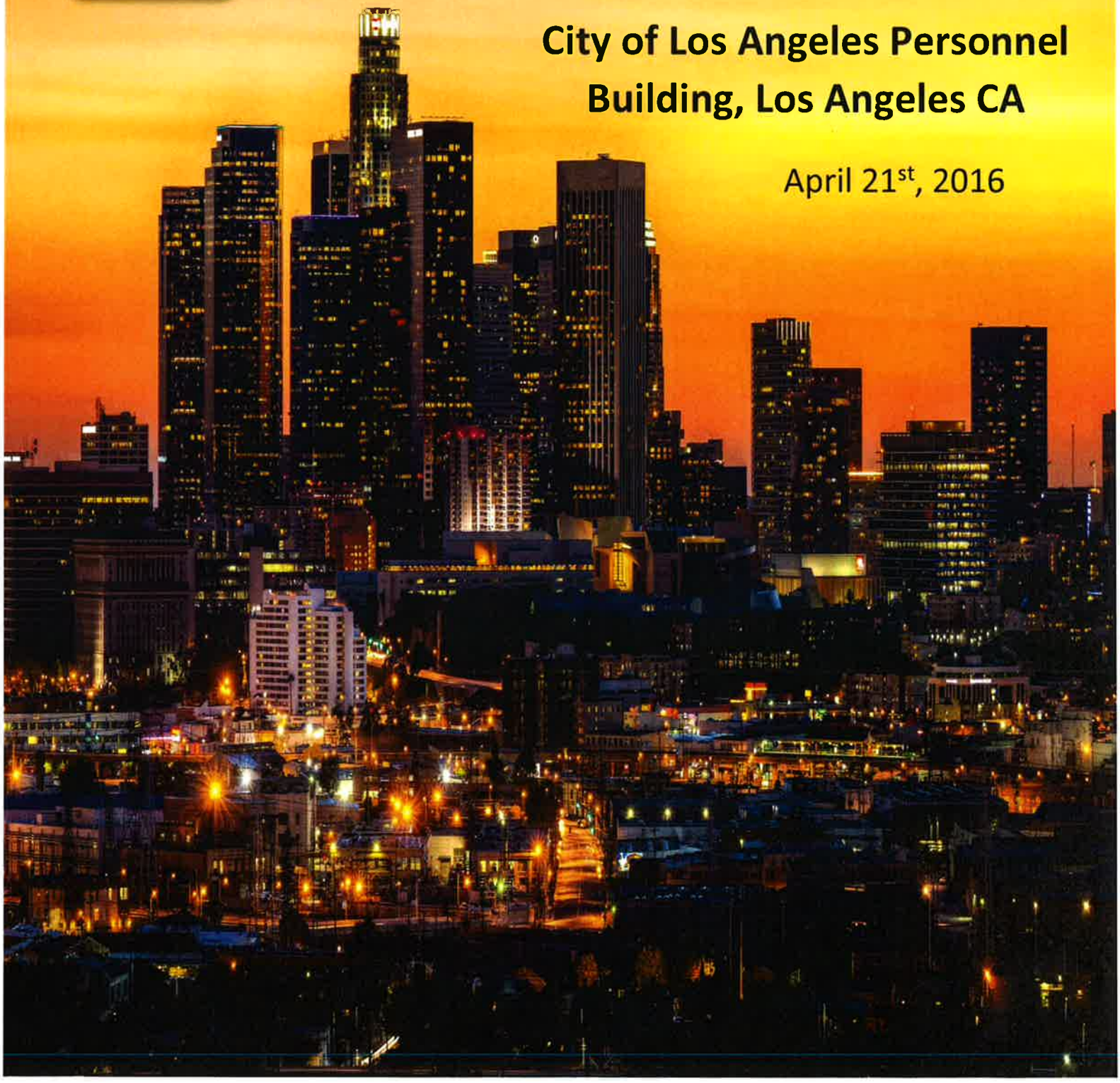
Cold Plus® Performance Report

PERFORMANCE SOLUTIONS INTERNATIONAL

City of Los Angeles Personnel Building, Los Angeles CA

April 21st, 2016



Cold-Plus® Testing Analysis and Report of Findings
Personnel Building, City of Los Angeles
April 21, 2016

Executive Summary

In collaboration with the City of Los Angeles, Daniel Rodriguez and his engineering team, EMCOR Mesa Energy and MelRok, the following data was collected and analyzed from two (2) rooftop packaged HVAC units located at the personnel building in Los Angeles, CA.

The data compares energy efficiency prior to and after the implementation of Cold Plus®. Data was collected at 1 minute intervals for over one month prior to the installation and has continued to be monitored through date of publication.

The conclusions are a clear efficiency improvement on both units with a combined 16% reduction in electrical consumption that can be directly attributed to the installation of Cold Plus®. Once injected, Cold Plus® caused a more efficient flow of the refrigerant and more efficient transfer of the cooling through the cooling system. This in turn resulted in less compressor usage per degree of cooling and, particularly at peak periods, supports the manufacturer's claim of significant energy savings and extension of life of the equipment after the injection of Cold-Plus®.

Executive Financial Summary

- Project Capital Cost: $2335
- Project Annual Savings: $1894.88
- ROI: 1.23 Years

Ancillary Benefits

- Reduced Maintenance of Refrigeration System
- Extended Life of Equipment
- *Water Consumption Reduction (Approximately 3790 Gallons of Water Saved*)*

*NREL/TP-550-33905 Reports National Weighted Average of Water Used /kWh Consumed

1. Introduction & Project Overview:

Melrok conducted a performance test of the Cold Plus® product on two packaged rooftop units (RTU) located on the City of Los Angles Personnel Building. The goal was to determine the energy impact of installing Cold Plus® in each of the 30 ton RTU's as described below:

- Unit AC1 Carrier Comfortlink Model 48/50Z030-105, 30 Ton RTU
- Unit AC2 Carrier Comfortlink Model 48/50Z030-105, 30 Ton RTU

2. Equipment Used:

Cold Plus hired EMCOR (Mesa Energy Systems Division) to install the following equipment:

- MelRok Precision MultiMeter and CT's
- MelRok Advanced Energy Router
- Supply Air Enthalpy Sensors
- Return Air Enthalpy Sensors
- Mixed Air Enthalpy Sensors
- Outside Air Enthalpy Sensors

3. Methodology:

- Baseline measurements of all sensors were recorded every minute for 32 days prior to installing Cold Plus using hours of 10am-6pm as instructed, M-F
- Raw Data results were analyzed
- Data was weather normalized by cooling degree hours
- Baseline electrical consumption was compared with the temperature difference between mixed air and supply air to determine the correlation
- Post installation data comparison used the month of February 10am-6pm, M-F

4. Results:

- Weather normalized data shows a ***16% efficiency improvement*** of Both AC1 & AC2 **(See Chart A1)**
- $.014 blended cost used for electricity /kWh
- 2 Hours and 1 Truck roll was used for total Labor calculation ($175/hr & $65 Truck)
- Individual Units Labor was calculated on 1 Hour Labor and 1 Truck roll/ea
- ***Combined ROI results of 1.23 years***
- ***AC1 results*** **(See Chart A2)** showed a ***24% efficiency improvement*** but ran less hours and therefore had longer ***ROI results of 1.8 years***
- ***AC2 results*** **(See Chart A3)** showed a ***14% efficiency improvement*** running more hours and therefore had shorter ***ROI results of .98 years***

Chart A1 AC1 & AC2 Combined Results:

Pre Daily Average	316.822	kWh	% Change
Post Daily Average	264.76492	kWh	16%
Average Daily Savings	52.05708	kWh	
Cost/kWh	0.14		
Daily Savings	$ 7.29		
Annualized Savings	$ 1,894.88		
Cost of Cold Plus	$ 1,920.00		
Estimated Labor	$ 415.00		
Total Project Estimate	$ 2,335.00		
ROI	1.23	Years	

Chart A2 AC1 Results:

Pre Daily Average	75.7	kWh	% Change
Post Daily Average	57.4	kWh	24%
Average Daily Savings	18.3	kWh	
Cost/kWh	$ 0.14		
Daily Savings	$ 2.56		
Annualized Savings	$ 666.12		
Cost of Cold Plus	$ 960.00		
Estimated Labor	$ 240.00		
Total Project Estimate	$ 1,200.00		
ROI	1.80	Years	

Chart A3 AC2 Results:

Pre Daily Average	241.122	kWh	% Change
Post Daily Average	207.36492	kWh	14%
Average Daily Savings	33.75708	kWh	
Cost/kWh	$ 0.14		
Daily Savings	$ 4.73		
Annualized Savings	$ 1,228.76		
Cost of Cold Plus	$ 960.00		
Estimated Labor	$ 240.00		
Total Project Estimate	$ 1,200.00		
ROI	0.98	Years	

Being the bulk of the consumption was consumed in AC2, we have attached the detailed reports of the complete analysis for AC2:

MelRok Energy IoT™

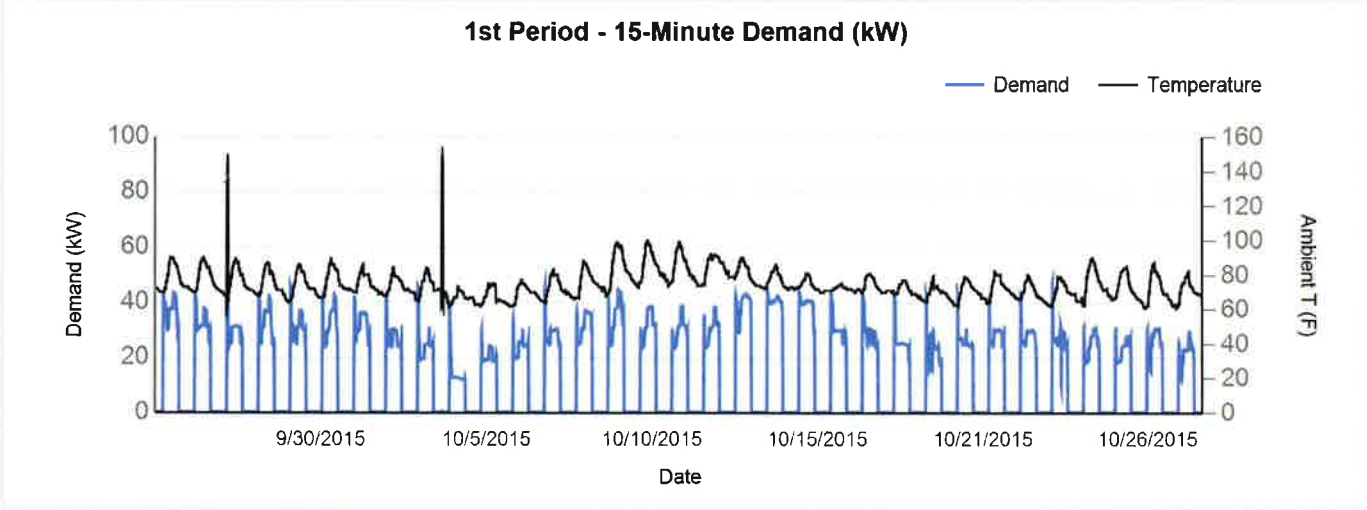
AC 2

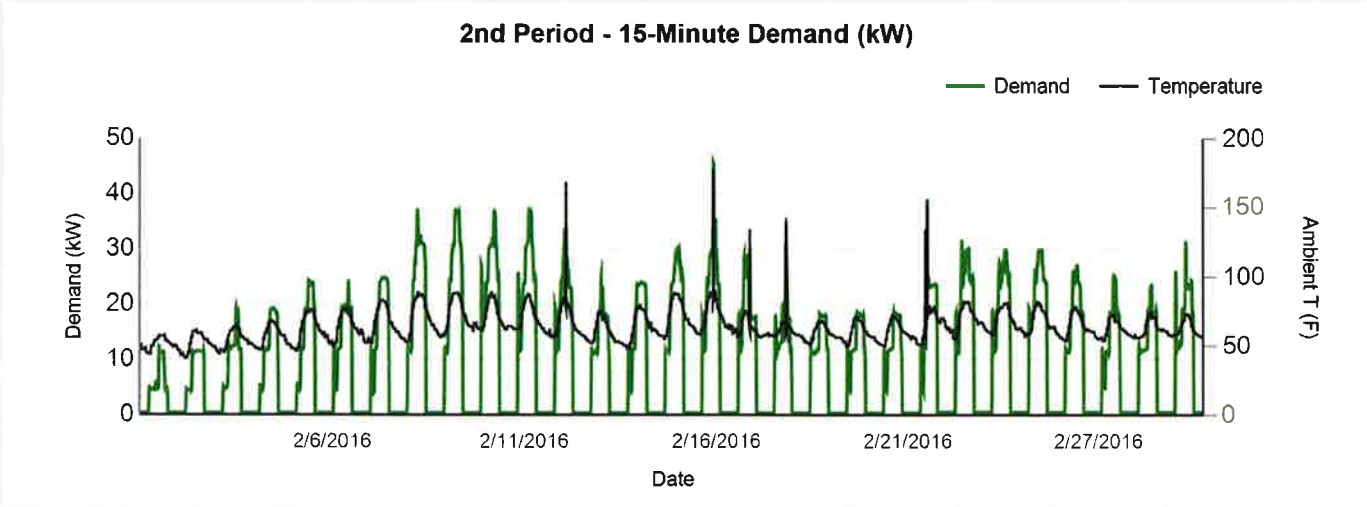
Measurement & Verification Report

LA City RTU2 Cold Plus

Summary (Filters: Weekdays, Hours: 10:00 – 18:00)								
	Start Date	End Date	Daily kWh	Peak kW	Daily kWh Cost ($)	Peak kW Cost ($)	Blended Cost ($)	Calc. Blended Rate ($/kWh)
1st Period	9/25/2015	10/27/2015	240.6	44.7	24	536	34	0.20
2nd Period	2/1/2016	2/29/2016	172.0	37.1	17	445	24	0.22
Change			-68.6	-7.6	(7)	(91)	(10)	0.03
% Change			-28.5	-17.0	(29)	(17)	(29)	13.38

Project Inputs			Estimated ROI (Days)	
Energy Cost ($/kWh)	Peak Demand Charge ($/kW)	Project Cost ($)	Based on kWh Rate	Based on Blended Rate
$0.10	$12.00	$1,200	175	125





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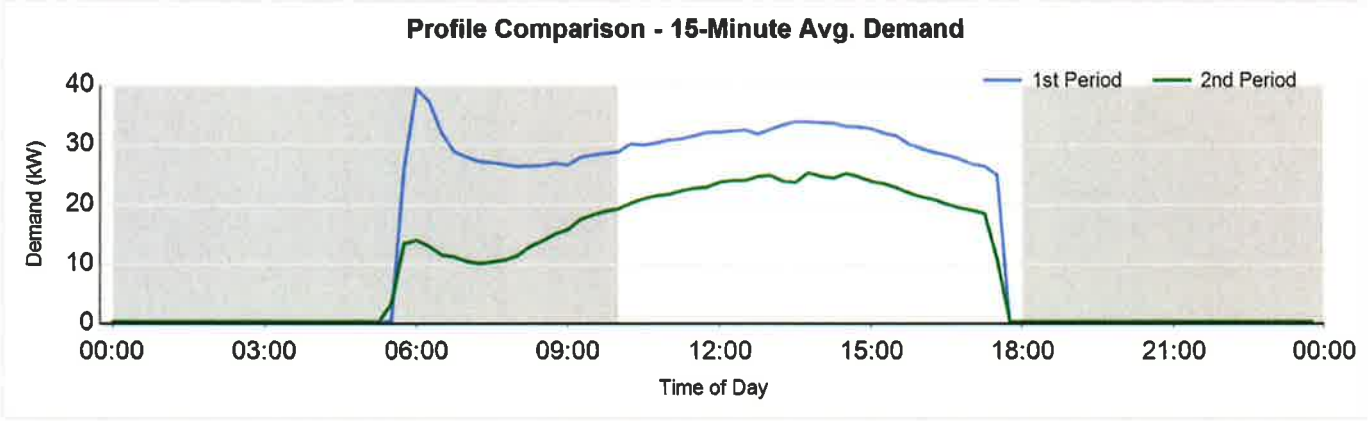
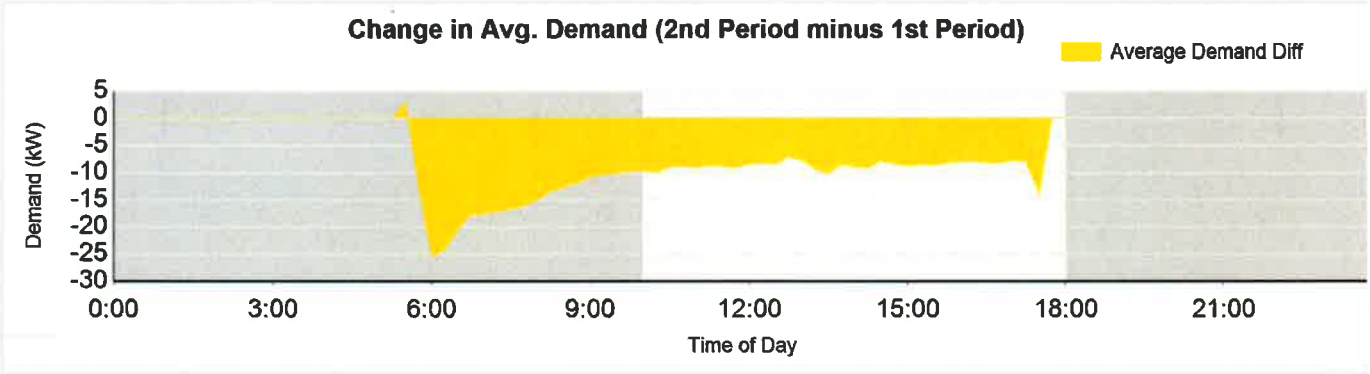
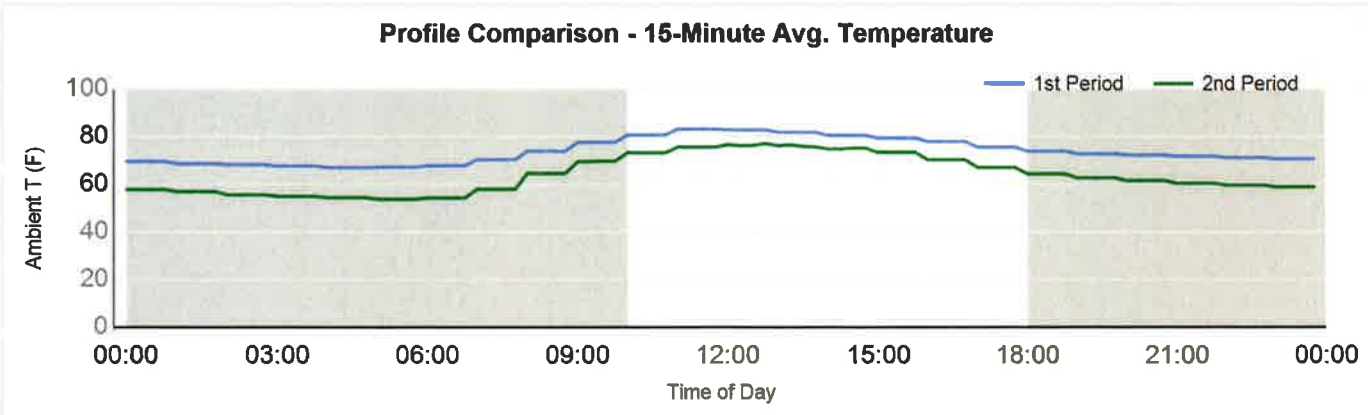
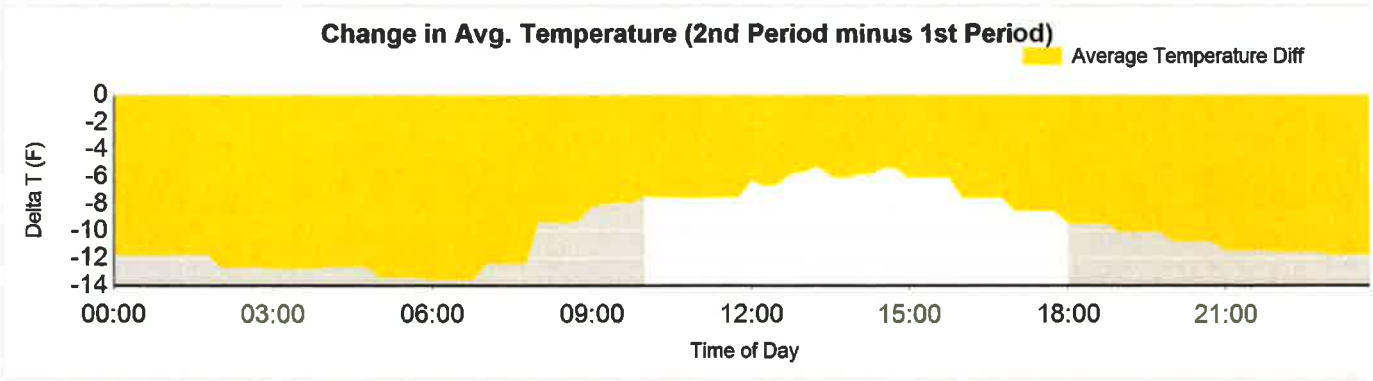
LA City RTU2 Cold Plus









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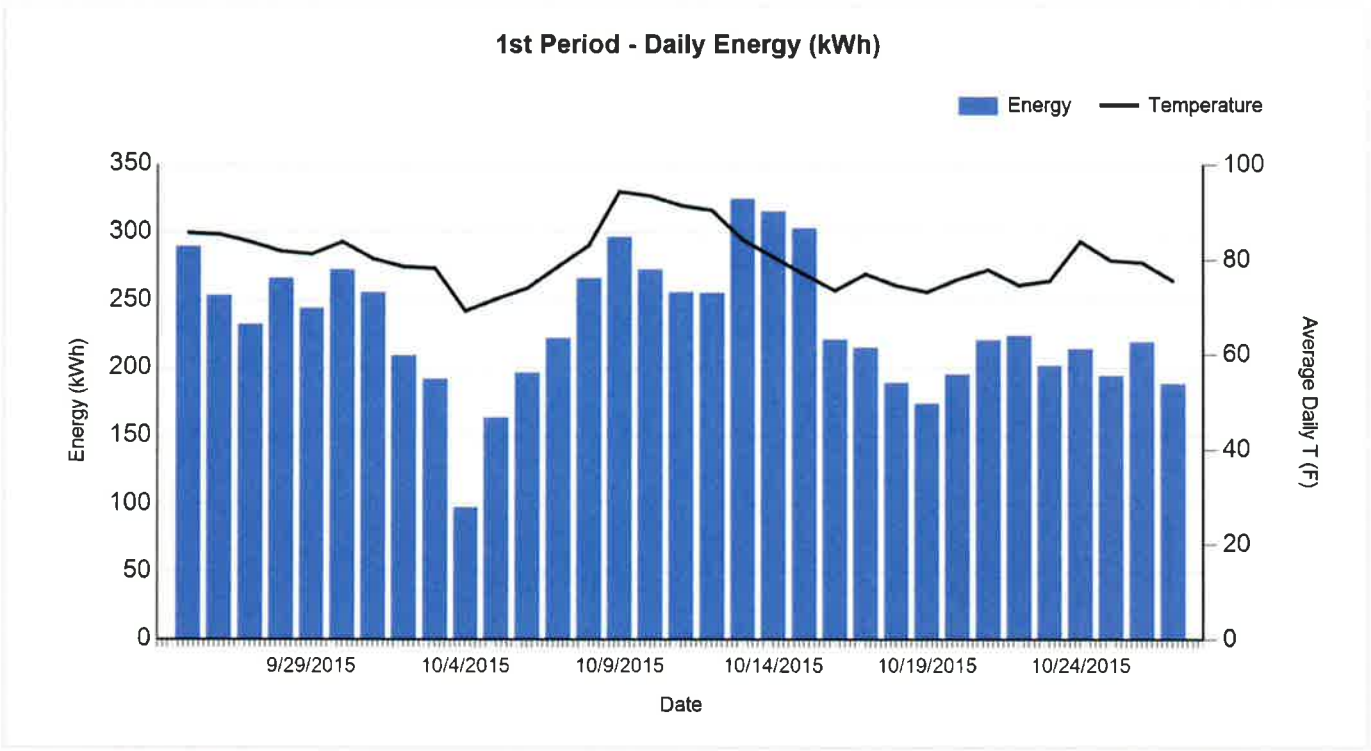

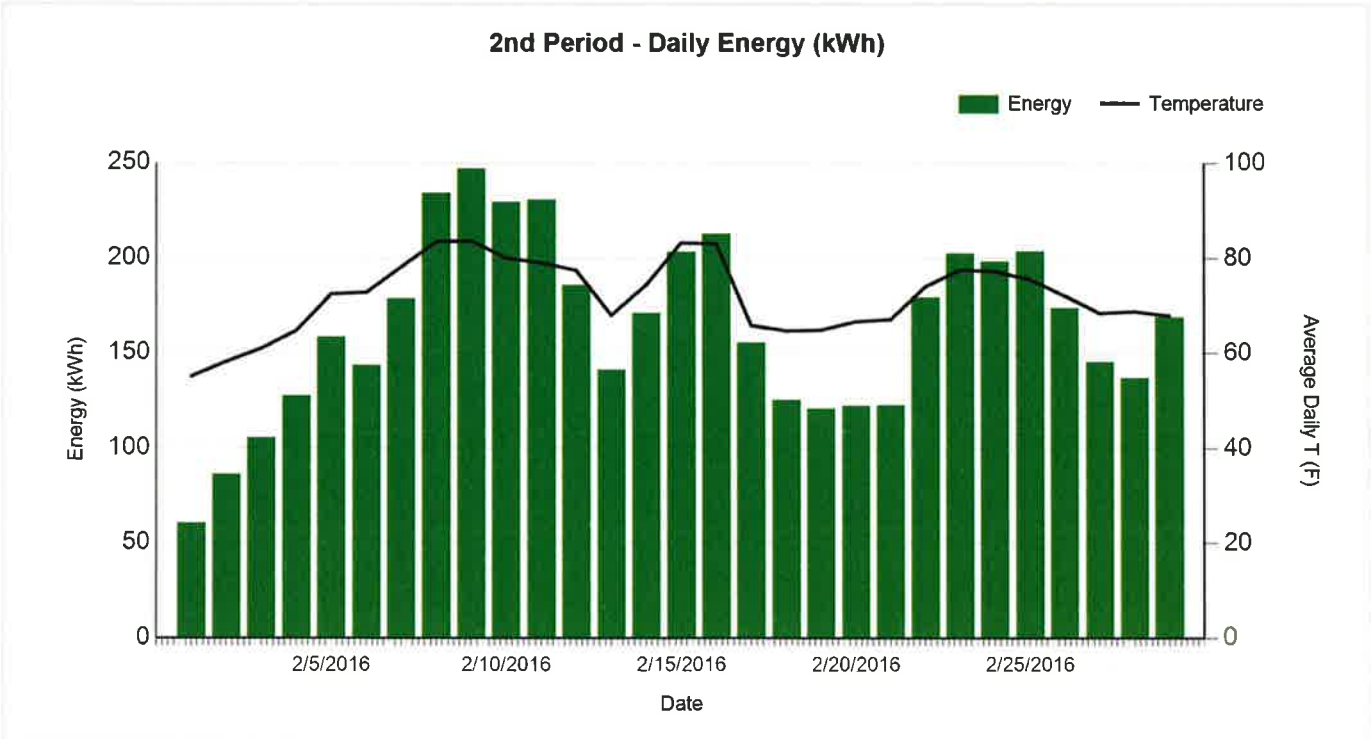

MelRok Energy IoT™

AC 2

Measurement & Verification Report

LA City RTU2 Cold Plus

Observations - Daily Data - Summary (Filters: Weekdays, Hours: 10:00 – 18:00)

Pre Period: Poor correlation observed between Energy and Temperature

Post Period: Strong correlation observed between Energy and Temperature

Temperature-Normalized Energy Baseline

Baseline Equation	R^2
Pre Period: Energy = 5.81 * Temperature + -221.9	0.50
Post Period: Energy = 5.68 * Temperature + -239.3	0.93

Chage In Normalized Energy Baseline (2nd - 1st)

% Change at Low T	% Change at High T
-14 %	-11 %