THE MADISON ENERGY GROUP

SOLUTIONS FOR A GREENER, BETTER FUTURE

Case Study:

GPM Investments C-Stores
Richmond, Virginia
Performed February 2017

Tech: EnerG² and IntelliHVAC

5 W. Hargett St. | 4th Floor | Raleigh, NC 27601 | 919-443-2404 | www.themadisonenergygroup.com

THE MADISON ENERGY GROUP
SOLUTIONS FOR A GREENER, BETTER FUTURE

The Company:

GPM Investments, LLC, or GPM, is the largest privately-owned company in the convenience store channel of business, operating or supplying fuel to more than 1,000 stores in a total of 18 states. The company, based in Richmond, VA, operates or supplies stores in Connecticut, Delaware, Illinois, Indiana, Iowa, Kentucky, Maryland, Michigan, Missouri, Nebraska, New Jersey, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee and Virginia.

The Project:

Madison Energy worked with GPM to reduce energy consumption in their HVAC and walk-in refrigeration systems utilizing their proprietary technologies; EnerG² for the walk-in coolers and freezers and IntelliHVAC for the HVAC units. A pilot program was completed using Time of Use and EKM data logging equipment and data was analyzed by third party engineers at HMS Engineering Ltd. and Tower Engineering.

EnerG² reduces energy consumption and compressor cycles in walk-in coolers and freezers by providing a more accurate means of temperature measurement through a specialized gel compound that simulates the food product temperature instead of the air temperature which fluctuates with more volatility. It retrofits to the existing thermostat air probe and requires no additional maintenance.

Guaranteed to Reduce Energy Costs 15 – 30%
Reduces Compressor Cycles by 40 – 60%
Prevents Wear and Tear
Extends Life of Equipment
12 Month ROI
Green Restaurant Associated Endorsed
Reduced CO2 Emissions – Go Green!
Lifetime Warranty

EnerG² is a device that was developed by The Madison Energy Group and contains a non-toxic, food safe gel compound that has similar thermal properties to that of food and beverage. It is therefore, not subject to the same wider and more volatile standard of deviation in temperature that air is. The technology of EnerG² is based on the fact that food and beverage products contain significantly differently thermal properties than air. This means that their temperatures rise and fall at different rates and at different intervals. This causes inefficiency in operation because typical measurement is of the environment (air) and not the actual food and beverage product. Air, having very little density, fluctuates with more volatility thereby causing the coolers to engage in cooling cycles unnecessarily, while EnerG² simulates the stable temperature curve of food product and allows the cooler to operate only when it needs to.

When applied, EnerG² easily retrofits over the external air probe in commercial coolers and freezers and converts the temperature measurement from the ambient air temperature to that of food and beverage temperature. We are now measuring the *intended target of measurement* of food and beverage temperature instead of the immediate environment surrounding the thermostat. This creates an inherently more efficient scenario and results in an average energy reduction of 15-30%. EnerG² is also effective at reducing carbon emissions by several thousand pounds annually. It also increases food safety by maintaining more stable temperature ranges and reduces maintenance costs on equipment by minimizing unnecessary compressor cycles.

HMS Engineering Ltd.

Phillip Stewart

Engineering Consultant

Background and Qualifications for Energy Analysis

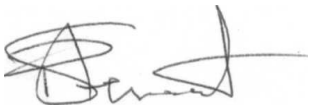
Mr. Stewart joined the US Military in 1982 and became a marine engineer involved with mechanical, electrical and structural engineering. After completing his military tour in 1990, he was recruited by Walt Disney World as a Control Specialist and Engineer. During that period Mr. Stewart became extremely interested in energy management systems. After opening Pleasure Island, MGM Studios, Disney Vacation Club, he realized that it was time for new growth in my life and joined Florida's largest Service Company BGSI. Mr. Stewart became certified as a Master Engineer for Refrigeration and Food Equipment.

After years of international endeavours Mr. Stewart entered semi-retirement where he established his consulting company, HMS Engineering Ltd. (HMS), based in Montego Bay, Jamaica in 2007.

As a Chief Engineer, Renewable Energy Consultant and Food Equipment expert, he continues to educate and assist many large companies on ways to reduce their energy consumption and increase their bottom line profits. Companies he has supported over years include Sandals, Couples Resorts, Montego Bay Convention Centre, KFC, Wendy's, Burger King, Moes, Margaritaville, and many others.

The attached Baseline/Performance Test Report was prepared by Mr. Stewart and all findings are based on analysis of the raw data logger information collected onsite and provided to him. I certify that neither I nor my company (HMS Ltd.) ever receive any compensation which correlates in any manner whatsoever to test report results and that the referenced report findings are accurate and unbiased.

Phillip Stewart



Chief Engineer
HMS Engineering Ltd.
Referenced Report No. GPM21217 Dated 2/12/2017

EnerG^2 Proof of Concept Protocol

Purpose: Demonstrate **EnerG^2** performance on walk-in cooler and freezer units at multiple pre-determined locations.

Sizing Protocol:

1. Measure baseline (before) performance
2. Install **EnerG^2**
3. Measure **EnerG^2** (after) performance

Measurement: Before/after measurement of:

1. Energy usage (kilowatt hours)
2. Compressor starts/stops (run time)
3. Amps
4. Volts
5. Kilowatts

Procedure:

1. Measure Baseline Data
    a. Stable Refrigeration Unit
        i. Identify walk-in cooler/freezer unit
        ii. Ensure unit is operating properly (normal duty cycle, no visible ice, reaches set point)
        iii. Ensure thermostat bulb is accessible (no evaporator/pressure units)
        iv. Ensure compressor motor is accessible for data logger connection
        v. Record refrigeration Information: Type, Mfg, Model #
    b. Compressor Power Source
        i. At the compressor
            - Single phase (hot lead)
            - 3 Phase (1 of 3 hot leads)
        ii. Locate power rating (amperage/voltage) on compressor nameplate
        iii. Record on datasheet; Phase, Volts and Amps
        iv. Record pilot start date/time on datasheet
    c. Record Baseline Data
        i. Attach Dent TOU CT Logger around hot lead to record total run-time as well as compressor cycle (”on/off”) data
        ii. Record Baseline Data – 7 days
        iii. Validate baseline data

2. Measure Performance Data
    a. Install **EnerG^2** over thermostat air probe
    b. Record **EnerG^2** start date/time
    c. Record Performance Data – 7 days
    d. Validate Performance Data
    e. Record pilot ending date/time
    f. Analyze results
    g. Present results

HMS Engineering Ltd.

Customer : The Madison Energy Group
5 Hargett St., 4th Floor
Raleigh, North Carolina, USA
27601

Report Print Date: 12-Feb-17

Report No.: GPM21217

Facility / Location: GPM - Store 3324 (Oleander Dr, Wilmington, NC)

Room/Equip. Tested: Walk-in Cooler

Calculation Basis

Compressor Motor: HP: 0.3 Volts: 230 RLA: 8.0 Phase: 3

Power Consumption: 2.84 kW Electricity Rate: $0.10 per kWh

Operating Basis

	Actual (Without E²)	With E²	Change	% Change
Projected Run Hours / Yr:	6,812	5,536	-1,276	-18.7%
Projected Cycles / Yr:	13,082	6,222	-6,860	-52.4%

Energy Use & Cost Savings per Month

	Actual (Without E²)	With E²	Change	% Change
Operating Hours / Month:	568	461	-106	-18.7%
KWh / Month:	1,612	1,310	-302	-18.7%
Energy Cost / Month	$161	$131	-$30	-18.7%

Mechanical Cost Savings per Month

	Actual (Without E²)	With E²	Change	% Change
Cycles / Month:	1,090	519	-572	-52.4%
Compressor Maintenance Cost/ Month:	$42	$20	-$22	-52.4%

Combined Energy and Mechanical Cost Savings

	Actual (Without E²)	With E²	Change	% Change
Energy & Mechanical Cost / Month:	$203	$151	-$52	-25.7%
Energy & Mechanical Cost / Year:	$2,435	$1,810	-$625	-25.7%

SMARTware 11 - [Data Download]

File Edit View Logger Tools Data Window Help

Summary

...GPM Store 3324.log (CT15110067)

Data File Name:	CT15110067 GPM Baseline (*saved*)
Logger Serial Number:	CT15110067
Description:	DENT SMART LOGGER
Logger Reset:	1/24/2017 12:00:00 PM
Elapsed Time Since Reset:	168.00 hrs
On-Time Since Reset:	130.67 hrs
Percent On Since Reset:	77.76%
Connected Load:	No Load Defined
Energy Cost:	Unknown
Data Starts:	1/24/2017 12:00:00 PM
Data Ends:	1/31/2017 12:00:00 PM
Data Elapsed Time:	168.00 hrs
Estimated Annual Hours On:	6812 hrs
Number of Turn Ons:	252
Percent On:	77.76 %
Data On-Time:	130.64 hrs
Average On-Time:	.02 hrs
Longest On-Time:	1.14 hrs
Shortest On-Time:	<0.01 hrs
Number of Turn Offs:	253
Percent Off:	22.24 %
Data Off-Time:	37.33 hrs
Average Off-Time:	.22 hrs
Longest Off-Time:	1.24 hrs
Shortest Off-Time:	< 0.01 hrs

SMARTware 11 - [Data Download]

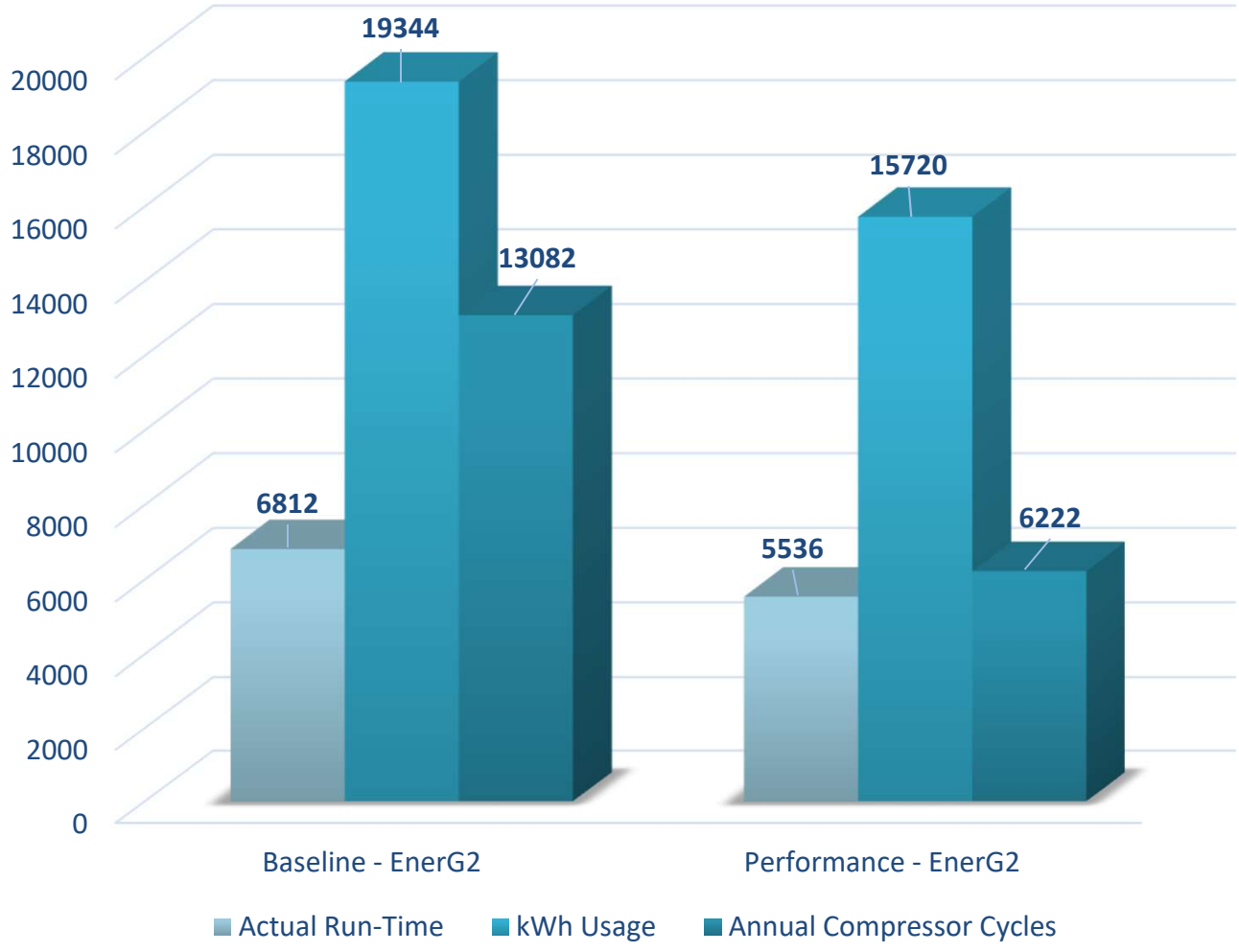
File Edit View Logger Tools Data Window Help

Summary

...GPM Store 3324.log (CT15110067)

Data File Name:	CT15110067 GPM Performance (*saved*)
Logger Serial Number:	CT15110067
Description:	DENT SMART LOGGER
Logger Reset:	1/24/2017 12:00:00 PM
Elapsed Time Since Reset:	168.00 hrs
On-Time Since Reset:	106.16 hrs
Percent On Since Reset:	63.19%
Connected Load:	No Load Defined
Energy Cost:	Unknown
Data Starts:	1/31/2017 12:00:00 PM
Data Ends:	2/7/2017 12:00:00 PM
Data Elapsed Time:	168.00 hrs
Estimated Annual Hours On:	5536 hrs
Number of Turn Ons:	120
Percent On:	63.19 %
Data On-Time:	106.16 hrs
Average On-Time:	.03 hrs
Longest On-Time:	.10 hrs
Shortest On-Time:	<0.01 hrs
Number of Turn Offs:	121
Percent Off:	36.81 %
Data Off-Time:	61.84 hrs
Average Off-Time:	.82 hrs
Longest Off-Time:	2.60 hrs
Shortest Off-Time:	< 0.01 hrs

CT15110067 Data Graph Series| Store 3324



HMS Engineering Ltd.

Customer : The Madison Energy Group
5 Hargett St., 4th Floor
Raleigh, North Carolina, USA
27601

Report Print Date: 12-Feb-17

Report No.: GPM21217

Facility / Location: GPM - Store 3730 (Carolina Beach Rd, Wilmington, NC)

Room/Equip. Tested: Walk-in Cooler

Calculation Basis

Compressor Motor: HP: 0.3 Volts: 230 RLA: 8.0 Phase: 3

Power Consumption: 2.84 kW Electricity Rate: $0.10 per kWh

Operating Basis

	Actual (Without E²)	With E²	Change	% Change
Projected Run Hours / Yr:	6,991	5,743	-1,248	-17.9%
Projected Cycles / Yr:	13,525	6,788	-6,737	-49.8%

Energy Use & Cost Savings per Month

	Actual (Without E²)	With E²	Change	% Change
Operating Hours / Month:	583	479	-104	-17.9%
KWh / Month:	1,655	1,359	-295	-17.9%
Energy Cost / Month	$165	$136	-$30	-17.9%

Mechanical Cost Savings per Month

	Actual (Without E²)	With E²	Change	% Change
Cycles / Month:	1,127	566	-561	-49.8%
Compressor Maintenance Cost/ Month:	$42	$21	-$21	-49.8%

Combined Energy and Mechanical Cost Savings

	Actual (Without E²)	With E²	Change	% Change
Energy & Mechanical Cost / Month:	$207	$157	-$50	-24.3%
Energy & Mechanical Cost / Year:	$2,485	$1,882	-$603	-24.3%

SMARTware 11 - [Data Download]

File Edit View Logger Tools Data Window Help

Summary

...GPM Store 3730.log (CT14040059)

Data File Name:	CT14040059 GPM Baseline (*saved*)
Logger Serial Number:	CT14040059
Description:	DENT SMART LOGGER
Logger Reset:	1/24/2017 12:00:00 PM
Elapsed Time Since Reset:	168.00 hrs
On-Time Since Reset:	134.06 hrs
Percent On Since Reset:	79.80%
Connected Load:	No Load Defined
Energy Cost:	Unknown
Data Starts:	1/24/2017 12:00:00 PM
Data Ends:	1/31/2017 12:00:00 PM
Data Elapsed Time:	168.00 hrs
Estimated Annual Hours On:	6991 hrs
Number of Turn Ons:	260
Percent On:	79.80 %
Data On-Time:	134.06 hrs
Average On-Time:	.01 hrs
Longest On-Time:	1.19 hrs
Shortest On-Time:	<0.01 hrs
Number of Turn Offs:	261
Percent Off:	20.20 %
Data Off-Time:	33.94 hrs
Average Off-Time:	.29 hrs
Longest Off-Time:	2.02 hrs
Shortest Off-Time:	< 0.01 hrs

SMARTware 11 - [Data Download]

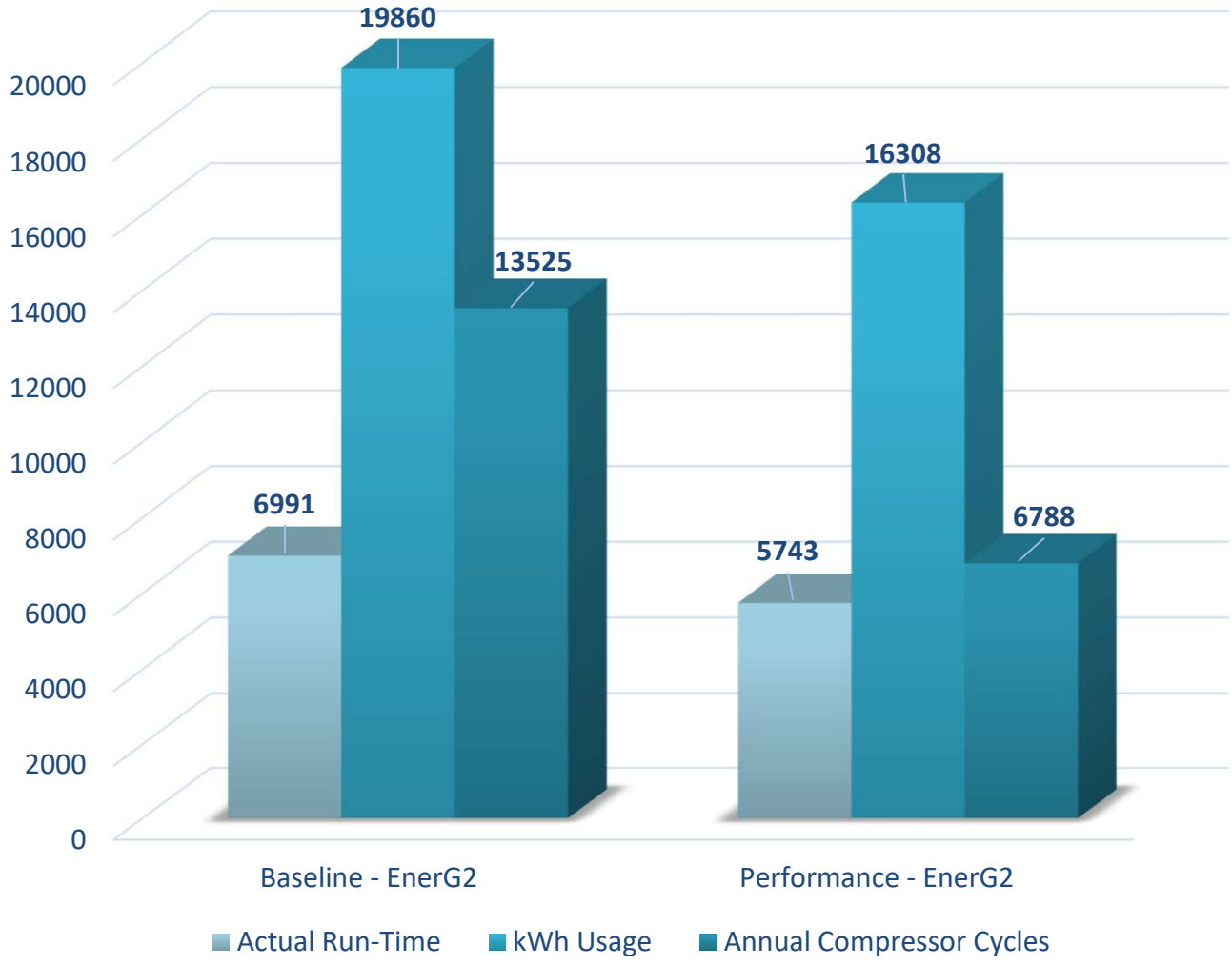
File Edit View Logger Tools Data Window Help

Summary

...GPM Store 3730.log (CT14040059)

Data File Name:	CT14040059 GPM Performance (*saved*)
Logger Serial Number:	CT14040059
Description:	DENT SMART LOGGER
Logger Reset:	1/24/2017 12:00:00 PM
Elapsed Time Since Reset:	168.00 hrs
On-Time Since Reset:	110.14 hrs
Percent On Since Reset:	65.56%
Connected Load:	No Load Defined
Energy Cost:	Unknown
Data Starts:	1/31/2017 12:00:00 PM
Data Ends:	2/7/2017 12:00:00 PM
Data Elapsed Time:	168.00 hrs
Estimated Annual Hours On:	5743 hrs
Number of Turn Ons:	131
Percent On:	65.56 %
Data On-Time:	110.14 hrs
Average On-Time:	.02 hrs
Longest On-Time:	1.35 hrs
Shortest On-Time:	<0.01 hrs
Number of Turn Offs:	132
Percent Off:	34.44 %
Data Off-Time:	57.86 hrs
Average Off-Time:	.44 hrs
Longest Off-Time:	4.43 hrs
Shortest Off-Time:	< 0.01 hrs

CT14040059 Data Graph Series | Store 3730



intelliHVAC

INTELLIGENT SOLUTIONS FOR HEATING AND AIR

IntelliHVAC reduces energy consumption in HVAC units through efficient fan control and compressor cycling. The combination of these two technologies optimizes performance by allowing the fans, which use 8 to 15 times less energy than the compressors to capture latent energy that would otherwise be lost. It is retrofitted at the 24 volt terminal and requires no additional maintenance.

Guaranteed to Reduce Energy Costs 10 – 30%
Reduces Compressor Cycles by 20%
Prevents Wear and Tear
Extends Life of Equipment
12 - 18 Month ROI
Reduced CO2 Emissions – Go Green!
Lifetime Warranty

IntelliHVAC is a dual microprocessor technology that easily retrofits to any existing central air HVAC system. It contains both a *post-purge* and *compressor cycle functions* that work together to create a significantly more efficient environment within the system. The inefficiency and therefore *opportunity* is that there is still latent cold energy on the coil or heat energy in the exchanger and this energy is wasted as it dissipates within the system. IntelliHVAC captures this excess energy through its *post-purge function*. This process is known as **latent recovery** and has been verified by numerous utility companies.

When the HVAC system reaches set point, IntelliHVAC will extend and optimize the fan run-time based on the previous compressor cycle to ensure that the latent hot or cold energy has been captured and that all of that air is circulated all the way through the duct system so that it is not wasted. IntelliHVAC continues to monitor the system and adjust the post purge cycle based on its proven algorithm.

IntelliHVAC also has a *compressor cycle function* that increases the overall energy savings cycling the compressor off for 5 minutes for every 25 minutes of continuous run-time. This allows the fan, which uses 8 to 15 less energy than the compressor to capture the latent energy from the coil or heat exchanger. IntelliHVAC will run the fan for the equivalent amount of time that the compressor is off to ensure that air continues to circulate and there are no negative effects to the indoor air temperature quality.

Tower Engineering
Craig Andes
Owner / HVAC Engineer

Fuquay-Varina, North Carolina

J. Craig Andes, MBA

With close to 40 years of experience, Mr. Andes has been an industry veteran since 1977 and has a keen eye toward efficiency for his customers. Mr. Andes has owned and operated numerous businesses including several mechanical companies, an insulating company, has built numerous structures, and has directed large service oriented companies. Mr. Andes has also been hired as a consultant by several companies to assist them in their growth and process management.

Currently Mr. Andes owns and operates Tower Engineering in the Raleigh, NC metro market.

After earning his MBA at Union University in Jackson, TN, Mr. Andes is able to merge the real-world practical side of HVAC with financial feasibility and ROI making for good common-sense guidance. With regard to Madison Energy Group, Mr. Andes serves as an independent, 3rd party consultant and assists the company specifically with the IntelliHVAC technology. Mr. Andes has help Madison Energy consult with companies such as Starbucks, Darden Restaurants, CBL Properties, and others in helping them to understand the mechanics of their systems as well as the benefits of the IntelliHVAC technology. Mr. Andes also manages the pilot program process, analysis and reporting on behalf of Madison.

The attached reporting is hereby approved and certified by Mr. Andes as accurate in its entirety. Mr. Andes is not compensated in any manner that is based on test results.

J. Craig Andes

Tower Engineering
Owner / HVAC Engineer
Date: 2/15/17

IntelliHVAC Proof of Concept Protocol

Purpose: Demonstrate **IntelliHVAC** performance on rooftop HVAC units at multiple pre-determined locations.

Sizing Protocol:

1. Measure baseline (before) performance
2. Install **IntelliHVAC**
3. Measure **IntelliHVAC** (after) performance

Measurement: Before/after measurement of:

1. Energy usage (kilowatt hours)
2. Compressor starts/stops (run time)
3. Amps
4. Volts
5. Kilowatts

Procedure:

1. Measure Baseline Data
    a. Stable HVAC Unit
        i. Identify HVAC unit
        ii. Ensure unit is operating properly (normal duty cycle, reaches set point)
        iii. Ensure compressor motor is accessible for data logger connection
        iv. Record system Information: Type, Mfg, Model #
    b. Compressor Power Source
        i. At the compressor
            - Single phase (hot lead)
            - 3 Phase (1 of 3 hot leads)
        ii. Locate power rating (amperage/voltage) on compressor nameplate
        iii. Record on datasheet; Phase, Volts and Amps
        iv. Record pilot start date/time on datasheet
    c. Record Baseline Data
        i. Attach EKM CT Logger around hot lead to record total run-time as well as compressor cycle (”on/off”) data
        ii. Record Baseline Data – 7 days
        iii. Validate baseline data

2. Measure Performance Data
    a. Install **IntelliHVAC** at 24 volt terminal
    b. Record **IntelliHVAC** start date/time
    c. Record Performance Data – 7 days
    d. Validate Performance Data
    e. Record pilot ending date/time
    f. Analyze results
    g. Present results

Craig Andes
HVAC Engineering Contractor
Fuquay Varina, NC

Report Date: 2/15/2017

On Behalf of:	The Madison Energy Group
For Client:	GPM Investments

Location: 6126 Oleander Dr, Wilmington, NC **Kwh Rate:** 0.10

		Date	Time	Base Reading	Date	Time	Reading	Date	Time	Reading
Area:	RTU 1	1/24/2017	12:00PM	4,288.6	1/31/2017	12:00PM	5,247.6	2/7/2017	12:00 PM	6,043.5
Meter #	15561									
						Kw Usage	959.0		**Kw Usage**	795.9
						Avg / Day	137.0		**Avg / Day**	113.7
						kWh/Yr	50005.0		**kWh/Yr**	41500.5

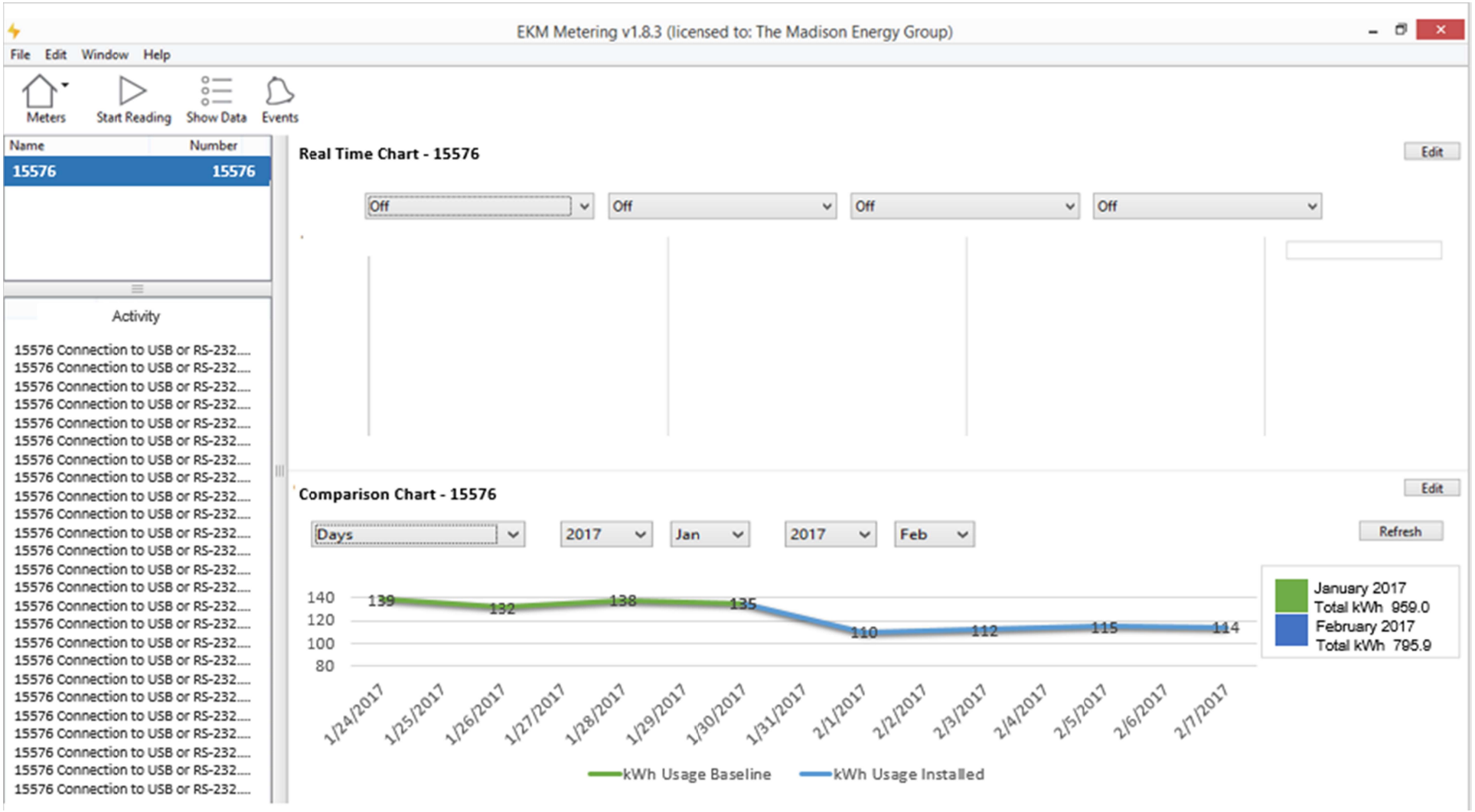
Kw Diff.		163.10
Diff / Day		23.30
Kwh/Yr		8504.50
% Change		17%
Savings/Yr	$	850.45

Location: 5325 S. College Rd, Wilmington, NC

		Date	Time	Base Reading	Date	Time	Reading	Date	Time	Reading
Area:	RTU 1	1/24/2017	2:00PM	3,684.8	1/31/2017	2:00PM	4,588.1	2/7/2017	2:00PM	5,309.0
Meter #	15569									
						Kw Usage	903.3		**Kw Usage**	720.9
						Avg / Day	129.0		**Avg / Day**	103.0
						kWh/Yr	47100.6		**kWh/Yr**	37589.8

Kw Diff.		182.40
Diff / Day		26.06
Kwh/Yr		9510.86
% Change		20%
Savings/Yr	$	951.09

Total Kwh/Yr		18015.4
Annual Savings	$	1,801.54
Average Annual Savings	$	900.77
Projected ROI		13.3 **Months**


EKM Metering v1.8.3 (licensed to: The Madison Energy Group)
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Meters
Start Reading
Show Data
Events
Name
Number
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15576
Activity
15576 Connection to USB or RS-232....
Real Time Chart - 15576
Edit
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Comparison Chart - 15576
Edit
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110
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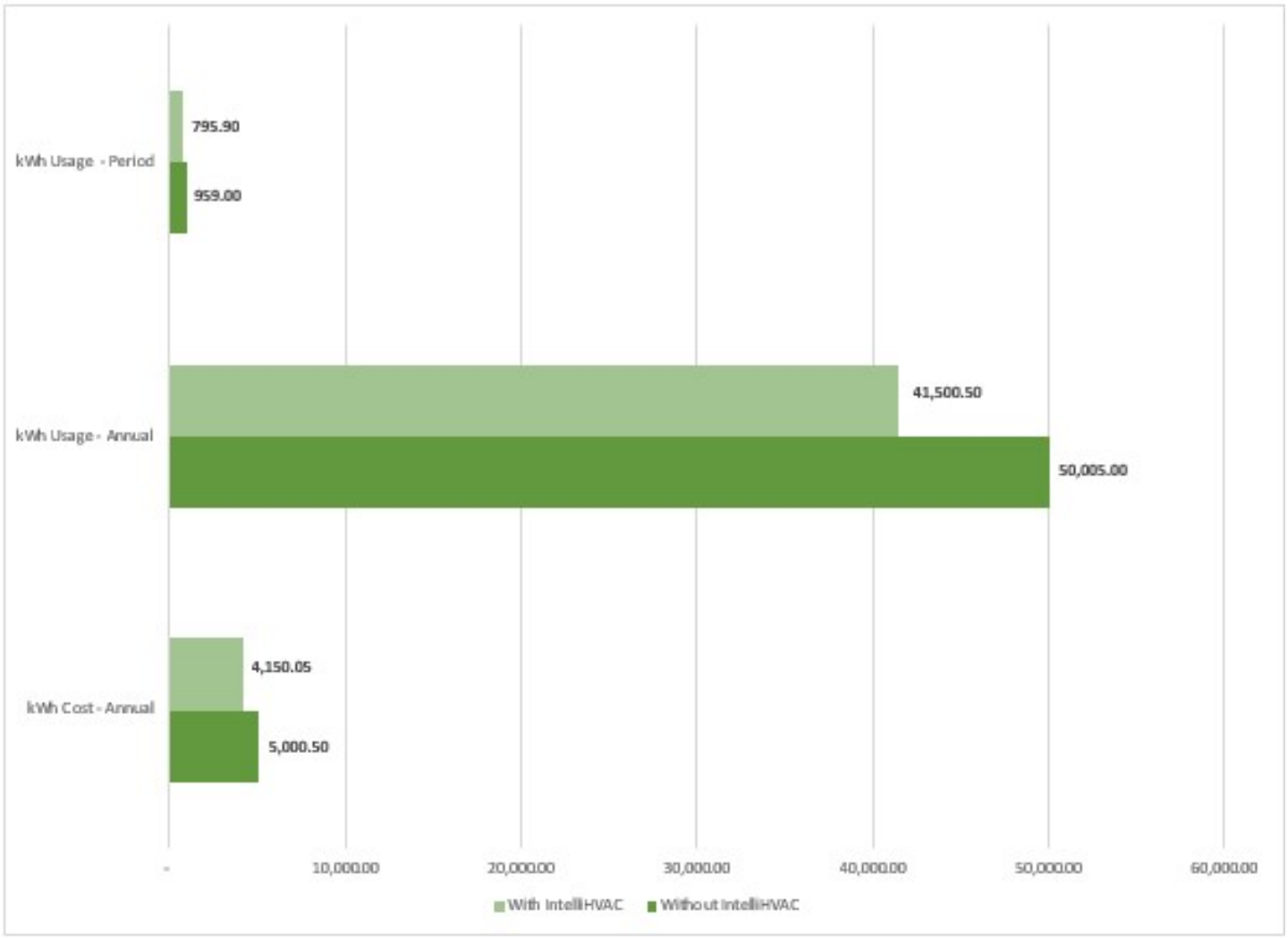
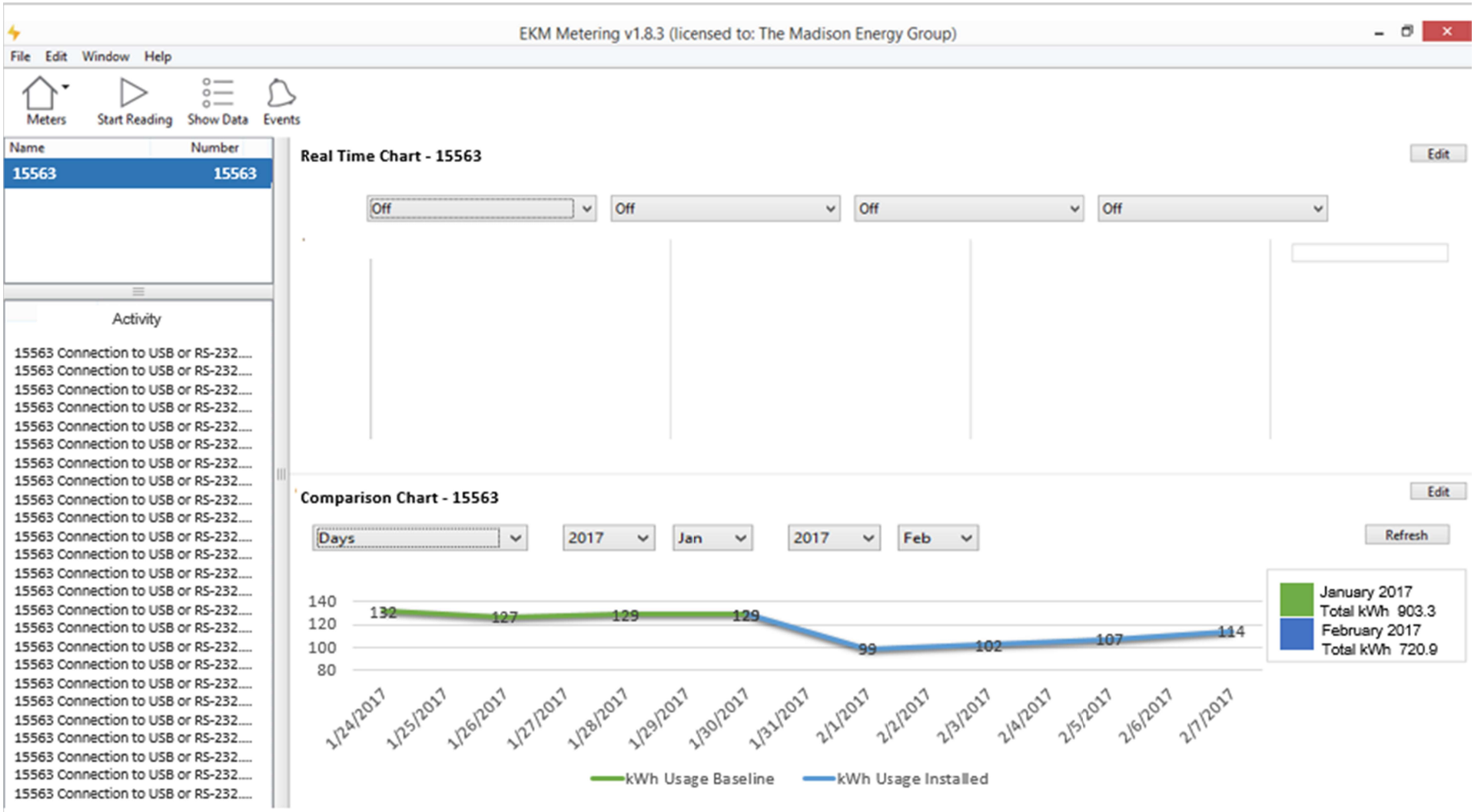
1/30/2017
1/31/2017
2/1/2017
2/2/2017
2/3/2017
2/4/2017
2/5/2017
2/6/2017
2/7/2017
January 2017
Total kWh 959.0
February 2017
Total kWh 795.9
kWh Usage Baseline
kWh Usage Installed

EKM METERING

Store 6126

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15563 Connection to USB or RS-232....
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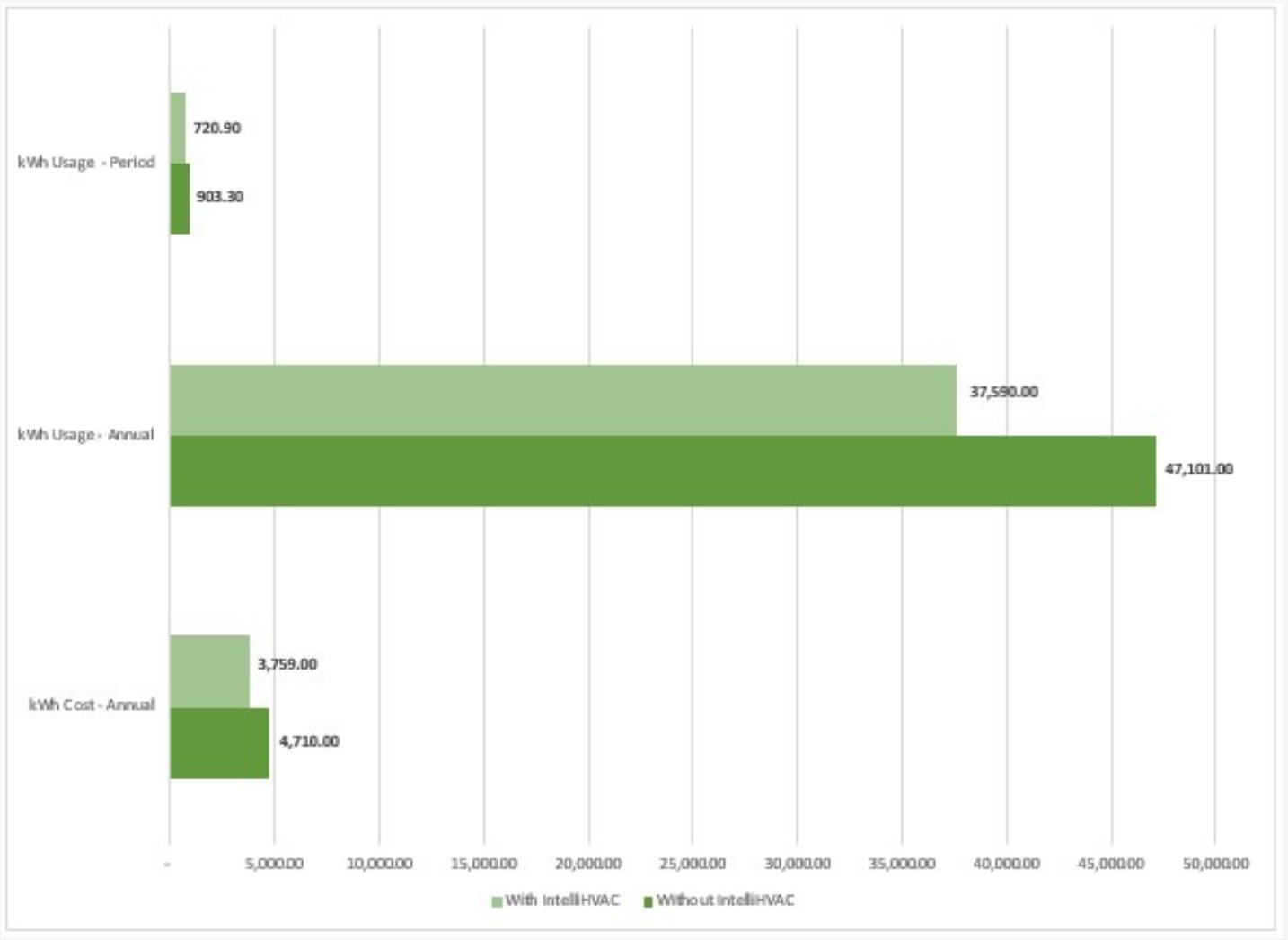
2/1/2017
2/2/2017
2/3/2017
2/4/2017
2/5/2017
2/6/2017
2/7/2017
January 2017
Total kWh 903.3
February 2017
Total kWh 720.9
kWh Usage Baseline
kWh Usage Installed

EKM METERING

Store 5325



THE MADISON ENERGY GROUP
SOLUTIONS FOR A GREENER, BETTER FUTURE

Pilot Program Performance Summary

Program Duration – 1/24/2017 – 2/8/2017

EnerG² Summary

Annual Savings – Cooler (Store 3324): $625
Annual Savings – Cooler (Store 3730): $603
Average Annual Savings per Unit: $614

Projected Annual Savings for 1,070 Units (1,070 locations x 1 unit): $656,980
Projected Savings Over 10 Years: $6,569,800

Return on Investment: 11.7 Months

IntelliHVAC Summary

Annual Savings - HVAC (Store 6126): $850
Annual Savings – HVAC (Store 3323): $951
Average Annual Savings per Unit: $900.50

Projected Annual Savings for 1,070 HVAC Units (1,070 locations x 1 unit): $963,535
Projected Savings Over 10 Years: $9,635,350

Return on Investment: 13.3 Months

Total Combined Projected Annual Savings: $1,620,515
Total Projected Savings Over 10 Years: $16,205,150

GPM INVESTMENTS