed is post-closure care costs. Landfill owners are required to monitor and maintain landfills for a minimum 30-year period (the post-closure period) following the closure of the facility. An annual expense is therefore accrued while the landfill is operating, although the actual cash disbursements to pay for post-closure activities won't occur until after the landfill is closed. Generally, the annual expense includes both post-closure care costs and closure costs.

According to the County's FY2014 CAFR, approximately \$36,300,000 in closure and post-closure care costs had been accrued (i.e., previously expensed) as of June 30, 2014, with the remaining \$16,000,000 in closure and post-closure care costs to be recognized as the remaining landfill capacity is filled. Total post-closure care costs (over 30 years and in current dollar terms) are disclosed as \$27,900,000.

Although these costs apply to all four of the County's landfills, from these data it is apparent that post-closure costs account for approximately 53.3 percent of the total estimated closure and post-closure care liability (= \$27,900,000 / [\$36,300,000 + \$16,000,000]). From this, and based on the estimated capping cost of \$2.47/ton in Table 2.5, CB&I estimates an amortized post-closure care cost for the Central Maui Landfill of \$2.82/ton.

In total, CB&I estimates an airspace value of \$13.74/ton (if pay-as-you-go financing is used) to \$15.43/ton (if land, liner construction, landfill gas collection and capping) are debt financed. If the \$13.74/ton value for landfill space is used in the DEM model (versus the \$30/ton assumed by DEM), the model projects Net Annual County MSW Costs of (\$896,500) for the current conditions scenario -- i.e., net revenue -- and \$138,200 for the IWCEP. In this case, the IWCEP is projected to have higher annual costs of \$1,034,700 versus current conditions.

If, on the other hand, the \$15.43/ton value for airspace is used in the DEM model, the model projects Net Annual County MSW Costs of (\$643,000) for the current conditions

²⁰ The FY2016 capital budget states "In an effort to conserve debt capacity, the county shall borrow only when necessary and utilize pay-as-you-go financing to the extent possible."

²¹ Five years was selected because the FY2014 CAFR indicates an assumed useful life for landfill infrastructure of 5 years. Additionally, Phase VI-A, the next cell scheduled for construction, has a capacity of approximately 495,000 tons and would provide approximately 3 ½ years of capacity which, allowing for time to construct the cell, would be approximately 4-5 years.



scenario -- i.e., net revenue -- and \$188,900 for the IWCEP. In this case, the IWCEP is projected to have higher annual costs of \$831,900 versus current conditions.

Clearly, the DEM model is sensitive to the per-ton value used to estimate landfill development-related capital costs. As noted previously, CB&I requested cost backup information underlying the estimate of \$30/ton. Although we did not obtain such information, DEM indicated that the \$30/ton included landfill development costs (i.e., liner and leachate collection system) and closure and post-closure care costs. This means that CB&I and DEM were in agreement on the cost factors to be included in the calculation of a value for the airspace, though our estimates of the value of these costs do not agree.

We found a possible explanation for the difference in airspace valuation estimates in correspondence that DEM submitted to the County Council on October 1, 2014, in response to Council's request for a breakdown of landfill costs. In that correspondence, DEM provided historical cost information for the Central Maui Landfill for the three prior fiscal years, which is summarized in Table 2.6:

TABLE 2.6. DEM ESTIMATED COST OF LANDFILLING (FULL COST)						
Cost Category	FY2012		FY2013		FY2014	
	Amount	\$/ton	Amount	\$/ton	Amount	\$/ton
Wages	\$1,161,142	\$7.60	\$1,196,274	\$8.02	\$1,162,301	\$7.35
Operations	\$3,063,416	\$20.04	\$3,064,906	\$20.54	\$3,506,443	\$22.16
Equipment	\$400,834	\$2.62	\$36,382	\$0.24	\$93,019	\$0.59
Interfund	\$113,011	\$0.74	\$112,296	\$0.75	\$112,983	\$0.71
SW Admin/Overhead	\$1,373,904	\$8.99	\$1,462,610	\$9.80	\$1,508,171	\$9.53
Subtotal	\$6,112,307	\$39.99	\$5,872,468	\$39.36	\$6,382,917	\$40.34
Development	\$1,089,806	\$7.13	\$1,063,882	\$7.13	\$1,128,101	\$7.13
Closure (FV)	\$408,104	\$2.67	\$398,396	\$2.67	\$422,445	\$2.67
Post-Closure (FV)	\$2,450,153	\$16.03	\$2,391,868	\$16.03	\$2,536,251	\$16.03
Subtotal	\$3,948,063	\$25.83	\$3,854,146	\$25.83	\$4,086,797	\$25.83
Total	\$10,060,370	\$65.82	\$9,726,614	\$65.19	\$10,469,714	\$66.17
Tons Disposed	152,848		149,212		158,219	

Notes:

1. Development = development costs of active landfill (includes interest).
2. Closure (FV) = cost to close active cell.
3. Post Closure (FV) = costs to monitor closed landfill for 30 years.
4. All dollar amounts are in Present Value unless denoted "FV" = Future Value.

Source:

1. DEM Letter to Policy and Intergovernmental Affairs Committee, Maui County Council, October 22, 2014.

DEM estimated that landfill development costs, closure and post-closure care costs amounted to \$25.83/ton. Although still not amounting to the \$30/ton used in the model, it is possible that DEM may have rounded the \$25.83/ton up to \$30/ton in order to be conservative. Notably, however, DEM based the closure and post-closure costs on *future value* (i.e., on the inflation adjusted cost when the closure and post-closure activities are performed years in the future).



If the DEM airspace value estimate of \$30/ton is based on using the future value of closure and post-closure care costs, we do not concur with that method of valuation, for the following reasons:

1. First, in performing a financial analysis, it is not appropriate to combine cost factors stated in present value terms with cost factors stated in future value terms. In present value analyses, dollar amounts expended in future years are recognized as being different from dollar amounts expended in the current year (due to the time value of money as well as potential inflation effects).
2. All other costs in the one-year DEM summary analysis are presented on a current cost basis. Including some costs on a present value basis and other costs on a future value basis results in costs that are not stated on a comparable basis.
3. The Governmental Accounting Standards Board (GASB), in Statement No. 18 ("Accounting for Municipal Solid Waste Landfill Closure and Postclosure Care Costs"), states that annual recognition of closure and post-closure care expenses, while a landfill is operating, should be based on *current costs*. As was noted previously, the County's FY2014 CAFR expresses the liability for closure and post-closure care in current dollar costs.
4. We agree that closure and post-closure care costs may change in the future due to inflation. Both GASB Statement No. 18 and the disclosure notes in the County's CAFR acknowledge this as well. However, GASB Statement No. 18 contemplates that the closure and post-closure care cost estimates will be adjusted annually for inflation. Thus, over time and as the landfill is filled to capacity, the current cost estimate will converge on the future cost estimate at the time of closure. In contrast, the DEM analysis appears to have brought the future, fully-inflated cost back to the present time in one single step.
5. Finally, we would note that under the current conditions scenario, the Central Maui Landfill has a projected remaining life of approximately 17 years (assuming a throughput of 150,000 tons per year). Under the IWCEP scenario, the landfill would have an estimated remaining life of approximately 85 years (assuming a throughput of 30,000 tons per year and that the IWCEP were operating today). The future value of post-closure care costs under the IWCEP scenario would therefore be escalated for inflation for a considerably longer period of time than the current conditions scenario. However, since the total tonnage capacity of the Central Maui Landfill is the same under both scenarios, the per ton cost of post-closure care on a *future value* basis would be higher for the IWCEP scenario versus the current conditions scenario (whereas it appears the DEM analysis assumed the per ton future value would be the same).

2.3.5 Tipping Fee Revenue Assumptions

The DEM cost model assumes a landfill tipping fee of \$90/ton which, consistent with historical practice, is charged only on the commercial hauler waste. Thus, for the current conditions scenario, the DEM model estimates annual tipping fee revenues of \$8,194,500 (= 91,050 tons of commercial hauler waste x \$90/ton). As discussed previously, the DEM analysis appears to have escalated the FY2016 tipping fee of \$86/ton to a forward year; this



may be reasonable given that the IWCEP is not operating in FY2016. Tipping fee projections for the IWCEP analysis are discussed in the next section.

2.3.6 Comparative Costs, Current Conditions vs. IWCEP Scenario

The analysis in the preceding sections focused on assessing the reasonableness of the underlying assumptions for the current conditions scenario in the DEM analysis. This section analyzes the assumptions in the DEM model as they relate to comparative costs between the current conditions and IWCEP scenarios.

Table 2.7 summarizes the primary cost and revenue parameters from the DEM one-year analysis. The IWCEP is projected to reduce the tonnage disposed in the Central Maui Landfill by 80 percent, from 150,000 tons per year to 30,000 tons per year. The DEM analysis projects that there will be proportionate 80 percent reductions in labor, volume usage and cover material costs, and a somewhat lower reduction of 75 percent in operations costs.

TABLE 2.7 DEM SUMMARY FINANCIAL ANALYSIS			
Parameter	Current System	IWCEP	Reduction from Current
Tonnage to Landfill	150,000	30,000	120,000 (80%)
Annual Costs			
CML Staff	\$1,837,000	\$367,400	\$1,469,600 (80%)
CML Operations	\$2,000,000	\$500,000	\$1,500,000 (75%)
CML Cover Material	\$1,400,000	\$280,000	\$1,120,000 (80%)
CML Space (Volume Usage)	\$4,500,000	\$900,000	\$3,600,000 (80%)
Tip Fee to Anaergia	\$0	\$4,008,600	NA
Total	\$9,737,000	\$6,056,000	\$3,681,000 (37.8%)
Annual County MSW Revenues			
Tip Fee	\$8,194,500	\$5,430,000	\$2,764,500 (33.7%)
Net Annual County MSW Costs	\$1,542,500	\$626,000	\$916,500 (59.4%)
Source:			
1. Department of Environmental Management, IWCEP analysis, undated.			

Based on the FY2016 proposed budget and an organization chart provided by the Solid Waste Division (SWD), there were 22 personnel assigned to the Central Maui Landfill cost center, including 9 equipment operators, 6 landfill attendants, 1 laborer, 3 cashiers (scalehouse operators), 2 worksite supervisors²², and 1 clerk. The 80 percent reduction in labor costs assumed in the DEM analysis would therefore imply a reduction in this staff to 4.4 employees (= 22 FTE x 0.2). While it is generally reasonable to project a reduction in staffing based on the decrease in tonnage handled at the Central Maui Landfill, a reduction to 5 employees (rounded up) appears to be an aggressive estimate for the following reasons:



²² A third supervisor has an office at the Central Maui Landfill, but provides oversight to the other 3 County landfills and is included in the Molokai cost center in the FY2016 proposed budget.

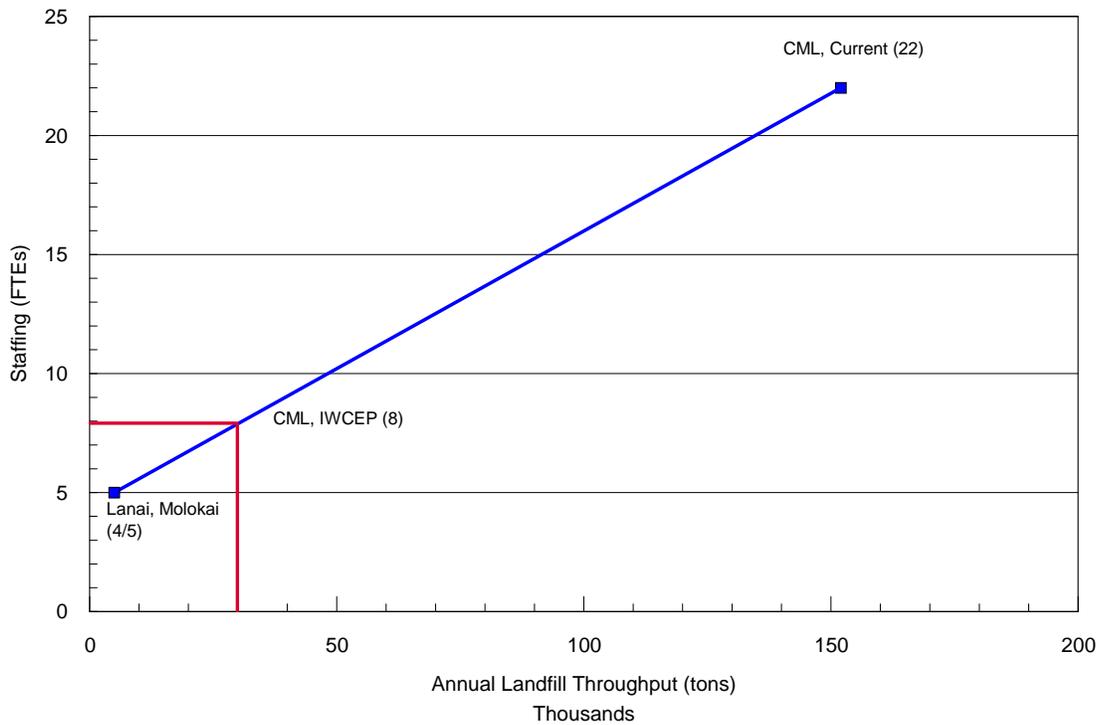
- Staffing levels at the 3 smaller landfills range from 4-5 employees. These other landfills handle approximately 1,000 to 5,000 tons per year of waste (for disposal), compared to the 30,000 tons to be handled at the Central Maui Landfill under the IWCEP scenario. This would suggest a “floor” of 4-5 employees, but for a smaller operation than 30,000 tons per year.
- The DEM model considered only reductions in total labor costs and did not detail which positions would be retained. Based on the current staffing, it might be assumed that the 5 positions would include 1 supervisor, 1 equipment operator, 1 landfill attendant, 1 laborer and 1 cashier. Such an assumption is challenged, however, by the current scheduling of staff at the Landfill. Landfill equipment operators and landfill attendants are scheduled for 10 hour workdays, 4 days per week. On a given day, the scheduling is staggered such that some of the operators/attendants start two hours earlier and finish two hours earlier during the day. Additionally, the Landfill operates 6 days per week.
- Based on the operating hours of the Landfill and the 6-day per week schedule, a staffing level of 5 employees would imply that some reduction in daily operating hours and/or days of operations is required. (Staff are assigned at the 3 smaller landfills on a 5 day schedule, for instance.) While reduced hours and days of operation may be warranted based on the reduced tonnage handled at the Landfill, it would also represent a reduction in current service levels.

A more reasonable estimate of staffing might include 1 supervisor, 2 equipment operators, 2 landfill attendants, 1 laborer and 2 cashiers (8 total staff). Even this staffing level may not be feasible given operating practices and goals (management from the Solid Waste Division would have to concur), and might still require a reduction in landfill operating times, but it would provide greater assurance of having backup personnel and greater flexibility in providing service to the community. The 8 positions would also be consistent with the staffing trendline for existing County landfill operations, as shown in Figure 2.2.

Based on an adjusted staffing level of 8 employees at the Central Maui Landfill (versus the 5 implied by the DEM analysis), the estimated reduction in labor costs would be 64 percent, not 80 percent as assumed in the DEM model. Making this change to the model would result in Net Annual County MSW Costs of \$1,542,500 for the current conditions scenario and \$919,920 for the IWCEP scenario, a savings of \$622,580 for the IWCEP. This savings is lower than initially projected by DEM.



FIGURE 2.2. STAFFING AT MAUI COUNTY LANDFILLS



Note:
1. Lanai/Molokai operate 5 days/week. CML operates 6 days per week.

As noted previously, DEM projected a 75 percent reduction in landfill operation costs under the IWCEP scenario. Historical operations cost data for the Central Maui Landfill were previously presented in Table 2.4. This data is summarized again in Table 2.8, where CB&I has additionally classified costs as fixed or variable. Variable costs (e.g., fuel, repairs and maintenance) are costs that typically might see a proportionate reduction with tonnage. Fixed costs (e.g., office supplies, professional services, dues) are costs that will likely be incurred under both the current conditions and IWCEP scenarios at generally the same level. We acknowledge that there is some judgement required in classifying expenses as variable or fixed, but believe the allocation presented in Table 2.8 is reasonable.



TABLE 2.8. HISTORICAL OPERATIONS COST DATA - CENTRAL MAUI LANDFILL

Cost Category	FY2012	FY2013	FY2014	FY2015	Average
Operations Costs					
Fuel (V)	\$339,336	\$319,193	\$317,041	\$301,902	\$319,368
Equipment (V)	\$326,312	\$136,395	\$26,583	\$118,901	\$152,048
Construction Materials (V)	\$25,937	\$12,354	\$1,839	\$2,615	\$10,686
Repairs & Maintenance (V)	\$661,037	\$878,753	\$804,576	\$712,525	\$764,223
Rent/Rentals (V)	\$6,753	\$2,296	\$331	\$3,610	\$3,248
Transport/Hauling (V)	\$242,599	\$273,571	\$252,282	\$275,761	\$261,053
Other (F)	\$184,969	\$181,464	\$220,074	\$181,422	\$191,982
Contracted Services (F)	\$381,393	\$358,446	\$516,532	\$1,088,902	\$586,318
Subtotal - Fixed	\$566,362	\$539,910	\$736,605	\$1,270,324	\$778,300
Subtotal - Variable	\$1,601,975	\$1,622,562	\$1,402,651	\$1,415,314	\$1,510,626
Total	\$2,168,337	\$2,162,473	\$2,139,256	\$2,685,638	\$ 2,288,926
% Fixed	26%	25%	34%	47%	34%

Notes:

1. F = fixed cost, V = Variable cost.

Source:

1. Historical cost data: Department of Finance records.

2. Classification of expenses as fixed or variable performed by CB&I.

We note that the relative proportion of fixed to variable costs has varied from year to year. This might be expected generally, but in this particular instance also stems from differences in annual expenditures for the “Contracted Services” category. Since some portion of Contracted Services may represent temporary project-specific work²³, we believe that a reasonable estimate of the fixed cost percent is 25 percent (as occurred in FY2012 and FY2013), versus the 4-year average of 34 percent.

On that basis, CB&I estimates that the reduction in landfill operation costs under the IWCEP scenario would be 60 percent, assuming that fixed costs amount to 25 percent of total landfill operations cost and that variable costs would be reduced by 80 percent due to the reduced tonnage handled at the landfill (60 percent = 25 percent + 0.2 x 75 percent). Making this change to the DEM model would result in Net Annual County MSW Costs of \$1,542,500 for the current conditions scenario and \$926,000 for the IWCEP scenario, a savings of \$616,500 for the IWCEP. This savings is lower than initially projected by DEM.

Cover material costs were discussed previously. The DEM model assumed that there would be an 80 percent reduction in daily cover costs, proportionate to the reduction in landfill tonnages. CB&I finds this to be a reasonable assumption.

The DEM model also employed a per-ton amortization rate to account for landfill development and closure costs and the cost of post-closure care. Conceptually, CB&I agrees that such an amortization rate can be used to assess the impacts of differential



²³ Other contracted services, such as landfill monitoring services, will be more routine and annually recurring.

landfill consumption under the two scenarios; however, CB&I estimated a lower amortization rate as discussed previously in Section 2.3.4.

Finally, under the IWCEP scenario, the DEM model includes a new cost category representing tipping fees paid to Anaergia. The formula used to calculate the \$4,008,600 in tipping fee costs is based on the tonnage of residential waste and excludes commercial hauler waste ($\$4,008,600 = 58,950 \text{ tons of residential waste} \times \$68/\text{ton}$). A tipping fee will be charged for commercial waste, but the DEM model treats that tip fee as a “pass-through” cost to the commercial haulers and not as a cost incurred by the County.

2.3.7 Comparative Revenues, Current Conditions vs. IWCEP Scenario

As discussed earlier, the DEM model predicted tipping fee revenues of \$8,194,500 under the current conditions scenario assuming 91,050 tons of commercial hauler waste, multiplied by a landfill tipping fee of \$90/ton.

The tipping fee revenue under the IWCEP scenario (\$5,430,000) consists of two components:

- First, the differential between the landfill tip fee (\$90/ton) and the Anaergia tip fee (\$68/ton) is applied to all 150,000 tons of incoming waste. This results in revenue of \$3,300,000 ($= [\$90/\text{ton} - \$68/\text{ton}] \times 150,000 \text{ tons}$). This is plausible in that DEM will continue to control the gatehouse and may assess its own tipping fee on incoming waste, and then subsequently pay the processing fee on that tonnage to Anaergia, keeping the difference as net revenue to the County. However, this calculation also implies that a disposal charge amounting to \$22/ton ($= \$90/\text{ton} - \$68/\text{ton}$) will be assessed on residential waste, whereas no such charge is currently collected.
- Second, pursuant to the IWCEP contract, Anaergia will pay a tipping fee of \$71/ton to dispose of residue at the Central Maui Landfill. As discussed earlier, the DEM model assumes such process residue will be 20 percent of the incoming waste, or 30,000 tons. Thus, the revenue to the County for landfilling the residue waste materials is estimated at \$2,130,000 ($= 30,000 \text{ tons} \times \$71/\text{ton}$).

2.3.8 Comparative Landfill Equipment Costs

The notes to the DEM model (refer to Attachment B) state that the IWCEP project will provide the additional benefit of prolonging the life of landfill rolling-stock equipment. However, this savings in future equipment costs is not quantified in the DEM model.

CB&I agrees that there will be comparatively less utilization of landfill equipment under the IWCEP scenario. This could result in longer operating life for existing equipment and/or a reduction in the number of pieces of operating equipment, and provide potential cost savings.

The current primary heavy equipment used at the Central Maui Landfill is summarized in Table 2.9. Also shown in the table is the estimated current cost of new equipment (based on a review of recent budget requests from DEM as well as CB&I research into procurement of similar equipment by other public jurisdictions).



Table 2.9 also shows a CB&I estimate of the reduced fleet of equipment that might be employed under the IWCEP scenario. Due to the reduction in landfill tonnage, fewer pieces of compacting equipment (i.e., bulldozers and compactors) would be required. Further, if the residue from the IWCEP is more homogeneous than MSW, or consists of primarily inorganic materials, then the compactors may no longer be necessary.

The remaining types of equipment (loader, backhoe, etc) however, would likely still be used under the IWCEP scenario to conduct landfill operations. The roll-off trucks, for instance, are used to service the residential drop-off area, which is assumed to be maintained under the IWCEP scenario to receive self-hauled waste.

TABLE 2.9. COMPARATIVE EQUIPMENT SCENARIOS						
Equipment Type	Current Conditions Scenario			IWCEP Scenario		
	Number	Cost/Unit	Total	Number	Cost/Unit	Total
Bulldozer (D8)	3	\$915,000	\$2,745,000	2	\$915,000	\$1,830,000
Bulldozer (D5/D6)	2	\$420,000	\$840,000	0	\$420,000	\$0
Compactor	2	\$790,000	\$1,580,000	0	\$790,000	\$0
Wheel Loader	1	\$350,000	\$350,000	1	\$350,000	\$350,000
Backhoe	1	\$100,000	\$100,000	1	\$100,000	\$100,000
Water Truck	1	\$300,000	\$300,000	1	\$300,000	\$300,000
Dump Truck	1	\$645,000	\$645,000	1	\$645,000	\$645,000
Roll-off Truck	4	\$250,000	\$1,000,000	4	\$250,000	\$1,000,000
Total	15		\$7,560,000	10		\$4,225,000
Annual Amortized Cost			\$979,055			\$547,157
Annual LF Tonnage			150,000			30,000
Cost/Ton			\$6.53			\$18.24

Notes:

- Annual Amortized Cost based on 10-year average equipment life and assuming 5 percent interest. The FY2014 CAFR notes a useful life for equipment of 5-10 years.

Source:

- Current Conditions equipment levels: Operations Plan for Central Maui Landfill, prepared by A-Mehr, Inc., Revised January 2014.
- IWCEP Scenario: CB&I estimate.
- Equipment costs: Letter from DEM to County Council Budget and Finance Committee detailing equipment CIP budget requests, May 1, 2015; Maui County Department of Finance - Purchasing Division, Bid Results - CAT D8T, November 10, 2015; CB&I research of other public procurement of landfill operating equipment and costs.

To compute the comparative equipment costs under each scenario, CB&I assumed an average useful life for the equipment of 10 years, and that the equipment would be financed over 10 years at 5 percent interest. We note that this may result in a conservatively high estimate of actual near-term equipment costs, because the estimate assumes that all of the equipment is purchased new and at the same time (whereas existing equipment would likely continue to be utilized under both scenarios). The annual amortized costs in Table 2.9



are therefore more appropriately viewed as an estimate of long-term average equipment costs.

Based on the comparative equipment schedules in Table 2.9, CB&I estimates that average landfill equipment costs are \$979,055 per year under the current conditions scenario and \$547,147 under the IWCEP scenario, a savings of \$431,908 per year for the IWCEP. Note that although there are overall savings in equipment costs, the cost per ton is higher in the IWCEP scenario because less tonnage will be handled at the landfill.

2.3.9 Sensitivity Analysis

The analysis contained in the preceding sections identified several modifications to the assumptions in the DEM model. CB&I performed a sensitivity analysis of the DEM analysis, using the following parameters (refer to Attachment D):

- Tonnage: commercial waste estimated at 89,576 tons per year, residential waste estimated at 62,805 tons per year, and total waste estimated at 152,561 tons per year (based on 5-year historical average of tonnages).
- Tipping Fees: tipping fees maintained as assumed in the DEM analysis (Central Maui Landfill = \$90/ton, IWCEP tipping fee = \$68/ton, residue disposal from IWCEP = \$71/ton).
- Labor Cost: current conditions labor estimated at \$2,002,681 based on 4-year historical average of wage costs and assuming 67 percent fringe rate. Labor for IWCEP scenario estimated at 36 percent of labor costs for current conditions scenario.
- Operations Cost: current conditions operations cost estimated at \$2,288,926 based on 4-year historical average. Operations cost for IWCEP scenario estimated at 40 percent of cost for current conditions scenario.
- Cover Material Cost: current conditions cover material cost estimated at \$1,341,046 based on 4-year historical average. Cover material cost for IWCEP scenario estimated at 20 percent of cost for current conditions scenario.
- Airspace (Volume Usage) Cost: current conditions airspace consumption cost estimated at \$15.43/ton, multiplied by 152,561 tons of incoming waste. Airspace consumption cost for IWCEP scenario also based on \$15.43/ton, but assuming tonnage to landfill is reduced by 80 percent (to 30,512 tons per year).
- Landfill Equipment Cost: This cost parameter was not included in the DEM analysis. Equipment costs for the current conditions scenario were estimated at \$979,055 per year, and for the IWCEP scenario at \$547,157 per year.
- All other assumptions from the DEM analysis were retained.

Under these modified cost parameters, CB&I estimates Net Annual County MSW Costs of \$903,884 for the current conditions scenario, and \$1,739,319 for the IWCEP scenario. Whereas DEM projected the IWCEP will have a net cost savings of \$916,500 per year, CB&I estimates the project will have net higher costs to the County of \$835,435 per year.



2.4 Findings and Recommendations

Based on our analysis of the DEM cost model and current costs at the Central Maui Landfill, CB&I has the following findings and recommendations:

Findings:

- The DEM cost model compares costs and revenues for the current landfill versus the IWCEP. The model focuses on the costs of the Central Maui Landfill (and not overall Solid Waste Division costs). CB&I agrees that this is an appropriate conceptual model for evaluating the impacts of the IWCEP, as other system costs are likely to be incurred under either scenario.
- The DEM cost model includes 5 principal cost parameters: labor, operations, cover material, landfill airspace, and tipping fees paid to Anaergia. CB&I concurs that these are appropriate cost parameters to include in the analysis.
- The DEM model assumes that tonnage handled at the Central Maui Landfill will decrease by 80 percent (from 150,000 tons per year to 30,000 tons per year) following implementation of the IWCEP. The contract with Anaergia states that the project will be designed to divert 85 percent of the incoming waste, but that actual diversion will depend on the composition of the waste. The contract includes a performance guarantee that 70 percent of the incoming waste will be diverted. The DEM model assumption appears to be reasonable.
- The DEM model assumes that labor costs at the Landfill will decrease by 80 percent with the IWCEP, proportionate to the reduction in tonnage. CB&I believes that an estimated reduction of 64 percent is more reasonable and consistent with the staffing at the 3 small landfills operated by the county. In either case, staffing reductions could require reductions in operating hours at the Central Maui Landfill.
- The DEM model assumes that operation costs at the Landfill will decrease by 75 percent with the IWCEP, generally proportionate (although somewhat lower) than the 80 percent reduction in tonnage. After reviewing historical operation costs and classifying them into fixed and variable categories, CB&I believes that a reduction of 60 percent is more reasonable.
- The DEM model assumes that cover material costs at the Landfill will decrease by 80 percent with the IWCEP, proportionate to the reduction in tonnage. Since cover material requirements are directly tied to the amount of waste handled, CB&I concurs with this assumption.
- The DEM model includes a per-ton cost of \$30/ton for airspace consumption to reflect the cost of landfill development and closure and post-closure care costs. CB&I agrees that it is appropriate to include such a cost factor, but estimates the per-ton cost at \$13.74/ton to \$15.43/ton, depending on financing assumptions. CB&I based its estimate on a current cost basis, whereas DEM may have estimated closure and post-closure care costs on a future value basis.



- CB&I performed an analysis of landfill equipment costs for the current Landfill operation as well as under the IWCEP scenario. The DEM model noted that there would be savings in equipment costs but did not quantify those savings. Based on our analysis, CB&I estimates that equipment costs would be reduced from \$979,055 per year (current conditions) to \$547,157 per year (IWCEP scenario).
- The DEM model assumes a tipping fee of \$90/ton for the Central Maui Landfill, and that pursuant to the IWCEP contract a tipping fee of \$68/ton will be paid to Anaergia to process incoming waste. The DEM model assumes that the County will retain the difference in these tipping fees (\$22/ton) as revenue to support the County's solid waste operations. The calculations in the DEM model imply that a \$22/ton disposal charge will be applied to residential waste, whereas no such charge is currently collected at the Landfill on residential waste. If it was intended that this disposal charge be assessed on residential waste, CB&I concurs with the revenue projections in the DEM analysis.
- The DEM model estimated that the IWCEP would result in net annual cost savings (versus the current landfill) of \$916,500. Based on the modified cost estimates noted in the previous findings, CB&I estimates that the IWCEP would result in higher net annual costs of \$835,435.

We note that this difference stems from two primary reasons: 1) CB&I estimated that cost reductions at the Central Maui Landfill would not be directly proportional to the reduction in Landfill tonnage, as was assumed in the DEM model; and, 2) CB&I estimated a lower cost for the airspace consumption compared to the DEM model.

- The IWCEP contract contains a "put-or-pay" provision that requires the County to initially deliver 125,000 tons of acceptable waste to the IWCEP, or pay for any shortfall. A review of historical waste quantities indicates that the County manages higher levels of waste to provide a buffer of as much as 77,000 tons over the threshold guarantee of 125,000 tons.

The minimum guaranteed tonnage will change over time based on a 3-year rolling average of actual waste deliveries. Thus, the 125,000 tons will increase or decrease depending on actual waste deliveries. This provides protection to the County if waste quantities were to decrease in the future, but it also raises the guarantee amount if actual waste deliveries are higher than 125,000 tons.

Recommendations:

- Council should request further clarification from DEM as to the detailed assumptions underlying the \$30/ton value for landfill airspace contained in the DEM cost model. This was an important assumption in the DEM analysis, and of all the cost parameters included in the DEM model, resulted in the largest cost savings (i.e., savings in airspace consumption was almost as much as estimated savings in labor, operations and cover materials combined).
- The "put-or-pay" provision in the IWCEP contract is not entirely clear as to how the 3-year rolling average adjustment to the guaranteed annual minimum



tonnage amount will be applied. The contract language governing the adjustment should be clarified with Anaergia as to intent and application.

- Council should review the status of the IWCEP at least annually with DEM. The IWCEP contract contains project milestones that require the IWCEP to commence operations by April, 2019 (unless an extension is granted). This annual review would be warranted to facilitate transition planning and to keep abreast of when the IWCEP will start operating, which will influence future CIP at the Central Maui Landfill as well as other solid waste program costs (i.e., current contracts for processing greenwaste, sludge, recyclables and other source separated materials).
- Council should further review both the DEM analysis and the CB&I analysis with the Solid Waste Division to determine if the projected reductions in labor, operational, cover and airspace costs under both analyses can be achieved.
- CB&I estimates that IWCEP implementation would increase overall costs by approximately \$835,000 annually, which still assumes that significant reductions are made to staff and operating expenses at the Central Maui Landfill. Should those reductions in staff and operating expense not be achieved, the overall cost increase would be greater. The IWCEP is intended to increase waste diversion and preserve landfill capacity, both of which may be County objectives. It is therefore recommended that the Council evaluate the projected cost increase in relation to County and community solid waste management and sustainability goals.
- The Council should also review the County's rights under the IWCEP contract (i.e., right to modify terms, rights with respect to project milestones, etc.) with its legal counsel. An understanding of the County's contractual rights is important and will aid in monitoring the implementation of the IWCEP and planning for future budgets.



Section 2 – Introductory paragraph

The introduction to Section 2 must address the background to issuance of the request for proposals for the IWCEP. The audit should clarify that “net cost benefit” was not a primary goal of the project. For accuracy, the audit should conclude that the current practice of landfilling, and ceasing all recycling programs and activities, is the least-cost alternative

However, that option is contrary to established Maui County policy, which should also be stated in the audit. Further, “net cost benefit” should be a comparison between the estimated costs and benefits of the project(s) recommended in the 2009 ISWMP (discussed below) and the 2012 IWCEP request for proposals and the resulting contract with Anaergia.

The department suggests the following be added to the introduction of Section 2:

The County of Maui is required by state law, Chapter 342G, Hawaii Revised Statutes, to develop an Integrated Solid Waste Management Plan (“ISWMP”). The law requires that all Hawaii counties “consider the following solid waste management practices and processing methods in their order of priority: 1.) Source reduction; 2.) Recycling and bioconversion, including composting; and 3.) Landfilling and incineration.”

Maui County’s current ISWMP is available online at <http://www.co.maui.hi.us/index.aspx?nid=881>. Major policies articulated in the 2009 update of the ISWMP include increasing diversion of waste from the landfills to at least 60 percent, achieved in large part through development of a Recyclable Materials Recovery Facility and a waste-to-energy facility. The ISWMP concluded that the Solid Waste Division’s annual budget would need to rise from \$50 million (2006) to \$109 million to accommodate these projects.

Although the audit was requested to address the net cost benefit between status quo operations and the anticipated net cost benefit of the Anaergia contract, a more thorough evaluation would address the costs associated with the projects proposed under the County’s 2009 ISWMP as compared to the Department’s 2012 Integrated Waste Conversion to Energy Project (“IWCEP”) request for proposals and the resulting contract regarding the Maui Resource Recovery Facility. The auditors understand that landfilling 100% of the County’s refuse and cessation of all recycling programs would provide the least-cost alternative; however, this is inconsistent with the County’s articulated policies and goals.

The request for proposals for the Integrated Waste Conversion and Energy Project (IWCEP) was based upon the following:

The overarching goal of the project is to increase diversion of economically recyclable materials from the waste streams, reducing the environmental impacts currently associated with landfilling and with importing fossil fuels for electricity generation

and transportation on the island. The IWCEP is seen as an economic generator that should create both short-term construction employment and long-term permanent employment.

The IWCEP should have a net environmental benefit as compared to disposal or other methods of waste handling. The IWCEP shall provide for compliance with stringent environmental standards as required by the state Department of Health (DOH) and U.S. EPA, including all applicable air emissions standards. The IWCEP should also reduce the County's costs and/or increase revenues and thus be a benefit to County residents. (Source: Section 1.2 of the RFP)

CB&I must therefore conclude that "net cost benefit" was not a primary goal of the request for proposals for the ISWMP; however, it was a factor weighed in the evaluation of the proposals.

2.1 Summary of IWCEP Project

2.1 title – remove "Project" (redundant)

Section 2.2 – Discussion of "put-or-pay" beginning with the paragraph immediately below Table 2.1 through the end of the section.

The put-or-pay tonnage does not change during the contract's term. It is 125,000 tons per year of Acceptable Waste. Whether or not the County has delivered that tonnage is measured on a three-year rolling average. For example, Year 1, 125,000 tons delivered; Year 2, 110,000 tons delivered; Year 3, 150,000 tons delivered. The average tons delivered per year = 128,333. County has met the minimum tonnage requirement for Years 1, 2, 3. Likewise, if during Year 4, the County delivered 120,000 tons, the average would be 127,000 tons and the County would owe no additional funds upon the annual settlement for Year 4.

A similar requirement is include in the Contract at Section 9.02. Should clarification be required, the County will address the issue with Anaergia.

Section 2.3.2

Current costs should include the costs of the current recycling programs, which are an integral component of current operations affecting the Central Maui Landfill, including the Three-Can-Plan recycling pilot program and the Community Drop Box program. Additionally, the expenses associated with the County's contract with EKO regarding processing of sewage sludge and greenwaste received at the Central Maui Landfill should be included.

These current annual expenses will be eliminated by the operation of the IWCEP, and therefore should be reflected as deductions.

Section 2.3.6

Comparison to the smaller landfills is inaccurate. These landfills will continue to accept all categories of waste. Central Maui Landfill, post IWCEP, will require the scalehouse to weigh incoming commercial loads prior to delivery to Anaergia's facility, and operations personnel to

staff the residential drop-off bins. Anaergia's inert residuals can be scheduled to be landfilled between set hours and on set days, potentially only 1 day per week. For these reasons, DEM stands by its estimate of reduction in operations expenses.

Attachment C

The following information must be corrected in Attachment C, and is reflected in other places throughout Section 2.

Estimated Remaining Capacity must be calculated absent Phase IV, which has never been under County control/ownership, although purchase of this property has been a component of long-term planning. Recently, landowner A&B/HC&S sold the property to another private owner, who currently does not wish to sell the property to the County.

Although the County purchased roughly 26 acres in 2012, this land has not been previously excavated through quarrying activities. It will be significantly higher in cost to develop for landfill space.

ATTACHMENT F

**CB&I RESPONSIVENESS SUMMARY:
SWD / DEM REVIEW COMMENTS**



Responsiveness Summary

Introduction

CB&I provided a copy of the draft assessment report to SWD and DEM for review and comment. Their comments are provided in Attachment E. Generally, it is our understanding that SWD reviewed Section 1 of the draft report, and DEM reviewed Section 2 of the draft report. This responsiveness summary addresses the comments received from SWD and DEM.

Responses to Comments of SWD

SWD offered comments to clarify certain aspects of County solid waste operations. Generally, CB&I has incorporated those comments into the final report, although in two instances we partially accepted the comments from SWD:

- SWD commented on Page 7 of the draft report (refer to Attachment E) that the County collects residential refuse from *most* of the households on Maui, Molokai, and Lanai. According to the Council Adopted FY2016 Budget, SWD provides collection to 25,000 residential accounts. The U.S. Census estimates that for the period 2010-2014, Maui County had an average of 53,131 households. As a result, we cannot conclude that SWD collects from “most” of the households in Maui County; instead, we have stated that SWD collects from a “significant portion” of households in the County.
- On Page 16 of the draft report, SWD provided comments on our summary of the FY2015 budget process. We have generally incorporated those comments into the final report, but have not included certain words which we felt represented SWD’s view of the budget process (but not necessarily the Council’s view). In the end, our summary simply states the factual events which transpired.

Responses to Comments of DEM

DEM provided comments in narrative form addressing Section 2 of the draft report. In the text which follows, CB&I responds to the major comments provided by DEM.

F.1 Comments on Section 2 - Introductory Paragraph

DEM commented that CBI’s summary of the IWCEP should include a note that “net cost savings” was not a primary goal of the IWCEP. DEM provided suggested language to emphasize that point, as well as additional language comparing the IWCEP to the County’s Integrated Solid Waste Management Plan and recycling/diversion programs and costs contained in the ISWMP. Further, DEM stated that CB&I should conclude that landfilling 100 percent of the County’s garbage and ceasing all recycling activities would be the least-cost alternative for managing the County’s waste.

CB&I acknowledges that “net cost savings” was not the only, nor perhaps even the primary goal of DEM in issuing the RFP for the IWCEP. We note, however, that the RFP stated that



“The IWCEP should also reduce the County’s costs and/or increase revenues and thus be a benefit to County residents”. Cost savings was therefore certainly a goal of the IWCEP.

Whether the IWCEP is the best alternative for the County, or will provide other benefits to the County, is an evaluation that is not within the scope of our assessment study of SWD. As noted on Page 1 of our report, the Maui County Council established the following objective for the assessment of SWD:

Assess whether implementation of the Maui County Integrated Waste Conversion and Energy Project (Contract M1016) will result in a net cost savings to the County compared to current operating practices.

Our report addresses that specific objective. However, we have included DEM’s review comments noting the other goals of the IWCEP in Attachment E.

F.2 Comments on Section 2.2 - Discussion of “Put-or-Pay” Provision

DEM commented that the required 125,000 tons of acceptable waste to be delivered by the County to the IWCEP is a fixed annual quantity that will not change over the term of the contract. DEM clarified that whether the County has delivered the required tonnage will be measured on a three-year rolling average basis. For instance, in the example provided by DEM, if the County delivered 125,000 tons in Year 1, 110,000 tons in Year 2, and 150,000 tons in Year 3, then the three-year average of tonnage delivered would be 128,333 tons and the County would owe no additional funds under the put-or-pay provision. The DEM example also assumed that the County delivered 120,000 tons in Year 4, in which case the three-year rolling average (for Years 2-4) would be 127,000 tons and again, the County would owe no additional funds.

CB&I finds this to be a plausible explanation of the intent of the contract, but still has concerns as to how the put-or-pay provision would be applied in practice. To give an example using a different set of tonnage parameters, assume that waste deliveries are 125,000 tons in Year 1, 110,000 tons in Year 2, 125,000 tons in Year 3, and 125,000 tons in Year 4. Based on DEM’s interpretation of the contract, the average deliveries for Years 1-3 would be 120,000 tons, and the County would pay a shortfall at the end of Year 3 (due to the 15,000 tons of lower waste deliveries in Year 2). The average deliveries for Years 2-4 would also be 120,000 tons, and the question is whether the County would again be assessed a shortfall at the end of Year 4, even though that shortfall (which occurred in Year 2) was already compensated at the end of Year 3.

Our recommendation is that the language of Section 6.03 be clarified with Anaergia as to intent and application. DEM stated in their review comments that “Should clarification be required, the County will address the issue with Anaergia”.

F.3 Comments on Section 2.3.2 - Current Costs of Recycling Programs

DEM commented that the costs of recycling programs should be included in the comparative cost analysis of current conditions versus the IWCEP. DEM stated that the cost of current recycling programs (e.g., the EKO composting contract) will be eliminated by the operation of the IWCEP, and therefore should be shown as reductions for the IWCEP scenario in the comparative cost analysis.



CB&I requested information from DEM on the per-ton costs of current recycling programs, which was then compared to the per-ton fees for handling recyclable materials under the IWCEP contract. This cost data is summarized in Table F.1 and shows that the net cost of handling recyclable materials is projected to increase under the IWCEP scenario by \$419,826 per year.

TABLE F.1 COMPARATIVE RECYCLING COSTS (CURRENT CONDITIONS VS. IWCEP SCENARIOS)						
Material	Average Tons/Year 2011-2015	Current Conditions		IWCEP		Cost Increase (Decrease)
		Processing Cost (\$/ton)	Annual Cost (total)	Processing Cost (\$/ton)	Annual Cost (total)	
Greenwaste - Private Hauler	12,889	\$20.00	\$257,780	\$29.00	\$373,781	\$116,001
Greenwaste - County	4,026	\$0.00	\$0	\$29.00	\$116,754	\$116,754
Sludge	23,142	\$83.00	\$1,920,786	\$76.00	\$1,758,792	(\$161,994)
Greasetrap Waste	5,069	\$50.00	\$253,450	\$100.00	\$506,900	\$253,450
Cooking Oil	1,098	\$50.00	\$54,900	\$100.00	\$109,800	\$54,900
County Recyclables	2,755	\$120.00	\$330,600	\$94.13	\$259,340	(\$71,260)
Subtotal			\$2,817,516		\$3,125,367	\$307,851
Less, County Revenue on Greenwaste			(\$128,890)		(\$16,915)	\$111,975
Net Cost to Process Organics/Recyclables			\$2,688,626		\$3,108,452	\$419,826
Notes:						
1. Tonnage values from Table 2.1 of report.						
2. County Recyclables includes recyclables collected at Central Maui Landfill, Olowalu Convenience Center and County drop-off facilities.						
3. IWCEP processing cost for County recyclables based on \$100/ton for first 2,250 tons per year, \$68/ton for additional tons.						
4. Maui County earns \$10/ton in net revenue on Greenwaste - Private Hauler tons.						

The net increase in costs stems from the following reasons:

- Under the IWCEP scenario, the cost of processing greenwaste will increase from \$20.00/ton to \$29.00/ton. Moreover, EKO currently accepts greenwaste from residential customers free of charge, whereas such material would incur a processing fee at the IWCEP.
- Under the IWCEP scenario, the cost of processing sludge will decrease from \$83.00/ton to \$76.00/ton.
- Under the IWCEP scenario, the cost of processing greasetrap waste and used cooking oil will increase from \$50.00/ton to \$100.00/ton.



- Under the IWCEP scenario, the cost of processing recyclables will decrease from \$120.00/ton to an average of \$94.13/ton²⁵.
- On balance, the cost of processing diverted materials is expected to increase by \$307,851 per year, with the higher cost of processing greenwaste, greasetrap waste, and cooking oil offsetting savings in the handling of sludge and recyclables.
- The County currently earns \$10.00/ton revenue on greenwaste from private haulers²⁶; this revenue would decrease to \$1.00 per ton under the IWCEP scenario. Although the \$1.00/ton might be collected on all greenwaste under the IWCEP scenario (including greenwaste from residential sources), it would presume that the \$29.00/ton processing fee would also be paid to Anaergia on residential greenwaste tons.
- On balance, the *net* cost of processing diverted materials (including revenues collected by the County on greenwaste) is expected to increase by \$419,826 per year.

F.4 Comments on Section 2.3.6 - Labor Costs

DEM commented that the CB&I analysis of potential labor cost reductions at the Central Maui Landfill (following IWCEP implementation) inaccurately compared those reduced operations to the 3 smaller landfills currently operated by SWD. DEM noted that, post-IWCEP, staff would still be required to operate the scalehouse and the residential drop-off area. DEM stated, however, that residuals from the IWCEP could be scheduled to be landfilled between set hours and on set days, potentially only one day per week. In essence, DEM projected larger labor cost savings than CB&I.

CB&I's analysis of potential savings in labor costs is detailed in Section 2.3.6 of the report. We noted that staff to operate the scalehouse and residential drop-off area would still be required (as agreed by DEM), and that a site supervisor and equipment operators would also continue to be needed. We estimated that 8 staff (versus the 5 or fewer implied by the DEM cost model) would be required, and that this staffing level was consistent with the 4-5 employees used at the smaller County landfills. These smaller landfills process 1,000 to 5,000 tons per year of waste, in comparison to the 30,000 tons of residuals expected to be handled at the Central Maui Landfill following implementation of the IWCEP.

We are not convinced by DEM's summary comment that 5 employees are a feasible staffing level for post-IWCEP operations at the Central Maui Landfill. Additional information would have to be provided by DEM (and SWD) for us to agree with that assumption.

For instance, DEM's statement that the Central Maui Landfill could be operated only one day per week implies that the landfill would be able to process approximately 576 tons per day of material using only 5 employees²⁷. Currently, the landfill handles approximately 500

²⁵ The cost of collecting these recyclables is not expected to change from current conditions because the recyclables are collected at County drop-off locations and would still have to be transported to the IWCEP.

²⁶ The County currently charges private haulers \$20.00/ton for greenwaste delivered to Central Maui Landfill, plus a recycling surcharge of \$10.00/ton for a total of \$30.00/ton. The County pays EKO \$20.00/ton to process the material.

²⁷ 576 tons per day = 30,000 tons per year of residuals handled over 52 days (one day per week),



tons per day of waste with a staff of 22 employees. Staffing the landfill with 22 employees on a single day of the week would present scheduling challenges and potential work rule issues (e.g., what work would these employees perform on other days of the week?).

Further, absent additional information on the composition of the residual material (e.g., is it wet? is it odorous?), it is also unclear whether the 576 tons of residual waste material could be stockpiled for a week at a time, and whether space will exist at the IWCEP to accommodate such a large stockpile.

In sum, CB&I believes that our comparison of labor costs is reasonable, and supported by the analysis contained in our report and current operating practices at the County's landfills.

F.5 Comments on Attachment C - Estimated Remaining Landfill Capacity

DEM commented that the remaining capacity of the Central Maui Landfill must be calculated absent Phase IV. DEM also indicated that the County purchased approximately 26 acres of land in 2012, and that this land has not been previously excavated through quarrying activities; developing this land for future landfill space will therefore result in higher costs than was estimated by CB&I.

With respect to the first comment, CB&I notes that our capacity projections were based on data contained in the County's Integrated Solid Waste Management Plan, as well as the County's Comprehensive Annual Financial Report (CAFR) for FY2014. As a practical matter, the FY2014 CAFR reported that Phase IV was nearly filled to capacity (with only 6 percent or approximately 48,570 tons of capacity remaining). As a result, our analysis did not assume significant capacity remains to be filled in Phase IV. In fact, we noted that closure of Phase IV is included in the future CIP budget for SWD.

CB&I also requested information on the 26 acres of land referenced in the DEM comments. DEM responded that this land is located north of the current landfill (whereas future landfilling activities are planned to occur to the south of the currently developed phases of the landfill), and that the land was purchased to support landfill diversion operations (i.e., not as future landfill area).

As is detailed in Section 2.3.4 of the report, CB&I estimated future landfill development costs based on proposed construction activities and costs contained in the CIP budget for SWD.



