

# Energy Audit

5/14/2012

DCA Chamorro Village Energy Audit Report

Initial scope of work for energy conservation measures to be evaluated and analyzed at the Chamorro Village.



## Table of Contents

<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>BASELINE ADJUSTMENT .....</b>	<b>2</b>
<b>UTILITY ANALYSIS .....</b>	<b>2</b>
<b>GENERAL FINDINGS .....</b>	<b>4</b>
<b>PROJECT COST ESTIMATES .....</b>	<b>4</b>
<b>SUMMARY AND CONCLUSIONS .....</b>	<b>4</b>

## EXECUTIVE SUMMARY

The purpose of this Audit is to validate the savings and project economics at the Chamorro Village for exterior lighting improvements. No other Energy Conservation Measures (ECMs) were included in this assessment for energy savings opportunities. The following table summarizes the results of the proposed lighting improvements at this facility:

TABLE 1 – EXTERIOR LIGHTING PROJECT SUMMARY

<b>Chamorro Affairs Department</b>					
<b>Lighting Energy Project</b>					
<b>ADJUSTED BASELINE ANALYSIS SUMMARY</b>					
Pre Data	Post Data	Savings		Project Summary	
KWH	KWH	KWH	\$	Cost (\$)	Simple Payback (yrs)
155,382	77,917	77,465	\$ 21,850	\$ 469,798	21.50
<b>ACTUAL UTILITY BILLING ANALYSIS SUMMARY</b>					
Based on Utility Billing		Actual Billing Savings		Project Summary	
Pre KWH	Post KWH	KWH	\$	Cost (\$)	Simple Payback (yrs)
106,323	77,917	28,406	\$ 8,012	\$ 469,798	58.63

The following table details the lighting audit by the East/West summary used in the detailed input.

TABLE 2 – DETAILS FROM LIGHTING INPU

Description	Pre KWH	Post KWH	Savings KWH	Rate	Annual Savings (\$)
East Metering	95,263	49,307	45,956	\$ 0.28206	\$ 12,962.47
West Metering	60,119	28,610	31,509	\$ 0.28206	\$ 8,887.58
Totals	155,382	77,917	77,465	\$ 0.28206	\$ 21,850.05

<b>Project Cost</b>	<b>\$ 469,797.87</b>
<b>Simple Payback (yrs)</b>	<b>21.5</b>
<b>Actual Utility Billing</b>	<b>106,323</b>
<b>% Adjustment</b>	<b>146%</b>

Note that Table 1 has two results. This is due to the “adjustment” of the baseline data to accommodate the lighting fixtures that are presently not working. This is explained as follows:

## BASELINE ADJUSTMENT

The table above shows that the utility usage for this facility annually is 106,323 KWH. However, the table also indicates the “pre” lighting usage is 155,382 KWH. How can a facility lighting system actually use more energy than the billing indicates? This is because the lighting system presently in place has many inoperable fixtures due to burn out or lamp failure. The “adjusted” baseline analysis shows what the facility would have used had the lighting system been operating properly. Note that if the system was working properly, the proposed project would have a 20 year payback, but DCA will only see part of that savings in “real” utility bill savings which more than doubles the payback for the project.

In many energy projects, the baseline must be “adjusted” to account for similar issues such as weather, inoperable systems, or systems that are not up to codes and standards. This is the only fair way to assess the proposed energy projects on a real savings basis.

## UTILITY ANALYSIS

The following tables detail the overall utility data provided for assessment of the exterior lighting at Chamorro Village. This data was provided as the total exterior lighting metering and the lighting audit was calibrated to this information.

**TABLE 3 – NORTH SIDE METER INPUTS**

Month	Avg KWH/Day	Days	KWH	KW	\$
J	144.09	31	4,467	1.5992857	\$ 1,260.20
F	145.82	28	4,083	1.5992857	\$ 1,151.86
M	139.18	31	4,315	1.5992857	\$ 1,217.31
A	140.52	30	4,216	1.5992857	\$ 1,189.39
M	126.20	31	3,913	1.5992857	\$ 1,103.91
J	121.42	30	3,643	1.5992857	\$ 1,027.74
J	125.70	31	3,897	1.5992857	\$ 1,099.39
A	134.53	31	4,171	1.5992857	\$ 1,176.69
S	120.70	30	3,621	1.5992857	\$ 1,021.53
O	134.20	31	4,161	1.5992857	\$ 1,173.87
N	130.87	30	3,927	1.5992857	\$ 1,107.86
D	216.21	31	6,703	1.5992857	\$ 1,891.00
<b>Totals</b>		<b>365</b>	<b>51,117</b>		<b>\$14,420.74</b>

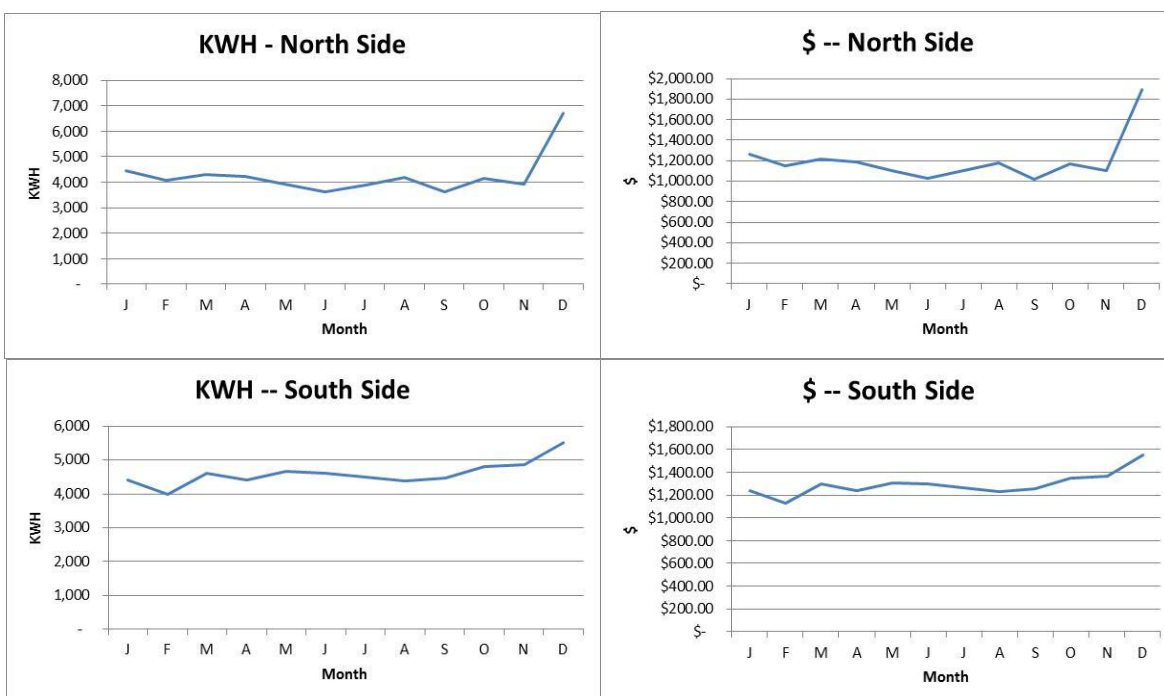
**TABLE 4 – SOUTH SIDE METERING**

Month	Avg KWH/Day	Days	KWH	KW	\$
J	142.41	31	4,415	14.07	\$ 1,241.34
F	142.89	28	4,001	14.07	\$ 1,124.93
M	148.93	31	4,617	14.07	\$ 1,298.13
A	146.74	30	4,403	14.07	\$ 1,237.96
M	150.30	31	4,660	14.07	\$ 1,310.22
J	153.65	30	4,610	14.07	\$ 1,296.16
J	144.93	31	4,493	14.07	\$ 1,263.27
A	141.09	31	4,374	14.07	\$ 1,229.81
S	148.97	30	4,469	14.07	\$ 1,256.52
O	154.77	31	4,798	14.07	\$ 1,349.02
N	161.58	30	4,848	14.07	\$ 1,363.08
D	178.00	31	5,518	14.07	\$ 1,551.46
<b>Totals</b>		<b>365</b>	<b>55,206</b>		<b>\$ 15,521.90</b>

**TABLE 5 – TOTAL METERING SUMMARY**

Facility	Annual KWH Usage	Average Monthly KW	Annual Cost (\$)
North Side Input	51,117	1.60	\$ 14,421
South Side Input	55,206	14.07	\$ 15,522
<b>Totals</b>	<b>106,323</b>	<b>15.67</b>	<b>\$ 29,943</b>

The following charts show the usage and cost by month for each meter associated with the exterior lighting:



In assessing the project with respect to the utility data there are some issues that should be considered and possibly discussed with the Guam Power Authority.

- The audit report indicated that all the exterior lighting was on a timed schedule operating from 6:00 PM until 6:00 AM. Unfortunately when the fixture types are entered with this time table, the usage more than doubles the utility billing information. This is why as noted herein, a “baseline adjustment” was made for the inoperable or burned out fixtures.
- Note that for the North side metering input that the demand averages at about 1.6 KW and for the South side the demand is shown to be over 14 KW. But the KWH for these two sites is almost the same in terms of usage. There appears to be some type of demand metering error for the North Side as using the billing data provided the load factor is over 100% for this meter.

Included in the Technical Appendix to this report is the detailed utility analysis used for this facility.

## GENERAL FINDINGS

The project as outlined in the scope of work documentation was only to replace or retrofit exterior lighting where possible with more efficient lighting systems. EMCE Consulting Engineers provided a detailed audit of the existing and proposed fixtures for use in the energy analysis contained herein. The project, with the baseline adjustment, will savings about 50% of the energy usage of a fully operable system today, and will have a projected payback of just over 20 years.

## PROJECT COST ESTIMATES

Project costs were obtained from EMCE as firm pricing for this Audit. The pricing and detailed audit is contained in the Technical Appendix for this report.

## SUMMARY AND CONCLUSIONS

The project will provide a substantial savings to Chamorro Village in exterior lighting consumption. The savings from the project will result in a reduction of over 50% of total operable system savings but 33% of total current billing.