Audit of Implementation of the Recommendations of the Cost Control Commission Concerning Energy Savings



Submitted by

Office of the County Auditor County of Kaua'i State of Hawai'i

> Report No. 11-01 April 2011

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Foreword

This office determined that an audit about implementation of the cost control commission's recommendations for saving energy would be valuable, given the importance of the commission's role in addressing county expenses and the significant cost of energy to the county.

Several findings were made which could reduce or moderate increasing electricity costs. The county paid \$1.3 million more for electricity in 2010 than in 2009. Our findings suggest that increases of this magnitude could be avoided or moderated by (1) following commission recommendations, (2) making departments and functions responsible for the electricity they use, and (3) adopting a strategic approach to energy management.

We would like to thank all who contributed data to this report, especially the commission, the Managing Director, the Office of Economic Development, the Building and Wastewater Divisions of the Department of Public Works, the Department of Water, the Finance Department, the Police Department, the Fire Department and the Kaua'i Island Utility Cooperative (KIUC).

Ernesto G. Pasion, County Auditor

Executive Summary

Background

The county uses electricity to operate county buildings, street lighting and signals, parks, landfills, county utilities (sewer and water), and other county functions. Historical statistics show that in calendar year (CY) 2010, the county used 20,028,843 kilowatt hours of electricity, for which it paid \$7,361,416. When compared to CY2009, CY2010 usage and costs increased by approximately 4 percent and 22 percent, respectively.

Under the Kaua'i County Charter, the goal of the cost control commission is to reduce the cost of county government while maintaining a reasonable level of public services. The commission made 36 recommendations for saving energy and electricity in 2008 and four more in 2009. Mayors Baptiste and Carvalho told the commission they intended to implement these recommendations.

Summary of Findings

Most of the recommendations have not been fully implemented because no one was accountable for implementing them. The county does not have a systematic process for implementing commission recommendations and no one was tasked with implementation.

- No one was accountable for implementing commission recommendations. As a result, only three of the 40 commission recommendations have been fully implemented.
- Energy savings could have resulted from timely implementation of the commission's recommendations. Instead, county energy use and costs increased due to inaction.
- The county lacks a strategic approach to energy management.

The findings and recommendations of the audit are more fully described beginning on page 8.

Summary of Recommendations

We recommend that the cost control commission:

- Direct the office of boards and commission to develop a systematic process to ensure that the commission recommendations accepted by the mayor are communicated to the departments or functions responsible for implementation.
- Ensure that it receives complete, regular, and timely reports on the status of pending recommendation, including reports on the progress (or lack of progress) toward implementation.

We recommend that the mayor:

- Distribute copies of the commission's recommendations for saving energy to all departments.
- Develop a strategy for implementation and ensure the departments and functions have adequate resources for implementation.
- Monitor implementation.

We recommend that the county:

- Create Green Teams and energy monitors in each department to increase departmental awareness of energy conservation. Since the county is a large water user and much of the county's electricity is used to pump water, the county should also consider promoting water conservation to decrease energy usage.
- Empower a energy manager to develop and implement short- and long-term energy management strategies and an action plan that establishes baselines, benchmarks, goals, and incentives for each department or function.
- Develop a process to ensure accountability for energy use, such as billing departments and functions for consumption whenever feasible.

The county is relying heavily on energy-savings performance contracts with an outside vendor to achieve energy efficiency, so we recommend that the mayor direct the appropriate resources to:

- Ensure that the energy-savings performance contracts are adequately monitored to enforce vendor contract commitments.
- Timely assess and collect any penalties due to the county under the contracts.
- Require a complete evaluation of each performance contract at the end of the contract periods.

Auditee Response

The managing director provided the auditee's responses to the draft report.

The managing director expressed agreement with the audit recommendations for finding 1.

The managing director expressed general agreement with the recommendation in finding 2 to distribute the commission's energy savings recommendations to all departments. However, he noted that the departments may not have the funding to implement all of the recommendations, or the expertise to measure and verify effectiveness of the measures. Finally, he stated that implementation of some individual commission recommendations could impact the overall feasibility of the performance contract program. We share his last concern. That is why we qualified the recommendation in finding 2 to advocate implementation of "recommendations that can be acted upon separately from the performance contract."

With regard to the recommendations in finding 3, the managing director agreed with the need to (1) form departmental "Green Teams" to promote energy awareness and (2) promote water conservation to reduce energy. The managing director indicated narrow disagreement on the recommendations that would be carried out by the proposed energy manager. He states that it is difficult to address these recommendations because implementation depends on the administration's ability to create and fund an energy manager position in the near future. He also indicated narrow disagreement on providing financial incentives for saving energy. While he agrees that incentive programs are good, and could be provided to departments who are able to control energy savings, many agencies do not have dedicated energy budgets.

The responses did not cite any errors in the audit observations and findings. The managing director's responses to the draft audit report are provided in full before the attachments.

CHAPTER 1

Introduction

This audit was conducted pursuant to the authority of the Office of the County Auditor, as provided in the Kaua'i County Charter. The audit was included in the county auditor's annual work plan for fiscal year 2010-2011, which was sent to the mayor and the Kaua'i County Council in June 2010.

Background

The Kaua'i County Charter created a cost control commission with the goal of reducing the cost of county government while maintaining a reasonable level of public services.¹ The charter mandates the commission to "review personnel costs, real property taxes, travel budgets, contract procedures; review with the aim of eliminating programs and services available or more efficiently supplied by other governments or organizations; eliminate or consolidate overlapping or duplicate programs and services; scrutinize for reduction any county operation."²

The county charter requires the commission to submit its recommendations semi-annually during the second and last quarter of each year, and further requires the mayor to submit all commission recommendations and the mayor's comments to the council.

As its name indicates, the commission has a significant role overseeing the cost of county government, so whether the county follows the commission's recommendations is important. This is especially true in the area of energy conservation, since electricity is such a high cost item for the county.

In calendar year CY2010, the county used 20,028,843 kilowatt hours of electricity, for which it paid \$7,361,416. The historical statistics show that when CY2010 is compared to CY2009, the county's electrical use and costs in CY2010 increased by about 4 and 22 percent, respectively.

The graph below shows the county's consumption of electricity in kilowatt hours and its electricity costs in dollars for the past six calendar years.

¹ Kaua'i County Charter (KCC) section 28.02.

² KCC section 28.04.



The county uses electricity to operate county buildings, street lighting and signals, parks, landfills, county utilities (sewer and water), and other county functions.

The figure below shows the large users within the county. The majority (61 percent) of the electricity is used by the Department of Water and the Wastewater Division of the Department of Public Works mainly to operate pumps. For this reason, the county's water use affects its electricity usage, since the water department and wastewater division must use more electricity to pump water if large water users like the county increase their water consumption and disposal.



MAJOR COUNTY USERS - FY 09/10

Source: Kaua'i County Auditor

Audit Objectives

Our audit objectives were: (1) document and analyze the implementation of cost control commission energy-savings recommendations and (2) evaluate county management controls over county electricity use.

The county administrative branch is responsible for creating and maintaining effective controls, by adopting an organizational structure, methods and procedures to ensure goals are met. Management controls include the processes for planning, organizing, directing and controlling operations, and the systems for measuring, reporting and monitoring program performance.

Since the commission recommendations included many energy efficiency best practices, assessing the county's response to the recommendations is not only necessary to maintain effective controls, but also to improve the county's processes and systems for controlling energy use and costs.

Audit Scope

The major work tasks for the audit were:

- Document and analyze progress or lack of progress toward implementation of the commission's energy conservation recommendations in 2008 and 2009
- Compare processes for managing and monitoring electricity use to best practices
- Make recommendations as appropriate

Audit Methodology

We examined the county's overall approach to implementing the recommendations of the cost control commission regarding energy conservation. We also examined each commission recommendation, and identified any issues involved in implementing the commission recommendations. We reviewed charter provisions, ordinances, and policies and procedures related to the commission and the role of its recommendations.

We interviewed key county employees involved in energy policy and building maintenance, including the Managing Director, the Energy Coordinator, and Chief of the Building Division. Staff from KIUC was also interviewed. We issued surveys to selected department and division heads to measure awareness of the commission's recommendations and to determine whether departments monitor electricity bills. We reviewed and analyzed electricity consumption data from a sample of select departments and agencies. We reviewed electricity expenditure data of individual departments and agencies before and after the commission's recommendations, as appropriate. We also conducted a limited review of the county procurement practices relevant to the commission's energysaving recommendations.

Our review was conducted in accordance with Government Auditing Standards issued by the Comptroller General of the United States and accordingly included such tests of records and other auditing procedures as we considered necessary under the circumstances. Our procedures included interviewing key staff, observing operations, reviewing management controls and testing selected samples of transactions and supporting documentation. The scope of our review was generally focused on the activity in the fiscal and calendar years during the 2007-2010 time periods.

Based on the results of our review, we prepared specific issues and recommendations for improvement and transmitted them to the administration in a draft report. These recommendations, as well as the administration's written responses, are in this report.

CHAPTER 2

Finding 1: No One Was Accountable For Implementing Commission Recommendations. As a Result, Only Three of the 40 Commission Recommendations Have Been Fully Implemented.

Background:

2008 Commission Recommendations

In a letter dated March 17, 2008 (Attachment B), the commission transmitted its findings and recommendations to Mayor Bryan J. Baptiste. One finding recommended that the water department and the wastewater division develop cost-saving opportunities for operations through the use of alternative energy sources and the other was for the departments to read and follow the energy savings recommendations in the Energy Use Study (2007 Study). (Attachment E) The 2007 Study made 34 recommendations, so the commission made a total of 36 recommendations in 2008. (Attachment A)

In a letter dated May 9, 2008 (Attachment C), Mayor Baptiste responded to the 2008 recommendations as follows:

"County energy use

The Commission recommended requiring the Department of Water and the Wastewater Division of the Department of Public Works to develop cost-savings opportunities for their operations through alternative energy, and requiring all departments to consider the recommendations in the energy survey recently conducted by my administration. I concur with the recommendation, and will require all departments to review the energy survey and implement recommendations when feasible. The Wastewater Division will be part of this effort.

The Department of Water is a semi-autonomous entity, reporting to the Board of Water Supply. I will make certain your recommendations are transmitted to the Board for its consideration."

2009 Commission Recommendations

In 2009, the commission made four recommendations: (1) execute a new Energy Savings Performance Contract (2) form departmental Green Teams to promote employee awareness, understanding, and sense of personal and departmental responsibility about energy use and develop energy savings measures, (3) designate a departmental energy monitor, and (4) designate a county energy analyst. (See Attachment D)

Mayor Bernard P. Carvalho, Jr. responded to these recommendations in a letter to the county council dated August 19, 2009 (Attachment E). Mayor Carvalho stated, in part, "[i]t is our intent to implement both recommendations, with additional details and timelines to be announced once our review is complete."

Through interviews and questionnaires, key county policy makers and select department or activity heads were surveyed to determine whether the 2008 and 2009 commission recommendations were implemented. Relevant county records and summaries of electric bills were reviewed as required. Participants in the interviews and surveys were:

- Managing Director
- Director of Finance
- Manager and Chief Engineer, Department of Water
- Chief of Building, Department of Public Works
- Chief of Wastewater, Department of Public Works
- Economic Development Specialist IV (Energy Coordinator), Office of Economic Development

Disposition of commission recommendations was measured against the following audit criteria:

- Implemented Department(s) or function(s) provided documentation confirming the recommendation's implementation, and or/we located necessary documentation using county and other resources
- Partially implemented Department(s) or function(s) provided documentation confirming some, but not all, of the directives in the recommendation had been implemented
- Not implemented Department(s) or function(s) failed to provide supporting documentation of implementation or other evidence to confirm the recommendation was implemented

Based on the definitions above, we found that of the 40 recommendations made by the commission in 2008 and 2009, three have been fully implemented, eight were partially implemented, and 29 were not implemented. (See Attachment A)

The results can be attributed to the lack of accountability and the processes to ensure accountability. Accountability is a core governance function that has been defined as:

[T]he obligation to answer for a responsibility that has been conferred. It presumes the existence of at least two parties: one who allocates responsibility and one who accepts it with the undertaking to report upon the manner in which it has been discharged.³

Under this definition, management (the administration) must allocate responsibility for implementing the commission recommendations by issuing directives and holding departments and functions accountable for implementation. In the case of the commission's recommendations, no directives were issued and no one was allocated responsibility for implementation.

Based on information from the interviews and the surveys, one reason accountability did not exist is that there are no administrative processes to ensure that the mayors' commitments to the commission are met. No follow up action occurred after the mayors wrote their letters. We found no evidence that the mayors issued any directives to accomplish the commitments described in their letters to the commission in 2008 and 2009.

We also found no evidence the commission's recommendations were systematically distributed or that departments or functions were directed to take action on these recommendations. The water manager and the wastewater chief stated that they did not receive a request (in the case of the water manager) or directive (in the case of the wastewater chief) to implement the commission's 2008 energy savings recommendations. Results of the interviews and surveys showed that the 2007 Study was not distributed to the departments. Aside from the energy coordinator, who worked on the study, no other county employee interviewed or surveyed could say with certainty that he or she had reviewed the study or was familiar with the recommendations in it.

³ This definition of accountability was developed by the Independent Review Committee on the Office of the Auditor General of Canada and cited in an article by George Morfitt, entitled "Accountability: A Key to The Success of Nonprofit and Volunteer Organizations," (CCAF-FVI <u>Update</u>, July 2004 edition).

As for the 2009 recommendations, no one surveyed or interviewed was required to implement the recommendations to form Green Teams, appoint a departmental energy monitor, or create a county energy analyst position.

It is important to note that the "fully implemented" recommendations were only completed through other initiatives. Two⁴ of the three were implemented by the County Council when it adopted the 2009 Edition of the International Energy Conservation Code as the county's energy code on January 21, 2010. The third, planning for efficient air conditioning for the Historic County Building, was incorporated into the renovation planning for the building, a project that began before the commission made its recommendations in 2009.

Accountability was also lacking because the commission did not receive regular reports on the administration's progress implementing the recommendations. Although the commission initiated discussion about the status of the energy savings performance contract at several meetings, no regular updates were provided by the administration about the status of the other outstanding recommendations. The commission is a part-time volunteer body, so it cannot reasonably be expected to monitor all 40 recommendations. However, KCC Section 7.06.B. requires the boards and commissions administrator to provide administrative and operational support to the commission including "gathering such information, documents, and data" that the commission "may deem necessary to perform its functions.." The commission performs a charter-mandated function that is important to the county's financial well-being. The significance of its work should justify staff support from the office of boards and commission sufficient to enable it to monitor implementation of cost-saving recommendations.

The recommendation to enter into an energy savings performance contract received some attention by the commission and the administration, but despite this attention, the recommendation has not been implemented.

An energy savings performance contract is an agreement with a private energy services company (ESCO) that uses future energy savings to pay for the entire cost of electricity and energy efficiency retrofits. The ESCO finances or arranges financing, designs, purchases, installs and maintains the energy saving equipment. The ESCO will also guarantee that the energy savings---which may be achieved through replacing lighting and electrical equipment, modifying or replacing boilers or chillers, installing modern energy management controls systems, replacing motors, or other

⁴ The recommendations were to adopt higher energy efficiency standards for (1) design and construction and (2) roofs, walls, and windows.

measures---will pay for all project costs. The concept of another⁵ energy savings performance contract was developed by the energy coordinator by early 2009, in response to rising energy costs. He introduced the project to the commission, promoted it to the administration, and began implementation.

Two interviewees stated that the administration may not have taken action on the commission's recommendations because it was relying on the performance contract to achieve energy savings. The problem with relying on the performance contract is that as of the end of 2010, the request for proposals for this contract had not been issued, and no performance contract was in place. Although the energy coordinator intended to fast-track the procurement by utilizing the expedited procurement process for performance contracts for public buildings allowed by Hawai'i Revised Statutes Section 196-30(c), the procurement has proceeded slowly, due to delays in the procurement and legal review processes.

By waiting for the energy savings performance contract to achieve energy savings measures, the county missed opportunities for energy savings from the other commission recommendations, especially the recommendations to decrease energy consumption by changing user behavior. (See Finding 2)

In addition, a performance contract may not necessarily result in savings for the county, since the level of savings achieved through a performance contract depends on whether new technology and equipment are significantly more energy efficient than the technology and equipment in place.

Recommendations:

We recommend the commission direct the office of boards and commissions to develop a systematic process for the commission's approval to ensure that:

- (1) the administration issues clear directives to implement commission recommendations accepted by the mayor to the departments or functions responsible for implementation;
- (2) the commission receives complete, regular and timely reports on the status of pending recommendations, including any reasons for delays and

⁵ An energy savings performance contract had been procured in 1995.

(3) the commission work with the mayor to ensure the process is in place and functioning.

Finding 2: Energy Savings Could Have Resulted From Timely Implementation of the Commission's Recommendations. Instead, County Energy Use and Costs Increased Due to Inaction.

As stated in Finding 1, only three of the commission's 40 recommendations were implemented.

When we examined the county's electricity bill summaries, we found that in CY2010, the County used 20,028,843 kilowatt hours of electricity, for which it paid \$7,361,416. Compared to the prior year (CY2009) consumption and costs increased about 4 and 22 percent, respectively.⁶

We also found that most major functions increased consumption over the last two fiscal years.

Department	FY 08/09	FY 09/10	Change
Parks	449,482	508,755	13%
Pools	116,960	116,354	-1%
Golf Course	178,137	218,426	23%
Auditoriums/stadiums	301,510	269,860	-10%
Council Services	204,180	282,420	38% ⁷
Civic Center	1,749,720	1,759,380	1%
Solid Waste	38,016	43,038	13%
Neighborhood centers	250,521	251,182	1%
Wastewater	4,250,135	4,440,780	4%
Baseyards/auto	181,114	178,669	-1%
Streetlights/traffic lights	1,895,653	1,922,619	1%
Police	1,611,154	1,698,602	5%
Fire	301,561	315,706	5%
Water	7,235,044	7,825,273	8%
Housing	70,627	76,857	9%
Transportation	90,120	80,200	-11%

COUNTY KILOWATT HOUR USE BY FUNCTION

Source: Kaua'i County Auditor

⁶ Graph of historical county energy usage and costs, page 5 of this report.

⁷ A reason for the large increase is that more electricity is needed for the council and council services at their temporary offices in the Hale Kaua'i Building than at the Historic County Building.

We also examined the 15 facilities using the most electricity in CY2006⁸ and found increased usage in five of the 15 facilities in the years after the commission made its recommendations. The table shows usage for the 15 high use facilities identified in the 2007 Study over selected 12-month periods following the study.⁹ The table also shows the 15 facilities with the highest usage in each 12 month period.

Facility	CY 2006	FY 08/09	FY 09/10	% change ('06 v. '09)	2006 rank	2008 rank	2009 rank
Ka'ana Street	1,336,400	1,388,400	1,457,600	9%	1	1	1
Civic Center (excluding Pi'ikoi)	1,041,360	1,102,320	1,102,080	6%	2	2	2
Pi'ikoi Building	657,000	647,400	657,300	0%	3	3	3
Convention Hall	170,400	152,760	145,560	-15%	4	5	5
Historic County & Hale Kaua'i Bldgs.	162,540	181,900	204,780	26%	5	4	4
Līhu'e Stadium	96,750	124,950	103,200	7%	6	6	6
Bus Maintenance Facility	87,600	90,120	80,200	-8%	7	8	10
Līhu'e Auto Maintenance Facility	82,000	90,800	89,900	10%	8	7	7
Līhu'e Fire Station	79,520	78,760	86,160	8%	9	11	8
Historic County Building Annex	NA	22,280	77,640	NA			11
Waimea Public Safety Complex	71,781	70,215	66,457	-7%	10	12	12
Waimea Swimming Pool	61,123	82,044	80,755	32%	11	10	9
Kōloa Fire Station	51,875	49,105	55,486	7%	13	14	15
Kalāheo Recreation Center	57,120	50,080	55,560	-3%	12	13	14
Fire Headquarters	NA	2,240	55,660	NA			13
Hanapēpē Baseyard	45,160	40,880	40,200	-11%	14	15	
Koloa Comfort Station	28,440	39,680	42,760	50%			
Kukuiolono Golf Repeater	42,413	39,591	43,662	3%			
Kapa'a Swimming Pool	44,264	34,916	35,599	20%	15		
Kapa'a Fire Station	43,517	38,993	38,240	-12%			

HIGH USE FACILITIES¹⁰

Sources: KIUC & Kaua'i County Auditor

⁸ The 2007 Study identified the 15 county facilities using the most electricity in CY2006, excluding facilities under the control of the water department and wastewater division.

⁹ CY2006 was selected as the pre-study benchmark year for the comparison because it was the last complete 12-month period for which accurate data is readily available. The reason is that the county changed the time period for its electricity bill summaries from a calendar year to fiscal year basis during 2007.

¹⁰ Water and wastewater facilities are not included in this list.

The level of savings from the commission's other recommendations cannot be precisely quantified. However, cost savings are associated with most of the recommendations, because they are well-accepted energy conservation and efficiency practices. Of the 40 commission recommendations, 11 are energy savings practices mandated for state facilities by Section 196-9, HRS, and 27 are Energy Star¹¹ best practices. (See Attachment A)

For example, cost savings are associated with the commission's recommendation to create Green Teams and departmental energy coordinators in order to increase employee awareness of energy conservation. Energy Star calculates that the potential energy savings for office buildings as a result of changing the behavior of office occupants ranges from 3.5 percent to 15.2 percent. These savings result from turning equipment off, being generally aware of energy conservation, using Energy Star equipment, installing power management software, harvesting daylight, and using efficient work station task lighting. The following calculation shows the county's potential savings from changing the way employees use electricity in the county's primary office spaces (Līhu'e Civic Center buildings).

Electric bill for Līhu	e Civic	Center for FY 09/10	\$598,096
Potential savings	High	(15.2%)	\$ 90,911
	Low	(3.5%)	\$ 20,933

Since the county uses electricity to pump water and wastewater, promoting water conservation among employees can also decrease energy usage.

Recommendation:

We recommend that the mayor distribute copies of the commission's energy-savings recommendations to all departments (including the water department and its board), order implementation of recommendations that can be acted upon separately from the performance contract, ensure that departments have adequate resources for implementation, and monitor implementation.

¹¹ Energy Star is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy established in 1992 to help businesses and individuals protect the environment through superior energy efficiency.

Finding 3: The County Lacks a Strategic Approach to Energy Management

Energy Star has developed best practices and an assessment matrix and other tools that can be used to develop a strategic approach to energy management. The Energy Star Energy Management Assessment Matrix scores organizations on the state of their energy management strategies. An organization's status is scored as: "little or no evidence," "some elements," or "fully implemented." The Energy Star program estimates that a fully implemented strategic approach to energy management can produce twice the savings for the bottom line and the environment.

We used the Energy Star Energy Management Assessment Matrix to assess the county's efforts in energy management strategies. We found that the county scores "little or no evidence" rankings in all seven categories. The following tables show the results of the assessment. The characteristics of an organization with a fully implemented strategic energy management program are also shown for comparison.

Category 1. Make Commitment to Continuous Improvement

	Little or no evidence	Fully implemented
Energy Director	No central or organizational resource Decentralized management	Empowered central or organizational leader with senior management support
Energy Team	No company energy network	Active cross-functional team guiding energy program
Energy Policy	No formal policy	Formal stand-alone EE policy endorsed by senior management

County ranking: "Little or no evidence"

The county's scores are low in this category because responsibilities are vague and decentralized, and this structure does not lend itself to easy implementation of energy-savings recommendations. Without a mayoral directive, no department or function has the authority to direct countywide changes in energy management.

Of the county employees interviewed, the building chief and the energy coordinator demonstrated the most expertise in energy conservation. While they have reduced energy usage in their own offices and incorporated energy savings measures in their projects, they report that the county structure does not allow them to direct other departments or functions to conserve energy or implement energy conservation measures. The building division provides maintenance and design for county facilities. The building chief has overall responsibility for county building construction and maintenance. He reports that energy efficiency was incorporated in his projects, such as the Kaiākea Fire Station, and that he considers energy savings criteria in design and construction projects within his jurisdiction. He reduced the number of lamps in the light fixtures in his office, but adds that he does not have the authority to order other employees to de-lamp or change their behavior to reduce energy consumption. He states that the county's electricity bills are monitored by the energy coordinator.

The energy coordinator is employed by the Office of Economic Development, but the majority of the funding for his position is received from the State, which must approve his duties. His approved duties for the 2010-2011 fiscal year are: monitor and participate in public utilities commission cases and activities, implement the development of county energy emergency plans, promote the commercial development of renewable energy resources and energy efficiency, participate in the Hawai'i energy policy forum, provide legislative testimony related to energy on behalf of the county, participate in the Hawai'i clean energy initiative and work to support State energy programs, such as property-assessed clean energy program and rebuild Hawai'i. He receives and reviews county electricity billing records, but aside from providing advice to departments about energy efficiency options, he is not authorized to require the departments to form Green Teams or to implement other energy savings measures recommended by the commission.

The following recommendations suggest steps the county can take to improve its rating in this category.

Recommendations:

We recommend implementation of the following commission recommendations: (1) form departmental Green Teams to promote employee awareness of energy efficiency and energy waste, (2) designate a person in each department whose clear responsibility is to scrutinize energy expense and suggest energy savings measures, and (3) designate a position ("energy manager") to oversee the performance contract, monitor rate schedules to determine appropriate rates, recommend changes in operations to reduce energy costs, and provide users with energy use and expense data.

We also recommend authorizing the energy manager to mandate¹² countywide implementation of energy savings measures, oversee the formation and activities of the Green Teams, and develop an energy policy

¹² Or request implementation, as in the case of the water department and legislative branch.

with input from the Green Teams and management. The position should be empowered as a central or organizational leader with senior management support, as described in the "fully implemented" condition in the matrix.

Category 2. Assess Performance and Opportunities

County ranking: "Little or no evidence"

	Little or no evidence	Fully implemented
Gather and track data	Little metering, no tracking	All facilities report for central consolidation/analysis
Normalize	Not addressed	All meaningful adjustments for organizational analysis
Establish baselines	No baselines	Standardized organizational base year and metric established
Benchmark	Not addressed or only same site historical comparisons	Regular internal & external comparisons and analyses
Analyze	Not addressed	Profiles identifying trends, peaks, valleys & causes
Technical assessments and audits	Not conducted	All facilities report for central consolidation/analysis

The county has low scores in this category because it does not adequately control and monitor county electricity consumption. The county does not have the capability to track consumption data. Without tracking, baselines cannot be established.

Most departments are not separately billed and do not budget or pay for electricity. Failing to bill users results in the condition that most departments and activities are not aware of the amount of electricity they use and have no incentive to manage consumption. The cause is a county policy that only requires departments and activities to budget and pay for electricity if they are the sole occupants of a building. The policy is justified by the explanation that shared spaces in buildings are not separately metered because of cost and electric company tariff restrictions. Since the majority of the departments and activities are not the sole occupants of county buildings, they are not billed, and are unaware of the cost of the electricity they use. The departments and functions required to budget and pay for all their electricity are:

Police	Fire ¹³	Transportation
Water	Auditor	Public Works

Among the departments and activities that do not pay for any electricity are the offices of the mayor, boards and commissions, county attorney, economic development, personnel services, elderly affairs, finance, planning and liquor control. They are not billed since they occupy portions of the buildings in the Civic Center (the Mo'ikeha, Pi'ikoi, and Kapule Buildings), and the electric bills for these buildings are paid by public works. Public works also pays for the electricity used by the administrative offices of the parks and housing departments, since these offices are also located in the Civic Center buildings.¹⁴

We also found that the county policy is applied inconsistently. Public works has been directed by the finance director to pay the electric bills for the Historic County Building and Annex, even though council services is the sole occupant of these buildings and should be billed for electricity under the policy.¹⁵ The police department, not public works, budgets and pays for the electricity used in the Kā'ana Street building shared by the department, county prosecutor and civil defense agency.

The county needs to develop user awareness and accountability in order to manage electricity use and costs. User awareness may occur if departments must budget and pay for electricity based on a methodology for apportioning electricity used in shared buildings. If electricity used in shared buildings is not apportioned, the county may not be able to establish baselines and make the analyses necessary to develop an effective energy management strategy. If departments and functions do not pay for their electricity use, they do not have an incentive to conserve.

¹³ The fire department pays for the electricity used in the buildings shared with the police department in Waimea, and the police department pays for the electricity for the facilities shared with fire in Hanalei. This arrangement is considered an even trade.

¹⁴ The parks and housing departments pay for the electricity used in their facilities outside the Civic Center.

¹⁵ During the Historic County Building renovation, council services temporarily moved to the Hale Kaua'i Building, and pays for electricity used there. When council services moves back into the Historic County Building, public works will resume paying for council service's electricity. The Kaua'i Historical Society occupies 1,352 square feet of the historic county building under a thirty-year lease dated July 25, 1997. Under the lease, the society pays a monthly fixed fee of \$152 for electricity. The lease provides that if the county is subject to rate increases, the society's payments must increase by a proportional amount. Although electricity rates have fluctuated since the beginning of the lease, the society has continued to pay \$152 a month for electricity to the present.

Recommendations:

We recommend that the county increase departmental awareness of the need to conserve energy, including billing departments for their consumption whenever possible or feasible. Since the county is a large water user and a significant portion of its electricity use is for pumping water, the county should also manage water use and promote water conservation among its employees to decrease energy usage.

We recommend that the mayor direct public works and the energy manager to develop a methodology for gathering and tracking data regarding electricity use by departments and functions, establishing a process to ensure accountability for electricity use, developing baselines and benchmarks for departments and functions, and conducting technical analyses, including analyses of trends, peaks, valleys and causes.

Category 3. Set Performance Goals

	Little or no evidence	Fully implemented
Determine scope	Determine scope	Short & long term facility and corporate goals
Estimate potential for improvement	No process in place	Facility & organization defined based on experience
Establish goals	Not addressed	Specific & quantifiable at organizational levels

County ranking: "Little or no evidence"

The county's scores are low in this category because it has not developed an energy management strategy. If the recommendations in the discussions of Categories 1 and 2 are implemented, the resources needed to develop a strategy will be in place.

Recommendation:

We recommend that the administration direct the energy manager and public works to propose long- and short-term energy management strategies for the county using input from the Green Teams, departmental energy monitors, the commission recommendations and the energy savings performance contractors.

Category 4. Create Action Plan

County ranking: "Little or no evidence"

	Little or no evidence	Fully implemented
Define technical steps and targets	Not addressed	Detailed multi-level targets with timelines to close gaps
Determine roles and resources	Not addressed or done on ad hoc basis	Internal/external roles defined & funding identified

As stated in the discussion in Finding 1, the county has not created an action plan for energy management, except for procuring energy savings performance contracts. If short- and long-term energy management strategies are developed and adopted, the county can develop an action plan with detailed targets and timelines and designate the personnel and funding necessary to execute the action plan.

Recommendation:

We recommend that the county utilize public works, the water department and the energy manager to develop and propose an action plan for energy management. The action plan should include a detailed definition of technical steps, targets and timelines, and identify the personnel and funding needed for plan execution. The action plan should be based on long- and short-term energy management strategies adopted by county policy makers.

Category 5. Implement Action Plan

County ranking: "Little or no evidence"

	Little or no evidence	Fully implemented
Create a communication plan	Not addressed	All stakeholders are addressed on regular basis
Raise awareness	No promotion of energy efficiency	All levels of organization support energy goals
Build capacity	Indirect training only	Broad training/certification in technology & best practices
Motivate	No or occasional contact with energy users and staff	Recognition, financial & performance incentives
Track and monitor	No system for monitoring progress	Regular reviews & updates of centralized systems

In addition to lacking an energy action plan, the county does not have the capacity to adequately monitor and verify aspects of county electrical consumption expediently and efficiently. The police, fire, parks, and public works departments conduct limited reviews of their electricity bills. Employees in these departments attempt to review bills or manage consumption, but are not provided the training to monitor effectively. In order for monitoring to produce tangible results, employees must be technically knowledgeable about energy conservation best practices and the electric rate structure. Knowledge of the rate structure is important because substantial savings occurs when electricity use is managed to not only lower the amount of electricity used, but to decrease the usage to a point where the account (facility) falls into a less costly rate classification.

The county purchases its electricity from KIUC at rates set by tariffs that are allowed to take effect by the Hawai'i Public Utilities Commission. The tariffs establish different rates based on the type of customer served (i.e. residential or commercial). Within the commercial classification, customer rates are based on the amount of electricity used, and the larger users generally pay at the higher rate levels.

Most of the county's accounts are categorized as Schedule G (small commercial). However, a significant number of accounts are billed at Schedule P.

Schedule G users pay the simplest and lowest overall rates. The Schedule G rates consist of a kilowatt hour charge, and a customer charge, which recovers costs unrelated to usage, such as the costs to read meters, bill customers, collect bills and maintain equipment and buildings.

If a user exceeds the Schedule G criteria limit, it is reclassified to the higher rate level appropriate to its usage. The higher J and P rate levels include consideration for the costs of paying for the additional facilities needed to provide for their heavy usage during peak periods.

Greater detail about the rates is available in the 2007 Study (Attachment E) and in Attachment G. The study identifies facilities where usage could be lowered so that the facility could be charged at a lower rate level.

Recommendation:

We recommend that the county take the steps necessary to achieve "fully implemented" ratings in this category. In implementing the action plan, the administration should ensure employees are informed and reminded of their roles and responsibilities in achieving plan objectives.

We recommend that the Green Teams, departmental energy monitors, and others executing the action plan receive technical training adequate to enable them to function effectively, including training in energy technology and utility rates.

Category 6. Evaluate Progress

County ranking: "Little or no evidence"

	Little or no evidence	Fully implemented
Measure results	No reviews	Compare usage & costs vs. goals, plans, competitors
Review action plan	No reviews	Revise plan based on results, feedback & business factors

The county's ranking in this category is low because it has no plan to effectively manage energy consumption and costs. It also lacks an inhouse data collection system to verify whether past energy saving programs have resulted in lower energy use or costs.

Recommendations:

We recommend that the action plan for energy management include the capability to account for energy use, so that the results of individual initiatives in the action plan can be captured and analyzed.

We recommend that the mayor direct the appropriate resources to (1) ensure that energy-savings performance contracts are adequately monitored to enforce vendor contract commitments and (2) timely assess and collect any penalties due to the county under the contracts. We also recommend a complete evaluation of all performance contracts at the end of the contract periods.

Category 7. Recognize Achievements

County ranking: "Little or no evidence"

	Little or no evidence	Fully implemented
Provide internal recognition	Not addressed	Acknowledge contributions of individuals, teams, facilities
Get external recognition	Not sought	Government/third party highlighting achievements

The county's rankings in this category are low, because work on energy savings projects is not recognized. The economic development office (through its energy coordinator) and the public works department (through its building chief) have been the catalysts for energy initiatives, such as initiating the performance contracts, completing the Ni'ihau School photovoltaic system installation, and greening the Kaiākea Fire Station. However, internal and external recognition for their efforts is lacking. We commend the administration for seeking external (LEED) recognition for the fire station.

Recommendation:

We recommend the administration consider providing agencies that complete energy conservation projects with internal recognition and incentives for working on additional projects. The incentives could include receiving a share of the savings in the next budget to use toward the additional projects. Bernard P. Carvalho, Jr. Mayor



Gary K. Heu Managing Director

OFFICE OF THE MAYOR County of Kaua'i, State of Hawai'i

4444 Rice Street, Suite 235, Līhu'e, Hawai'i 96766 TEL (808) 241-4900 FAX (808) 241-6877

MEMORANDUM

TO: Ernesto G. Pasion, County Auditor

FROM: Gary Heu, Managing Director

DATE: April 19, 2011

SUBJECT: Responses to the Draft Audit Report – Performance Audit of the Implementation of the Recommendations of the Cost Control Commission Concerning Energy Savings

Thank you for the opportunity to respond to the subject Draft Audit Report. The report has been reviewed by members of our staff, and we provide the following comments and responses to the findings and recommendations of the Draft Audit Report.

Finding 1: No One Was Accountable For Implementing Commission Recommendations. As a Result, Only Three of the 40 Commission Recommendations Have Been Fully Implemented.

Recommendations:

We recommend the commission direct the Office of Boards and Commissions to develop a systematic process for the commission's approval to ensure that:

(1) The Administration issues clear directives to implement the Cost Control Commission's recommendations accepted by the Mayor to the departments or functions responsible for implementation.

We agree in that as a general rule the Mayor should issue a directive to all appropriate department managers and staff for implementation of Cost Control Commission recommendations that have been accepted. These directives should be detailed and the agencies responsible for implementation should report regularly back to the Mayor or his designee on their progress, so that this information can in turn be reported back to the Commission.

An Equal Opportunity Employer

(2) The Cost Control Commission receives complete, regular and timely reports on the status of pending recommendations, including any reasons for delays.

We agree that as a general rule the Commission should receive complete, regular and timely reports on the status of pending recommendations that have been approved by the Mayor. We will implement policies and procedures to insure this happens in the future.

(3) The Cost Control Commission work with the Mayor to ensure the process is in place and functioning.

It is the Mayor's intent to address each Board and Commission at least once a year during a regularly scheduled meeting. This will provide an opportunity for direct interaction during which progress and success on implementation and reporting can be discussed and refined if necessary.

Finding 2: Energy Savings Could Have Resulted From Timely Implementation of the Cost Control Commission's Recommendations. Instead, County Energy Use and Costs Increased Due to Inaction.

Recommendation:

We recommend that the Mayor distribute copies of the commission's energy-savings recommendations to all departments (including the Water Department and its board), order implementation of recommendations that can be acted upon separately from the performance contract, ensure that departments have adequate resources for implementation, and monitor implementation.

Re-distribution of the commission's energy savings recommendations to all departments should be done, but the actual implementation of many recommendations requires funding which departments may or may not have access to at this time or in FY12. It is our intent to instruct departments to implement non-cost alternatives as feasible, along with any recommendations that are currently funded, and to report back to a central point of contact on a quarterly basis as to progress. This progress can then be reported to the Mayor and the Commission.

Although we agree with this recommendation, it should be noted that there are potential issues that could arise if individual recommendations are acted upon separately from the pending performance contract, because they could impact the overall feasibility of the performance contract program. In a performance contract, energy efficiency retrofits are looked at as a package. Almost all of the recommendations involving fixture or equipment retrofits would fall under the scope of work for a performance contract. Fast payback measures such as lighting retrofits can subsidize more expensive, longer payback measures involving air conditioning upgrades, thus creating a comprehensive energy efficiency program. Implementing only the simplest and cheapest measures would be "cream skimming" and is not recommended. Also, the individual departments do not have trained staff that could cost out and implement measures followed by some type of measurement and verification function to gauge performance.

Finding 3: The County Lacks A Strategic Approach to Energy Management

Recommendations:

We recommend implementation of the following commission recommendations:

(1) Form Departmental "Green Teams" to promote employee awareness of energy efficiency and energy waste.

We agree that a County-wide Green Team should be formed and will be taking steps to do so in the next sixty days.

(2) Designate a person in each department whose clear responsibility is to scrutinize energy expense and suggest energy savings measures.

We agree that each department should be represented, however it should be noted that for many departments there is no one on staff with specific knowledge and experience on the technicalities of energy efficiency measures. The Green Team's scope of work initially would be limited to sharing ideas that can be fairly and easily implemented across departments, and being the "champions" within the various departments to encourage greater energy conservation and efficiency specifically per the no-cost recommendations of the 2007 Energy Study. One of the challenges we will face is that most offices are not submetered and therefore cannot effectively track individual energy use.

(3) Designate a position ("Energy Manager") to oversee the performance contract, monitor rate schedules to determine appropriate rates, recommend changes in operations to reduce energy costs, and provide users with energy use and expense data.

The audit report is not clear on how the designation of an Energy Manager will occur. While the auditors acknowledge that the Building Division Chief and the Energy Coordinator in the Office of Economic Development are the most knowledgeable within the County on energy matters, it stops short of recommending either of these positions be designated the Energy Manager. Further, the audit acknowledges that the Energy Coordinator position as it is currently described lacks both the capacity and the necessary authority to operate successfully as the Energy Manager. We concur with this assessment.

That being the case, we find it difficult to address the recommendations in this report that would be carried out by the proposed Energy Manager. One thing we can commit to is that we are moving forward with the performance contract and it will be managed by the Energy Coordinator.

We also recommend authorizing the Energy Manager to mandate (or request as in the case of the Water Dept. and Council) countywide implementation of energy savings measures, oversee the formation and activities of the Green Teams, and develop an energy policy with input from the Green Teams and management. The position should be empowered as a central or organizational leader with senior management support, as described in the "fully implemented" condition in the matrix.

This is an excellent recommendation, however, its implementation would hinge on our ability to create and fund an Energy Manager position in the near future. Ideally, this person needs to have an engineering background with an energy focus. Use of tools such as Energy Star, life cycle costing, etc. requires specialized training. It is important to point out that the County Administration has not ignored energy efficiency and we have done the best we can with existing personnel and resources. OED and Building Division have been working with existing resources in doing the best job possible by partnering and sharing expertise and resources. This is one reason why the first performance contract was implemented in 1996.

Recommendations:

We recommend that the County increase departmental awareness of the need to conserve energy, including billing departments for their consumption whenever possible or feasible. Since the County is a large water user and a significant portion of its electricity use is for pumping water, the county should also manage water use and promote water conservation among its employees to decrease energy usage.

This is an excellent recommendation. We intend to initiate discussions with the Department of Water on a water conservation awareness program that can be implemented within County Departments.

We recommend that the Mayor direct the Public Works Department and the Energy Manager to develop a methodology for gathering and tracking data regarding electricity use by departments and functions, establishing a process to ensure accountability for electricity use, developing baselines and benchmarks for departments and functions, and conducting technical analyses, including analyses of trends, peaks, valleys and causes.

As discussed previously, the County currently does not have an Energy Manager and there are no systems in place to track electricity use by departments and functions, because most are not metered separately. The capability of establishing benchmarks, conducting technical analyses does not currently exist. We are working with sustainability expert Ken Stokes to measure the County's overall carbon footprint, which we hope to have completed by the end of this calendar year. That data will provide us with a baseline from which we may begin to implement measures that will allow us to measure and reduce our carbon footprint over time.

Recommendation:

We recommend that the Administration direct the Energy Manager and Public Works to propose long- and short-term energy management strategies for the county using input from the Green Teams, departmental energy monitors, the commission recommendations and the Energy Savings Performance Contractors.

These are excellent suggestions, which can be carried out once the needed human resources (i.e. Energy Manager) are in place.

Recommendation:

We recommend that the County utilize public works, the Water Department and the Energy Manager to develop and propose an action plan for energy management. The action plan should include a detailed definition of technical steps, targets and timelines, and identify the personnel and funding needed for plan execution. The action plan should be based on long- and short-term energy management strategies adopted by county policy makers.

We agree with this, but similar to previous discussion, an Energy Manager is needed as the administrative "driver" of an action plan.

Recommendation:

We recommend that the county take the steps necessary to achieve "fully implemented" ratings in this category. In implementing the action plan, the administration should ensure employees are informed and reminded of their roles and responsibilities in achieving plan objectives.

We recommend that the Green Teams, departmental energy monitors, and others executing the action plan receive technical training adequate to enable them to function effectively, including training in energy technology and utility rates.

The County needs to have that key position of Energy Manager that can implement, train and monitor.

Recommendations:

We recommend that the action plan for Energy Management include the capability to account for energy use, so that the results of individual initiatives in the action plan can be captured and analyzed.

We recommend that the Mayor direct the appropriate resources to:

(1) Ensure that energy-savings performance contracts are adequately monitored to enforce vendor contract commitments.

Energy Savings Performance Contracts are partnerships between the County and an Energy Service Company (ESCO). Although the performance contract has guaranteed savings clauses that places the risk on the ESCO, program success is a partnership. Both sides must develop a positive relationship and have a role in the success of the venture. The ESCO relies on county data and information to generate proposals that can then be realized when implemented.

(2) Timely access and collect any penalties due to the county under the contracts. We also recommend a complete evaluation of all performance contracts at the end of the contract periods.

The County relies on ESCO expertise to commit to funding a performance contract. As noted previously, we can install the most efficient fixtures and equipment available, but it is the human interaction that is critical. Measurement and verification protocols vary from monitoring savings for a period of time, then stipulating the savings for the remaining period, to metering as much as possible. The different protocols come with different costs. Each department participating under a performance contract must decide if they want to spend savings on metering or on other project enhancements. All performance contracts should be evaluated during regular intervals in the contract period as well as at the end of the contract period.

Recommendation:

We recommend the Administration consider providing agencies that complete energy conservation projects with internal recognition and incentives for working on additional projects. The incentives could include receiving a share of the savings in the next budget to use toward the additional projects.

Incentive programs are good. However, most agencies do not have dedicated energy budgets. As noted by the audit, many agency electrical bills are paid for by the Public Works Department. For those agencies that control facilities and thus energy savings, they should receive incentives that would motivate them to continue their efforts. In addition to internal recognition, external, public recognition through press releases should showcase the efforts of these dedicated public servants.

cc: George Costa, Economic Development Director

	Recommendation Implemented?	
2008 Cost Control Commission Recommendations	Yes	<u>No</u>
2008-1: DOW & WW should be required to develop cost-savings opportunities for their operations through the use of alternative energy sources*		ţ
2008-2: Departments should read the Study and follow recommendations		Ļ
2.1 Reduce bulbs and lamps (de-lamp)*		↓
2.2 Replace inefficient light bulbs and lamps*		Ļ
2.3 Disconnect Civic Center alarm system		↓
2.4 Disconnect non-essential lights*	 	Ļ
2.5 Set energy targets*		↓
2.6 Revise user fees or penalties to encourage energy efficiency*		Ļ
2.7 Tint windows facing the sun*	Р	
2.8 Paint walls a light color and use light colored floor coverings*	Р	
2.9 Upgrade ballasts, phase in installation of electronic, staged, or dimmable photocell lighting controls*		ţ
2.10 Upgrade exit signs to LED technology*		↓
2.11 Implement a systematic program to improve building envelope maintenance and upgrades to reduce cooling loads*		ł
2.12 Study and implement energy efficient field, stadium, and gym lighting*	Р	
2.13 Install occupancy sensors*		↓
2.14 Survey locations of thermostat sensors, replace or relocate sensors*		↓
2.15 Isolate lighting in work areas so only areas in use are lit*		Ļ
2.16 Phase in park lighting to non-grid or energy efficient*	Р	
2.17 Study and implement water and wastewater power efficiency measures, including self generation*		ł
2.18 Work with KIUC to study and implement converting street and traffic lighting to energy efficient*	P	

		<u>Recommendation</u> <u>Implemented?</u>	
2008 Cost Control Commission Recommendations	Yes	<u>No</u>	
2.19 Develop and implement air conditioning plans for Historic County Building*	1		
2.20 Improve efficiency of Kaana Street chiller, consider DG options*		•	
lighting to energy efficient*		₽	
2.22 Departments should be required to monitor and manage electricity use*		↓	
2.23 Energy efficiency considerations should be incorporated into county decisions*	Р		
2.24 County should adopt State energy mandates:			
2.24.a Incorporate energy efficiency standards which equal or exceed those mandated for State facilities in design and construction, except where application of the standards interfere or conflict with the use of the facility as an emergency shelter**	1		
2.24.b Incorporate energy efficiency measures for roofs, walls, and windows which equal or exceed those mandated for State facilities in new or renovated residential units built with County funds or located on County lands**	1		
2.24.c Set thermostats to achieve room temps of 74-78° except where higher or lower temperatures are required for public health, safety, or welfare, or the protection of equipment**		ł	
2.24.d Install occupancy or light sensors in new construction or renovation of county buildings or facilities where justified by life cycle cost-benefit analyses and where the installation does not impair public health, safety, or welfare**		Ļ	
2.24.e Use life cycle cost-benefit analyses to purchase energy efficient equipment and use utility rebates where available to reduce purchase and installation costs**	Р		
2.24.f Install solar water heating in county buildings, facilities, or residential units when feasible under standards mandated for state buildings**	Р		
2.24.g Procure environmentally preferable products**		↓	
2.24.h Purchase the most fuel efficient vehicles that meet the needs of their programs and are justified by life cycle cost-benefit analyses, provided that life cycle cost-benefit analyses of purchases shall include consideration of projected fuel costs**		¥	

		Recommendation Implemented?	
2008 Cost Control Commission Recommendations	<u>Yes</u>	<u>No</u>	
2.24.i Promote efficient operation of vehicles**		Ŧ	
2.24.j Require that county vehicles utilize the most appropriate minimum octane fuel**		Ţ	
2.24.k Implement water and energy efficiency practices and principles of waste minimization and pollution prevention to reduce waste and increase conservation**		ţ	
2009 Recommendations		<u> </u>	
2009-1: Execute a new energy savings performance contract*		•	
2009-2: The County should engage and promote employee awareness, understanding and sense of personal and departmental responsibility among all employees for how they use energy and other resources and how they can reduce waste and improve efficiency in their daily work by creating "Employee Green Teams" in the county*		t	
2009-3: Designate a person in each county department whose clear responsibility is to scrutinize energy expense and suggest energy savings measures*		ŧ	
2009-4: Designate a position to oversee performance contract, monitor rate schedules to determine appropriate rates, recommend changes in operations to qualify for lower rates, to the extent practical, separate and distribute energy use and expense data by department or facility*		ţ	
TOTAL	3 Yes, 8 Partial	29 No	

Legend:

* Energy Star Best Practice
* HRS §196-30(c)practice
* Fully implemented
P Partially implemented
Not implemented
Bryan Baptiste Mayor



Gary H. Heu Administrative Assistant

Cost Control Commission COUNTY OF KAUA'I, MO'IKEHA BUILDING C/o Office of Boards and Commissions 4444 Rice Street, Suite 150 Līhu'e, Hawai'i 96766

March 17, 2008

The Honorable Bryan J. Baptiste, Mayor County of Kaua'i, Mo'ikeha Building 4444 Rice Street, Suite 235 Lihue, Kauai, Hawaii 96766

Dear Mayor Baptiste:

Re: County Energy Usage

Your Commission, at its meeting of March 10th, 2008, having reviewed the County Energy Use Survey Guide, and based on its discussion of County energy consumption, made the following Findings:

FINDINGS

- 1. The annual cost of the electricity in 2007 exceeds \$7,000,000.
- 2. Electrical usage by the County of Kauai during 2004 to 2007 has essentially been constant, at the rate of 20,000.00 kWh.
- The major consumers of electricity are the Department of Water, with about 40.4% or 8,000,000 kWh, and the Wastewater Division of the Department of Public Work, with about 21.9% or 4,400,000 kWh.

Based upon the foregoing findings, this Commission makes the following Recommendations:

RECOMMENDATIONS

- 1. The Department of Water and the Wastewater Division of the Department of Public Works should be required to develop cost-saving opportunities for their operations, through the use of alternative energy sources (for example: wind, and solar power). These alternatives should be considered for implementation particularly during expansions or renovations to existing facilities and the construction of new facilities.
- 2. All Departments should be asked to read the Energy Use Survey Guide and to follow the recommendations outlined therein.

Thank you for your time and consideration in reviewing the Commission recommendations.

Respectfully submitted,

COST CONTROL COMMISSION

Bv

LORNA A. NISHIMITSU Its Chairperson

Bryan J. Baptiste Mayor



Gary K. Heu Administrative Assistant

OFFICE OF THE MAYOR County of Kaua'i, State of Hawai'i 4444 Rice Street, Suite 235, Liħu'e, Hawai'i 96766 TEL (808) 241-6300 FAX (808) 241-6877

May 9, 2008

Ms. Lorna A. Nishimitsu, Chair Members of the Cost Control Commission Office of Boards and Commissions 4444 Rice Street, Suite 150 Līhu'e, HI 96766

Subject: Cost Control Commission recommendations

Dear Chair Nishimitsu and Members:

Thank you for the Commission's recommendations, dated March 17, 2008, relating to vacant positions, electrical usage, and golf course fees. I appreciate the time you have spent on these subjects. My comments on the recommendations are as follows.

Vacant positions

The Commission recommended limiting funds budgeted for salaries to salaries and contract services associated with the vacant positions.

I strongly agree with the philosophy of the proposal, which advocates more precise budgeting. My administration has begun developing an administrative policy to address and place restrictions on transfers from funds budgeted for salaries, and the policy will be transmitted to you upon completion.

County energy use

The Commission recommended requiring the Department of Water and the Wastewater Division of the Department of Public Works to develop cost-savings opportunities for their operations through alternative energy, and requiring all departments to consider the recommendations in the energy survey recently conducted by my administration. I concur with the recommendation, and will require all departments to review the energy survey and implement recommendations when feasible. The Wastewater Division will be part of this effort. Cost Control Commission Recommendations May 9, 2008
Page 2

The Department of Water is a semi-autonomous entity, reporting to the Board of Water Supply. I will make certain your recommendations are transmitted to the Board for its consideration.

Wailua Golf Course Fees

The commission recommends increasing fees to allow the course to become a selfsustaining operation over a three to five year period. Golf course management is meeting with a steering committee from the Kaua'i Golf Association to review the current fee schedule. This group will prepare a report of its findings, and the findings will be forwarded to your commission.

Thank you for assisting the County in managing its costs. Should you have any questions regarding the comments, please call me.

Sincerely,

Bapterte

Mayor Bryan J. Baptiste

Attachment D

Randy Finlay Vice-Chair



MEMBERS: Lorna Nishimitsu Sandi Sterker Michelle Swartman Benjamin Bregman Nadine Nakamura

COST CONTROL COMMISSION COUNTY OF KAUA'I C/o Office of the Mayor 4444 Rice Street, Suite 150 Lihue, Hawai'i 96766

TO: The Honorable Mayor Bernard P. Carvalho Jr.

FROM: Mercedes Youn, Cost Control Commission Support Clerk

DATE: July 29, 2009

RE: Cost Control Commission Recommendations

At its meeting on July 13, 2009, the Cost Control Commission approved the attached recommendations and findings regarding a County performance contract proposal and the establishment of departmental employee green teams.

Please be aware that Section 28.05 of the Kaua'i County Charter requires that the Mayor shall, with mayor's comments thereon and within thirty (30) working days of receipt, submit to the council for its immediate consideration all ordinances proposed by the commission.

Thank you for your time and consideration.

Should you have further questions, please contact me at (808) 241-4920 or by email at <u>myoun@kauai.gov</u>.

cc: John Isobe, Executive Assistant/Boards and Commissions Administrator Gary Heu, Administrative Assistant Wallace Rezentes, Director of Finance Beth Tokioka, Executive Assistant

02009-307

(3) Attachment

Randy Finlay Vice-Chair



Members Lorna Nishimitsu Sandi Sterker Nadine Nakamura Ben Bregman Michelle Swartman

KAUAI COUNTY COST CONTROL COMMISSION Office of Boards and Commissions 4444 Rice Street, Suite 150, Līhu'e, Kaua'i 96766

July 29, 2009

The Honorable Mayor Bernard P. Carvalho, Jr. County of Kaua'i, Mo'ikeha Building 4444 Rice Street, Suite 235 Līhu'e, HI 96766

Dear Mayor Carvalho:

Subject: Recommendations regarding a performance contract proposal for County Facilities to reduce energy consumption and formation of Departmental Employee Green Teams.

Your Commission, at its meeting on June 15, 2009, in its discussion on a related to a new Energy Savings Performance Contract and creation of County Employee Green Team Committee(s), made the following findings:

FINDINGS

- 1. An Energy Savings Performance Contract is an agreement between a building owner (and facilities manager) and a private energy services company that uses future energy savings to pay for the entire cost of a building's electricity and energy efficiency retrofits.
- The County last did a performance contract in 1996 with Honeywell as the Energy Services Company (ESCO). It cost the county about \$640,000 but returned more than \$760,000 in savings before it wound down in December 2008.
- 3. The term for an Energy Savings Performance Contract usually range from 10-20 years.
- 4. The ESCO will also guarantee that the energy savings provision provides minimal risk to the County.
- 5. A new performance contract should include the Līhu'e Civic Center this time around as well as the Police and Civil Defense facilities.

07009-307

Cost Control Commission Findings and Recommendations Page 2 of 3

- 6. Employee Green Teams are encouraged to engage members of the workforce in assessing their work environments, identifying opportunities, and making recommendations to become more resource efficient.
- 7. Although electrical consumption has gradually decreased over the past three years, the County's electrical expenses have steadily increased. In 2008, the total County electrical bill was \$8.9 million, a \$2 million increase since 2005.
- 8. As the cost of oil increases, the cost of electricity will continue to take a larger percentage of the overall County budget.
- 9. It is unclear whether each County Department has a person(s) whose clear responsibility is to scrutinize energy expense and suggest energy saving measures.
- 10. KIUC energy use data is currently not tabulated by each department, but is aggregated for the entire County. As a result, departments do not receive timely data regarding their specific energy usage and costs.
- 11. Reducing energy costs will require staff to do the following:
 - A. Oversee Energy Savings Performance Contract (a multi-year effort)
 - B. Coordinate physical improvements recommended by Contractor at specific facilities
 - C. Monitor KIUC rate schedules to determine appropriate rates for diverse facilities needs
 - D. Recommend changes in operations in order to qualify for lower KIUC rates
 - E. To the extent practical, separate and distribute KIUC energy use and expense data by department or facility so that each area has timely and useful information

RECOMMENDATIONS

1. Execute a new Energy Savings Performance contract to improve energy efficiency in the County of Kaua'i buildings and facilities.

The county should be required to develop cost savings opportunities for their operations, through energy efficiency, and conservation measures by exploring a new performance contract proposal for County Facilities.

2. Form a County Departmental Green Team Committees to assess work environments, identify opportunities, and make recommendations to reduce waste and improve efficiencies in their daily work.

To engage and promote employee awareness, understanding, and sense of personal and departmental responsibility among all employees for how they use energy and other resources and how they can reduce waste and improve efficiency in their daily work by creating an "Employee Green Teams" in the county. Cost Control Commission Findings and Recommendations Page 2 of 3

3. Have each department or work area assign an existing staff member with the responsibility to oversee energy reduction responsibilities as provided for in item number 11 of the above <u>FINDINGS</u>.

Thank you for your time and consideration in reviewing these recommendations.

If you should have any further questions, please contact the Boards & Commissions Office at 241-4920 or <u>myoun@kauai.gov</u>.

Respectively submitted,

andy Finlay, Vice-Chairman Cost Contral Commission

(2) Attachments

(2009-307

Employee Green Teams

Purpose:

Employee Green Teams are chartered to engage members of the workforce in assessing their work environments, identifying opportunities, and making recommendations for the organization to become more environmentally appropriate, operationally effective, and resource efficient. Focal areas could include, but not be limited to, the selection, use, and disposal of resources such as energy, water, material, equipment, facilities and workspace, etc. The intent of the employee team approach is to raise the awareness, understanding, and sense of personal and departmental responsibility among all employees for how they use energy and other resources, and how they can reduce waste and improve efficiency in their daily work. A basic premise to this approach is that many of the best ideas for improving efficiency and eliminating waste will come from those who do the day to day work. Development of a "green" ethic throughout the organization would be a desired outcome.

Composition:

Team members would be recruited from all/most of the departments or appropriate work groups within the organization, so as to constitute a meaningful representation of the workforce. Qualifications for membership should be established prior to recruitment so that the team will be comprised of members who will be able to make meaningful contributions to the team's efforts. Selection could be by solicitation of volunteers, or by assignment of qualified, committed, willing employees. While team members will participate as individuals, they are also representatives of their work groups and would seek input from and report back to their co-workers.

Process:

A general process for organizing the team should be planned before the team is convened, so that the team can organize itself quickly, learn and understand its mission, and get to work. Team-building should be facilitated so that all members of the group can actively engage early in the process of developing its approach to addressing its purpose.

Expectations should be clarified as to the timing and scope of deliverables. The team's scope of work and processes by which the team will review opportunities, develop and deliver recommendations, and how management will accept/reject/implement the team's recommendations should also be established at the beginning.

Training:

Training should be provided as necessary to help the team do its job. The training should cut across all sectors, including the 3 R's; energy efficiency; and sustainability. The discussion should also include sessions on life-cycle costing and how it relates to good business practices and in keeping a company strong. A safety component would be desirable and could be folded into the training. (E.G. the proper way to compost; handling incandescent bulbs safely, sanitary recycling practices, handling burned out fluorescents, etc.)

Accountability:

Team members need to understand what their tasks are, the time frame that they are to perform those tasks, to who they are accountable, and the resources that are available to them. The metrics of what they do and how costs and benefits are evaluated should be clear and understood by all.

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Organizational Support:

It is important that the organization's leadership publicly supports the team's importance, and communicates that the contribution that the Green Team makes is important to the organization and will be seriously considered for implementation. This is not a feel good, make work activity, but a legitimate work team to be engaged in a legitimate task for the organization. The expected outcomes will be valued by the organization.

Leadership from the top down (Mayor, department heads, workplace supervisors, etc.) must support the group's efforts by allowing them the necessary time, place, budget, tools, and access to accomplish their work. Compensation of team members is not recommended, but formal and informal recognition and appreciation of their effort and contribution should be communicated to the team members and to the organization at large.

The organization's leadership also needs to act on the majority of the suggestions and recommendations from the Green Team. Results should be measured, documented and publicized. One suggestion is to have a percentage of the documented "benefits" quantified and a special "Green Rewards" event celebrated so the entire organization can be made a part of the effort. The event could recognize the team members and encourage active participation and support from their peers in future endeavors.

PERFORMANCE CONTRACT FOR COUNTY FACILITIES

Many County agencies face increasing energy costs and the need to replace worn-out equipment, but lack the funds to make building improvements. An energy savings performance contract (ESPC) is an alternative (innovative) method for purchasing energy-saving improvements in buildings or facilities.

An Energy Savings Performance Contract is an agreement between a building owner (or facilities manager) and a private energy services company (ESCO) that uses future energy savings to pay for the entire cost of a building's electricity and energy efficiency retrofits. A building owner contracts with an ESCO, who then finances or arranges financing, designs, purchases, installs and maintains energy saving equipment. The ESCO will also guarantee that the energy savings – which may be achieved through replacing lighting, electrical equipment, modifying or replacing boilers and chillers, installing modern energy management control systems, replacing motors, or other measures – will pay for all project costs. This guaranteed savings provision provides minimal risk to the County.

The term for ESPC's usually range from 10-20 years.

The County last did a performance contract in 1996 with Honeywell as the Energy Services Company (ESCO). The County should consider another Performance Contract solicitation, some 13 years after the last one. As proven by the 1996 program, Performance Contracts work.

At that time, even though Water and Wastewater projects, with their large pumps and motors, did not survive the economic test/payback period, the County should reexamine the potential energy savings opportunities at these facilities, some 13 years later. At that time, the "run times" of the equipment and the cost of the retrofits did not produce good enough return on investment (ROI) to move forward. Here, 13 years, later, with equipment that much older and with different operational requirements, the numbers might turn out to be very different. Technological improvements in lighting also support consideration of another Performance Contract. Super T-8 lamps, T-5 lamps and LED (light emitting diodes) lamps provide efficiency options that should be examined for use in all county facilities.

The County ended up with a lighting retrofit for the Building Division that cost approximately \$639,910 and generated energy and operational savings of approximately \$761,618. A portion of the savings was used for an energy management system for the Līhu'e Civic Center. Energy efficiency measures at the Līhu'e Civic Center was not considered because it had recently been renovated and the lighting and air conditioning systems were considered state-of-the-art. A new performance contract should definitely include the Līhu'e Civic Center this time around as well as the Police and Civil Defense facilities on Kaana Street.

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Related to improved energy efficiency at facilities, the County could also considering installation of small on-site renewable energy systems. Typical systems under consideration include photovoltaic power systems, concentrated solar power systems, wind turbines and fuel cells. Options for these renewable energy systems include outright ownership, lease-to-own or power purchase agreements. Renewable energy at specific county facilities would be much more valuable at high efficiency facilities.

Coordinating a multi-agency solicitation is very difficult and requires the cooperation from the highest officials in the Mayor's office, Finance, County Attorney as well as the heads of the respective departments. Facility and operational data is critical to the program's success and the selected ESCO must be seen as a team member, not only as an outside contractor. The County Council also needs to support this effort.

The following information is from the State Department of Business, Economic Development and Tourism's Energy Division website at http://hawaii.gov/dbedt/info/energy/efficiency/state/performance/

HRS 36-41 allows government agencies to enter into performance contracts.

HRS 36-41 - Performance Contracting

Energy retrofit and performance contracting for public facilities.

Guide to Energy Performance Contracting

Guide to help State agencies improve their buildings using the money saved by reducing energy costs to pay for the improvements. A part of what is normally paid to the utility company is saved and this savings is used to pay for better equipment, better controls, better maintenance, etc. July, 1998. 243 pages; pdf file; 573 kb.

Guide to Energy Performance Contracting - Supplement

Measurement and verification of energy savings. July 2000. 89 pages; pdf file; 4508 kb.

Energy Performance Contracting - Case Study

Case study of energy performance contacting at the University of Hawaii at Hilo and Hawaii Community College. July 2000. 85 pages; pdf file; 2680 kb.

State Facility Energy Upgrade Analysis and Performance Contracting Potential

Report and recommendations by the Washington State Department of General Administration. April, 2003. 35 pages; pdf file; 111 kb.

Transforming a County facility into a highly energy efficient facility is only part of the solution. This energy efficiency transformation is only a snapshot in time. Facility/building managers and the individual offices need to be educated on proper use of efficiency fixtures and equipment. Constant, consistent and continuous educational reinforcement efforts are required to ensure the continuation of the positive impacts of energy efficiency measures. As an example, it does no good to have an efficient AC system if the system is left on all night when the cooling is not required. It is also counter-productive to keep an unoccupied building lit after hours or to air condition a room with the doors and windows open.

The County should also consider the creation of a permanent Facilities Energy Manager (FEM) position that will track operations; examine utility bills; interact and educate facility/building managers; interact with "green" team members; review and comment on any agency plans that may impact energy use; and advise the Agency head and Mayor on major energy-related impacts that should be considered in decision making. The FEM should also be able to secure federal and state grant funds and utility rebates that are available for County efficiency and renewable energy projects. The Facilities Energy Manager should have an engineering background, be required to obtain CEM (Certified Energy Manager) certification (within a specific timeframe) and should be provided enough staffing to effectively carry out the assigned duties. These positions will provide positive benefits over and beyond their costs and is a good investment for the County.

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Attachment E

Bernard P. Carvalho, Jr. Mayor



Gary K. Heu Administrative Assistant

OFFICE OF THE MAYOR County of Kaua'i, State of Hawai'i RECEIVED 4444 Rice Street, Suite 235, Līhu'e, Hawai'i 96766 TEL (808) 241-4900 FAX (808) 241-6877

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August 19, 2009

Honorable Bill "Kaipo" Asing, Chair Kauai County Council 4396 Rice Street Lihue, Hawaii 96766

Re: Recommendations of the Cost Control Commission

Dear Chair Asing and Councilmembers:

Please find attached recommendations made by members of the Cost Control Commission and transmitted to me on July 29, 2009.

Pursuant to Section 28.05 of the Kauai County Charter, I herewith transmit a copy to you and inform you that these recommendations are under review by the administration. It is our intent to implement both recommendations, with additional details and timelines to be announced once our review is complete.

I would like to publicly commend the members of the Cost Control Commission for their thoughtful work, and for making recommendations that I believe will have a positive impact on County operations – in addition to providing cost savings – in the months and years to come.

Respectfully submitted

Bernard P. Carvalho, Jr. Mayor

C: Randy Finlay, Chair, Cost Control Commission John Isobe, Executive Assistant/Boards and Commissions Admnistrator Gary Heu, Administrative Assistant Wallace G. Rezentes, Jr., Finance Director Beth Tokioka, Executive Assistant

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9/23/2009

County of Kaua'i

ENERGY STUDY

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EXECUTIVE SUMMARY

The project was initiated to develop or identify opportunities or programs to increase the energy efficiency of the Kaua'i County organization. The continuing challenge to the County is to meet the increasing demand for public services despite rising costs and budgetary constraints. Becoming energy efficient is an important step in meeting this substantial challenge. The County, like other governmental agencies, projects millions in spending each year on energy to provide public services. During 2006, the County consumed approximately 19,906,917 kilowatt hours of power, and it paid electric bills in the amount of \$6,695,732.91. If the County could decrease or stabilize its energy use, any savings as a result of the County's energy efficiency can be used for other programs and services.

In addition to cost savings, energy efficiency will promote energy security for the County. The Energy Planning and Policy Branch, Department of Business, Economic Development and Tourism notes in its 2006 yearly activity plan that imported oil is used to meet up to 90 percent of Hawai'i's total energy demand. Act 96, 2006 Session Laws of Hawai'i noted that Hawai'i's dependence on imported fossil fuel makes it vulnerable to oil embargo, supply disruption, and international market dysfunction. Increased energy efficiency will decrease the County's dependence on imported oil.

Environmental benefits also result from energy efficiency. According to the U.S. Department of Energy (US DOE), energy use by commercial buildings and industrial facilities is responsible for more than 50 percent of U.S. carbon dioxide emissions. As an owner and operator of many facilities within the County, our government must

consider measures to reduce greenhouse gas emissions in its buildings for the benefit of the island.

The project consisted of three components:

1. Employee awareness

2. County-wide mandates

3. Development of recommendations based on inspection and review

The employee awareness program consisted of developing and disseminating ways to save on energy, water, and paper through monthly energy tips. The objective of the program is to encourage changes in employee behavior that will result in reduced costs from decreased consumption of these resources, reduction of waste generated and sent to the landfill, and reduction of the County's impact on the environment. The energy tips issued to date are Attachment A.

In addition to the energy tips, energy mandates were developed. The mandates are requirements to consider energy efficiency when making decisions in key areas. The mandates impose energy efficiency measures, and are intended to influence workplace behavior and decision making to achieve long-term energy efficiency. The mandates were developed, approved by the Mayor, and reviewed by all departments prior to implementation.

Finally, a facilities inspection and review of County energy consumption were conducted to survey County use of electricity and identify any measures that could be taken to decrease consumption. The facilities inspection and review were the first

assessments of County energy use conducted since 1996.¹ The review disclosed that the County lacks a mechanism to monitor and track its consumption of electricity.² In most agencies, electric bills are paid as a clerical function, and there is no oversight or management of usage. The facilities inspection was intended to raise awareness of energy issues in agencies and to provide them with suggestions for steps they could take toward energy efficiency. The inspection produced recommendations that agencies might consider implementing. The recommendations are grouped into measures that require little or no funding (low/no cost), recommendations requiring some implementation costs (moderate costs), and capital intensive recommendations (higher cost). These recommendations are as follows:

- Low/no cost
 - Reduce bulbs and lamps (de-lamp)
 - Replace inefficient light bulbs and lamps
 - o Disconnect non-working Civic Center alarm system
 - Disconnect non-essential lights
 - o Set energy targets
 - o Revise user fees or penalties to encourage energy efficiency
 - Tint windows facing the sun
 - o Paint walls a light color and use light colored floor coverings
- Moderate cost
 - Upgrade ballasts, phase in installation of electronic, staged, or dimmable photocell lighting controls
 - Upgrade exit signs to LED technology
 - Implement a systematic program to improve building envelope maintenance and upgrades to reduce cooling loads
 - o Study and implement energy efficient field, stadium, and gym lighting
 - Install occupancy sensors
 - Survey locations of thermostat sensors, replace or relocate sensors
 - Isolate lighting in work areas so only areas in use are lit

¹ The 1996 review, described on pages 9-10, was conducted at a cost of approximately \$640,000. The current review was conducted at no cost to the County, using internal resources and pro bono assistance from KIUC and others.

² Fuel consumption in tracked through the Gas Boy system.

- Phase in park lighting to non-grid or energy efficient
- Isolate lighting in work areas so only areas in use are lit
- Higher cost
 - Study and implement water and wastewater power efficiency measures, including self-generation
 - Work with KIUC to study and implement converting street and traffic lighting to energy efficient
 - Develop and implement air conditioning plans for the Historic County Building
 - o Improve efficiency of Kaana Street chiller, consider DG options
 - Study and implement measures to convert field, gym, and stadium lighting to energy efficient
 - Study and implement measures to convert Convention Hall cooling and lighting to energy efficient

The review concludes that the departments should be required to monitor and

manage energy use and that energy efficiency considerations should be

incorporated into county decisions.

HISTORY OF COUNTY ENERGY REVIEWS

1978 and 1991 Energy Studies

The energy situation in the County of Kaua'i was studied by the Hawai'i Natural Energy Institute at the University of Hawai'i , Manoa in 1978. Results of the study were documented in a two-part report. In 1979, "Energy Self-Sufficiency for the County of Kaua'i , Volume 1: Energy Data" was published. "Energy Self-Sufficiency for the County of Kaua'i, Volume 2: General Energy Plan" was issued in 1980. The General Energy Plan proposed the following recommendations for governmental action:

ACTIONS TO CONSERVE ENERGY			
Source	Near-Term Present to 1982	Mid-Term 1983 to 1990	Far Term 1990 on
Govt.	Establish county energy office, with energy commission made up of local representatives from industry, community, etc.	Raise office to Departmental status	Continue
	Initiate carpooling program	Continue to promote carpooling program	Continue
	Initiate bikeway network	Continue bikeway path	Initiate island wide mass transit
	Revise current interior lighting standards		
	Require timers and water heater jackets on all electric and gas water heaters		

Near-Term Present to 1982	Mid-Term 1983 to 1990	Far Term 1990 on
Market energy conservation to community (workshops, seminar, fair)		
Push to revise permit schedule to encourage energy efficient construction		
Initiate const. And monitoring of Kauaʻi energy house	Continue	
Design new county buildings for total energy efficiency		
Restrict zoning changes on projects which require excessive energy supply and distributions systems		
Government commitment to conservation in procurement practices		
Encourage energy audits to all island residences	Continue	
Encourage energy audits to small businesses	Continue	
Push for state legislation on tax incentives for raising energy efficiency in power generation		
	Near-Term Present to 1982Market energy conservation to community (workshops, seminar, fair)Push to revise permit schedule to encourage energy efficient constructionInitiate const. And monitoring of Kaua'i energy houseDesign new county buildings for total energy efficiencyRestrict zoning changes on projects which require excessive energy supply and distributions systemsGovernment commitment to conservation in procurement practicesEncourage energy audits to all island residencesEncourage energy audits to small businessesPush for state legislation on tax incentives for raising energy efficiency in power generation	Near-Term Present to 1982Mid-Term 1983 to 1990Market energy conservation to community (workshops, seminar, fair)Push to revise permit schedule to encourage energy efficient constructionInitiate const. And monitoring of Kaua'i energy houseContinueDesign new county buildings for total energy efficiencyContinueRestrict zoning changes on projects which require excessive energy supply and distributions systemsContinueGovernment commitment to conservation in procurement practicesContinueEncourage energy audits to all island residencesContinuePush for state legislation on tax incentives for raising energy efficiency in power generationContinue

Source	Near-Term Present to 1982	Mid-Term 1983 to 1990	Far Term 1990 on
Govt.	Establish a county energy office, with energy commission made up of local representatives from industry, community, etc.	Total utilization of gasohol in county vehicles	Continue
	,	vehicles for county fleet	
	Pass added gas tax (20% of existing tax). Utilize for alternate energy development.	Increase non-gasohol fuel tax to 50% of existing county rate	Continue
	Push for tax credit on all natural energy resource use in power generation and liquid fuel production		
	Push for tax exemption on liquid fuel from indigenous resources		
	Push to require solar hot water in all new large-scale use (600 gal.) construction	Require solar hot water in all new const. where applicable	Continue
	Retrofit energy systems in public buildings	Continue retrofit	Continue Retro
		Require energy efficient concepts in all public housing	Continue
	Promote R&D of small scale appropriate technologies	Participate with business in developing small- scale appropriate tech. markets	Continue

Govt.Solar water heating workshop on building your own solar collectors cheaplySolar water heating workshop on building your own solar collectors cheaplySeek funding for construction of pilot/demo large-scale wind systemsSeek funding for construction of pilot/demo large-scale wind systemsIsland-wide conversion of municipal wasteContinue	9

In 1991, the County's Office of Economic Development engaged ECM, Inc. to

provide a follow-up report ("Report"). The stated goals of the Report were "to provide

specific recommendations which could be implemented by ordinance within a two year

period and to provide an analytical framework for County decision making." (Report,

page 1) The Report provided recommendations to move the County toward energy

sustainability within the time, resource, and control constraints of the County. The

recommendations in the report were as follows:

- 1. Retrofit high usage residential incandescent light bulbs with compact fluorescents
- 2. Retrofit all residences with solar water heaters (or heat pumps)
- 3. Require energy efficiency audits of existing commercial structures, with the County leading the way by auditing and retrofitting its buildings and by publicizing the program
- 4. Amend building codes to promote energy conservation
- 5. Amend vehicle/fuel tax systems to promote energy efficiency; use funds for road efficiency improvements and public transportation
- 6. Investigate solid waste disposal generation options
- 7. Promote secure environment for alternative energy development
- 8. Restrict future additions of new fossil fuel electric generation

1996 Audit and Performance Contract

On November 4, 1996, the County entered into a contract with Honeywell, Inc. to provide a detailed energy audit and a report of efficiency measures for the departments of Public Works and Water. As a result of an initial analysis, Honeywell and the County agreed that although the DOW and Wastewater of the Public Works Department were high energy users, efficiency measures for these operations would involve replacing large pumps and motors, and so would not be economically justified over the ten year program. The run times (electrical usage) of the large equipment did not justify the replacement costs of the retrofit at the time. Thereafter, Honeywell proceeded with a program consisting of replacing and retrofitting lighting in 29 smaller County facilities, and installing an energy management system for the Civic Center to control the Center's two chiller plants. The lighting retrofit consisted largely of replacing T-12 light fixtures and magnetic ballasts with light fixtures utilizing more efficient T-8 lamps and electronic ballasts. Incandescent bulbs were also replaced with more efficient compact fluorescent bulbs. Additionally, high pressure sodium lamps replaced high wattage incandescent lamps and mercury-vapor light fixtures.

Under the performance contract with the County, Honeywell was required to design and install energy conservation measures which would result in guaranteed energy savings. Honeywell promised the County energy savings estimated at \$66,000 for the first year, \$68,174 for years 2-10, and other operational savings over the life of the contract. The County financed a total of \$639,910.38 to pay for the Honeywell contract through a municipal lease. The contract contained a guaranteed savings clause whereby Honeywell paid any difference between their projected savings and

actual, verified savings for the 10-year period. Although Honeywell paid penalties to the County for failing to meet some of its guarantees, the Office of Economic Development estimated that the total energy and operational savings for the County from the Honeywell contract over the ten year period was \$761,618.

COUNTY ELECTRICAL USAGE

When mapped over a three year period, Kaua'i County kilowatt hour

consumption has been fairly level, averaging about 1,650,000 kWh per month.



During 2006, the County consumed approximately 19,906,917 kilowatt hours of power, and paid electric bills of \$6,695,732.91. This was approximately 739,407 fewer kilowatt hours consumed than in 2005.

Despite level consumption, the County's bills over the same period increased, primarily as a function of the per kilowatt hour charge, which rose from an average of \$.26692 in 2004 to an average of \$.34227 in 2006. The charges include applicable surcharges and taxes. As a result of higher fuel surcharges, the County paid \$255,584.63 more for power in 2006 than it did in 2005.³

³ Energy costs on Kaua'i are higher than other counties in Hawai'i and significantly higher than costs on the mainland. Kaua'i County's average retail cost in 2006 was \$.3430921. The Energy Information Administration, which provides official energy statistics for the United States Government, reported in August 15, 2007 that the average retail price of electricity in the state of Hawai'i for commercial customers was \$.2108 in 2006. The same report states that the next highest average retail costs were in Massachusetts at \$.1612, California at \$.1031, and Alaska at \$.1166.



The County's energy usage is characterized by a few large users consuming the majority of the energy. The Department of Water (DOW), the Wastewater Division of the Public Works Department (Wastewater), and the County's streetlighting function comprise 71.6 percent of the energy consumed by the County in 2006. The proportionate energy usage by County users is shown in the following figure.



The three-year consumption history of County users is shown in the figure below.



The consumption of large users in the County must be addressed because of their effect on overall energy usage, however, the need to manage their usage is more compelling because of the rates paid by large users. Most of the County's accounts are categorized as small commercial (Schedule G), for which energy consumption is projected at between 30 kW demand and 10,000 kWh of use per month. The kilowatthour (kWh) or energy charge is a charge for energy that the customer has used during the billing period. Energy is power (watts) used over time (hours), and is measured in units called kilowatt-hours. For example, a 100-watt light bulb used for 100 hours will consume 10,000 watt-hours, or 10 kilowatt-hours. Schedule G users pay a customer charge of \$21.89 per month, plus a kilowatt hour charge of \$.37065. The customer charge is designed to recover costs that do not fluctuate with amount of usage by the customer. These costs are sometimes referred to as "fixed" costs, because as they are incurred, they remain fixed regardless of changes in consumption. Specifically, the customer charge covers the costs of meter reading, billing, collections, and service equipment and facilities necessary to serve an active customer, regardless of the customer's use during the month.

If a County account uses more than permitted under the Schedule G rule, it moves up to the large commercial user category, or Schedule J. Although Schedule J rates have a lower per kilowatt hour charge of \$.33978, Schedule J customers are also assessed a higher customer charge of \$36.48 per month, and a demand charge of \$6.08 per kilowatt in addition to the per kilowatt hour charge. Schedules for large users, such as J and P, include demand or kW charges separate from the energy or kWh charge in their rate structures. The cost of capacity relates to the fixed cost of generation and transmission and distribution plant to meet the peak load of these customers. The peak load of each customer is measured in units of kilowatts (1,000 watts), or kW, sustained over a fifteen-minute period during the bill cycle. If Schedule J users can reduce overall usage, they might be able to migrate to the lower Schedule G rate. Conversely, if a Schedule J user increases its electrical consumption, that Schedule J user may move up to the Schedule P rate, which is even higher than Schedule J. County sites charged

at the Schedule J rate are listed below. Based on past usage, some of these accounts may have the potential to be managed so that they can be recategorized to the lower Schedule G rate. These are marked with an asterisk:⁴

Hanapēpē Faye Park*	Waimea STP	Waimea Athletic*
Eleele Booster Pump	Hanapēpē Deepwell 1	Hanapēpē Deepwell 2*
Hanapēpē Deepwell 3	Hanapēpē New Locker Ro	om*
Hanapēpē Stadium*	Hanapēpē Baseyard*	Kalawai Park*
Koloa Comfort Station*	Kōloa Well E	Kōloa Well D
Mahaulepu Well 1	Puhi Well 1	Līhu'e Intake
Microbiology Lab*	Līhu'e Auto Maintenance*	Nawiliwili Sewer 1*
Historic County Building	Isenberg Park*	Hanamaulu Park*
Wailua Golf Course Pump*	Hanamaulu Booster Pump	*
Nounou Deepwell 1 & 2	Wailua Tank*	Makaleha DPW 1*
Nounou Deepwell 3	Kapa'a Refuse Station*	Kapa'a New Park*
Kahau Road New Lights*	Anahola Deepwell 1 & 2	
Hanalei Refuse Station*	Kīlauea Park*	Kīlauea Gym*
Kekaha Deepwell 2	Lāwa'i Deepwell	DOW Operation Building
Kapilimao Well	Pukaki Well*	Hanamaulu Well 3*

The largest power users in the County are charged at Schedule P. Schedule P users are charged a customer charge of \$346.51 and a demand charge of \$10.45 monthly. In addition, they pay an energy charge of \$.33226 for the first 400 kWh and \$.31271 per kWh for over 400 kWh. For Schedule P customers, the kWh charge is based on adjusted kWhs, rather than metered kWhs. Schedule P includes demand or

⁴ The downward potential is based on 2006 usage.

kW charges separate from the energy or kWh charge in the rate structure. Schedule P rates also include a consideration called a power factor. Power factor, expressed as a percent, is a reflection of the customer's use of reactive power, or kvarh, relative to their use of kWh. The greater the ratio of reactive power to energy, the lower, or poorer, the customer's power factor. The less reactive power used by the customer relative to his energy consumption, the higher, or better, the customer's power factor. The more reactive power the customer uses, the more generating and transmission and distribution facilities the utility needs to serve that customer. Therefore, customers with low power factor are charged an additional amount to recover the higher cost to serve them, and customers with high power factor have their billed kWhs reduced to reflect the utility's lower cost to serve them. If Schedule P users can reduce consumption, they could migrate downward to Schedule J. The need to reduce usage has additional significance when the impact of the load factor is considered. Load factor refers to the energy (kWh) actually used by the customer as compared to the maximum amount of energy the customer could have used if the customer had sustained its peak demand throughout the entire bill period. Although it is not shown on the bill, this concept is important for Schedule P customers whose kWh charges are based on load factor. High load factor is generally desirable from the utility's point of view because it means that the fixed costs of the plant can be spread over more kWhs and thus lowered per kWh.

The County Schedule P users are shown below. Those who may have the potential to manage their usage to move downward to Schedule J are marked with an asterisk.

Kōloa Well F	Piikoi Building	Puhi Well 5A and 5B
Kīlauea Deepwell 1 & 2	Wailua Homesteads Well	* Wailua STP
Moikeha and Kapule Buildings	Convention Hall*	3990 Kaana Street
Līhu'e Stadium*	3190 Kapule Highway	Kilohana Deepwell F
Kōloa Deepwell 1 & 2	Akemama Well 2*	Kalāheo Deepwell 2 (new)
Kalāheo Deepwell 2 (old)	Hanapēpē STP	Hanapēpē Well 4*

Finally, the highest effective energy rates are charged for street lighting, \$.45451 per kilowatt hour per month, as of December, 2007. Added to the cost of the energy used for street lighting is a monthly fixture charge, which covers KIUC's costs to supply, install, and maintain all street light fixtures. The fixture charge as of October, 2007 is from \$5.74 to \$6.20 per month per fixture. As discussed in the section recommending improvements, energy efficient street light design could result in fewer and more efficient street lights, decreasing energy and fixture costs.

In order to achieve a five percent reduction in overall County energy consumption as suggested by the County Council, ⁵ the usage of the DOW, Wastewater, and the streetlighting function must be addressed since these activities comprise the majority (71.6 percent) of the County's energy usage. When put into perspective, a decrease of five percent in overall County energy consumption, without change in the consumption of Water, Wastewater, or street lighting would equate to eliminating almost all of the power to the parks, recreational, and neighborhood center

⁵ "Budget Message For The Fiscal Year 2007-2008," Kaua'i County Council, May 29, 2007.

facilities (6.12 percent of total usage) or half of the combined consumption of eleven other major County users (11.45 percent of total usage).⁶

Controlling or reducing the energy usage of the DOW, the Public Works Wastewater, and the streetlighting activity poses considerable challenge because energy efficiency for these entities requires capital-intensive modifications. The reason is that the energy is needed to run numerous large pumps and other energy-consuming equipment which must be replaced or modified to be energy efficient.

For example, the Board of Water, along with the DOW, is implementing a multimillion dollar, multiyear plan to manage its water infrastructure to meet future needs, called Water Plan 2020. The plan was not designed with the primary concern of reducing energy costs to the County, however, some of its components may result in energy efficiency, such as appropriately sizing replacement storage and transmission systems. Until the Water completes the portions of the plan that result in energy efficiency, and Wastewater and street lighting consumption is also significantly reduced, a five percent reduction in overall use is unlikely to occur.

However, all departments can, and should study and implement measures to reduce energy consumption. The site survey identified a number of opportunities for individual departments, and these are listed in the following sections. The programs have been categorized as low/no cost, moderate cost, or high cost. Where possible, anticipated energy savings and cost recovery periods are indicated, however, the figures will fluctuate depending on rates. Precise savings and cost recovery calculations will require further engineering studies and assessments.

⁶ The other users are Finance, Public Works, OED, Transportation, Housing, Elderly Affairs, Personnel, Liquor Control, County Attorney, Planning, and Economic Development.

EMPLOYEE AWARENESS PROGRAM

The first phase of the energy efficiency program was to develop and implement an employee awareness program to:

- raise employee awareness of actions they can take during their workday to produce positive environmental impacts
- provide sustainable alternatives to workplace actions
- encourage behavioral change, so that energy efficiency is considered in management decisions

The employee awareness program was intended to improve cooperation and communication between the County organization and its employees. By disseminating ways to save on energy, water, and paper through monthly energy tips, it is hoped that changes in employee behavior will result in reduced costs from decreased consumption of these resources, reduction of waste generated and sent to the landfill, and reduction of the County's impact on the environment.

Other benefits from employees' broadened understanding of environmental issues include better delivery of services at lower costs, improved employee morale from being engaged in developing solutions to energy issues, and improvement of the public perception of the County as a responsible employer and public citizen.

COUNTYWIDE ENERGY MANDATES

In addition to the employee awareness program, energy mandates were developed. The mandates are requirements to consider energy efficiency when making decisions in key areas. The mandates are intended to influence workplace behavior and decision making in order to achieve long-term energy efficiency. Whenever possible, the mandates are linked to State mandates for ease of implementation. The mandates were developed, approved by the Mayor, and reviewed by all departments prior to implementation. The mandates are as follows:

All County agencies shall:

 Incorporate energy efficiency standards which equal or exceed those mandated for State facilities in the design and construction of County facilities and buildings, except where application of the standards interfere or conflict with the use of the building or facility as an emergency shelter;

Rationale: Pursuant to Act 96, 2006 Session Laws of Hawai'i, State agencies are mandated to design and construct buildings meeting the Leadership in Energy Environmental Design (LEED) silver or two green globes rating system or another comparable state-approved, nationally recognized, and consensus-based guideline. This mandate would have the County utilize the State requirements. Despite initial costs that may be higher than now experienced, new high performance buildings may be more cost effective than conventionally designed buildings in the long run, as they can cost up to 50 percent less to operate. Buildings meeting the new standard can also serve as a showcase for energy efficient building technology.
Incorporate energy efficiency measures for roofs, walls, and windows which equal or exceed those mandated for State facilities in new or renovated County residential units which are built with County funds or are located on County lands;

Rationale: This mandate also adopts the requirements of Act 96 for roofs, walls, and windows. State agencies are required to prevent heat gain in residential facilities up to three stories to provide R-19 or equivalent on roofs, R-11 or equivalent in walls, and high performance to minimize heat gain or cool air loss.

 Set thermostats in County offices or work spaces to achieve room temperatures within the range of 74 to 78 degrees, except where higher or lower temperatures are required for public health, safety, or welfare, or for the protection of equipment;

Rationale: A review of mandated thermostat settings for private and public sector buildings found consensus regarding the recommended range of room temperatures: 74 to 78 degrees. Mandating a reasonable range of temperatures should result in cost savings because for every degree in temperature lowered, energy costs for cooling increase by two to three percent.

 Install occupancy or light sensors in new construction or renovation of County buildings or facilities where justified by life cycle cost-benefit analyses and where the installation of sensors does not impair the public health, safety, or welfare;

Rationale: Lighting accounts for 25 to 40 percent of the energy bill for government office buildings, but many rooms are empty for most of the day. With occupancy sensors, the human factor is removed, and no lights will be on unless the space is occupied.

 Use life cycle cost-benefit analyses to purchase energy efficient equipment and use utility rebates where available to reduce purchase and installation costs;

Rationale: Use of energy efficient office equipment, such as Energy Star qualified products, results in significant energy savings. For example, the U.S. Environmental Protection Agency reports that use of Energy Star computer monitors result in about 52 percent energy savings over standard new products, Energy Star copiers result in 42 percent savings, and Energy Star faxes result in 40 percent savings.⁷ Energy Star light fixtures produce 66 percent savings. Rebates or other financial incentives from KIUC may be available to defray some of the costs for upgrading equipment to Energy Star level and for making other modifications for better energy efficiency.

 Install solar water heating in County buildings, facilities, or residential units where deemed feasible, provided that in assessing feasibility, the standards mandated for State buildings shall be used;

Rationale: This requirement is based on the requirements for State buildings mandated by Act 96. Solar water heating, when feasible, should provide environmental, social, and cost benefits to the County. Energy costs are reduced from 50 to 80 percent if electric heaters are replaced by solar. KIUC rebates or subsidies could also be explored to defray some of the costs of installing solar systems.

7. Procure environmentally preferable products;

Rationale: The use of products that do not have a negative impact on the environment has many benefits. Energy efficient products will generate savings to the County and

the environment. Using nontoxic products will protect water sources and landfills from contamination. Using recycled products will save the supply of raw materials and avoid the energy used to extract these materials.

 Purchase the most fuel efficient vehicles that meet the needs of their programs and are justified by life cycle cost-benefit analysis, provided that life cycle cost-benefit analysis of vehicle purchases shall include consideration of projected fuel costs;

Rationale: Purchasing the most fuel efficient vehicles possible results in significant savings for the County's fleet. Using a calculation provided by the US DOE, if the County purchases a vehicle that gets 30 miles per gallon instead of 20, fuel savings of \$583 per year would be realized. If a vehicle gets 15 miles per gallon instead of 25, \$933 would be saved each year.⁸ With a fleet of approximately 524 vehicles, the County could realize fuel savings from \$300,000 to \$500,000 annually by improving the energy efficiency of its fleet.

9. Promote efficient operation of vehicles;

Rationale: Based on Act 96. Proper maintenance and efficient driving can reduce gas consumption and improve gas mileage. For example, keeping an engine properly tuned can improve gas mileage by 4 percent, and avoiding aggressive driving (speeding, rapid

 ⁷ "Energy Star – The Power to Protect the Environment Through Energy Efficiency," July 2003.
⁸ Costs were calculated using an average mile per gallon figure, fuel costs of \$3.50 per gallon, and

^{10,000} miles of driving annually. Calculator is available at <u>www.fueleconomy.gov/feg/savemoney.shtml</u>.

acceleration and braking) can lower gas mileage by 33 percent at highway speeds and five percent in town.⁹

10. Require that County vehicles utilize the most appropriate minimum octane fuel; and

Rationale: The requirement was based on Act 96, except that the Act mandated use of 87-octane fuel. The specific octane level was eliminated to provide County agencies with more flexibility to use higher or lower octane fuel.

11. Implement water and energy efficiency practices and principles of waste minimization and pollution prevention to reduce waste and increase conservation.

Rationale: Based on Act 96. The importance of reducing the County's footprint on the environment by increasing conservation is evident. In addition, water conservation by the County will help to reduce the energy consumption of the DOW, the highest energy user in the County.

⁹ Examples from the US DOE, at <u>www.fueleconomy.gov/feg/driveHabits.shtml</u> and <u>www.fueleconomy.gov/feg/maintain.shtml</u>.

OBSERVATIONS AND RECOMMENDATIONS

General

Low- or no-cost reductions are difficult to achieve because the performance contract of 1996 harvested the low-hanging fruit: the County-wide conversion of inefficient lighting fixtures and installation of an energy management system. Since the time of the performance contract, lighting technology has advanced, but the quick savings achieved by the performance contract, such as those achieved with replacing incandescent bulbs with compact fluorescents, are no longer possible. Implementing the next generation of energy-efficient lighting results in higher cost because current fixtures must be replaced with sensor-equipped ones.¹⁰

Additionally, as previously stated, significant reductions in energy use cannot be achieved without capital programs by the DOW, Wastewater, and the street lighting function. However, some modest energy efficiencies may be possible if conservation measures are implemented by the other departments. The building survey resulted in recommendations for energy improvements as follows.

Low/No Cost Measures

Reduce bulbs and lamps

Work and non-work areas should be reviewed to find opportunities to reduce the light wattage in non-critical areas or reduce (de-lamp) the number of bulbs or lamps used. During the last administration, the Finance Director mandated removal of half of the lamps in each external lighting fixture in the Civic Center. However, this mandate

¹⁰ See description of new ballast technology on pages 29-30.

was forgotten and all fixtures are now fully lamped. Reviving the mandate results in energy savings of about \$800.00 per year.

Replace inefficient bulbs or lamps

If incandescent bulbs are used as task lighting, replacement with compact fluorescent lamps (CFL) results in significant savings without losing light. A 20-watt CFL produces the same light as a 75-watt incandescent bulb. Further, CFLs are up to 80 percent more efficient and can last ten times longer, resulting in less maintenance. Replacement CFL lamps or bulbs may be free to the County under the KIUC incentive program. For example, reading lights in most fire stations are still incandescent, and could be replaced with CFLs. KIUC estimates annual savings from the replacement at \$560.

Disconnect Civic Center alarm system

The alarm system in the Civic Center Building is connected, but not used. While connected, the system draws unnecessary power to operate the various sensors and lights in the individual offices throughout the building. The system should be reviewed to see if it could be deactivated to save energy.

Disconnect non-essential lights

Each building has interior lights that are on for 24 hours and cannot be turned off. These lights should be disconnected or connected to switches so they can be turned off, except when required for security purposes. In the Civic Center Building, for

example, lights in the interior entryway of some offices, such as the Mayor's Office and the Office of Economic Development, are lit unnecessarily, since the areas are secured by a locked gate and locked doors. If lighting is necessary, these lights could be connected to a switch or a sensor, so they are operated only when needed.

Set energy targets

Energy efficiency should be an essential part of County business decisions. Whether acquiring equipment and supplies, allowing new night activities in County recreational facilities, planning office renovations, or planning a new park or facility, County employees should be educated and required to routinely incorporate energy efficiency. In addition to educating employees to the importance of considering energy efficiency for economic and environmental reasons, positive or negative incentives could help to ensure awareness. Positive incentives could consist of allowing work groups or departments to share in energy savings. Negative incentives could consist of penalizing work groups, departments, or department heads in the performance evaluating or budgeting processes for failing to meet predetermined energy efficiency goals.

Revise user practices and penalties

User behavior may have a significant effect on energy use. For example, users should be informed that lights should not be turned on except when needed, and turned off after use. All County employees should be provided a hotline number to report public lighting that is on unnecessarily. Timers have been used in an attempt to control

park lighting; however, the County receives many anecdotal reports of lights being left on in unused tennis or basketball courts. User charges for energy use or for extra lighting might also be options.

The primary user of County fields, convention hall, and stadium is the State of Hawai'i. Under an agreement with the State Department of Education (State DOE), State DOE uses County facilities free of charge. Since there is no charge for utilities, there are no fiscal incentives for the State DOE users to conserve energy. The Convention Hall management reports that State DOE users often request full cooling of the auditorium for rehearsals attended by only a few individuals, instead of conducting rehearsals and other pre-event activities without air conditioning, or using school facilities for rehearsals. However, most usage is not charged to the users, and facility rental charges currently set by ordinance do not compensate the County for the full cost of utilities and other services necessary to operate the facility during use.

Facility energy costs can be lowered by altering work schedules. The City of Vista, California also cut energy costs by allowing its employees to work a 9/80 schedule. The program was originally started to alleviate traffic congestion on roadways. The schedule, implemented at no cost, resulted in emissions reduction and improved energy efficiency, partly because of electricity to facilities being off for two extra days per month.

Tint windows facing the sun

Windows account for less than five percent of a structure's total surface, but they may account for 25.8 percent of the heat an air conditioner has to remove from that

structure. Installation of window tinting on windows facing east and west (in the direction of morning and afternoon sun) helps decrease energy use. Window tinting costs may qualify for a KIUC incentive. A higher cost option is installing high performance windows. These windows reduce the amount of heat transmitted through windows into the interior work spaces.

Paint walls a light color and use light colored floor coverings

Spaces with dark walls and ceilings could be repainted with a lighter color, as the same light levels could be produced with less wattage if walls and ceilings reflected more light, rather than absorbing it. Similarly, the color of floor coverings should be as light as maintenance considerations allow, to reflect light.

Moderate Cost Measures

Upgrade ballasts

The County still has a number of older electromagnetic ballasts in place, although the majority was replaced with electronic ballasts in the last performance contract. Advanced technology has produced a new generation of more efficient ballasts. The new electronic ballasts have daylight harvesting and dimming features, and should be considered where appropriate.

The concept of daylight harvesting and dimming is to make the best use of natural light available in a building. Sensors detect the strength of outdoor light and adjust levels as needed to maintain consistent lighting throughout the space. On bright days, lights closest to windows are dimmed, and lights toward the interior of the building

remain at full strength. This provides consistent light levels throughout the space, leading to improved employee comfort and productivity.

Excessive lighting is a common problem in older buildings, which were built to older standards which require up to twice the amount of lighting currently recommended. A fixed level dimming feature allows each room to be programmed to its optimal light level and power output. Fixtures with dimmable ballasts can be programmed down to 40 percent of their maximum lumen output in increments of 10 percent. This allows the wattage in overly lighted spaces to be reduced without creating the dark areas that occur when individual fixtures or tubes are removed.

A possible candidate for this type of retrofit is the vehicle bay lighting in fire stations. The vehicle bay lighting in fire stations were not replaced in the 1996 energy efficiency retrofit. The existing 34-watt T-12 lamps can be replaced with more efficient 28-watt T-8 lamps without decreasing the amount of available lighting. Replacement will also avoid future maintenance issues, since under the Federal Energy Act of 1992, T-12 lamps cannot be manufactured after October 1995. Therefore, T-12 lamps are more expensive to procure than T-8 and, in time, replacements will no longer be available. As part of the same retrofit, electronic ballasts could be installed. Replacing 34-watt T-12 lamps and standard electromagnetic ballasts with 28-watt T-8 lamps and electronic ballasts will produce more than 40 percent in energy savings, and the problems of light flicker and noise from the electromagnetic ballasts will be eliminated.

The vehicle bay lighting upgrade could also consider installing ballasts with daylight harvesting and programmable dimming features. Daylight harvesting means that a photosensor in the ballast reads the amount of daylight and adjusts the level of

light accordingly. Since the ballasts operate independently, the lamps closer to entrances, such as doors or windows, will dim more than lamps in corners. This creates consistent illumination throughout the space and decreases energy consumption. Daylight harvesting is particularly useful for the fire department equipment bays, since the areas have significant light if the doors are left open during the day, but have lights left on in many instances because firefighters are busy with other duties. In addition, fixed-level dimming allows the ballasts in each area to be programmed to optimal light level from 40 percent to 100 percent, further saving energy. Based on savings generated for a similar retrofit program, energy savings could be as much as \$1,416 per year, per station.¹¹ In addition, up to 50 percent of the cost of the new ballasts could recovered through a KIUC incentive.

Upgrade exit signs to LED technology

Solid-state light-emitting diode (LED) exit lights are a development that saves energy and maintenance costs. This technology uses a string of small colored lights. The County uses fluorescent/compact fluorescent lamps in its exit signs. Conversion from fluorescent to LED exit signs reduces annual energy use from 140 kWh to 44 kWh per sign, resulting in savings of \$32.62 annually. LED lights emit 72 pounds of carbon dioxide annually, compared to 230 pounds for fluorescents. Finally, maintenance costs are drastically decreased, since the service life of a fluorescent lamp is 10.8 months, compared to over 10 years for an LED lamp. Using the Energy Star life cycle cost

¹¹ The savings are based on an estimated 50 percent energy savings from converting electronic ballasts to light-harvesting dimmable ballasts for a student housing retrofit for the Cuarto and Tercero Residence Hall complexes, University of California, Davis. The retrofit was reported in the 2006 Best Practices publication by the Green Building Research Center, University of California, Berkeley. The manufacturer of the ballasts estimates savings of from 30 to 70 percent. <u>www.axistechnologyinc.com/fag.html</u>.

calculations for exit signs and assuming that the County has approximately 150 exit signs, the difference in annual energy costs between LED (with battery backups) and fluorescent is approximately \$2,242.¹² In addition, fluorescent bulbs must be changed, so the maintenance cost of the lamps would add approximately \$844 per year to the cost of operating fluorescent exit signs.¹³ The annual savings in energy and maintenance costs (\$3,085) as a result of using LEDs instead of fluorescents would cover the purchase price of \$9,750 for the 150 new LED exit signs within 1.2 years.¹⁴ The conversion would also reduce air pollution by 100,850 pounds of CO2 over the life cycle of the signs, and the air pollution reduced is the equivalent of 8.79 cars removed from the road for a year, or 12.5 acres of forest.

As an added advantage, the US DOE's Energy Star program reports that LED signs provide additional safety, because they are usually brighter than comparable incandescent or fluorescent signs and have a greater contrast with their background due to the monochromatic nature of the light emitted.

Building envelope maintenance and upgrades

The Mayor's energy mandates include consideration of energy efficiency improvements for new construction. Part of the building and construction energy program is the implementation of building maintenance and operations practices to promote energy efficiency. The survey disclosed opportunities to address deferred maintenance issues for the benefit of employees as well as energy efficiency. Broken

¹² www.energystar.gov/ia/business/led exitsigns techsheet.pdf -

¹³ There is no maintenance cost for the LED sign, since the LED lamp lasts longer than the exit sign.

¹⁴ Energy costs are projected at 34.1 cents per kilowatt hour; \$65 is used as the cost of an LED sign with battery backup. Installation costs are not included.

louvers were observed at five of the fifteen sites visited. In one of the sites, Hanapēpē Baseyard, the louvers in the office area could not be closed completely, and the room could not be sufficiently cooled without the doors left open. Although louvers may have been the standard for older buildings, there is more energy efficient technology available today. If broken louvered windows were replaced with windows that form a more effective seal, such as casement windows, or windows using energy efficient glazed and low solar gain glass, significant energy savings and a better work environment for employees can result.

Heat gain through windows accounts for 25.8 percent of the cooling load of a building. Heat gain through ceilings and roofs accounts for another 9.6 percent. Heat conducted through walls accounts for 3.4 percent of cooling, and heat conducted through doors accounts for .3 percent of cooling. The heat gain could be addressed by landscaping. According to the US DOE, well-designed landscaping will cut energy costs dramatically, protect from the summer sun, help control noise and air pollution, and reduce consumption of water, pesticides, and fuel for landscaping and lawn maintenance. The US DOE estimates that carefully positioned trees can reduce surrounding air temperatures by as much as 9 degrees F, and temperature directly under trees can be as much as 25 degrees Farenheit cooler than air temperatures above nearby blacktop. That translates into significant decreases in energy consumption for cooling, such that, on average, a well-designed landscape provides enough energy savings to return initial investment in less than eight years.¹⁵

¹⁵ Source: US DOE, DOE/GO-10095-0046, FS 220, April 1995.

Other building envelope upgrades could improve energy efficiency. By sealing air leaks through walls, ceilings, windows, and doors, cooling needs could be decreased by 7.5 percent. More efficient roofing material, attic insulation, or alternate roofing strategies such as green roofs could also effectively reducing cooling needs.

For new buildings, a well-oriented and designed building will decrease future energy expenses. Considering the sun's direction in determining the axis of the building, as well as placement of the windows, will result in energy efficiency. In the interior of the buildings, building construction or renovation planning needs to take into account "daylighting" strategies to reduce lighting and cooling loads. Examples of these strategies are locating windows, clerestories, roof monitors, and light shelves on south facing windows. Not only will these strategies lower the need for electrical lights, but since sunlight is cooler light, air conditioning requirements will decrease because electric lights produce more waste energy than daylight for the equivalent lighting effect.

Install occupancy sensors

Occupancy sensors detect the presence of people in a space, and turns off lights when the room is not occupied for a set period of time. There are two main types of occupancy sensors. Passive Infrared (PIR) units detect changes in the infrared background by monitoring movements in the area. Ultrasonic units generate a high-frequency sound wave and monitor changes in the signal return time to detect occupancy. Multi-technology units combine technologies for more accurate monitoring without false triggering. The timing of the sensors can be adjusted depending on the use of the space. Motion-detecting sensors can also be used outdoors as security

lighting. Since the lights are turned on only when people are in the space, energy savings result. According to the Graybar Company, the energy savings as a result of occupancy sensors are as follows:

- Private offices 14-70 percent savings
- Conference rooms 22-65 percent savings 30-90 percent savings
- Restrooms
- 30-80 percent savings Corridors
- Storage areas 45-80 percent savings

The City of Arlington, Texas, installed over 170 occupancy sensors on light switches. The sensors turn off ceiling lights in offices where no motion is detected for ten minutes. The savings since installation are 13,000 kilowatt hours of electricity. Each unit cost \$50 and the total cost has been \$8,500 so far. Even with a kilowatt hour rate of \$.1186 per kilowatt hour (compared to \$.34 for Kaua'i in 2006), the City of Arlington expects a return on its upfront costs within five years.

Survey locations of thermostat sensors, replace or relocate sensors

Inappropriately located or broken sensors cause hot and cold spots in air conditioned buildings. When office spaces are remodeled, sensor location is not always taken into account. As a result, a sensor may be placed in a location that may not provide readings that result in the best level of air conditioning for occupants. For example, a sensor located near a window or in an equipment space may provide higher temperature readings. Therefore, the resulting office temperature may be cooler than necessary. All sensors should be surveyed to determine whether they are appropriately located.

Isolate lighting

The lighting in the vehicle repair bays at the Līhu'e Auto Repair Shop are metal halide and consume large amounts of electricity. Energy efficient replacements should be considered; however, a simpler remedy is to reconfigure light switches. Currently, all of the bay lights are connected to the same switch, so all lights must be turned on at the same time, even if all of the bays are not in use. Reconfiguring light switches so that each bay has its own switch will make it possible to turn lights on only in the bays where light is needed.

Phase-in park lighting to non-grid or energy efficient

Park lighting not only affects a park user's experience, but it affects park safety, the park budget, and the environment. Opportunities for energy efficiency in park lighting are to replace existing park lamps with energy efficient equivalents, use natural lighting wherever possible, find renewable energy solutions where feasible, install controls such as motion sensors, and direct outdoor lighting downward, to reflect useful light towards users, rather than into the sky.

Where possible, use of solar or other off-grid park lighting should be considered for use. Funds from a prior grant from the State were used to purchase solar lights at a few parks. Additional grant funding should be explored to expand the use of solar lights. The Convention Hall parking lot could also benefit from solar lights, which can be installed without having to damage the existing parking lots to install trenches.

Solar programs could be expanded beyond lighting. The City of Yuma, Arizona, has installed a solar garden at one of its parks, which produces 86.4 kWh of power that

will become a future energy source for the park. The total cost incurred for the development of the solar garden power plant was \$500,000. If the County undertook to develop a similar garden at this cost, recovery could occur in fewer years, due to the higher cost of electricity for the County.

LED lights are an energy efficient option.¹⁶ The City of Toronto has commenced a citywide initiative to install LED lights throughout its infrastructure, including its parks.¹⁷ Another energy efficient option is fixtures with electrodeless lamps. These lamps use magnetic induction technology to generate light. The predicted lamp life of these lamps is approximately 100,000 hours, compared to about 24,000 hours of life for high pressure sodium lamps. So use of the electrodeless lamp is likely to reduce maintenance requirements. Electrodeless lamps are now used in Union Square Park, New York. According to some law enforcement officers, the lights enhance safety, since faces remain evenly lighted as people walk along paths, allowing people to identify others at a greater distance. The lights also emit white light, enabling colors appear more distinct than under the high pressure sodium lamps. Reportedly, the new, clean diffusers in the electrodeless lamps are bright enough so that there is enough light to read newspapers at night when standing below the lamps.

 ¹⁶ See section on LED exit signs for information regarding the efficiency of LEDs.
¹⁷ www.cree.com/press/press_detail.asp?i+1184161665008

Higher Cost Measures

 Study and implement water and wastewater power energy efficiency measures, including self-generation

DOW: The DOW's primary use of electricity is to operate motors on groundwater wells located throughout the island. Once the water is lifted out of the ground and placed into surface storage tanks, the water system is a gravity system and uses very little electricity. There are a few opportunities for the DOW to potentially reduce the demand for electricity.

Storage and pump modifications: At the present time, the DOW attempts to supply water from its storage tanks during periods of high demand. If the tanks are emptied before the demand subsides, then the peak demand must be supplied by pumping water out of the ground at higher pumpage rates. The well pumps are sixed larger in order to meet this demand situation. Modifications could be made to reduce the electricity demand. First, more storage tank capacity would allow the demand to be met without operation of well pumps during peak periods. This would allow the pumps to be sixed smaller and to operate at a more efficient operating point. Larger tanks and smaller pumps would result in lower electricity usage over time. At the present time, the DOW has plans to add 5.0 MG of storage capacity to the system in the short term with another 4.0 MG planned for the longer run.

Pipe size modification: Several places on the island have undersized pipe feeding storage tanks and customers. This operating arrangement results in higher friction losses in moving water throughout the system and therefore, more energy is required to pump the water into the tanks. If all undersized pipes on the island were

replaced with appropriately sized pipes, there would be less energy required to pump water into storage and ultimately to customers.

Gravity systems: Making more use of gravity surface water systems may also save energy. While surface water sources require treatment, the treatment costs may be less than then groundwater pumping costs, given the relatively high quality of the surface waters available on the island.

Wastewater: A wastewater utility uses electricity for pumping and in the operation of a wastewater treatment plant. Electricity is one of the Wastewater's largest expenses, and the division tries to minimize electricity use whenever possible.

R1 and UV impacts: Over the next ten years, most of the County's wastewater treatment plants are expected to be upgraded to produce R1 reclaimed water. "R1" refers to a designation made in State guidelines that allows broader use of reclaimed water. To produce R1 reclaimed water, the division will discontinue using chlorine for disinfection and install disinfection systems using ultraviolet (UV) light. Although UV disinfection uses more energy than chlorination, energy savings elsewhere may result as described below.

Reduction in pumping requirements: The combination of UV disinfection and increased use of R1 reclaimed water could result in a decrease in groundwater pumping for irrigation as use of reclaimed water offsets the need for using pumped groundwater supplies. The amount of energy saved from reduced pumping will vary for each customer and will depend on factors such as the depth to groundwater and the distance from the customer to the wastewater treatment plants. With UV disinfection and subsequent use of R1 reclaimed water, the division may be able to reduce the use of its

injection wells for effluent disposal, thus reducing energy costs because electricity would not be required to pump effluent into the ground for disposal.

Alternate energy for operations: The City of Eugene, Oregon, has a wastewater treatment plant. Ninety percent of the methane produced by the wastewater facility is directed to produce power, which fills half of the power needs of the wastewater plant. In another project in the city of Santa Barbara, California, a wastewater treatment plant uses electricity and heat generated by digester gas from its anaerobic digesters and two 250 kW fuel cells. All of the project's capital and operating costs are paid by the City's private partner. The partner sells the power generated to the City by the partner at a cost below that charged by the local electric utility, and the net operating benefit to the city is approximately \$20,000 per year given the then-current electric prices. Solar power is another option that could be considered for providing some of the power needed for the County's larger wastewater treatment facilities.

DOW and Wastewater: Power factor correction capacitors: A power usage analysis for water and wastewater in the city of Sugar Land, Texas, recommended that power factor correction capacitors be installed at water facilities to yield a five-year savings of \$181,459.¹⁸

 Work with KIUC to study and implement converting street and traffic lighting to energy efficient alternatives

¹⁸ The relative electric cost in Texas is about \$.11 per kilowatt hour, compared to \$.34 for Kaua'i in 2006.

The "How-to Guide to Effective Energy-Efficient Street Lighting" document issued by the New York State Energy Research and Development Authority¹⁹ notes that most street lighting is selected based solely on either providing a recommended amount of light to a roadway or based on the general style of the pole and fixture to meet architectural requirements. However, in addition to light levels, effective energy efficient street lighting design should also consider the following: efficient lamp technologies, optimum pole placement, efficient light distribution, and aesthetics, while using the least amount of energy and meeting various visual performance requirements. Street lighting within the County follows the traditional model, where lighting selection is based on providing a recommended amount of light to a roadway. The traditional model does not consider recurring energy costs. Since the rate for street lighting is the highest in the KIUC rate schedule, energy costs should be considered in street lighting design.

Although all street light fixtures were replaced at considerable cost by KIUC to mitigate hazards to endangered bird species, energy efficient street design concepts were not utilized in this replacement. The replacement was conducted with a "one size fits all" approach, without considerations for optimum pole placement, the relative benefits and detriments of different lighting technologies for the location, aesthetics, and costs (including life cycle and maintenance costs, as some technologies might be costly, but easier and cheaper to maintain). The Illuminating Engineering Society of North America lists the following as the benefits of good roadway lighting:

Reduce nighttime accidents, which occur three times more often than in the day
Aid in police protection

¹⁹ <u>How-to Guide to Effective Energy-Efficient Street Lighting for Municipal Elected/Appointed Officials,</u> New York State Energy Research and Development Authority, October 2002.

- Facilitate traffic flow

- Promote business and industry during nighttime hours

- Improve community spirit and growth

The impact of proper lighting design on roadway visibility include the following:

- Location and design of the lights determines how much glare is produced in a driver's eyes.

- If lighting enables a person or object to be frontally lit, as opposed to seen in silhouette, a driver's response time may improve.

- Appropriate design takes into consideration how visibility is affected by the complexity of the roadway and the amount of traffic.

- Appropriate design can take into account how visibility is affected based on the way light is distributed when it hits the particular roadway surface under dry and wet conditions.

In addition to lighting design, the Michigan State Energy Extension Program reports that the following have been used to improve energy efficiency and reduce costs. However, the report cautions that any move to save energy must be concerned first with maintaining or improving safety:

- Energy savings may be possible by reducing the amount of light in the late night hours when traffic volumes drop; some European countries use this strategy between about 11 p.m. to 5 a.m.

- Better roadway markings, possibly including in-road lighting, and improved signage may in some cases reduce the amount of overhead light used, though how much savings might be realized from this strategy is hard to predict

- Solar energy is used in some roadway applications now and could play a larger role in the future, although initial investment is substantial.²⁰

Reviewing street lighting technology may also hold promise for energy and cost savings. The street lighting in the County utilizes high pressure sodium lamps, which are energy efficient. However, colors are still difficult to distinguish under high pressure sodium lamps.²¹ In contrast, using metal halide lamps would result in whiter light, aiding visibility. Metal halide lamps had not been widely used in street lighting because their life was about one-fourth that of high pressure sodium lamps, however, recent developments in metal halide lamp technology have resulted in longer-lasting metal halide lamps. The development of the new metal halide technology has caused one highway lighting expert to predict that horizontal burn, pulse-start metal halide lamps with electronic ballasts will become the new energy efficient lighting of choice for roadways.²²

Light-emitting diode (LED) technology is increasingly being used for traffic lights and street lights in areas where very bright light is not essential, such as sidewalks and urban areas. As discussed in an earlier section relating to LED exit signs, LED technology is extremely energy efficient, and LED lamps have long service lives, so maintenance costs are reduced. The cities of Ann Arbor, Melbourne, Australia, Los Angeles, and Ede (the Netherlands) are using LED streetlights in pilot projects. Reportedly, there are also jurisdictions that improve energy efficiency even further by

²⁰ "Topic: Lighting –Outdoor," Energy Solutions Database, Washington State University.

²¹ The above report states that police have noted difficulty in distinguishing between blue or gray or green. $\frac{2^2}{2^2}$ The expect is less that police have noted difficulty in distinguishing between blue or gray or green.

²² The expert is lan Lewin of the Illuminating Engineering Society of North America's Roadway Lighting Committee, who was quoted in "Topic: Lighting –Outdoor," Energy Solutions Database, Washington State University.

using solar-powered LED street lights. LED applications are more common in pedestrian or vehicle signal lights at intersections. Louisville, Kentucky, is converting its incandescent traffic lights to LEDs, saving on maintenance, emergency re-lamping labor, and bulb disposal. Cost savings are estimated at \$250,000 and 7.5 million kWh per year. The cities of New Rochelle and Arlington, Texas, also converted traffic signals to LED. The City of Dayton changed pedestrian and vehicle signals at 330 intersections from incandescent to LED, and estimated the cost savings per intersection over a seven year useful unit life at \$4,753 per intersection.²³ Although replacement fixtures were paid for by general funds, the cost of fixtures for new and rebuilt intersections was paid for by federal Congestion Mitigation and Air Quality (CMAQ) Improvement funds.

Given the substantial and unavoidable costs of street, pedestrian, and traffic lights, a County investment in exploring efficient lighting options will likely be recovered fairly quickly. The County should work with KIUC to study the feasibility of incorporating effective energy efficient street lighting design concepts into lighting requirements for new developments or in lighting replacement and upgrade programs. External (federal, state, or private) grant or loan sources could also be explored to fund major programs.

Finally, the County could consider auditing its street and traffic light bills, either in-house or by using an outside vendor. The audit could include checking for calculation errors, whether correct rates are used, whether there are billings for lights that do not exist, whether there are double billings, and whether the utility has properly maintained the street lights. The City of New Orleans used an outside vendor to recover \$15 million in overcharges for 54,000 street lights. On a more modest level,

²³ The fixture cost was \$260 per unit.

Savannah, Georgia, reportedly saved almost \$200,000 per year as a result of its audit of street and highway lighting bills.

Develop and implement air conditioning plans for the Historic County Building

The US DOE Energy Star Portfolio Manager system was used to analyze the energy efficiency of the Historic County Building. The results of the analysis are shown on Attachment B. The analysis reviewed energy consumption and billings, gross floor area of the building, the operating hours per week, the number of workers and computers used in the building, and the level of air conditioning and heating. According to the analysis, the energy performance of the facility dropped from a rating of 57 (September 2005 to September 2006) to a rating of 53 (September 2007 to September 2007). This decrease in efficiency was also reflected in the energy cost per year, which increased from \$50,972.88 to \$54,502.06 for the same period. The efficiency rating was better than the industry average of 50, but less than the minimum efficiency rating of 75 required for recognition as an Energy Star facility.

The cooling system for the Historic County Building is the primary cause of the low rating. The building is cooled by numerous window air conditioners, rather than a central chiller, and the units do not appear to be regularly cleaned and maintained. In addition, the basement is not occupied, but cooled at considerable cost. Cost savings could result by planning and implementing an air conditioning plan.²⁴ One approach for beginning the planning process might be to commence a competitive procurement to solicit plans to improve the energy performance rating of the facility to minimum Energy Star level, which translates into a reduction of 25 percent in energy usage.²⁵

 ²⁴ See results of the site survey on pages 58-59. The plan could also include the Annex.
²⁵ The calculations for this target are found in Attachment B.

Improve efficiency of Kaana Street chiller, consider DG options (with an emphasis on renewables)

The Kaana Street Public Safety complex houses the Kaua'i Police Department, the Office of the Prosecuting Attorney, and the Civil Defense organization. The Energy Star Portfolio Manager system analysis produced an energy performance rating of 74 for the building throughout the reporting period.²⁶ This rating is probably the result of energy efficiency measures incorporated by the Building Department when the facility was built in 1980. The rating compares very favorably to the industry average of 50, but falls slightly short of the Energy Star minimum of 75. The energy consumption savings of 4 percent necessary to achieve the Energy Star minimum are very achievable through a combination of employee conservation measures and installation of additional equipment, such as energy saving and power conditioning systems. The County has received unsolicited proposals for this equipment, and could increase its selection pool by issuing a competitive procurement. The procurement could be specific, and identify the type of technology that the Building Division believes could achieve the 4 percent reduction target, or it could be broad, and solicit proposals for any technology that could achieve reductions of 4 percent or more.

The Kaana Street public safety complex lot and roof spaces also provide opportunities for self-, or off-grid generation to supplement the power purchased from KIUC. Energy- and cost-effective options might include solar systems or gas-powered combined heat and power systems. The systems may generate enough power to meet some of the needs of the Transportation Division facility located across the street.

²⁶ The complete analysis is in Attachment B.

 Study and implement measures to convert field, gym, and stadium lighting to energy efficient alternatives

With increased awareness of energy and environmental concerns, many studies have emerged with recommendations for upgrading the lighting in recreational facilities so more illumination is provided for less energy.²⁷ According to the Washington State University Energy Solutions Database, the following are steps that can be taken to save energy needed for field lighting:

- Review scheduling. The more games that can be played during the daylight the better. If games must be played in the evenings, be sure lights are not turned on until needed, and are turned off shortly after the game ends. In order to support these practices, a timer system with easily controlled overrides for special events or charging leagues additional fees for extra lighting may be options.

- Examine lighting options. Metal halide lights produces white light, and is preferred as it renders color accurately. In addition, new studies seem to show that people can see better under less white light than yellow (high pressure sodium) light. New metal halide pulse-start technology has extended lamp life and reduced warm-up time.

- Incorporate appropriate lighting system design when converting lights. System design has many benefits, including lower energy consumption, safer conditions for

²⁷ Steinbach, Paul, "Night Games," Athletic Business, volume 25, number 5, pages 61-67 (May 2001); Kennedy, Mike, "Making Sports Facilities Brighter and More Energy-Efficient," American School and University (July 2000); "Recommended Practices for Sports and Recreation Area Lighting (RP-6-01)," Illuminating Engineering Society of North America.

spectators and players, and community satisfaction, since the light will shine where it is needed, rather than into neighboring homes or roadways.

- Control systems could be installed to keep lights off when unneeded. Systems could also allow facilities to run at less than full power (perhaps for practices) or illuminate only the spectator sections to accommodate cleanup and departure.

The town of Sahuarita, Arizona received a Governor's Merit Award for Energy Efficiency in 2005 as a result of installing energy efficient lights. Existing lights on two baseball fields were converted and lights were added to a third field. Sahuarita used Light-Structure Green fixtures and estimates that conversion to the fixtures will result in savings of \$89,754 over 25 years.²⁸ The conversion resulted in better field lighting, despite fewer fixtures. The new technology enabled the town to change from two lighted fields with 78 fixtures to three lighted fields with 48 fixtures. In addition to the energy savings, the town benefited because (1) the energy and maintenance savings allowed the town to grow recreational programs without an impact on the budget, (2) the new system cut off-site spill and glare light by 50 percent for nearby observatory, interstate highway and residences, and (3) on and off schedules could be entered through a web-based program to reduce energy and labor costs and hassle.

Research and technology regarding energy efficient gymnasium lighting has developed in recent years.²⁹ Gymnasiums lights are no longer designed so that the lighting throughout the facility is uniformly suitable for sports. Efficient lighting design for

²⁸ The energy savings were calculated on projected savings of 51.2 kW, cost of energy at \$.10 per kWh, and 700 annual usage hours. If the savings are adjusted to Kaua'i County's cost of power in 2006 (\$.341), the savings would be \$306,061.12.

²⁹ Examples: "Lighting Controls for Gyms," Lighting design lab news (Fall 2005); "Options for Gymnasium Lighting: Metal Halide vs. T-5 High Output," Estes, McClure & Associates, Inc. (1.26/2005); Lighting Options for Gymnasiums," Office of Energy Efficiency, Canada (2002).

gymnasiums takes into consideration that gymnasiums are multipurpose rooms, and considers factors as the use of the gymnasiums (such as for sports, classrooms, social halls), use of the spaces within the gymnasium (such as spectator areas and playing areas), energy and maintenance costs, time of use, intensity of use, and available technology to determine lighting and lighting configuration. New gymnasium lighting systems use occupancy sensors, daylight controls, external lighting sources, and energy efficient lamps to produce lighting that is energy efficient and user friendly. The County should consider taking advantage of advanced lighting technology in its gymnasiums to save energy.

A lighting retrofit of California State University's Dominguez Hills Gymnasium reduced energy usage of the gym by over 61,500 kWh or 15 percent. At Kaua'i's 2006 electric rate, the savings would be \$21,050 per year. The retrofit included installation of tubular skylights to capture sunlight to light the building interior. Installation of the skylights enabled the university to replace 144 U-tube fluorescent fixtures with just 72 energy efficient T5 sport fixtures. The lighting was also controlled by installation an infrared occupancy sensor to each light, enabling the lights to operate independently so unused portions of the gym are not lit. The light fixtures also use an automatic rotating sequence to extend lamp life. Further energy efficiency upgrades included improvement to air handling units and installation of a metering system to enable staff to monitor energy usage.³⁰ The costs and benefits of this upgrade and other similar ones could be the subject of an engineering study to determine whether the energy needed to provide lighting for the County's gymnasiums, neighborhood centers, and other large

³⁰ The upgrade was reported as part of the publication "Best Practices," written and produced by the Green Building Research Center, University of California, Berkeley.

public areas could be decreased by incorporating energy efficiency design considerations when installing or upgrading lighting.

Study and implement measures to convert Convention Hall to energy efficient alternatives

According to the American Society of Theatre Consultants,³¹ some of the areas where energy efficient "green" concepts can be applied to performing arts buildings are:

- Building envelope, mass and exterior. The flat areas of the roofs can be considered as catchments or for green roofs. Large wall areas and high roofs may provide opportunities for power generation using solar panels and wind generation.

- Building operations. Under-floor HVAC supply displacement systems are more efficient than that of ceiling distribution systems. Renewable energy sources and power co-generation could have value. Lighting and air conditioning systems could be upgraded to energy efficient alternatives and provide better air quality as a bonus. Hillsdale High School, San Mateo California, spent \$329,000 to update lighting equipment in two theater facilities. All lighting equipment was reviewed, and many of the stage lights were found to be antiquated fixtures with asbestos leads. Lighting fixtures were replaced with safer, more energy-efficient fixtures.³²

 ³¹ The ASTC Letter, Fall 2004.
³² Reported at <u>http://dramabiz.com/tcon.htm.</u>

BUILDING ENERGY USAGE INSPECTION AND REVIEW

After the DOW, street lighting, and Wastewater, the next 15 high energy use facilities in the County were identified based on 2006 consumption. The County facilities and their 2006 usage in kilowatt hours (kWh) are:

1. Kaana Street Public Safety Complex	1,336,400
2. Civic Center (excluding Piikoi Building)	1,041,360
3. Piikoi Building	657,000
4. Convention Hall	170,400
5. Historic County Building	162,540
6. Līhu'e Stadium	96,750
7. Bus Maintenance Facility	87,600
8. Līhu'e Auto Maintenance Facility	82,000
9. Līhu'e Fire Station	79,520
10. Waimea Public Safety Complex	71,781
11. Waimea Swimming Pool	61,123
12. Kalāheo Rec Center	57,120
13. Hanapēpē Baseyard	45,160
14. Kapa'a Swimming Pool	44,264
15. Kapa'a Fire Station	43,517

The project commenced on July 1, 2007. Research to identify the high use locations was conducted in July, 2007. County and KIUC personnel conducted site visits to the fifteen locations identified as high users in July and August, 2007. The results of the site visits were analyzed and the data regarding the sites analyzed. The site visits focused on County buildings because the US DOE has identified that as much as 30 per cent of the energy consumed in commercial buildings is unnecessary or inefficient. The benefits of energy improvement go beyond the utility bills. Improvements to the building environment, such as increased use of natural light and indoor air quality, have been shown to increase productivity and lower absenteeism, benefiting employees and taxpayers.

OBSERVATIONS AND CONCLUSIONS

The energy assessment disclosed a need for departmental and countywide monitoring of electric and fuel usage and charges. No department regularly tracked or monitored electricity or fuel use. Countywide monitoring tracking, studying, monitoring, or control of County energy or fuel use was also nonexistent. KIUC and other vendors send bills to the department, which are paid without checking for accuracy or abnormalities such as variation in usage patterns. Sadly, information about County energy consumption does not exist within the County and must be requested from KIUC. Even this information is not entirely accurate, as changes in the billing system at KIUC have made collection of historical data very difficult. It is essential that the County require its departments to track, monitor, and analyze energy use, and report their findings to a central point within the County.

Departments consider the cost of energy as an uncontrollable, rather than controllable cost, and few have incorporated energy efficient work practices into their daily routines. This view will cause major problems when revenues fall. Departments rarely propose capital improvements that contribute to energy efficiency. Rather, the trend is to propose budget line items that contribute to energy inefficiency. Personal printers, refrigerators and vehicles are viewed as desirable status symbols and regularly requested. Personal control over these devices should be discouraged, rather than allowed, as this trend is not economically or ecologically sound. User charges could be considered for employees who insist on using personal devices with significant energy requirements, such as refrigerators and printers.

Implementation of energy and fuel conservation and management programs is an essential component of a County energy efficiency strategy. Departments should be required to establish programs to control energy and fuel usage. This report contains some suggestions for programs. Departments should also be encouraged to initiate capital programs aimed at their most inefficient facilities and activities. If implementation requires expenditures, departments should budget for these expenditures, or seek outside funding, such as KIUC rebates or state and federal funding. The administration and Council could also consider funding incentives for these programs from savings on utility or fuel bills.

One of the benefits of this study was the development of the Mayor's energy mandates, which can provide a starting point for changing the cultural view of energy efficiency as a consideration in major County activities. A feature of the energy mandates is that they specify that energy efficiency must be considered County purchasing activities. First, improvements in energy efficiency are required for new construction, remodels and repairs in existing facilities, and for improvements in building maintenance and operations practices. Consistent with this requirement, the Parks and Public Works Departments should be encouraged to implement energy efficiency in its program of preventative maintenance, so that building performance is regularly monitored and managed at energy efficient levels. At a minimum, the Buildings Division and Parks Department should consider assigning a staff position to energy management and assessment. The mandates also require the acquisition of energy efficient vehicles and measures to ensure their efficient operation. As a whole, the

mandates set up missions for energy efficiency and a policy framework that can continue into the future, to the benefit of taxpayers and future administrations.

The County culture should also be changed to require consideration of energy efficiency in most County decision making, including whether to continue existing programs or offer new programs or functions.³³

As the cost of fossil fuels rise and demand for public services increase, energy efficiency has become a necessity for the County, not an option.

³³ For example, if a community group requests free use of a facility, the cost of providing the facility should be a factor in considering the request. For example, the community burden of allowing performing groups to regularly use an air conditioned County facility to provide paid lessons may be sufficient to require imposition of a user fee.

Acknowledgements:

Mayor Bryan J. Baptiste – for creating the opportunity for this review

Glenn Sato – for providing direction, technical support, and research for the review

Paul Daniels of KIUC – for performing the site inspections and analyzing data Ed Nakaya of KIUC – for providing invaluable assistance with cost and usage data Randy Hee of KIUC – for providing KIUC resources for this review

Ann Hajnosz, Art Griffin, and J. Thomas Jacobs of RW Beck – for providing technical support on Water and Wastewater issues

Doug Haigh – for answering many facilities questions and providing data on the County facilities

All department and facility heads – for providing input regarding their facilities and providing access to the facilities

Shelley Teraoka – for providing graphics for the energy tips and secretarial support for this report

SUMMARY OF KIUC RATES (CHARGED TO THE COUNTY					
(as of September 30, 2010)						

Schedule	G (small commercial)	J (large commercial)	P (large power – secondary)	SL (street lighting)
Criteria	Not greater than 30 kW demand and 10,000 kWh of use per month	Greater than 30 kW demand and less than 100 kW demand or greater than 10,000 kWh per month	Demand greater than 100 kW ¹	<u> </u>
Monthly customer charge	\$23.82	\$39.69	\$369.38	
Demand charge (per kW of monthly demand)	NA	\$6.62	\$11.14	
Kilowatt hour charge per month	\$0.35769	\$0.32390	\$0.31379 (Tier 1), (\$0.28977 (Tier 2) ²	\$0.41530
Surcharges and adjustments (per kWh, per month)	Energy rate adjustment (\$0.003916) and resource cost surcharge (\$0.001825)	Energy rate adjustments (\$0.003916) and resource cost surcharge (\$0.001825)	Energy rate adjustments (\$0.003916) and resource cost surcharge (\$0.001825)	Energy rate adjustments (\$0.003916) and resource cost surcharge (\$0.000324)
Other				Fixture charge - from \$6.25 to \$6.75 per fixture, per month

¹ Metered on the secondary side of meter. ² Tier 1 covers the first 400 kWh of billing demand and Tier 2 covers all billing demand over 400 kWh.