Energy and Water Efficiency Measurement and Verification Case Study

CATHOLIC CHARITIES HAWAI'I

1 Introduction

1.1 Company Overviews

Catholic Charities Hawaii operates retirement homes for underprivileged seniors. The property in this analysis is a ten bedroom, 5 bath duplex in Honolulu at 1027 Lowell Place in Kalihi. The home has 10 year-round occupants.

Pono Home is an energy and water efficiency company based in Honolulu, HI. Pono Home's service is broken down into three main subject areas: installation of efficiency hardware (e.g., LED lights), education of stakeholders, and maintenance of appliances to optimize them for efficient use.

1.2 Project and Results

On June 8, 2015, Pono Home conducted an efficiency service at 1027 Lowell Place that included installed energy and water saving devices, education, and some appliance maintenance for a total price of $220. Products installed included 4 showerheads, 3 faucet aerators, 2 LED bulbs, and 1 smart strip. Cleaning maintenance was performed on 3 refrigerators' condenser coils and one dryer vent. A vampire power assessment was performed and recommendations to staff made, and refrigerator and freezer temperatures were adjusted to lie within normal ranges. Pono Home adjusted the timer on the solar hot water heater on site. Residents who were present for the service were educated about washing clothes in cold water and a variety of other recommendations that are routine for the Pono Home service.

After 9 months, energy and water consumption figures were used to calculate the differential before and after service. We calculated the trailing kWh consumption average by averaging all full month bills prior to the month of service (n=10). We calculated the average post-service kWh consumption by averaging June 2015 plus all full month bills after the month of service (n=9). The month of service, June 2015, was included in the "post" service grouping, since the service was conducted relatively early in the month. Raw data are presented below.

	2014					2015												2016	
Months	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Electric (in kWh)																			
1027 Lowell	1130	1055	1277	1129	1131	1259	1283	995	1230	931	919	1219	967	1159	986	945	900	1084	1041
Water (thousand gallons)																			
1027 Lowell		14	15	16	15	18	16	15	16	13	14	12	14	13	13	12	10		

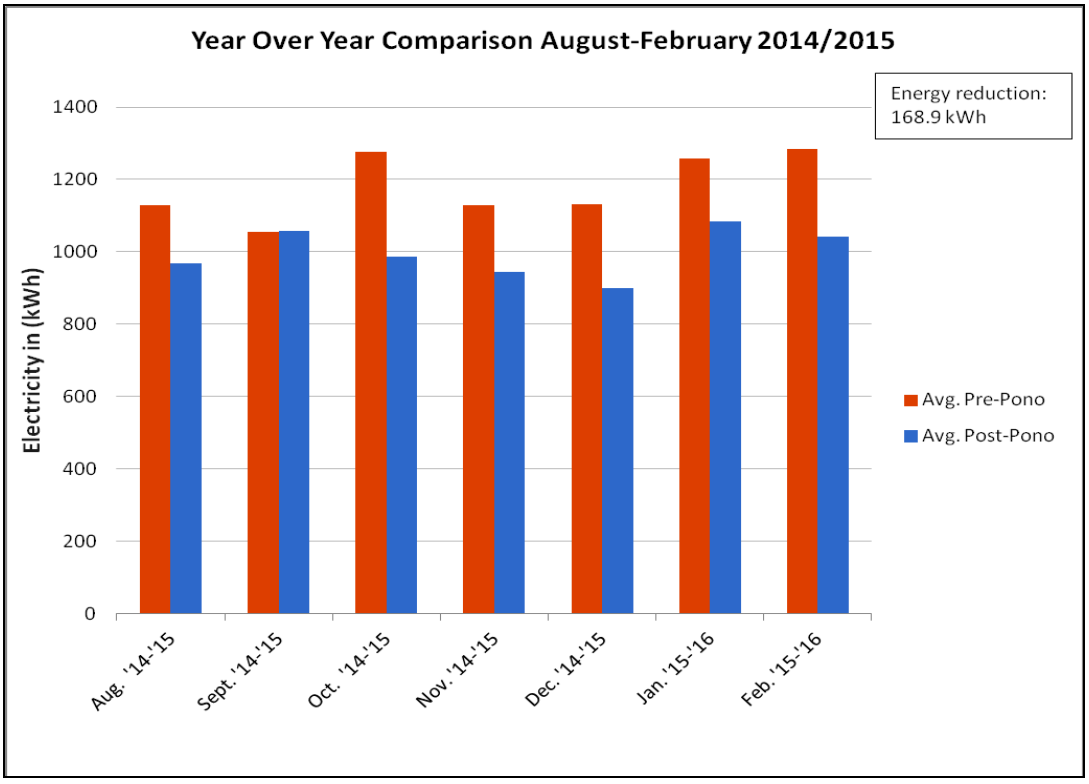
In addition, we looked at same month comparisons for August 2014 to February 2015 compared to the same months a year later, in order to give a simpler "same month" comparison. The utility data shared with Pono Home was more comprehensive for electricity than for water, so water comparisons were made for the months of September to December 2014 vs. 2015.

For YOY comparisons for one month:	August - Feb (2014/15 vs. 2015/16)													
	Aug	Aug	Sept	Sept	Oct	Oct	Nov	Nov	Dec	Dec	Jan	Jan	Feb	Feb
Electric (in kWh)	1130	967	1055	1159	1277	986	1129	945	1131	900	1259	1084	1283	1041
Monthly change		163		-104		291		184		231		175		242
Sept - Dec (2014 vs. 2015)														
Water (thousand gallons)			14	13	15	13	16	12	15	10				
Monthly change				1		2		4		5				

The results of the analyses show a decrease in both energy and water consumption.

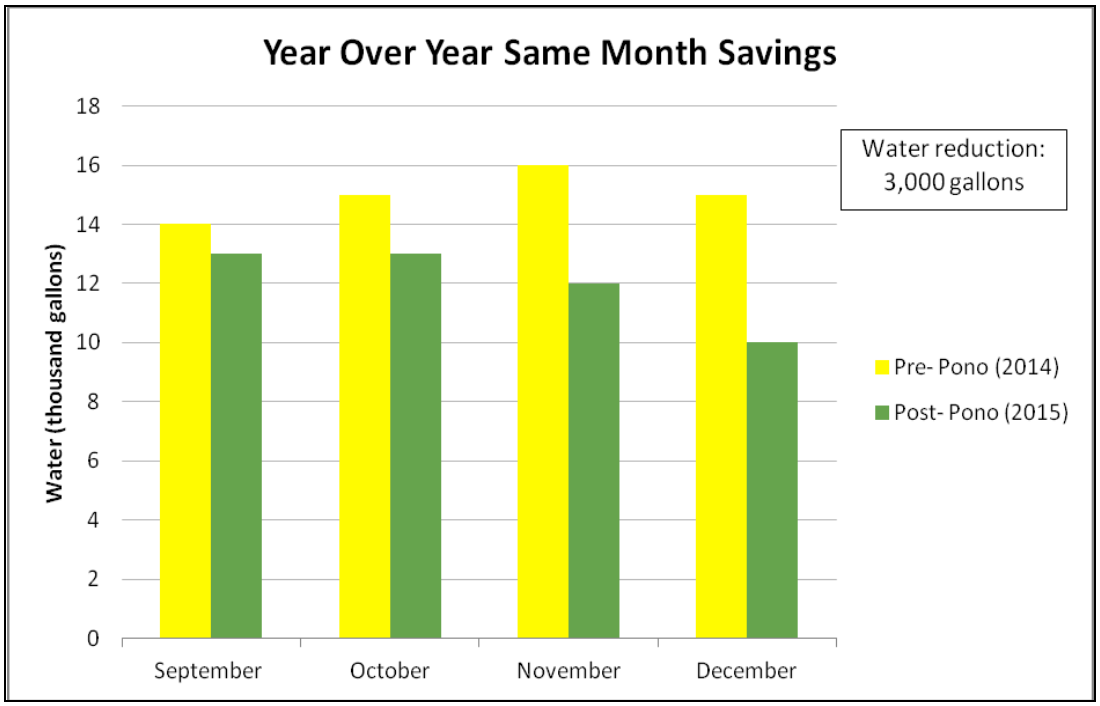
Analysis 1: 19 months

Ave Before	Ave after	Diff	%	Ave monthly $ difference	Annualized savings	% savings
1142.00	1024.44	117.56	10.29%	$30.45	$365.36	
1142.00	1024.44	117.56		30.45	365.36	10.29%
15.33	12.57	2.762	18.01%	$16.02	$192.23	
15.33	12.57	2.762		$16.02	$192.23	18.01%
					Annual Savings	
					Energy:	$365.36
					Water:	$192.23
					Total:	$557.59



Analysis 2: Year over year, same month

Change		
Ave		
		$ Diff
168.9		$43.73
3		$16.05



1.3 Project Analysis

There appears to be a fairly consistent and strong result in both energy and water consumption at the retirement home. In the analysis of almost two years, the average monthly reduction was 118 kWh and 2700 gallons of water. The retirement home pays 25.5 cents per kWh for its power and has a blended water rate depending on consumption. For this analysis, we used $5.35 per thousand gallons, based on a sampling of random calculations from the property's water billing statements. Thus, the average monthly savings were $30.45 in electricity and $16.02 in water. This represents a 10.29% decrease in energy use, and 18.01% decrease in water use.

Attempting to correct for seasonality in the year over year analysis, we found that the property used an average of 168.9 kWh and 3,000 gallons of water less in the same months after service than it did a year prior. This equates to monthly savings of $43.73 and $16.05, respectively, or a total of $717.41 per year.

2 Conclusion and Key Stats

2.1 Key Stats

- 19 month average monthly energy usage reduction: 117 kWh, 10.29%
- 19 month average water usage reduction: 2,700 gallons, 18.01%
- Same month energy reduction: 168.9 kWh
- Same month water reduction: 3,000 gallons
- Estimated annualized savings: $717.41
- Estimated annual carbon emission reduction: 2456.69 pounds of CO2 equivalents
- Payback Period: 3.7 months
- One year Return on Investment: 69.33%

2.2 Conclusion

The project appears to have been a success in making the property more energy and water efficient. The brief payback period and solid ROI should help convince other similar property owners of the efficacy of efficiency solutions for generating great returns as well as helping the environment. The job performed by Pono Home in this instance was just a pilot. There is a lot more that could be done inside the property and across other Catholic Charities properties.