THE MADISON ENERGY GROUP

ENERGY EFFICIENCY SOLUTIONS

Case Study:

HOWARD UNIVERSITY

THE MADISON ENERGY GROUP
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Proof of Concept Protocol

Purpose: Demonstrate product performance on specified equipment at multiple pre-determined locations.

Measure Baseline Data:

I. Identify equipment
II. Ensure unit is operating properly (normal duty cycle, no visible ice, reaches set point)
III. Ensure thermostat is accessible and compatible
IV. Ensure compressor motor is accessible for data logger connection
V. Record unit information: Type, Mfg, Model #

Compressor Power Source:

I. At the compressor
    i. Single phase (hot lead)
    ii. 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

Record Baseline Data:

I. Install EKM Omni-meter V.3
II. Record Baseline Data – 7 days
III. Validate baseline data

Measure Performance Data:

I. Install Madison technology
II. Record install start date/time
III. Record Performance Data – 7 days
IV. Validate Performance Data
V. Record pilot ending date/time
VI. Analyze results

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. 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 the 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. __HU31219__ Dated __3/12/2019__

HMS Engineering

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

Report Print Date: 12-Mar-19

Report No.: HU31219

Facility / Location: Howard University

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

	(Without EnerG²)	With EnerG²	Change	% Change
Projected Run Hours / Yr:	6,723	5,339	-1,384	-20.6%
Projected Cycles / Yr:	10,948	4,138	-6,810	-62.2%

Energy Use & Cost Savings per Month

	(Without EnerG²)	With EnerG²	Change	% Change
Operating Hours / Month:	560	445	-115	-20.6%
KWh / Month:	1,591	1,264	-328	-20.6%
Energy Cost / Month	$159	$126	-$33	-20.6%

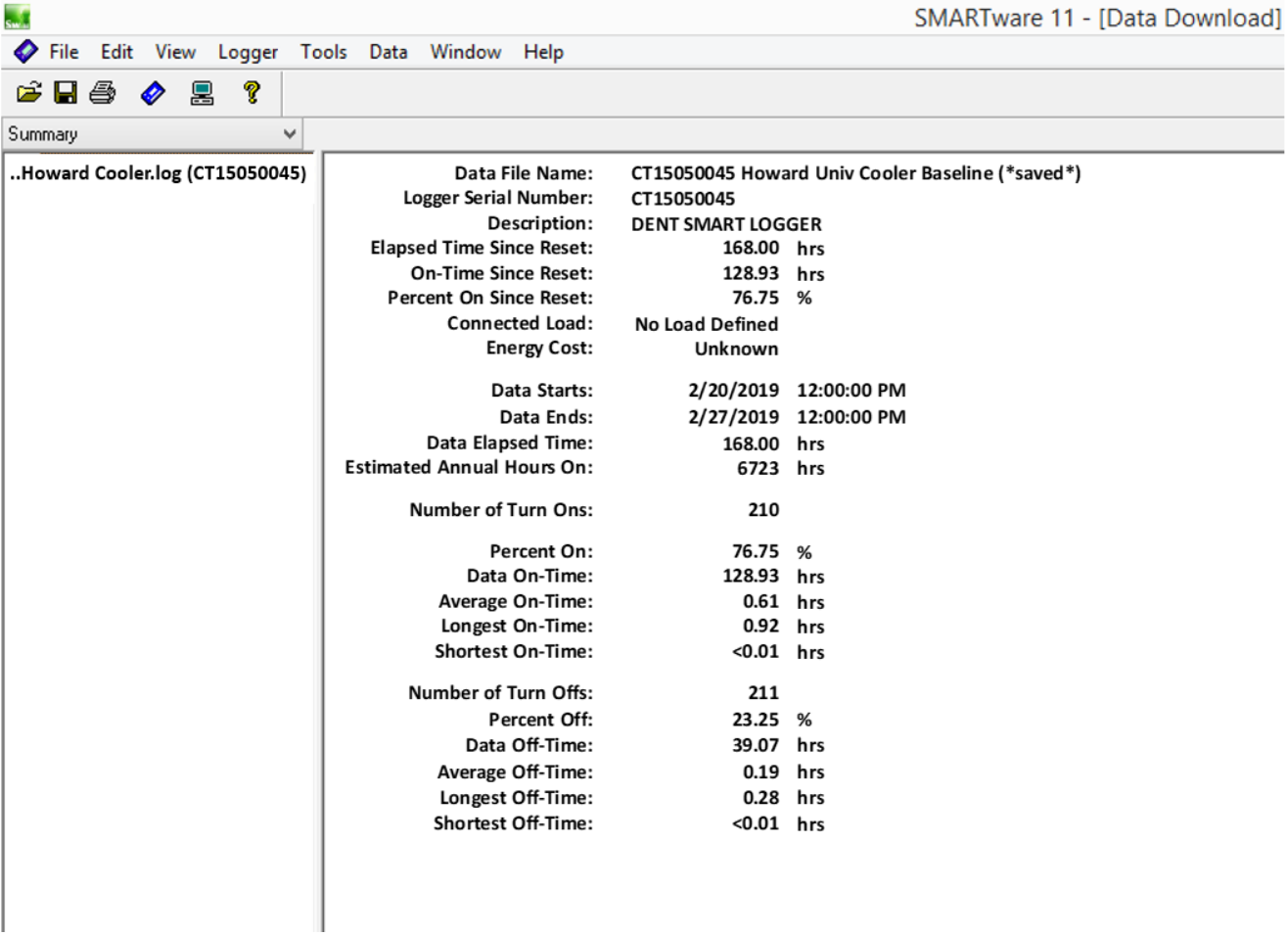
Mechanical Cost Savings per Month

	(Without EnerG²)	With EnerG²	Change	% Change
Cycles / Month:	912	345	-568	-62.2%
Compressor Maintenance Cost/ Month:	$42	$16	-$26	-62.2%

Combined Energy and Mechanical Cost Savings

	(Without EnerG²)	With EnerG²	Change	% Change
Energy & Mechanical Cost / Month:	$201	$142	-$59	-29.2%
Energy & Mechanical Cost / Year:	$2,409	$1,705	-$704.07	-29.2%

EnerG² Return on Investment Months: 10.21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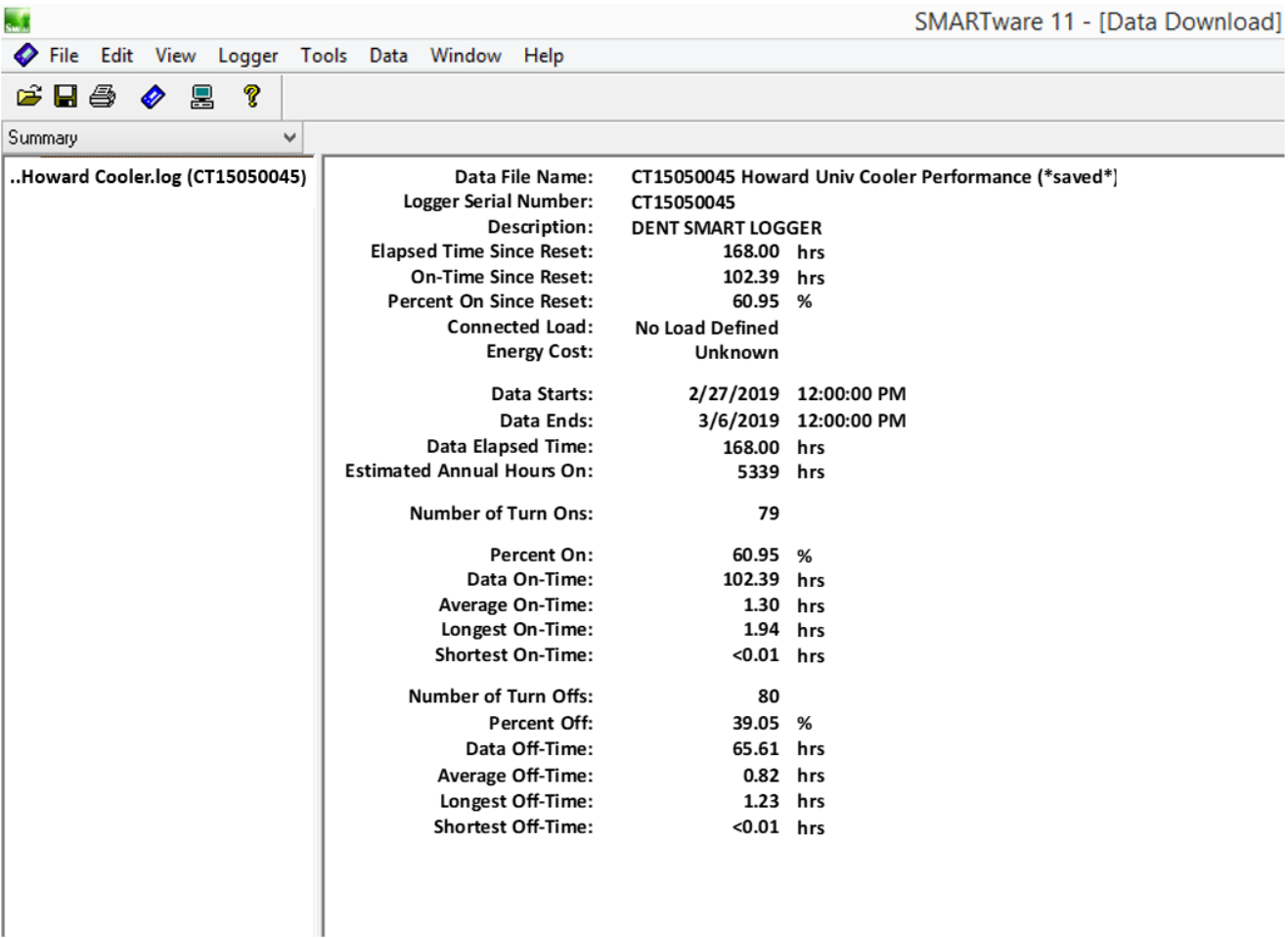
File Edit View Logger Tools Data Window Help
Summary
..Howard Cooler.log (CT15050045)
Data File Name: CT15050045 Howard Univ Cooler Baseline (*saved*)
Logger Serial Number: CT15050045
Description: DENT SMART LOGGER
Elapsed Time Since Reset: 168.00 hrs
On-Time Since Reset: 128.93 hrs
Percent On Since Reset: 76.75 %
Connected Load: No Load Defined
Energy Cost: Unknown
Data Starts: 2/20/2019 12:00:00 PM
Data Ends: 2/27/2019 12:00:00 PM
Data Elapsed Time: 168.00 hrs
Estimated Annual Hours On: 6723 hrs
Number of Turn Ons: 210
Percent On: 76.75 %
Data On-Time: 128.93 hrs
Average On-Time: 0.61 hrs
Longest On-Time: 0.92 hrs
Shortest On-Time: <0.01 hrs
Number of Turn Offs: 211
Percent Off: 23.25 %
Data Off-Time: 39.07 hrs
Average Off-Time: 0.19 hrs
Longest Off-Time: 0.28 hrs
Shortest Off-Time: <0.01 hrs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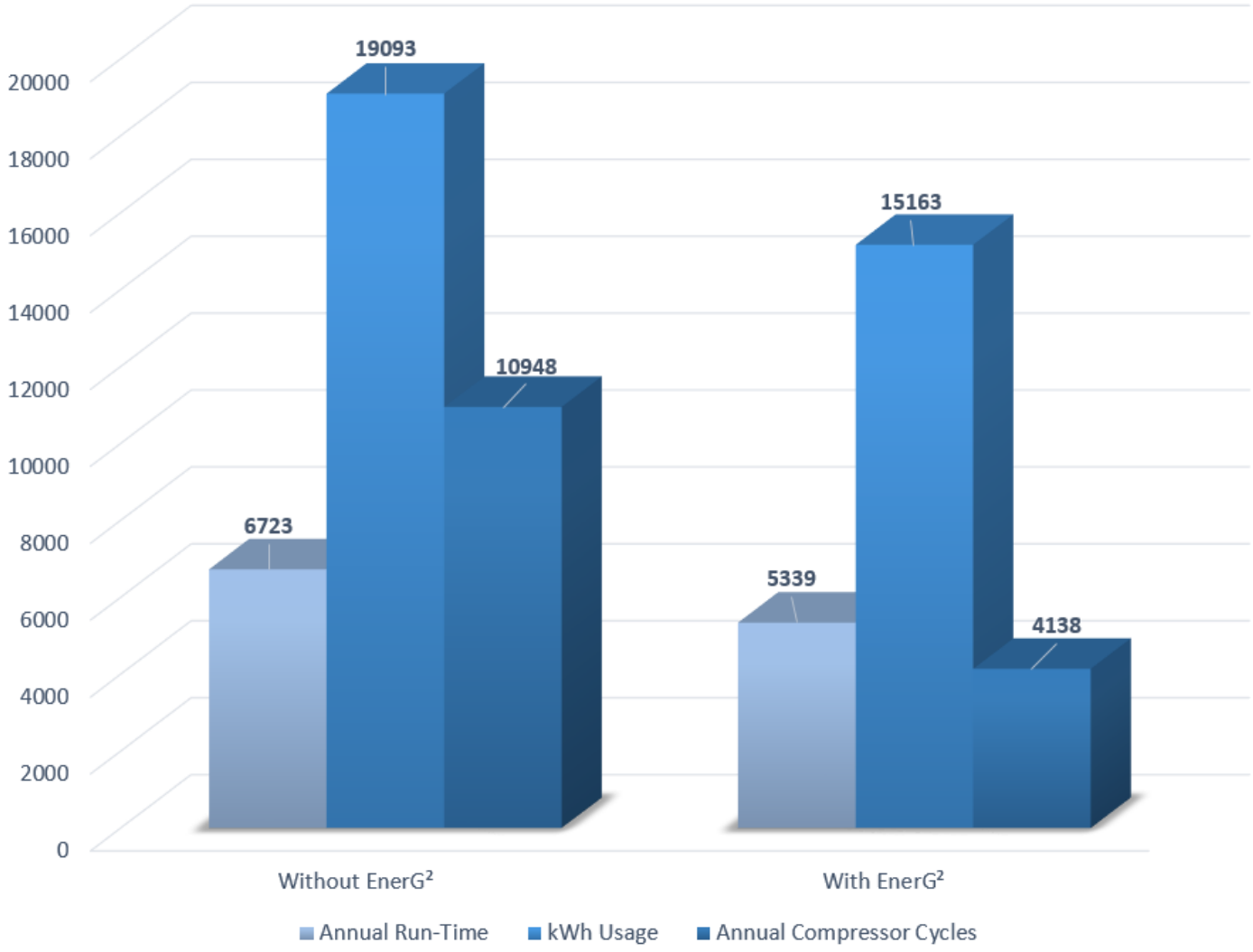
File Edit View Logger Tools Data Window Help
Summary
..Howard Cooler.log (CT15050045)
Data File Name: CT15050045 Howard Univ Cooler Performance (*saved*]
Logger Serial Number: CT15050045
Description: DENT SMART LOGGER
Elapsed Time Since Reset: 168.00 hrs
On-Time Since Reset: 102.39 hrs
Percent On Since Reset: 60.95 %
Connected Load: No Load Defined
Energy Cost: Unknown
Data Starts: 2/27/2019 12:00:00 PM
Data Ends: 3/6/2019 12:00:00 PM
Data Elapsed Time: 168.00 hrs
Estimated Annual Hours On: 5339 hrs
Number of Turn Ons: 79
Percent On: 60.95 %
Data On-Time: 102.39 hrs
Average On-Time: 1.30 hrs
Longest On-Time: 1.94 hrs
Shortest On-Time: <0.01 hrs
Number of Turn Offs: 80
Percent Off: 39.05 %
Data Off-Time: 65.61 hrs
Average Off-Time: 0.82 hrs
Longest Off-Time: 1.23 hrs
Shortest Off-Time: <0.01 hrs

CT15050045 Data Graph Series | Howard University Cooler



Serial Number: CT15050045
Description: DENT SMART LOGGER
On-Time Since Reset: 231.32 hrs
Off-Time Since Reset: 104.68 hrs

Date	TOU/Day (hrs)
Wednesday, February 20, 2019	8.88
Thursday, February 21, 2019	19.71
Friday, February 22, 2019	20.60
Saturday, February 23, 2019	19.69
Sunday, February 24, 2019	16.25
Monday, February 25, 2019	17.14
Tuesday, February 26, 2019	17.62
Wednesday, February 27, 2019	18.08
Thursday, February 28, 2019	14.89
Friday, March 1, 2019	15.09
Saturday, March 2, 2019	15.17
Sunday, March 3, 2019	12.36
Monday, March 4, 2019	13.63
Tuesday, March 5, 2019	14.92
Wednesday, March 6, 2019	7.29

HMS Engineering

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

Report Print Date: 12-Mar-19

Report No.: 3/12/2019

Facility / Location: Howard University

Room/Equip. Tested: Walk-in Freezer

Calculation Basis

Compressor Motor: HP: 0.3 Volts: 230 RLA: 12.0 Phase: 3

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

Operating Basis

	(Without EnerG²)	With EnerG²	Change	% Change
Projected Run Hours / Yr:	7,422	5,519	-1,903	-25.6%
Projected Cycles / Yr:	8,664	3,317	-5,347	-61.7%

Energy Use & Cost Savings per Month

	(Without EnerG²)	With EnerG²	Change	% Change
Operating Hours / Month:	619	460	-159	-25.6%
KWh / Month:	1,757	1,306	-450	-25.6%
Energy Cost / Month	$176	$131	-$45	-25.6%

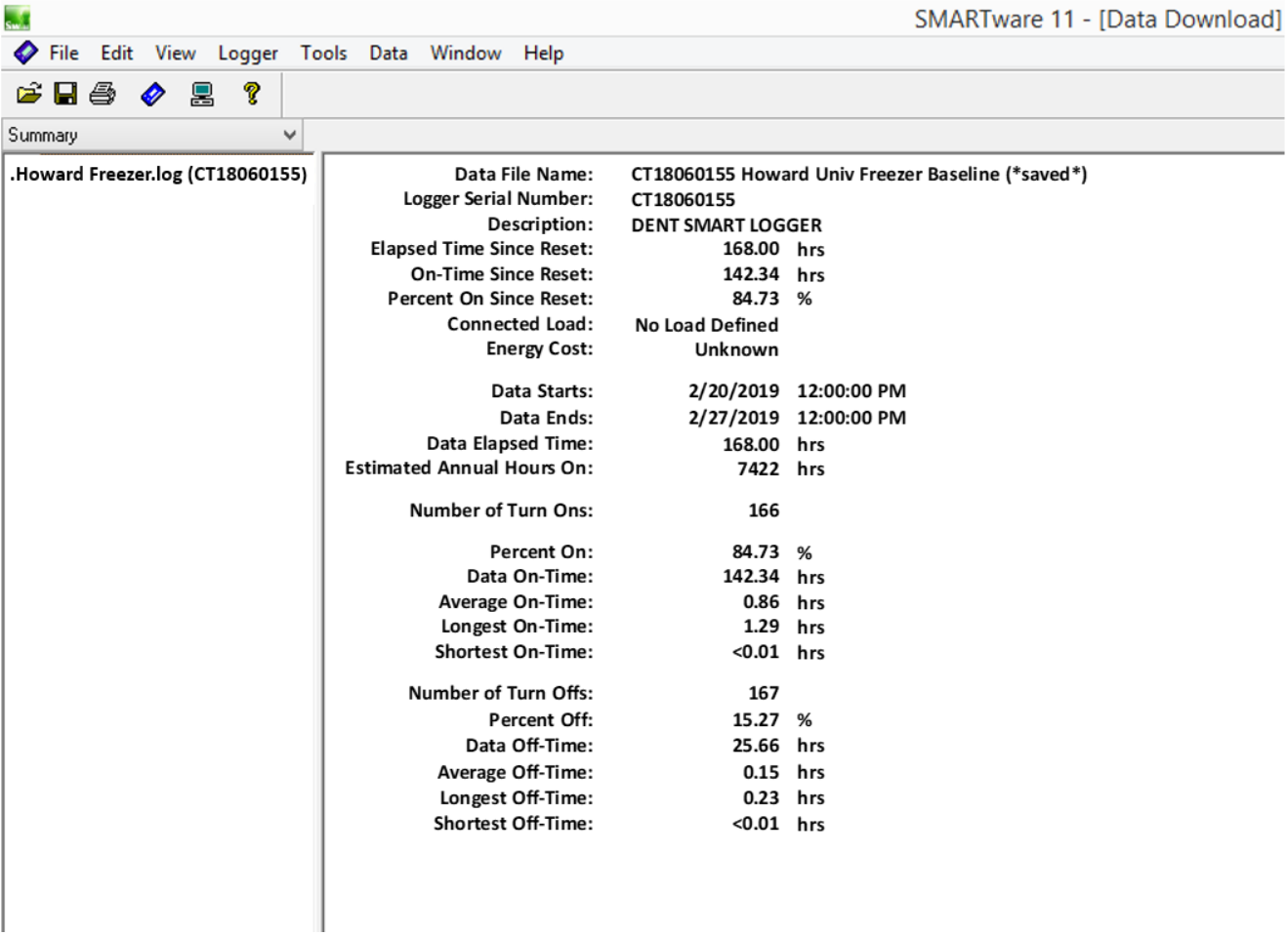
Mechanical Cost Savings per Month

	(Without EnerG²)	With EnerG²	Change	% Change
Cycles / Month:	722	276	-446	-61.7%
Compressor Maintenance Cost/ Month:	$42	$16	-$26	-61.7%

Combined Energy and Mechanical Cost Savings

	(Without EnerG²)	With EnerG²	Change	% Change
Energy & Mechanical Cost / Month:	$217	$147	-$71	-32.6%
Energy & Mechanical Cost / Year:	$2,608	$1,759	-$849.03	-32.6%

EnerG² Return on Investment Months: 8.47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File Edit View Logger Tools Data Window Help
Summary
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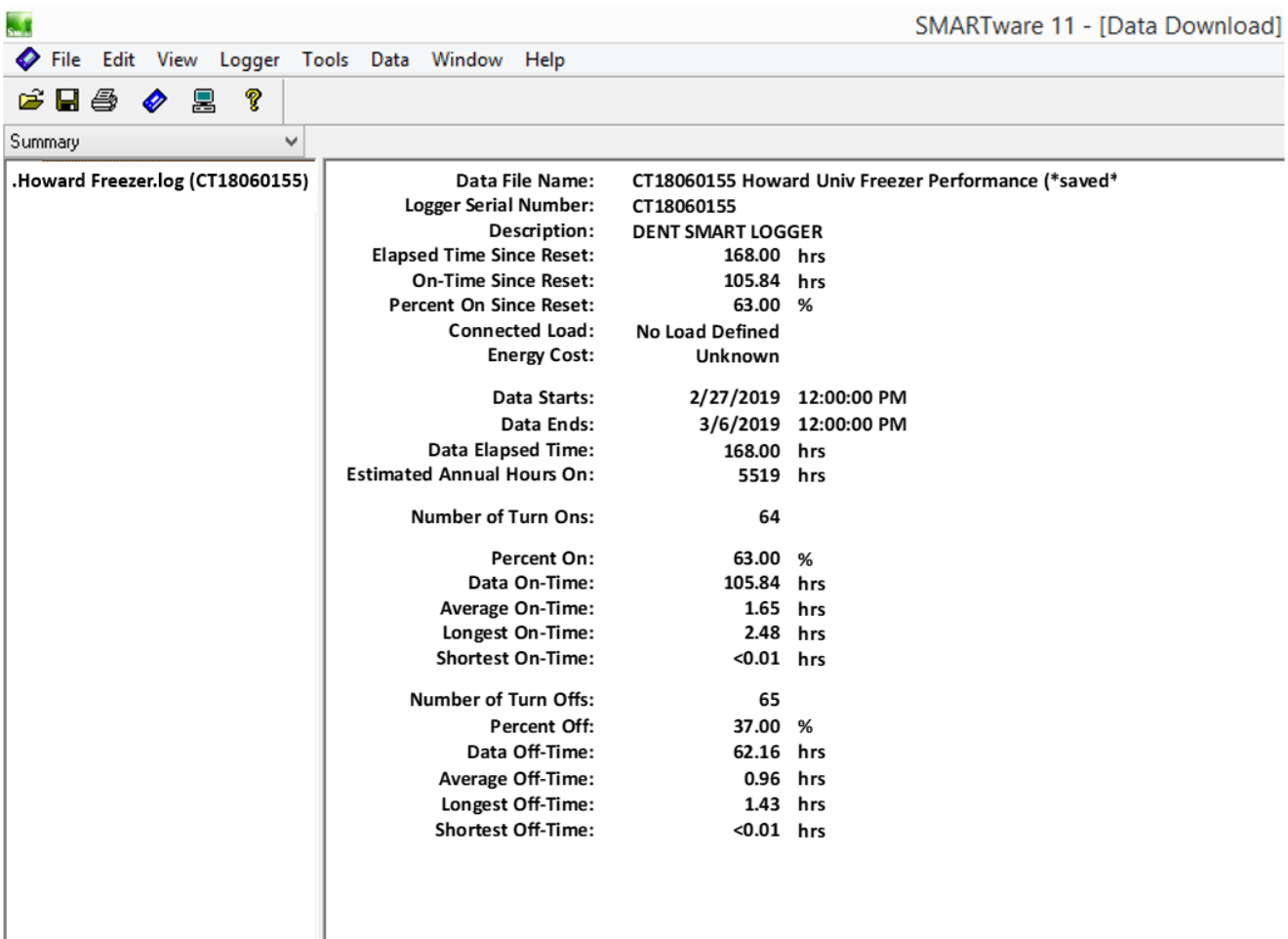
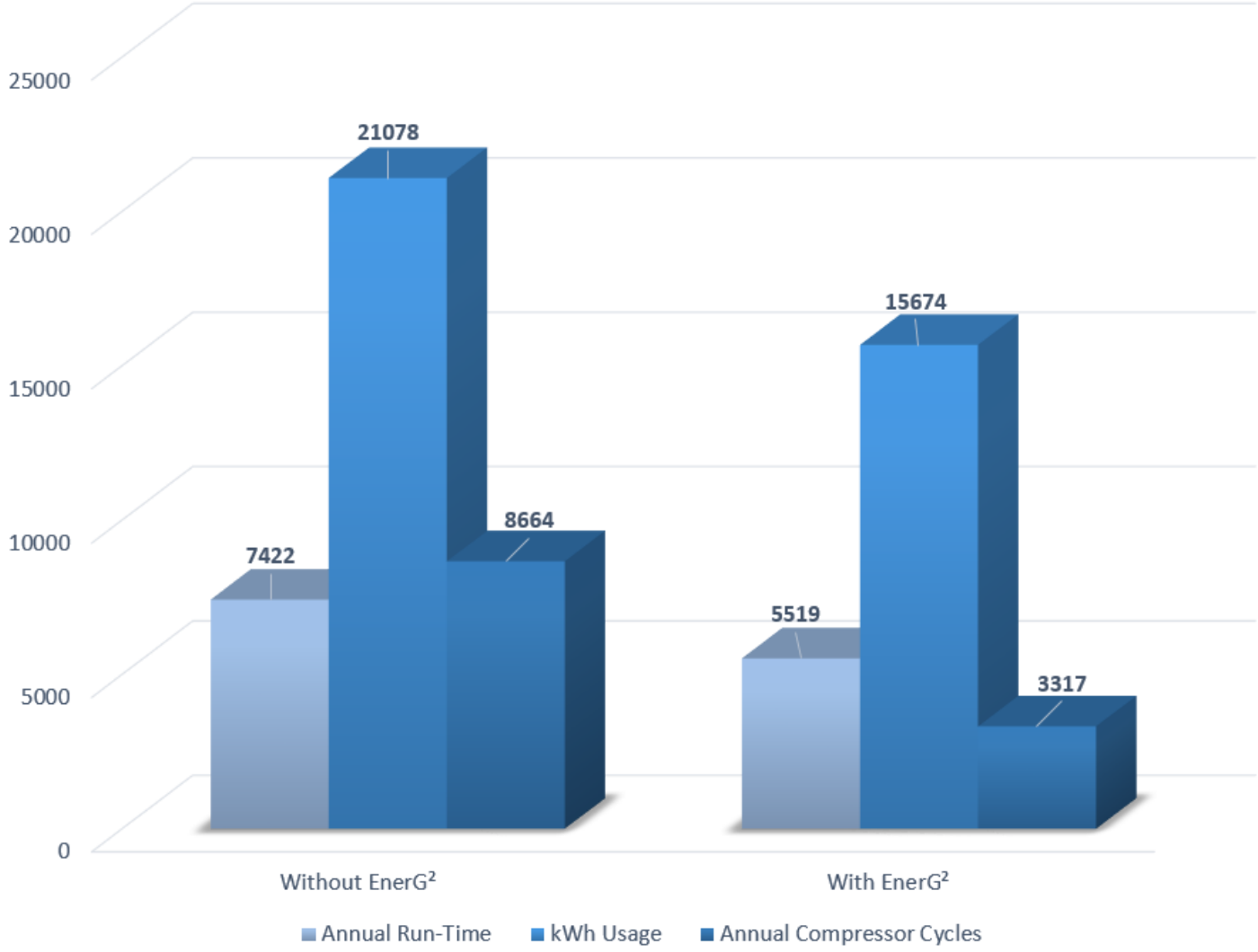
Data File Name: CT18060155 Howard Univ Freezer Baseline (*saved*)
Logger Serial Number: CT18060155
Description: DENT SMART LOGGER
Elapsed Time Since Reset: 168.00 hrs
On-Time Since Reset: 142.34 hrs
Percent On Since Reset: 84.73 %
Connected Load: No Load Defined
Energy Cost: Unknown
Data Starts: 2/20/2019 12:00:00 PM
Data Ends: 2/27/2019 12:00:00 PM
Data Elapsed Time: 168.00 hrs
Estimated Annual Hours On: 7422 hrs
Number of Turn Ons: 166
Percent On: 84.73 %
Data On-Time: 142.34 hrs
Average On-Time: 0.86 hrs
Longest On-Time: 1.29 hrs
Shortest On-Time: <0.01 hrs
Number of Turn Offs: 167
Percent Off: 15.27 %
Data Off-Time: 25.66 hrs
Average Off-Time: 0.15 hrs
Longest Off-Time: 0.23 hrs
Shortest Off-Time: <0.01 hrs


SMARTware 11 - [Data Download]
File Edit View Logger Tools Data Window Help
Summary
.Howard Freezer.log (CT18060155)
Data File Name: CT18060155 Howard Univ Freezer Performance (*saved*
Logger Serial Number: CT18060155
Description: DENT SMART LOGGER
Elapsed Time Since Reset: 168.00 hrs
On-Time Since Reset: 105.84 hrs
Percent On Since Reset: 63.00 %
Connected Load: No Load Defined
Energy Cost: Unknown
Data Starts: 2/27/2019 12:00:00 PM
Data Ends: 3/6/2019 12:00:00 PM
Data Elapsed Time: 168.00 hrs
Estimated Annual Hours On: 5519 hrs
Number of Turn Ons: 64
Percent On: 63.00 %
Data On-Time: 105.84 hrs
Average On-Time: 1.65 hrs
Longest On-Time: 2.48 hrs
Shortest On-Time: <0.01 hrs
Number of Turn Offs: 65
Percent Off: 37.00 %
Data Off-Time: 62.16 hrs
Average Off-Time: 0.96 hrs
Longest Off-Time: 1.43 hrs
Shortest Off-Time: <0.01 hrs

CT18060155 Data Graph Series | Howard University Freezer



Serial Number: CT16080155
Description: DENT SMART LOGGER
On-Time Since Reset: 248.18 hrs
Off-Time Since Reset: 87.82 hrs

Date	TOU/Day (hrs)
Wednesday, February 20, 2019	10.75
Thursday, February 21, 2019	20.33
Friday, February 22, 2019	21.41
Saturday, February 23, 2019	22.69
Sunday, February 24, 2019	18.47
Monday, February 25, 2019	18.99
Tuesday, February 26, 2019	19.26
Wednesday, February 27, 2019	20.87
Thursday, February 28, 2019	15.26
Friday, March 1, 2019	14.31
Saturday, March 2, 2019	13.55
Sunday, March 3, 2019	13.97
Monday, March 4, 2019	14.20
Tuesday, March 5, 2019	15.47
Wednesday, March 6, 2019	8.64

The Madison Energy Group
ENERGY EFFICIENCY SOLUTIONS

Proof of Concept Performance Summary

Program Duration - 2/20/2019 - 3/6/2019

EnerG² Summary

Annual Savings - Cooler	$	704.07			
Annual Savings - Freezer	$	849.03			
Average Annual Savings per Unit	$	776.55			
Projected Annual Savings for		16	units	$	12,424.80
Projected Savings Over 10 Years				$	124,248.00
Return on Investment ----------			9.26		Months

IntelliHVAC Summary

Annual Savings - RTU 1	$	-			
Annual Savings - RTU 2	$	-			
Average Annual Savings per Unit	$	-			
Annual Savings Normalized for Season	$	-			
Projected Annual Savings for		0	units	$	-
Projected Savings Over 10 Years				$	-
Return on Investment ----------			####		Months

Overall Summary of Performance

Combined Monthly Energy Savings	$	1,035.40
Combined Annual Energy Savings	$	12,424.80
Combined Energy Savings Over 10 Years	$	124,248.00
Cumulative Return on Investment/Months		10.65

MADISON ENERGY GROUP
ENERGY EFFICIENCY SOLUTIONS

Limited Lifetime Replacement Warranty

Guarantor: The Madison Energy Group, located at 5 West Hargett St. 4th Floor Raleigh, NC 27601 will fulfill and administer the obligations of this performance guarantee.

This performance guarantee certifies that The Madison Energy Group's (manufacturer) EnerG^2 will perform satisfactorily during the guarantee period in accordance with its original energy saving standards. If the unit is defective when received or becomes defective, it will be replaced in accordance with this Limited Lifetime Warranty/Performance Guarantee. Please call The Madison Energy Group at 919-443-2404 Option 2 if this occurs.

The performance guarantee does not cover negligent, fraudulent and/or intentional damage. If the EnerG^2 unit is damaged, another EnerG^2 unit will be sent immediately as a replacement. For coverage to be valid, the client must register with The Madison Energy Group and provide proof of purchase in the form of a paid invoice from either The Madison Energy Group or one of its qualified, contracted distributors. The unit must also e installed properly along with manufacturer specifications.

This performance guarantee is effective from the date of purchase, provided that adequate proof of purchase is maintained, the product is properly registered (see below) and the product is installed properly. The Madison Energy Group must be notified immediately of any defects in the unit with all records being made available for inspection. Defects will be verified. This guarantee is exclusive and in lieu of any other performance guarantee or warranty of merchantability or fitness for a particular purpose.

In no event shall The Madison Energy Group be liable for any special, indirect, incidental or consequential damages. This guarantee, covering the replacement of the EnerG^2 unit is void is the product covered by the guarantee has been subject to: intentional damage, alteration, tampering, acts of God and other insurance perils, faulty installation or claims covered by insurance or service contract. The coverage applies only to EnerG^2 and no other product. Claims not submitted in accordance with the terms and conditions of this guarantee are void. Damage by unreasonable or unintended use, neglect, improper service or other causes not arising of defects in material or workmanship are not covered.

To Make a Claim: For service please contact The Madison Energy Group support line at 919-443-2404

To Register: In order for coverage to be valid, you must register your EnerG^2 within 30 days of purchase at www.themadisonenergygroup.com. Coverage is non-transferable.

PHONE: 919-443-2404
FAX: 919-800-3700
INFO@THEMADISONENERGYGROUP.COM

5 WEST HARGETT ST. · 4TH FLOOR
RALEIGH, NC 27601
WWW.THEMADISONENERGYGROUP.COM

MADISON ENERGY GROUP
ENERGY EFFICIENCY SOLUTIONS

Limited Lifetime Replacement Warranty

Guarantor: The Madison Energy Group, located at 5 West Hargett St. 4th Floor Raleigh, NC 27601 will fulfill and administer the obligations of this performance guarantee.

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In no event shall The Madison Energy Group be liable for any special, indirect, incidental or consequential damages. This guarantee, covering the replacement of the IntelliHVAC unit is void is the product covered by the guarantee has been subject to: intentional damage, alteration, tampering, acts of God and other insurance perils, faulty installation or claims covered by insurance or service contract. The coverage applies only to IntelliHVAC and no other product. Claims not submitted in accordance with the terms and conditions of this guarantee are void. Damage by unreasonable or unintended use, neglect, improper service or other causes not arising of defects in material or workmanship are not covered.

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