



Hilton Waikoloa Village Phase 1 Energy Plan

Phase 1 funded by



Hawaii Energy



ENERGY CLOUD

Project Location

Hilton Waikoloa Village

Signature Hilton Resort located on the Kohala Coast of the Big Island of Hawaii. Hilton Waikoloa Village spans 62 ocean front acres, offering breathtaking tropical gardens and abundant wildlife. The resort features 1,240 guest rooms and also offers extensive conference / ball room facilities. Internal transit includes a state of the art tram and boat ferries that span the whole property.





ENERGY CLOUD



Project ROI

Project Costs: \$98,798.94

**Fully Implemented Energy Plan
Savings: \$95,410.82**

Return on Investment: 1.03 years

As previously stated, the energy plan is based on real numbers and actual energy usage in the project areas. Management is working on implementing the whole energy plan, but has already achieved the bulk of the plan and sits at a 1.19 Year ROI as of this presentation.

Typical projects like this have a 2-3 year ROI.



Project Scope

Real-Time Sub-Metering

The Project at Hilton Waikoloa Village focused on Real-Time Sub-metering of some of the key areas at the resort that Hilton management wanted to gain a greater understanding of the energy use. Hawaii Energy provided the funding for this first Phase Pilot.

Some of these areas included:

Main Kitchen

Ball Room Air Handlers

Other potential high energy use areas

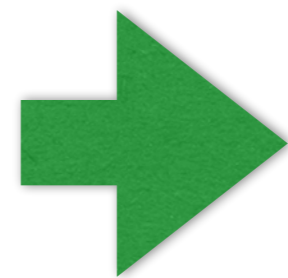
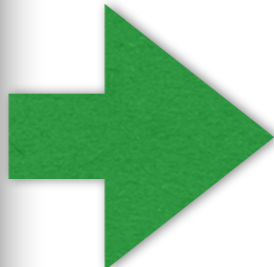
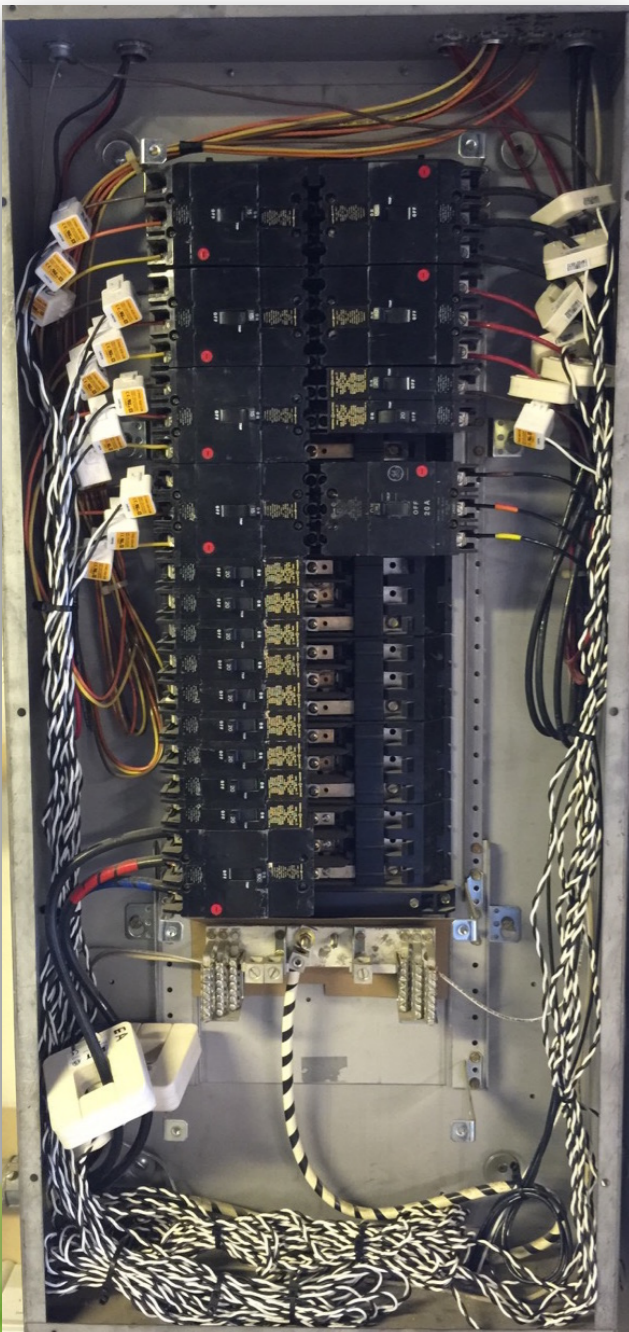




Project Solution

gMeter® Energy Management System

The Energy Cloud gMeter® Energy Management System measures energy in “real-time,” sampling in 5-15 second increments directly at the internal panel level and on a per circuit basis. This granular measurement capability gives a true picture of what’s really going on in a facility. All data is sent securely to Energy Cloud’s data center in a cloud infrastructure which allows management to access their data facilities all over the world and from any computer or smart enabled mobile device.



gMeter CT's collect data from Panel

data sent wirelessly

gMeter sends data to Energy Cloud®

Data viewable worldwide



gMeter[®] Platform

Phase I Module Utilized: Energy Measurement



Efficiency



Lighting



HVAC



Building Envelope

Utilities



Water



Electricity

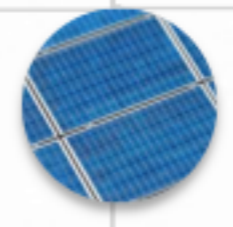


Gas

Renewables



Wind



Solar/PV



Fuel Cells

Environment



Humidity



Temperature



Air Quality



Methodology

Evaluation, Measurement & Verification

All data reported on and all suggestions under the energy plan are based on actual measured data from gMeter[®]. No “deemed” savings or theoretical calculations were used to arrive at savings. Every energy measure in the energy plan under this project is based on actual energy usage, events and phenomenon that were measured after installing the gMeter[®] Energy Management System in the environment.

Core gMeter[®] features that were used:



Real Time Data



Historical Tracking



Energy Signature



Power Metrics



Benchmarking



Comparison Tools



Run Time Stats



Alerts



ENERGY CLOUD

Energy Plan

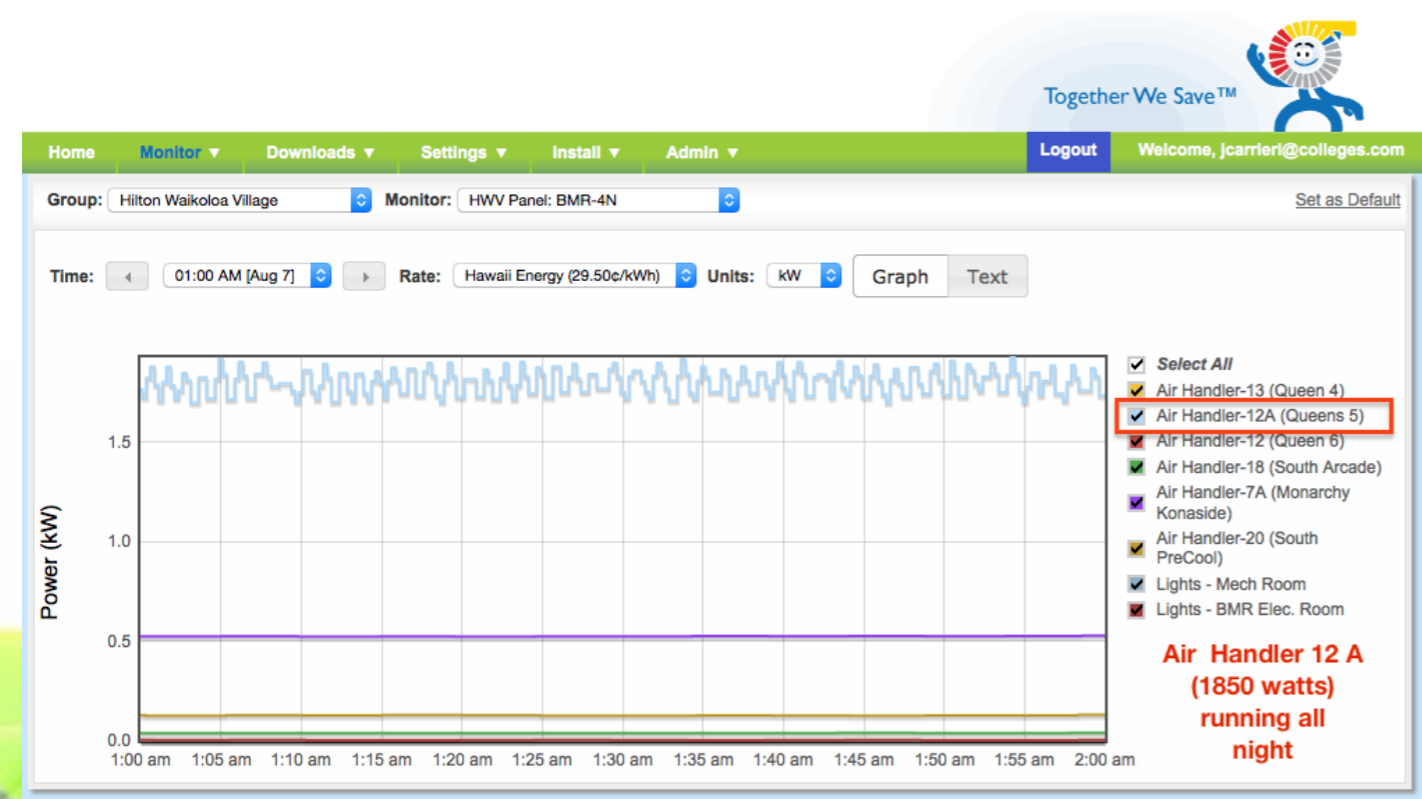
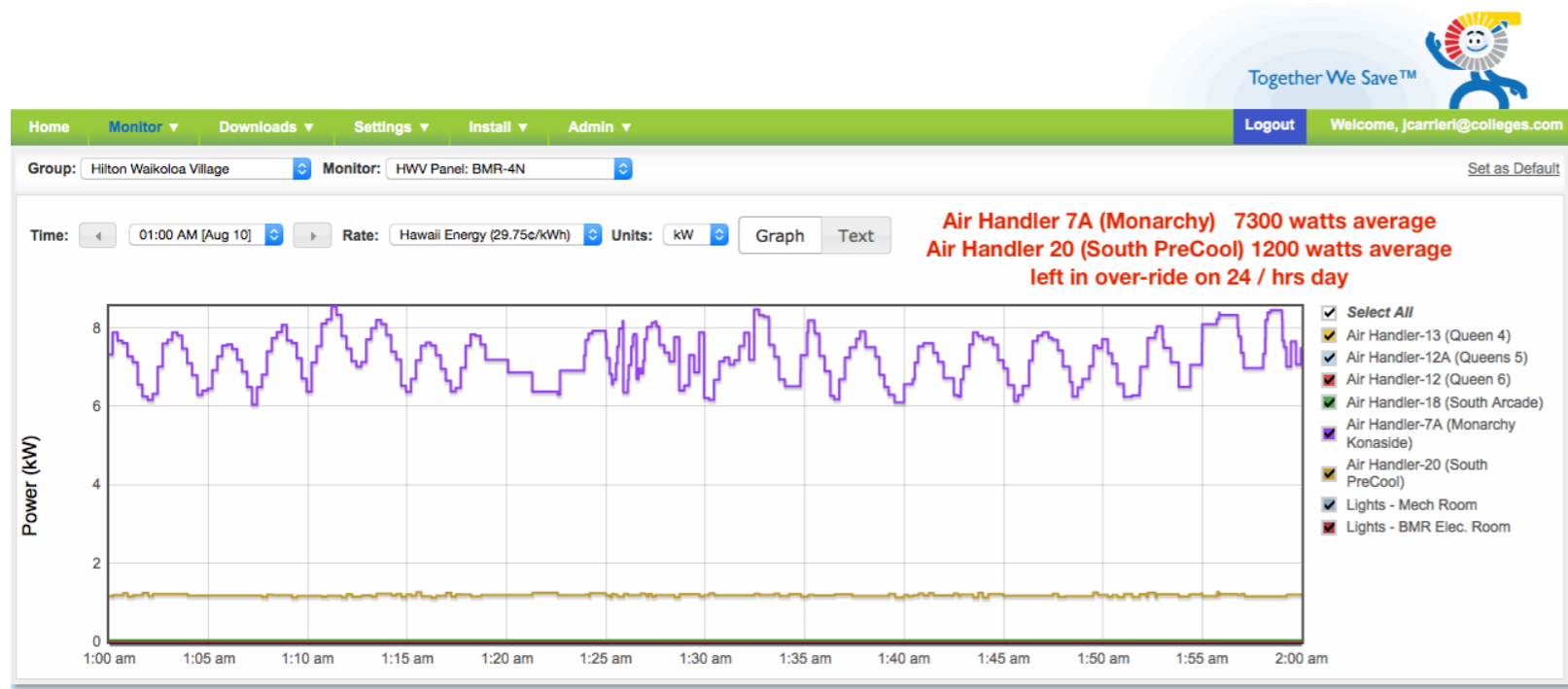
Hilton Waikoloa Village Energy Savings Plan Phase 1

Energy Measure	Done	Panel	Measure Type	Average Kwh Usage	Hours / Day / Saved	Kwh Daily Savings	Price Per Kwh	Daily Savings	Average Monthly Savings	Annual Savings
Kitchen Exhaust Fan 1, shut off at night? (Off 9pm-4am)	✓	KSB-4N2	Schedule_time	6.8	7	47.6	0.339	\$16.14	\$490.80	\$5,889.79
Kitchen Exhaust Fan 2, shut off at night? (Off 9pm-4am)	✓	KSB-4N2	Schedule_time	1	7	7	0.339	\$2.37	\$72.18	\$866.15
Kitchen Exhaust Fan 9, shut off at night?	✓	KSB-4N2	Schedule_time	0.16	5	0.8	0.339	\$0.27	\$8.25	\$98.99
Kitchen Exhaust Fan 2, Off at night but still pulling .6kw		KSB-4N2	Schedule_time	0.57	7	3.99	0.339	\$1.35	\$41.14	\$493.70
Kitchen Exhaust Fan 1, Fix VD Sys 6.8Kw avg / 75% save	✓	KSB-4N2	fix_to_normal_ops	5.1	17	86.7	0.339	\$29.39	\$893.97	\$10,727.82
Kona Fountain Scheduling (reduce from 11:45p to 6:30p)	✓	LSB	Schedule_time	21	5.25	110.25	0.339	\$37.37	\$1136.79	\$13,641.78
Kona Fountain Running 2nd Pump, Double / Power	✓	LSB	Configuration_chg	20.54	9	184.86	0.339	\$62.67	\$1906.10	\$22,873.65
Airhandler #6 Proper Operation (On Overnight)	✓	BM4N	fix_to_normal_ops	0.3	22	6.6	0.339	\$2.24	\$68.05	\$816.65
Airhandler #7a Proper Operation. Still pulling .5kw off.		BMR-4N	fix_to_normal_ops	0.52	24	12.48	0.339	\$4.23	\$128.68	\$1,544.21
Airhandler #7a Proper Operation. (On Overnight)	✓	BMR-4N	fix_to_normal_ops	7.3	22	160.6	0.339	\$54.44	\$1655.95	\$19,871.84
Airhandler #12a Proper Operation (On Overnight)	✓	BMR-4N	fix_to_normal_ops	1.825	22	40.15	0.339	\$13.61	\$413.99	\$4,967.96
Airhandler #20 Proper Operation (Fix Controls issue)	✓	BMR-4N	fix_to_normal_ops	1.2	22	26.4	0.339	\$8.95	\$272.21	\$3,266.60
Shut off Kitchen Ceiling Fan at night		KK-2N3	Schedule_time	0.135	8	1.08	0.339	\$0.37	\$11.14	\$133.63
Shut off Meat Prep Fan Coils 1&2 during night		KK-2N2	Schedule_time	0.8	10	8	0.339	\$2.71	\$82.49	\$989.88
Shut off Meat Chopper at night		KK-2N2	Schedule_time	0.15	10	1.5	0.339	\$0.51	\$15.47	\$185.60
Shut off Patty Machine at night		KK-2N2	Schedule_time	0.290	10	2.9	0.339	\$0.98	\$29.90	\$358.83
Store Room (Shut off lights at night)?		KK-2N2	Schedule_time	0.6	10	6	0.339	\$2.03	\$61.87	\$742.41
F&B Office. Shut off computers at night?		KK-2N2	Schedule_time	0.125	10	1.25	0.339	\$0.42	\$12.89	\$154.67
Chef's Office. Shut off computer + at night?		KK-2N2	Schedule_time	0.120	10	1.2	0.339	\$0.41	\$12.37	\$148.48
Air Conditioner		KK-2N2	Schedule_time	1.3	10	13	0.339	\$4.41	\$134.04	\$1,608.56
Shut off Hood Lights		KK-2N4	Schedule_time	0.46	10	4.6	0.339	\$1.56	\$47.43	\$569.18
Force Blast Freezer Controls to shut off at night.	✓	KK-2N4	Schedule_time	1.41	8	11.28	0.339	\$3.82	\$116.31	\$1,395.73
Bug lights shut off at night?		KK-2N5	Schedule_time	0.846	10	8.46	0.339	\$2.87	\$87.23	\$1,046.80
Ware Washer shut off at night?		KK-2N5	Schedule_time	0.174	10	1.74	0.339	\$0.59	\$17.94	\$215.30
Nothing Listed Breaker, shut off at night?		KK-2N5	Schedule_time	0.165	10	1.65	0.339	\$0.56	\$17.01	\$204.16
Shut off Tram completely at night (12 am - 5am)		TRAM	Schedule_time	4.2	5	21	0.339	\$7.12	\$216.53	\$2,598.44
Total							0.339	\$261.40	\$7950.73	\$95,410.82



Air Handlers gMeter Energy Alerts

gMeter helps management find Air Handlers left in over-rides which would keep them running 24 / hrs / day. Note the different day captures. This is an on going important feature of gMeter which can find when equipment goes beyond normal usage thresholds. Alerts can be set with text messages or email.

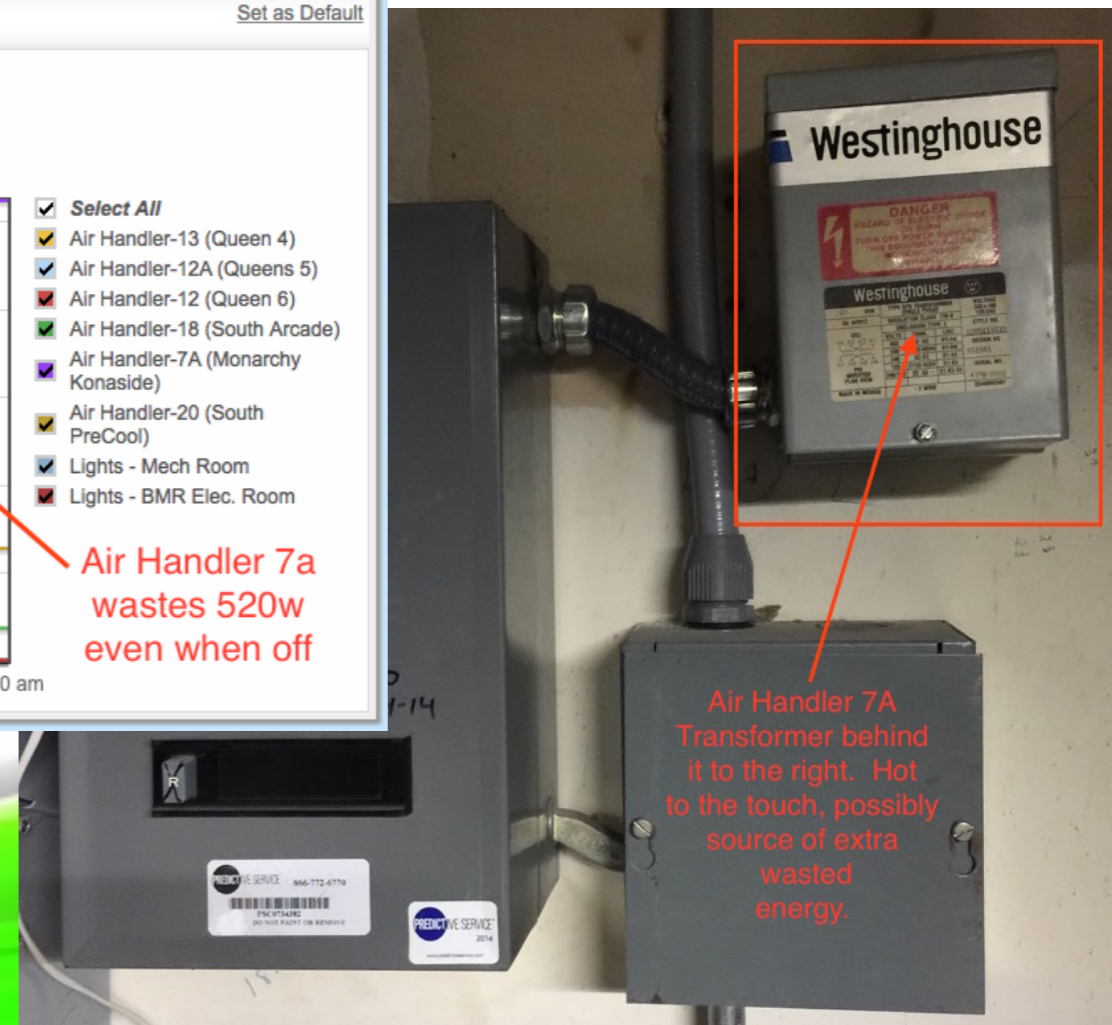
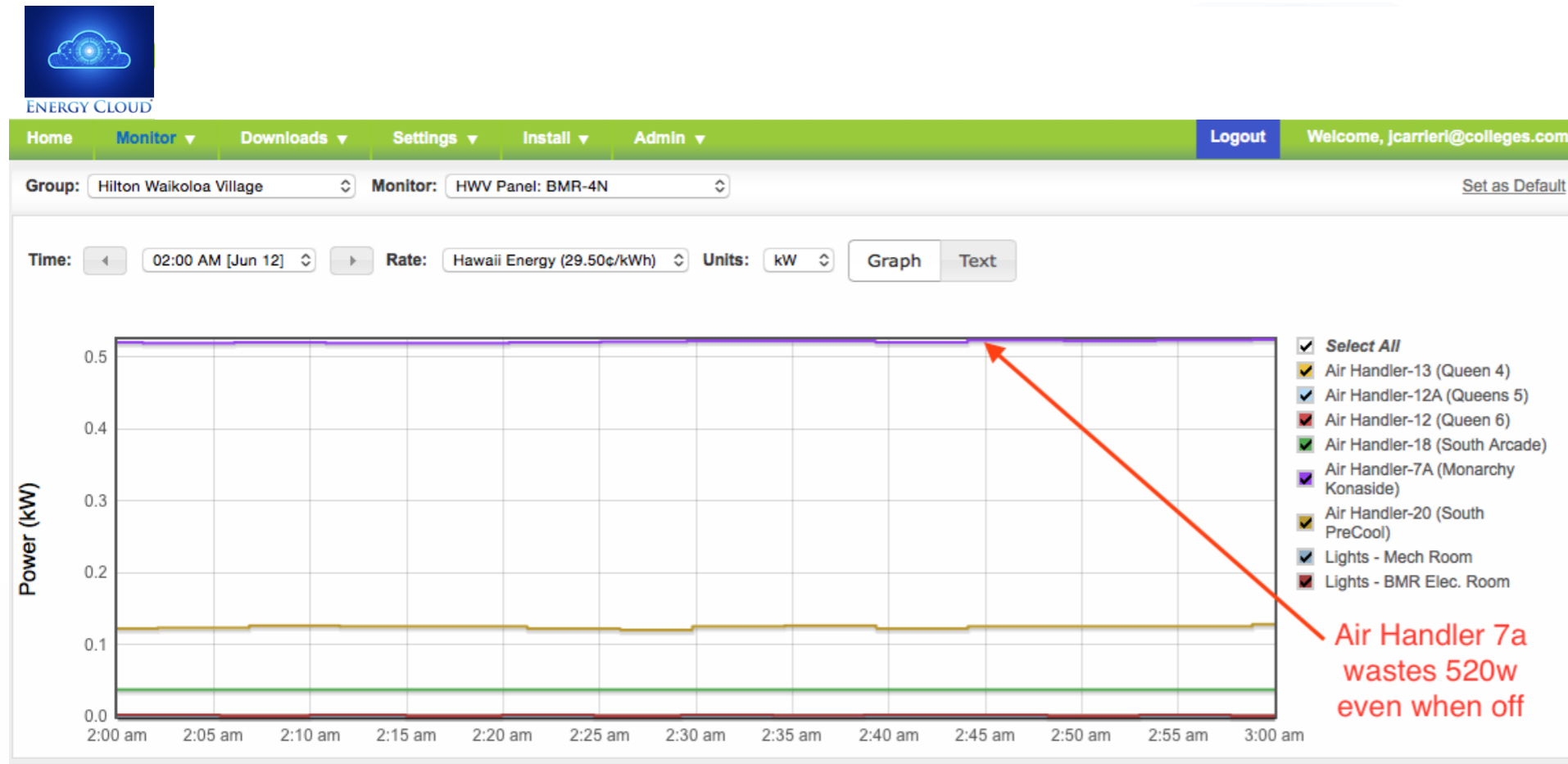




Air Handlers

gMeter Helps find energy wraiths

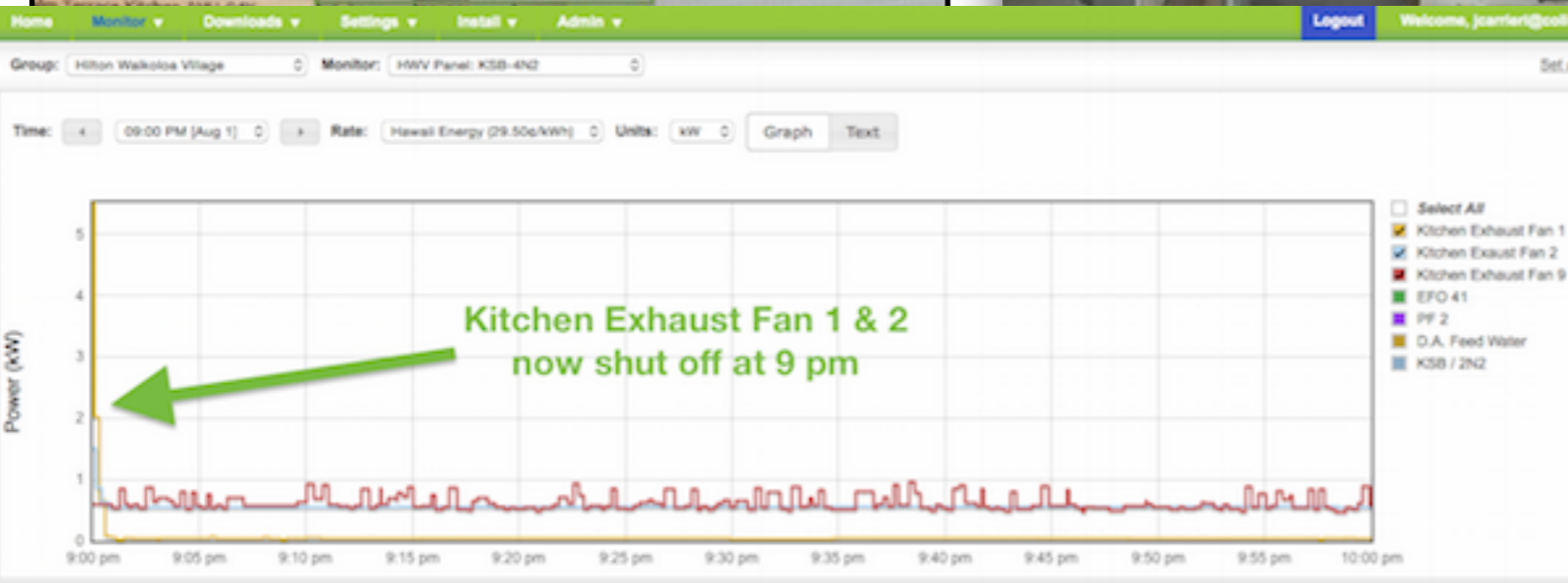
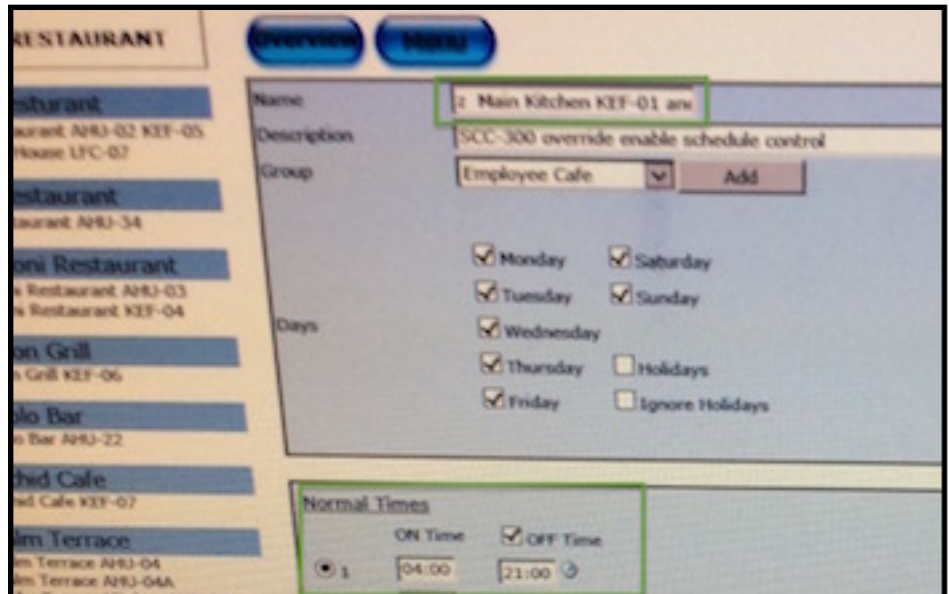
gMeter helps management find energy wraiths that continually drain / use energy with no benefit while wasting money. In this example, gMeter found that one of the largest air handlers still wasted 520 watts even when it was off, 24hrs / day.





Kitchen Scheduling Kitchen Fans

gMeter helped management detect equipment running all night such as the 3 major kitchen fan arrays. Substantial savings of over 8.5 Kw were achieved by scheduling them to be shut off at night through the existing building management system.





gMeter EM & V

gMeter validates 3rd party Tech.



gMeter[®] validates a third party energy efficiency variable drive technology

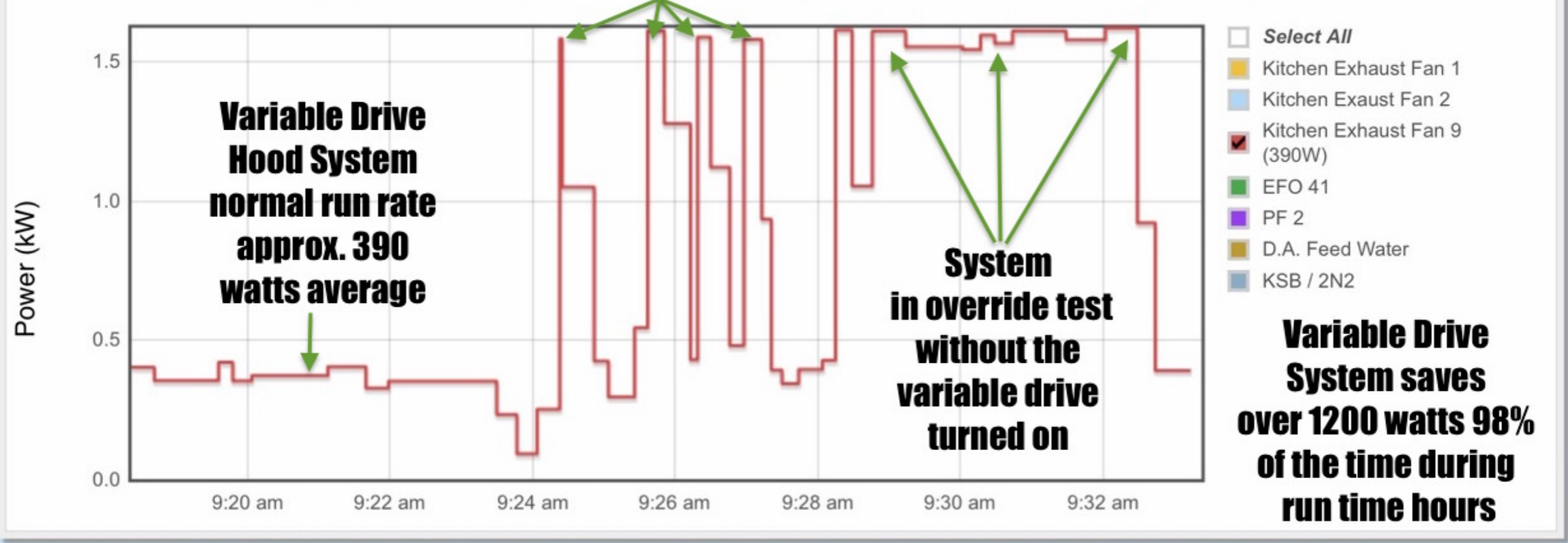


Home Monitor Downloads Settings Install Admin Logout Welcome, jcarrieri@colleges.com

Group: Hilton Waikoloa Village Monitor: HWV Panel: KSB-4N2 Set as Default

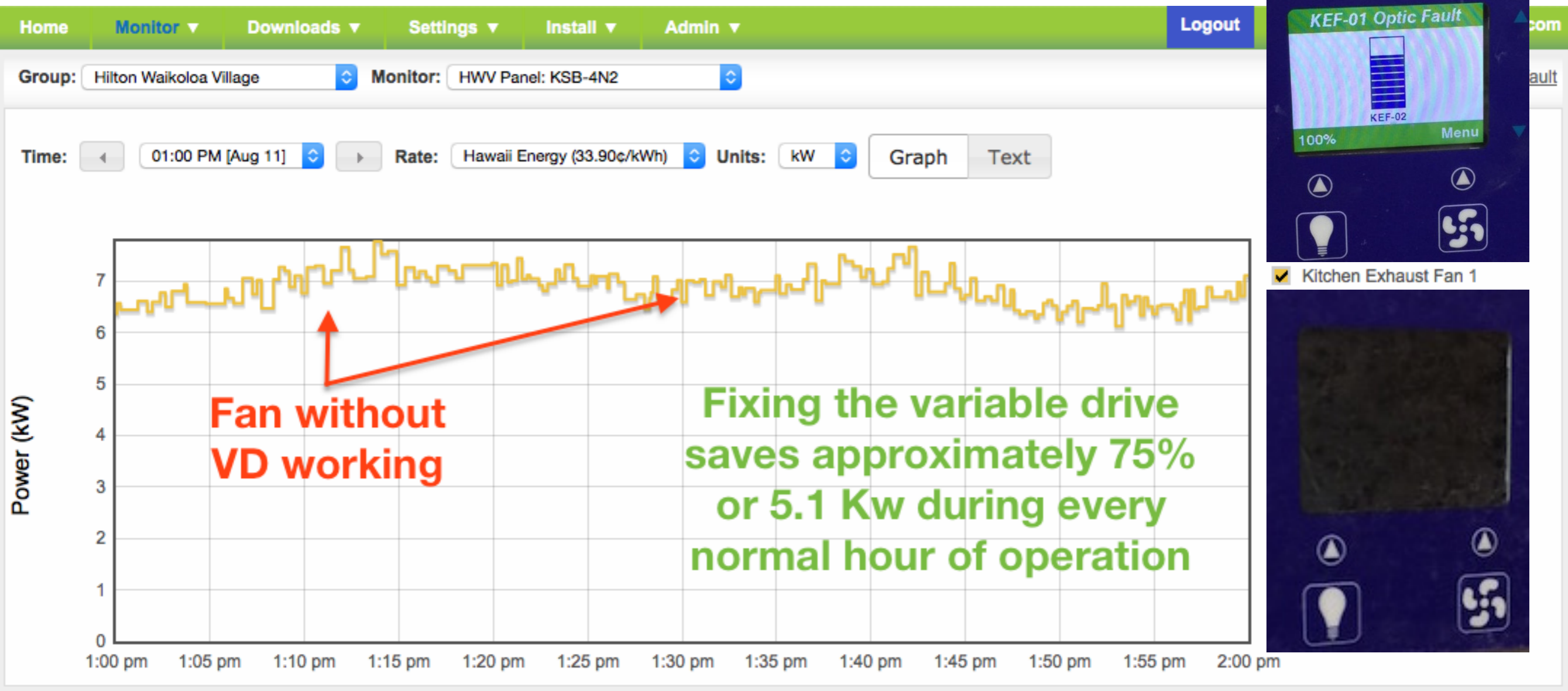
Time: Live Rate: Hawaii Energy (29.50c/kWh) Units: kW Graph Text

System with drive engaged peaking properly due to high heat of actual cooking during measurement





After studying the fan efficiency system that was working, gMeter proved that the largest kitchen fan array was not working efficiently as it should. Upon further looking into the matter, it was found the fan efficiency variable drive system showed a fault on one controller along with the main controller being completely dead.





ENERGY CLOUD

Kitchen

Many opportunities found in the Kitchen

Evaporator Coil #1 and Coil #2 can be shut down at night. See Butcher area below for Evap. systems that can be shut off at night. No food is in this area at night and it's completely cleaned. Doors are opened to main kitchen area during cleaning.

These and other energy measures possibilities were found in the kitchen areas such as hood lights left on at night, office equipment and other items.

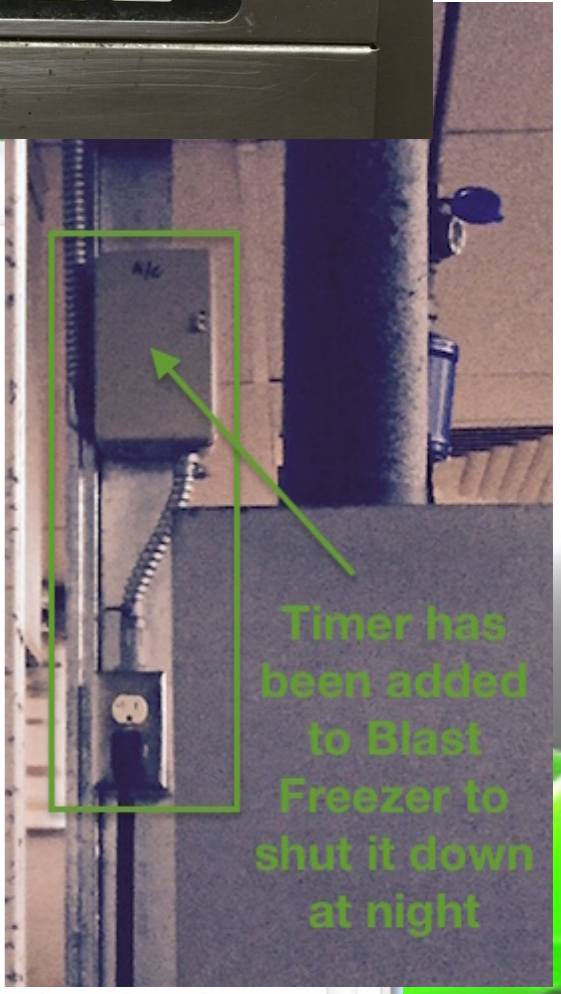
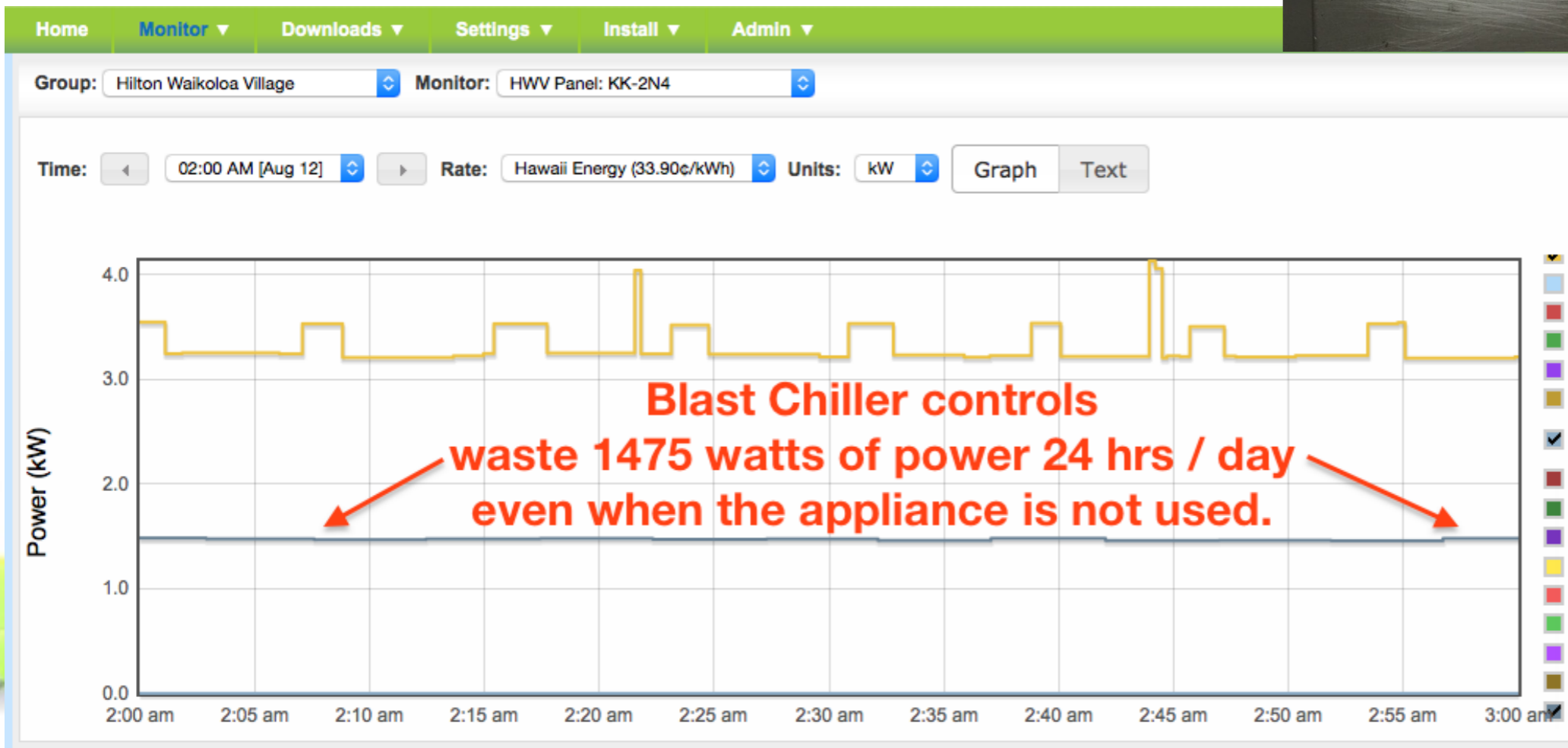




Kitchen

gMeter identifies inefficient equipment

gMeter can be used to benchmark / test commercial equipment. gMeter identified power inefficiency in the blast freezer appliance. Although the appliance should really only power when it's specifically being used, we found that the controls waste power 24 hours a day. Our energy plan included putting a power timer to force shut it off at night.



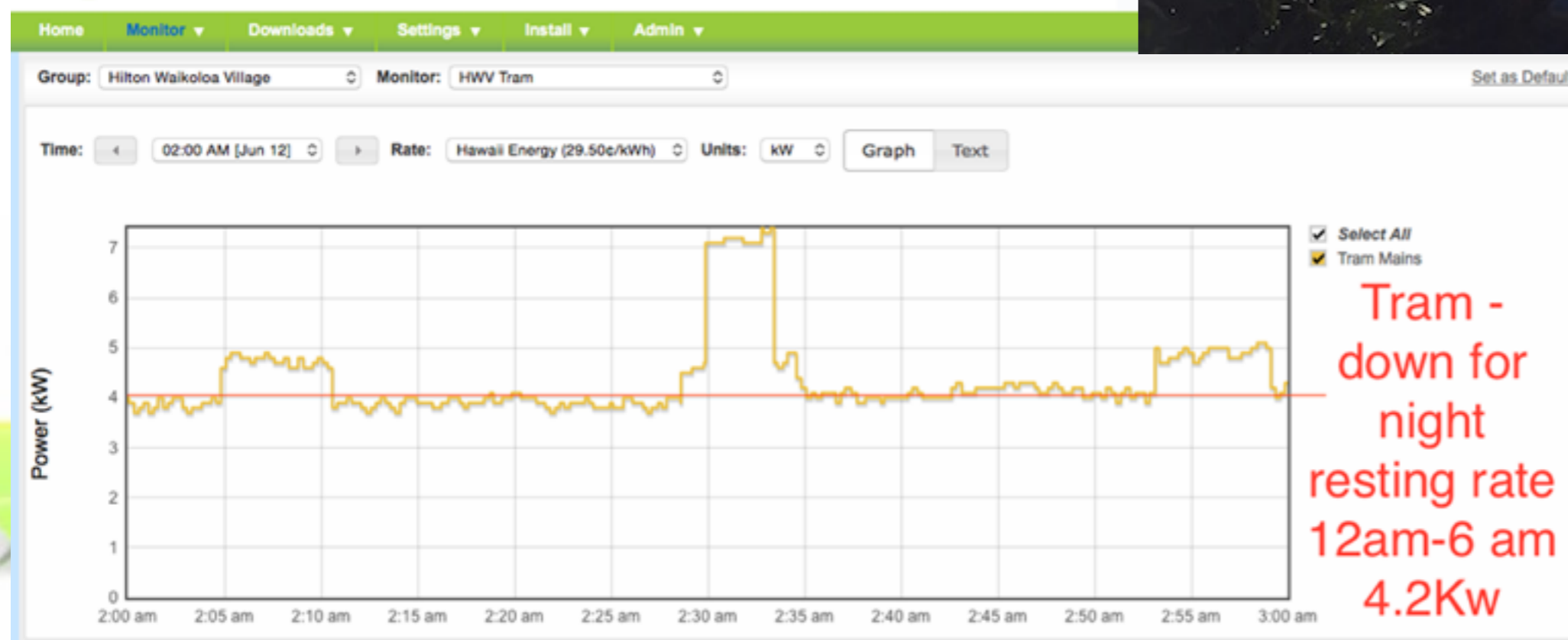


ENERGY CLOUD

Tram

Energy Cloud's gMeter®

gMeter helped measure different aspects of the Tram system from rest rates, normal operational run rates to system peaks. It also determined that the system still used 4.2 Kw every night even when the trams did not run. Management is evaluating shutting it down at night in consideration with cleaning crew operational considerations and air brake warm up periods for feasibility.





Tram

gMeter was used to help look for differences between the trains and other system details. We are still analyzing this and additional data such as differences in different legs of the train tracks.




	TRAM 1		TRAM 2		TRAM 3	
	Trip1	Trip 2	Trip1	Trip 2	Trip1	Trip 2
Leaving Ocean Tower						
Rest Rate Kw		32	23/27	12.7 26.5		
Peak Kw		71.3		55		
Average Kw	42	38.7	27.6-32	32	30	30-31.9
Arrive at Palace Tower	1m 21s	1m 21s	1m 20s	1m 20s	1m	1m 20s
Rest Rate Kw	18.7-33	24	14.4	14.7		16.2
Peak Kw	56.8	44	59	63		50*
Average Kw	36-29.7	37 24 21	38	23	23-25	32.6
Arrive at Convention Center	5m 15s	4m 35s	4m 15s	4m 2s	3m 40s	4m 8s
Rest Rate Kw	22.9	23.6	18.8	32		16
Peak Kw						65.8
Average Kw	42.3	26	36	38	32	35
Arrive at Lobby	6m 40s	6m 11s	5m 55s	5m 44s	5m 18s	5m 40s
Rest Rate Kw	23.2-31	21.8	19.1	19.7 28	5.5	10.6
Peak Kw		No Peak				39*
Average Kw	38	33.9	35.2		20	25
Arrive at Lagoon Tower	9m 25s	8m 47s	8m 15s	8m 7s	7m 30s	7m 56s
Rest Rate Kw	52-28	30			14.4	14.8-32
Peak Kw		46			55	47.4
Average Kw	30	34	42	24.6-37	28.9-33	21-37
Arrive at Lobby	13m	11m 52s	11m 40s	14m 22s	10m 10s	10m 40s
Rest Rate Kw		26.5		14.4	15.4	19
Peak Kw	40	67.6*				66.4
Average Kw	37	47 22	32.8		38.7	30
Arrive at Convention Center	15m 18s	13m 42s	13m 40s	16m 42s	11m 55s	12m 45s
Rest Rate Kw		16	18.6		11.1	19.6
Peak Kw	56.4	48	60			45
Average Kw	37	34		28.6	23.8-25.5	32-34
Arrive at Palace Tower	17m 55s	16m 32s	16m 20s	19m 22s	14m 35s	15m 20s
Rest Rate Kw	13.2	15.8		12		17.5
Peak Kw		63*				42.6
Average Kw	26	44.2	36-42	40-30	29-32	44
Arrive at Ocean Tower	19m 50s	18m 24s	18m 10s	21m 32s	16m 45s	17m 5s

Our consulting services found the Tram AC controls were controlled by the driver. After multiple stays at the property, we noticed customers were uncomfortable due to extremely cold settings being set by the drivers. Management removed control from the drivers setting it to a default resulting in more passenger comfort and potentially energy savings in the future. These retrofit measures was put in place starting on July 11th, whereas the tram was already using more energy in June than it was in May prior to the changes. Currently more energy is being used, we believe as a result of seasonal temperature peaks with July/August being the highs, but will study over time.

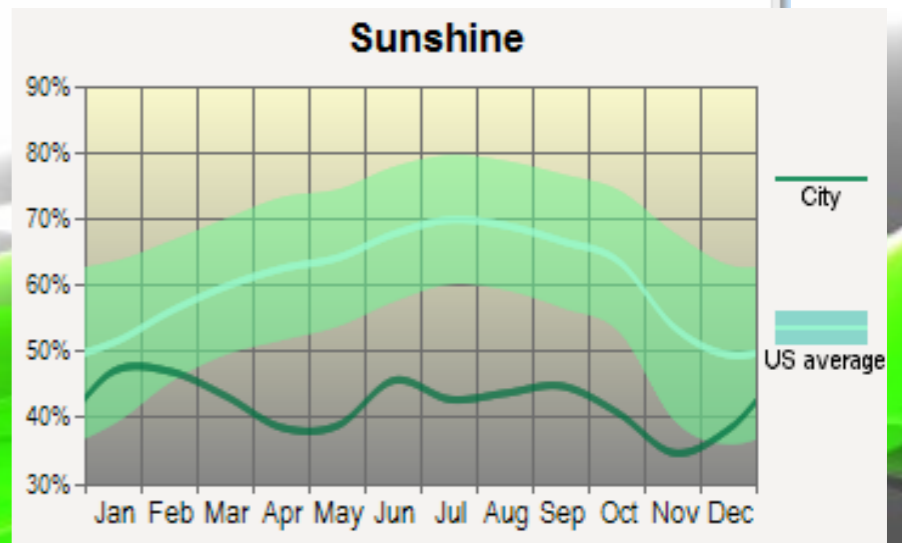
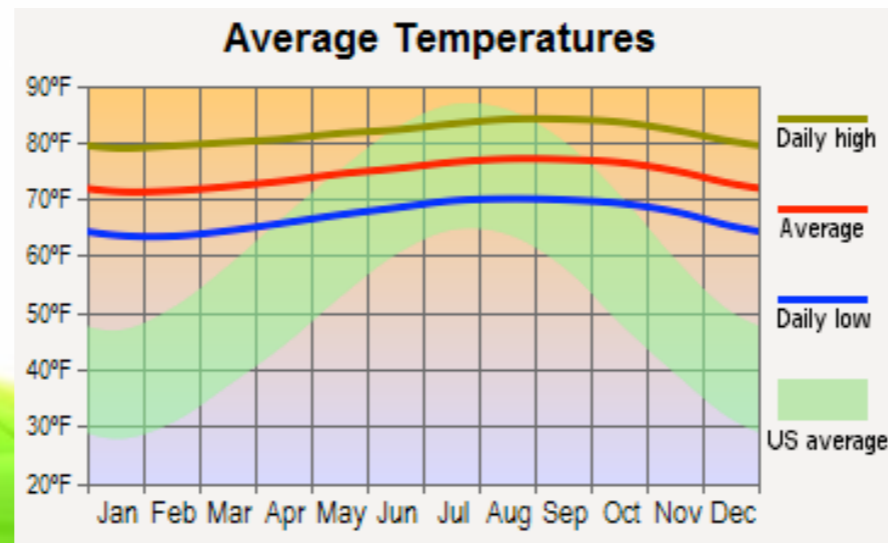
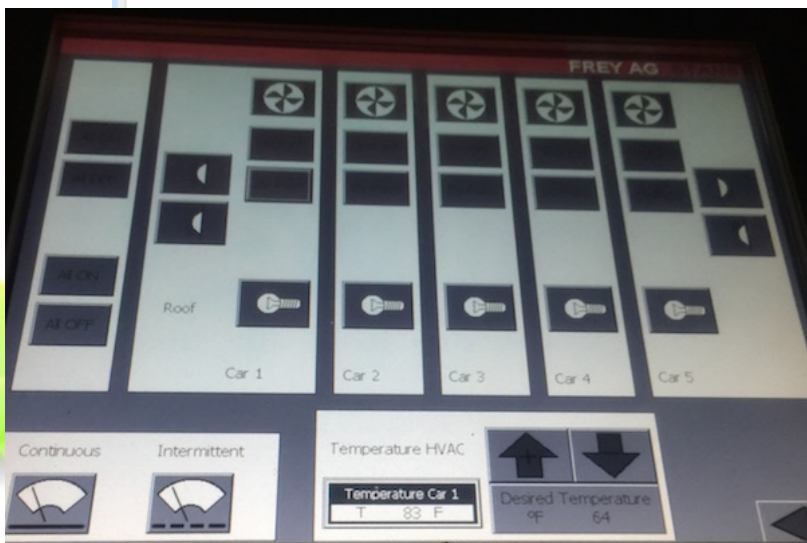
Group: Hilton Waikoloa Village Monitor: HWV Tram

Date: 10 May 2015 Compare Date: 10 Jul 2015

Energy Options



Energy Usage									
Channel	Total Energy (kWh)	Average Energy (kWh)	Average Power (kW) Used While Running	Actual Running Time	kVAh	Avg Day	\$	\$/Day	
10 May 2015 - 9 Jun 2015									
Tram Mains	30429.60	981.60	41.01	741 hours and 56 minutes	41312.25	1332.65	\$9052.81	\$292.03	
10 Jun 2015 - 10 Jul 2015									
Tram Mains	32804.10	1058.20	44.91	730 hours and 23 minutes	43860.79	1414.86	\$9759.22	\$314.81	
10 Jul 2015 - 9 Aug 2015									
Tram Mains	34746.75	1120.86	46.81	742 hours and 21 minutes	46410.90	1497.13	\$10337.16	\$333.46	



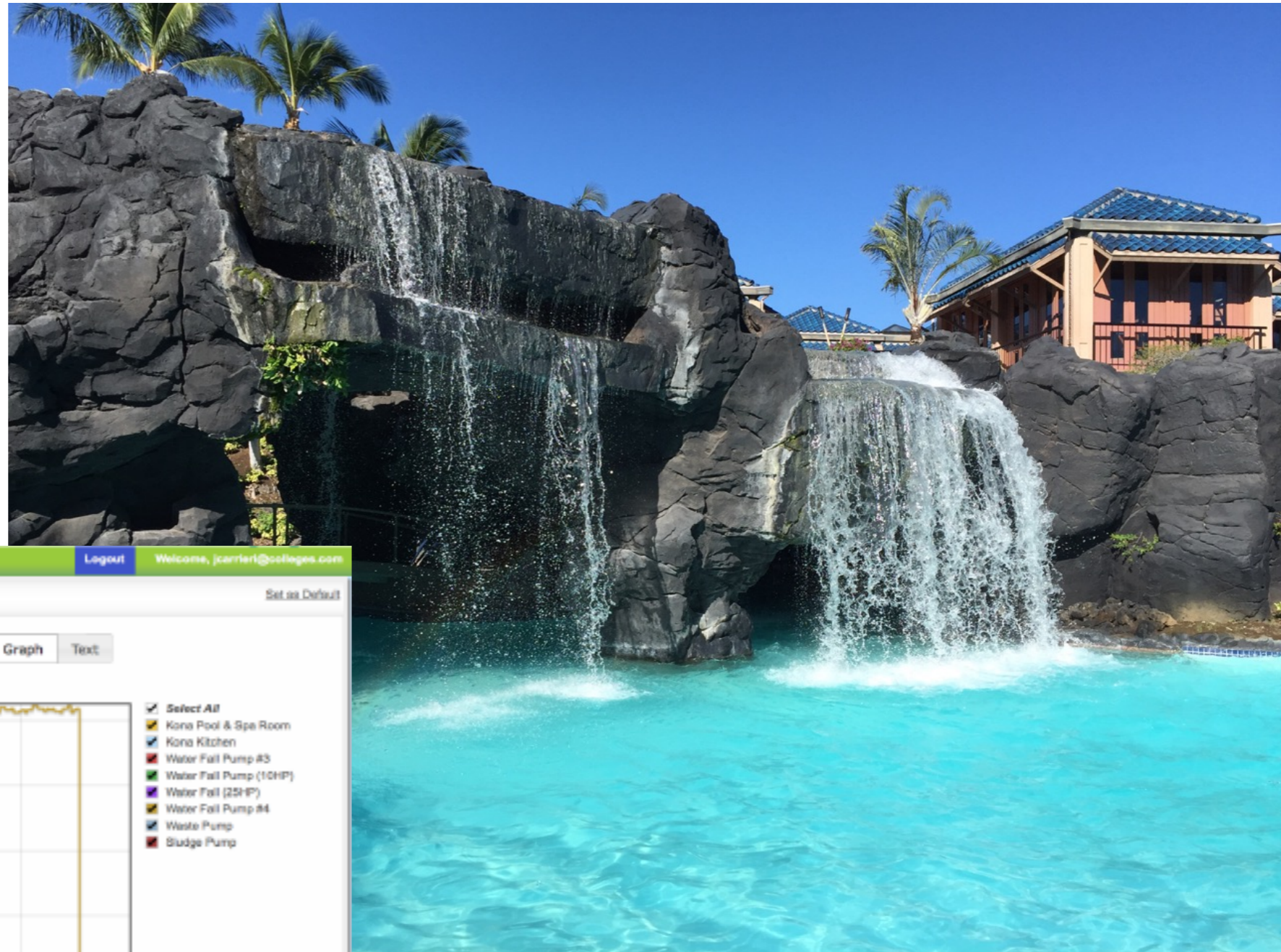


ENERGY CLOUD

Kona Pool

Waterfall adjustments

The Kona Pool Waterfall which uses 21 Kw when operational was turning off at approximately 11:55 pm each night. When analyzing this with gMeter we recommended that this particular fountain be scheduled to shut down at 10:30 pm, 30 minutes prior to when the pool closed at night which was 11 pm. It was further decided to turn it off when the slide shut off at 6 pm further saving energy but keeping it on all during the day during the guests' main pool activity period.





Kona Pool Waterfall adjustments

Home Monitor Downloads Settings Install Admin Logout Welcome, jcarrier@c

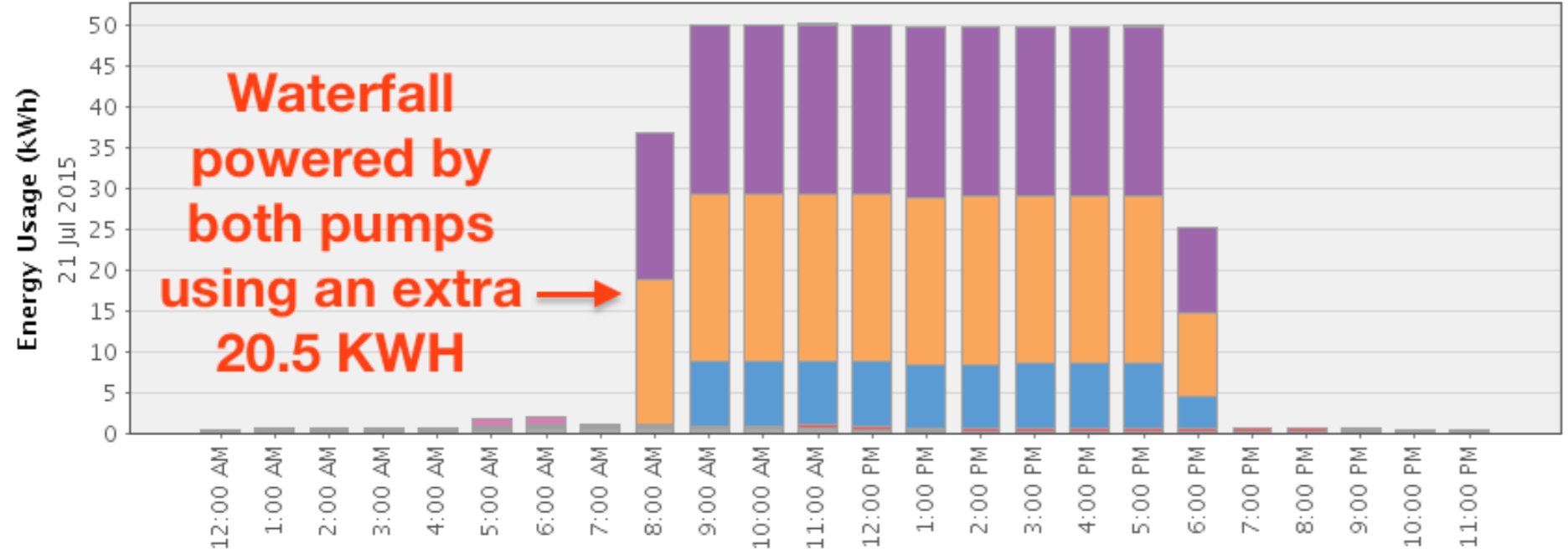
Group: Hilton Waikoloa Village Monitor: HWV Panel: LSB/4N

Date: 10 Aug 2015 Compare Date: 21 Jul 2015 Day Week Month Year Graph Text

Energy Options Temp Options



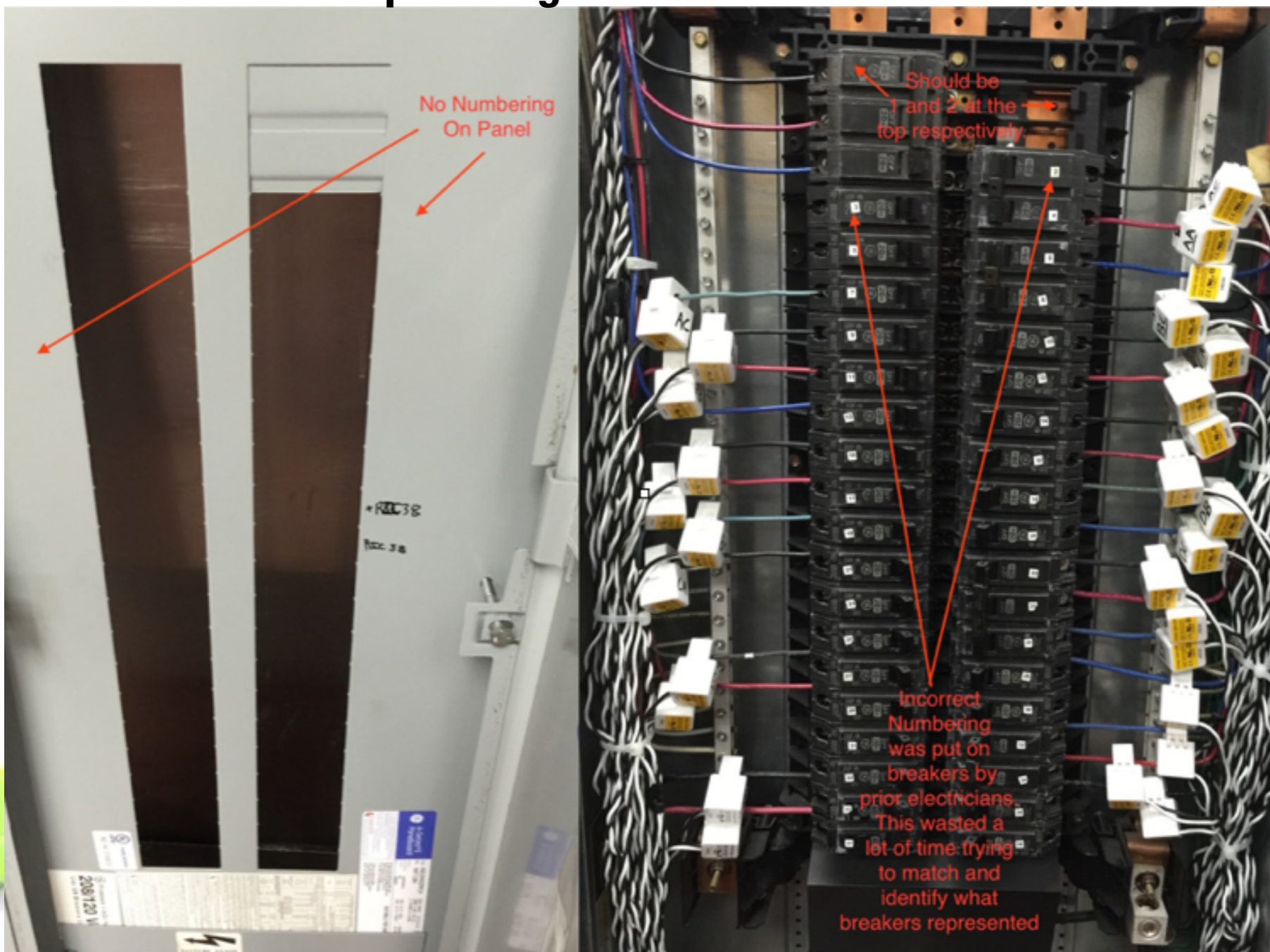
- Kona Pool & Spa Room
- Kona Kitchen
- Water Fall Pump #3
- Slide Pump
- Kona Water Fall 2nd Pump(25HP)
- Main Kona Water Fall Pump
- Waste Pump
- Sludge Pump



- Kona Pool & Spa Room
- Kona Kitchen
- Water Fall Pump #3
- Slide Pump
- Kona Water Fall 2nd Pump(25HP)
- Main Kona Water Fall Pump
- Waste Pump
- Sludge Pump

Fixed Mis-labeled KK-2N4 Panel

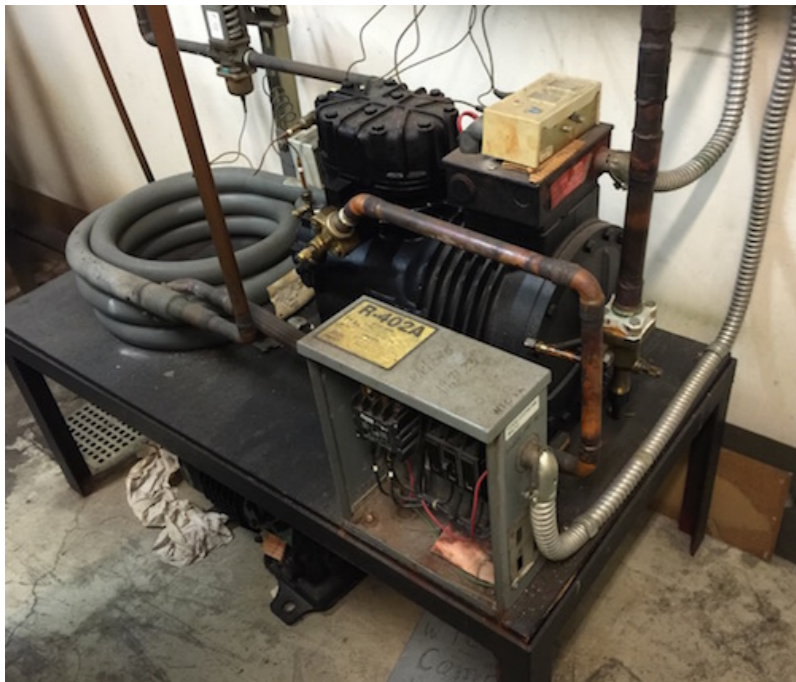
We found mis-labeled panels not to NEMA standards. This caused confusion and wasted time in trying to identify what breakers really represented. We properly labeled the panel itself and fixed the panel legend.





Did not make the plan

Evaluated all options on Chosen Panels



Our team looked at all elements of the panels that were measured. In some cases, vague labeling left us on a ghost hunt, as in the case of the “Back Room” which we thought might be dry storage but turned out to be a compressor for a walk in cooler that was separate from the main compressor banks. Also, this was the case for the “Tilt Scale” which was actually a walk in cooler. The important thing, is only items which can be proven and able to save energy made the plan. In some cases, areas that logically seemed to make sense such as the temperature reduction in the tram AC’s, but did not yet prove savings, were left out, as an example.

Areas Considered that did not work or were not feasible - Waikoloa Energy Savings Plan

Possible Energy Measures	Panel	Measure_type	Kwh Usage	Hours / Day / Saved	Kwh daily_savings	Price_per_kwh	Daily Savings	Average Monthly Savings	Annual Savings
D.A Feed Water (Not possible to shut off)	KSB-4N2	Schedule_time	4.86	8	38.88	0.339	\$13.18	\$400.89	\$4,810.82
Tilt Scale turned out to be Freezer. Not feasible	KK-2N4	Schedule_time	1.13	12	13.56	0.339	\$4.60	\$139.82	\$1,677.85
“Back Room” turned out to be WIC Compressor	KK-2N3	Schedule_time	0.575	10	5.75	0.339	\$1.95	\$59.29	\$711.48
Reduce Tram Cooling 1 Train (6am-8am)	TRAM	temp_adjustment	1	2	2	0.339	\$0.68	\$20.62	\$247.47
Reduce Tram Cooling 2 Trains (8am-11am)	TRAM	temp_adjustment	2	3	6	0.339	\$2.03	\$61.87	\$742.41
Reduce Tram Cooling 2 Trains (6pm-12pm)	TRAM	temp_adjustment	4	6	24	0.339	\$8.14	\$247.46	\$2,969.64
Reduce Tram add. inefficiencies (15kw diff)	TRAM	fix_to_normal_ops	15	2	30	0.339	\$10.17	\$309.33	\$3,712.05



Future Many Additional Areas for Savings



Home Monitor Downloads Settings Install Admin Logout Welcome, jcarrier@colleges.com

Group: Hilton Waikoloa Village Monitor: HWV Panel: BMR-4N Set as Default

Time: Live Rate: Hawaii Energy (29.50¢/kWh) Units: kW Graph Text

Channel	Watts	kVA	Power Factor	Voltage	Current (A)	Last Received
Air Handler-13 (Queen 4)	1337	2705	49%	277.10	3.20	7:28.27 AM
Air Handler-12A (Queens 5)	1859	3008	61%	277.40	3.60	7:28.33 AM
Air Handler-12 (Queen 6)	2	3	62%	277.00	0.00	7:28.18 AM
Air Handler-18 (South Arcade)	2046	3006	68%	277.50	3.60	7:28.31 AM
Air Handler-7A (Monarchy Konaslide)	6334	8575	73%	277.50	10.30	7:28.29 AM
Air Handler-20 (South PreCool)	3555	3896	91%	277.40	4.60	7:28.30 AM
Lights - Mech Room	0	3	12%	278.20	0.00	7:28.28 AM
Lights - BMR Elec. Room	0	9	18%	277.30	0.00	7:28.28 AM

Energy Voltage / Current All

