



# Retrofits: Making the Most of What You Have

Brenna Walraven, *USAA*

Mike Ellinger, *Whole Foods Market*

Frank Inoa, *Arby's*

Andrew

Mitchell

*DOE*

# Better Buildings Summit

**Retrofits: Refrigeration, RTU's, and Lighting**

May 27<sup>th</sup> at 3:30 pm - 5:00 pm

**Brenna Walraven**  
**Corporate Sustainability Strategies, Inc.**



# Better Buildings Challenge



USAA Real Estate Company

## USAA Real Estate Company

- One of first real estate companies to accept the Better Buildings Challenge
- Long term commitment
- Actively engaged
- Doing the right thing



# Do the right thing



USAA Real Estate Company



2003



2004



2005



2006



2007



2008



2009



2010



2011



2012



2013



2014



2015

- **Saved \$23M over 15 years - Equivalent to \$328M in additional asset value**
- **Equivalent to planting 29,375 acres of trees or removing 21,444 cars or powering over 14 thousand homes**

# Why should we care?

## Because they do.....



We know what it means to **Conserve**

# Better Buildings Challenge



USAA Real Estate Company

## Lighting Retrofit

- **ENERGY STAR Labeled**
- **LEED EBOM Platinum**
- **Continuous Process Improvement philosophy**
- **LED presented new opportunities – but increased risk**



Chicago FBI Regional Headquarters



US GOVERNMENT BUILDING FUND



# Better Buildings Challenge



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## Lighting Retrofit

- DOE and National Labs as objective resource
- Helped develop specifications
- Reviewed bid submissions to help vet
- Gave confidence



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US GOVERNMENT BUILDING FUND

# Better Buildings Challenge



USAA Real Estate Company

## Lighting Retrofit Results

### Financial Summary

Net Investment Cost	\$168,178
Net Investment Cost per SF	\$0.39
Simple Payback Period (SPP)	2.05 years
Return on Investment (ROI)	49%
Net Present Value (NPV)	\$381,217
Internal Rate of Return (IRR)	\$48%
Potential Impact on Net Operating Income (NOI)	\$81,876
Potential Impact on Asset Value	\$1,169,657



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US GOVERNMENT BUILDING FUND

## Lighting Retrofit – Potomac Yard

*Re-lighting a parking garage structure for performance and energy savings*

- DOE and National Labs as objective resource
- Helped develop specifications
- Reviewed bid submissions to help vet
- Gave confidence

### PROJECT COSTS AT A GLANCE

Description	Cost
Equipment	\$173,822
Sales Tax (6%)	\$11,095
Installation, Labor, Tax & Disposal	\$40,946
<b>Subtotal</b>	<b>\$225,863</b>
Utility Rebate	(\$10,000)
<b>Total Cost (after Rebate)</b>	<b>\$215,863</b>
Annual Savings (based on \$.07 per kWh and annual maintenance costs savings of 43K)	\$135,783
Estimated Payback	1.59 Year
ROI	63%
IRR	62%

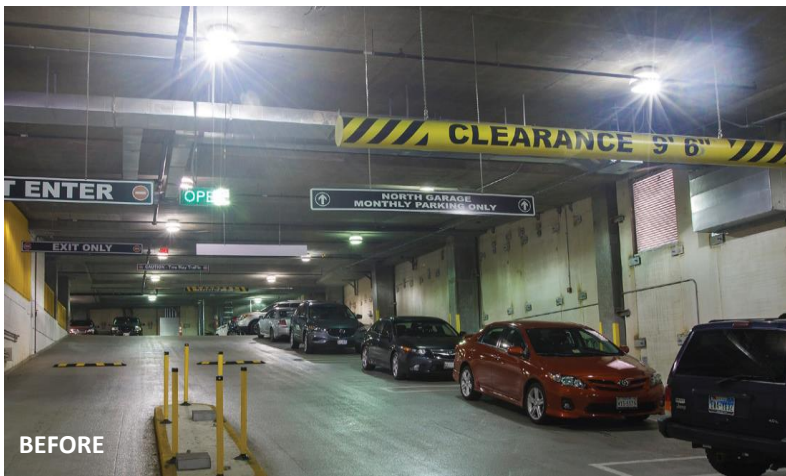
# Better Buildings Challenge

*Re-lighting a parking garage structure for performance and energy savings*



**PROJECT COSTS AT A GLANCE**

Description	Cost
Equipment	\$173,822
Sales Tax (6%)	\$11,095
Installation, Labor, Tax and Disposal	\$40,946
<b>Subtotal</b>	<b>\$225,863</b>
Utility Rebate	(\$10,000)
<b>Total Cost (after Rebate)</b>	<b>\$215,863</b>
Annual Savings <small>(based on \$.07 per kWh and annual maintenance cost savings of \$43k)</small>	\$135,783
Estimated Payback	1.59 Years
ROI	63%
IRR	62%



BEFORE



AFTER



## Doing it right from the start – Industrial Development Program

- DOE and National Labs as objective resource
- Helped develop high bay LED warehouse specifications
- Allows for highly efficient lighting at development
- Gives confidence & attractive benefit for tenants



# Industrial LED Specification Options

## Contractor-specification requirements:

- 25 fc maintained horizontal illuminance at 3' AFF
- Lighting power density of 0.60 W/sf (**10% less than current Std. 90.1**)

## Fixture-performance requirements:

- Minimum 18,000 lumens

Could be lower, but **the higher the value, the fewer fixtures needed**

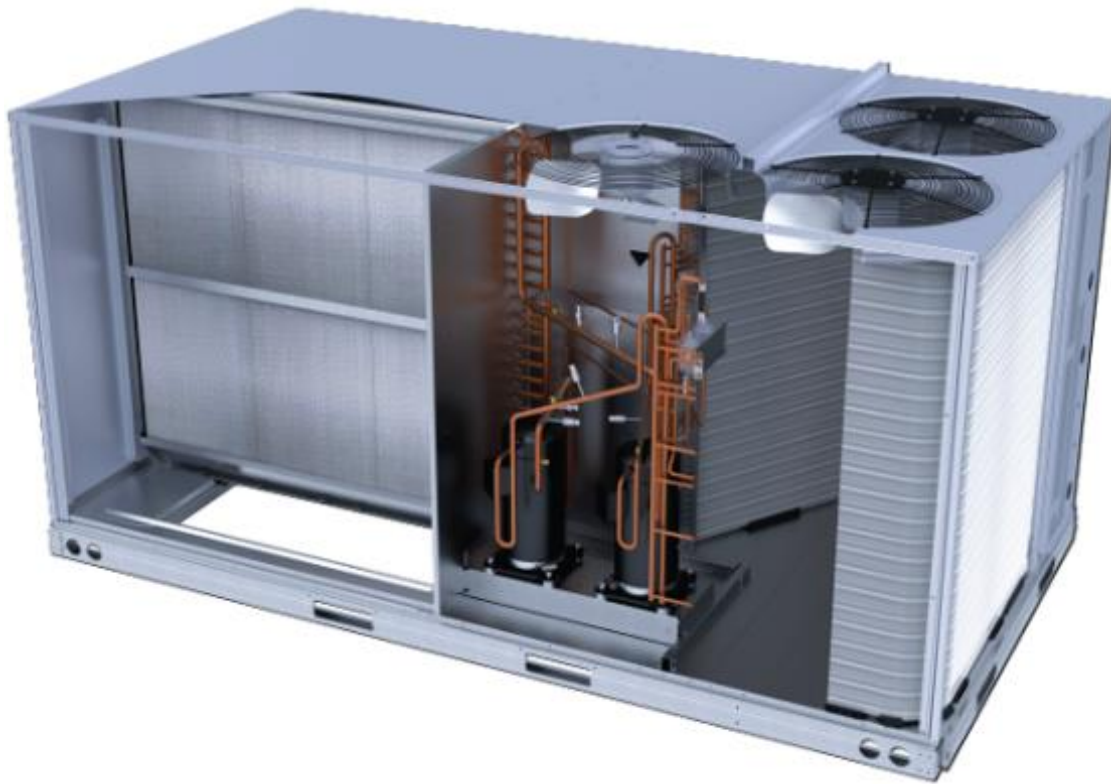
- Minimum Luminaire Efficacy Rating (LER): 90 lm/W

Light output / power = 18,000 lm/W / 90 lm/W = 200 W

This value is **≈ 40% more efficient than High Intensity Discharge (HID) sources used**

## Fixture-performance requirements:

- **Correlated Color Temperature (CCT): 3,500 – 5,000 K**  
**Accept 4,000 or 5,000 – many LEDs are more efficient at the higher CCT values and there is no real need to push low on the CCT end**
- **Color Rendering Index (CRI): 70+**  
**A superior color quality is not necessary for warehouse applications**
- **Coefficient of Utilization (CU):**  
**40 (also written as 0.40 or 40%) for a RCR of 10, with reflectance categories of 80/50/20**
- **Light output (life proxy): L85 of 60,000 hours**
- **Temperature range: - 10 F – 120 F**



Our experiences with advanced HVAC control retrofits and high efficiency roof top units



# Mike Ellinger

## Global Maintenance and Refrigeration Coordinator

Whole Foods Market

2006-Present

**Whole Foods Market** (WFM) is committed to reducing its environmental impact and supporting the health of its customers and team members, not only through the products it sells, but in how it designs, builds, and operates its stores.



## Advanced RTU Controls

VFD projects

High Efficiency RTU replacement

- 7 sites with 42 units in California, Arizona and Hawaii
- 771 tons of capacity
- 299 fan hp
- 1,109,000 estimated kwh savings to date
- Partnered with control company on the first sites in order to gain information for analytics that were shared with DOE



## Variable Speed Fan Retrofits

- More than just a VFD, it is a powerful energy efficiency upgrade kit that converts constant volume HVAC systems from single-speed to variable-speed, reducing fan energy use by an average of 70%.
- Integrates with our existing building controls
- Controls motorized dampers in economizer mode
- Monitors unit for air flow deficiencies

## Variable Speed Fan Retrofits

- 141 sites with a total of 855 units installed to date
- 4,155 fan hp
- 10,938,000 estimated kwh savings a year
- 1.5 year estimated payback

- 265 units remaining
- Project included gathering all rooftop unit data for asset management purposes
- The VFD managed the utility rebate process for us as well

## High Efficiency Roof Top Units

- Currently 3 sites retrofitted with Ultra High Efficiency units installed in Oregon and Florida
- Total of 18 units as of today
- Working with Pacific Northwest National Laboratory on units being installed in Portland, Oregon for data monitoring
- Estimated 100+ standard high efficiency units installed

Questions?



**Thanks!**

Mike Ellinger

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Frank Inoa  
Sr. Director, Operations Engineering  
Arby's Restaurant Group, Inc.







# ARBY'S NEW ASSET MANAGEMENT PLATFORM

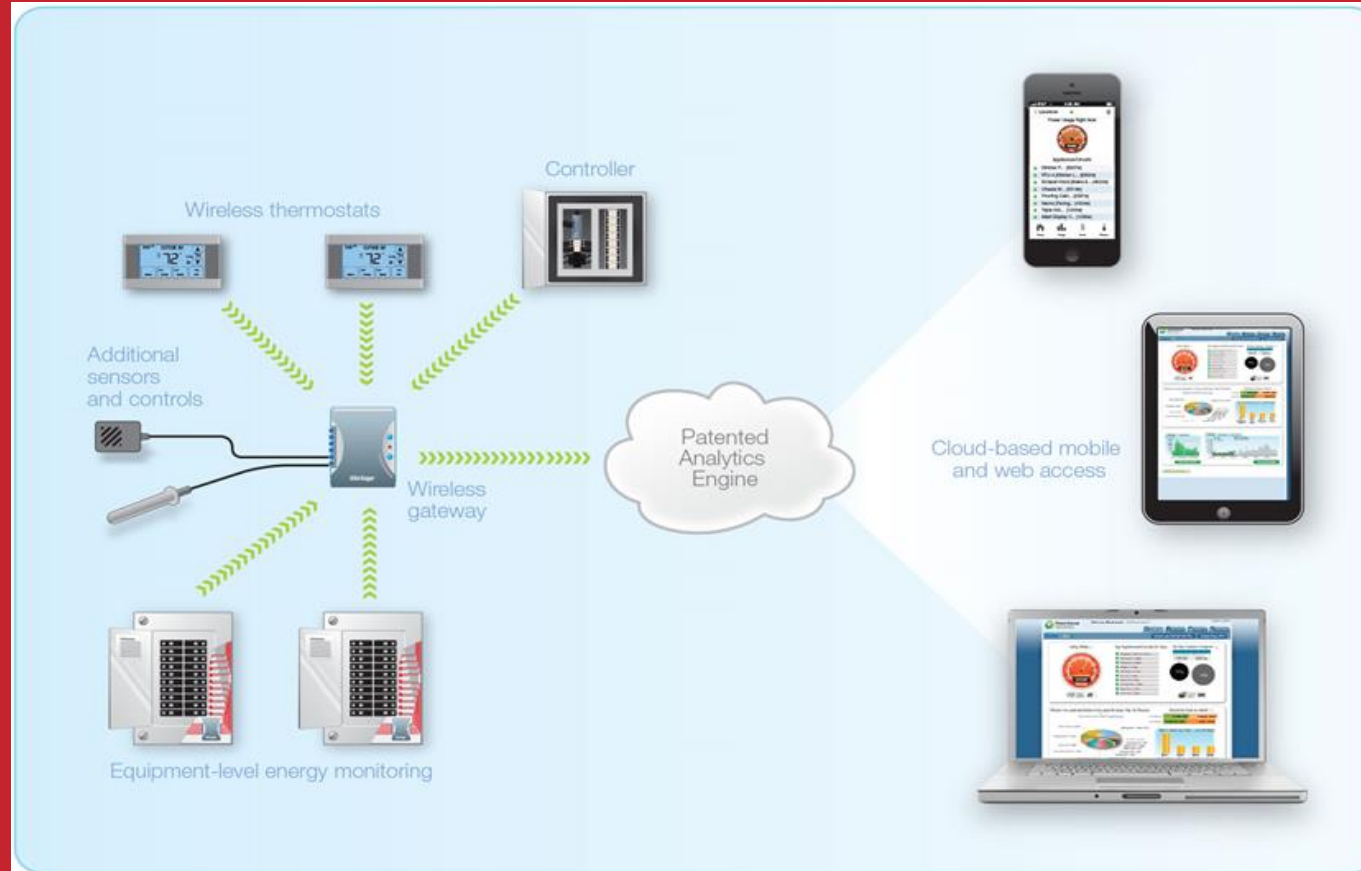
ARG found a system with comparable costs of programmable thermostats with much more expandability

RCM4	SiteSage Asset Mgmt System	
	<b>Observation:</b>	Several non-programmable thermostats were installed on the HVAC systems
	<b>Opportunity:</b>	Upgrade to SiteSage system to capture non-occupied savings potential, provide enterprise-wide energy use insight
	Per Site	Companywide
<b>Cost</b>	\$1,672	\$1,439,592
<b>Annual Electricity Reduction</b>	15,368 kWh	13,231,418 kWh
<b>Annual Natural Gas Reduction</b>	197 Therms	169,362 Therms
<b>Annual Water Reduction</b>	-	-
<b>Annual Carbon Reduction</b>	8.5 MTCO <sub>2</sub> e	7,336 MTCO <sub>2</sub> e
<b>Equivalent to</b>	958 Gallons of Gasoline	825,173 Gallons of Gasoline
<b>Total Annual Savings</b>	\$1,668	\$1,435,873
<b>Simple Payback</b>	1 year 0 month	1 year 0 month
<b>Additional Notes:</b>	Assumes three thermostats per site	



# ARBY'S NEW ASSET MANAGEMENT PLATFORM

A system to manage energy costs, equipment performance, and food safety



# ARBY'S ASSET MANAGEMENT PLATFORM

Centralized, easy to use HVAC & other controls

Current Thermostat Settings (Friday, August 30, 2013, 9:44 AM)

Mode:  Auto  Cooling  Heating  Off  
 Fan:  Auto  On  
 AM Prep Setting: 75°F Hold

Switch to Closed Days Schedule (See Settings to make all other changes.)

- Closed: 80°F (11:00p - 6:00a)
- AM Prep: 75°F (6:00a - 11:40a)
- Lunch: 69°F (11:40a - 4:20p)
- Lull: 80°F (4:20p - 8:00p)
- Dinner: 72°F (8:00p - 10:00p)
- Clean: 76°F (10:00p - 11:00p)

Period	Temperature
12a	80°
1	80°
2	80°
3	80°
4	80°
5	80°
6	80°
7	75°
8	75°
9	75°
10	75°
11	75°
12p	69°
1	69°
2	69°
3	69°
4	69°
5	69°
6	69°
7	80°
8	80°
9	80°
10	80°
11	72°
12	76°

Effective benchmarking down to the equipment level across the Enterprise

Benchmark HVAC/R Food Safety Admin

Results - Past 30 Days (based on measured usage)

View By: Location Search: [ ]

Name	City	State	Cost	Cost Sq. Ft.	Cost Oper.Hr.
Braintree	Braintree	MA	\$ 7,795	\$ 1.95	\$ 24.58
Dedham	Dedham	MA	\$ 5,801	\$ 0.97	\$ 17.24
Lexington	Lexington	MA	\$ 3,874	\$ 1.55	\$ 8.73
Salem	Salem	MA	\$ 1,830	\$ 0.73	\$ 3.81

WIC Cond (Meat)

Day Week Month Year

Usage Nov 15, 2:30pm: 0.57kWh

Patented analytics tackle operational inefficiencies and equipment performance

SiteSage Status: Current use: 51.06 kW | \$8.17/hr Current voltage: 288v Outside Temp: 46°F Enterprise

Off Hours Report November 13, 2014

Selected Off Hours Circuits, Past 30 Days

Total Lost Profits for Selected Circuits: \$88 (\$1,066/yr)  
 Selected Period vs. Comparison Period: \$113 (\$1,369/yr) (more profits)

Equipment	Current Period	Comparison Period
Heat Lamp (Point)	\$7	\$15
Exhaust Hoods (Main)	\$9	\$13
Frozen Margarita Machine	\$4	\$9
Bun Toaster	\$8	\$7
2 Door Mug Chiller	\$5	\$22
Heat Lamps (Broil)	\$5	\$17

Proactive, exception based push reporting and "mobile first" strategy

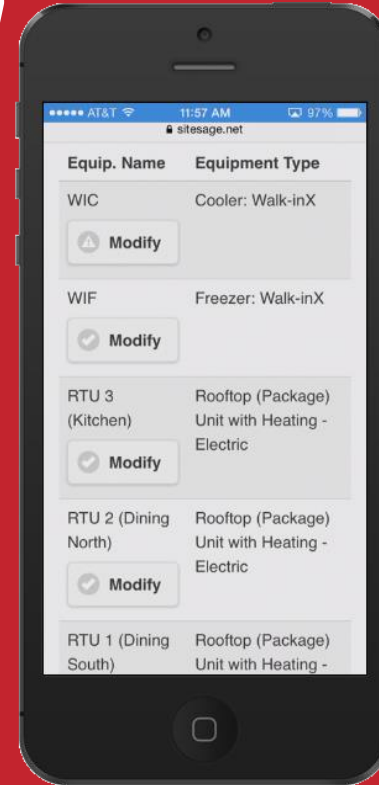




# ARBY'S ASSET MANAGEMENT PLATFORM

## Expanded Capabilities, *Assets Application*

- **Capture**: Mobile app to capture make, model, serial number, age, tons, observed condition, notes, photos
- **Analyze**: Online reporting, mapping & scoring enables quick sorting of thousands of units
- **Maintain**: Bar codes deployed facilitate future access to and updating of equipment data

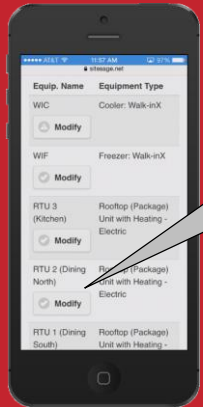


# ARBY'S ASSET MANAGEMENT PLATFORM

- Platform's new capability

- Audit & Inventory Mobile App to capture:

- Make
    - Model
    - Serial Number
    - Age
    - Tonnage
    - Input observed conditions
    - Upload photos
    - Input bar code information



Surveyor enters information while on the roof-top and data is uploaded directly onto Arby's SiteSage portal

Some units flagged for immediate replacement

## Equipment On-Site Scoring

- Objective, deducts points from physical observation

- All units begin with perfect score (100), points deducted for:

- Outdated refrigerant (R 22)
    - Age
    - Housing condition
    - Coil condition
    - Poor condensation drainage
    - Standing water
    - Electrical issue
    - Lowest score is a 0

Location	Unit	Make	Model	Age	Tons	Overall Cond	Call Cont	Energy (kWh)	Score
#5533	RTU 1 (Service)	Lemnox	GCR16-W	20	7	Service	Service	WDF	0
#0161	RTU 3 (Kitchen-Rear)	Trane		25	4	Service	Service	F	0
#7549	RTU 1 (Kitchen-North)	Carrier		28	12	Service	Service	F	0
#5783	RTU 2 (Lobby)	Trane	BYC1300	28	10	Service	Fair	WDF	0
#5533	RTU 3 (Dining)	Lemnox	GCR24-W	20	7	Service	Service	WDF	0
#0754	RTU 2 (Service Area)	Trane		25	5	Service	Service	WDF	0
#6584	RTU 2 (Dining East)	Lemnox	GCR24-W	22	7	Service	Service	DF	0
#6504	RTU 1	York	ORC30C	20	8	Service	Service	WDF	0
#0161	RTU 2 (Dining)	Other	PGAMB2	22	6	Service	Service	W	2
#1900	RTU 2 (Front Lines)	Other				Service	Fair	WDF	13
#9153	RTU 1 (Lobby)	Trane	BYC1100			Service	Fair	WDF	15
#5783	RTU 1 (Lobby)	Trane	VCD1800	16	15	Service	Fair	WDF	14
#6657	RTU 1 (Dining Room)	Trane				Service	Service	DF	15
#5533	RTU 1 (Kitchen)	Carrier	58DDPY1	20	10	Poor	Poor	WDF	15
#1900	RTU 2 (Dining South)	Lemnox	GCR16-W	20	5	Poor	Poor	WDF	16
#1900	RTU 2	York	OC3000	20	7	Service	Poor	DF	15
#1900	RTU 3 (Kitchen)	Lemnox	GCR18-W	20	5	Poor	Poor	WDF	15
#1900	RTU 1 (Dining North)	Lemnox	GCR16-W	20	5	Poor	Poor	WDF	15
#4208	RTU 2 (Dining)	Carrier	58DDPY1	20	10	Poor	Poor	WDF	15
#1920	RTU 2 (Service)	Other	7	15	5	Poor	Poor	WF	16
#7549	RTU 4 (Dining North)	Other		25	5	Service	Poor	F	17
#6064	RTU 1 (Kitchen)	Lemnox	LGA125S	18	10	Poor	Poor	WDF	19
#5446	RTU 3 (Janitor)	Lemnox	GCR10-61			Service	Poor	DF	20
#1065	RTU 4 (Courter)	Trane	SAVA-40			Service	Poor	DF	20
#9786	RTU 3 (Kitchen)	Carrier	48T800K	26	5	Poor	Poor	DF	20
#1905	RTU 1 (Kitchen)	Lemnox		9	18	5	Poor	WDF	21
#6584	RTU 3 (Kitchen)	Lemnox	GCR24-W	22	12	Poor	Poor	DF	22
#6584	RTU 1 (Dining West)	Lemnox	GCR24-W	22	7	Poor	Poor	DF	22
#6778	RTU 4 (Dining Right)	Lemnox	GCR24-W	22	7	Fair	Fair	WDF	23







# 2015 HVAC REPLACEMENT PROJECT (VIDEO DEMO)



*Equipment Audit & Inventory Demonstration*



# 2015 HVAC REPLACEMENT PROJECT

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## 2015 AOP Impact HVAC Replacement Project

- New platform allowed Arby's to survey 940 restaurants in (93) days
- 2,600 + roof-top-units "scored" & information entered into database
- Roll-out of 340+ units planned between March 1, 2015 & May 31, 2015
- Update feature provides new live equipment information
- Expected R&M savings of \$465K
- \$100K energy usage savings

## Early Wins

- Reduced cost of equipment by \$1,177 per RTU (\$397.8K total)
  - An additional 3% discount for spring purchases (approximately \$51K)
- Reduced cost of installation \$1,159 per RTU (\$391.7K total)
- Ecova rebate estimates for project may exceed \$41K



# ARG ENERGY GOALS & SAVINGS (2011 BASE LINE)

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## GOALS

15% Reduction in Total Energy Consumption in Company Owned Restaurants by the end of 2015 (Arby's Efficiency Matters)

20% Reduction in Total Energy Consumption in Company Owned Restaurants by 2020 (DOE's Better Buildings Challenge)

## CURRENT SAVINGS (EOY 2014)

11% Reduction in Total Energy Consumption

10% Reduction in Total Energy Costs



## PARTNERSHIPS/AFFILIATIONS

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ecova®

