Deep Retrofits

December 3, 2013
3:00-4:00 PM EDT
Overview and Agenda

- Welcome and Overview
- Deep Energy Retrofits: An Overview
- Glenborough’s Aventine Office Building Case Study
- Walmart’s Supercenter Case Study
- Additional Resources
- Question & Answer Session
## Today’s Presenters

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cara Carmichael</td>
<td>Rocky Mountain Institute</td>
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<tr>
<td>Carlos Santamaria</td>
<td>Glenborough, LLC</td>
</tr>
<tr>
<td>Jim McClendon</td>
<td>Walmart Stores, Inc.</td>
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</tbody>
</table>
Cara Carmichael
Senior Consultant
Rocky Mountain Institute
Deep Energy Retrofits…

- Achieve ≥ 50% energy savings
- Integrative design and analysis process
- Improved project economics
- Provide value beyond energy cost savings (VBECS)
- Positive electricity system impacts
Not incremental, but a new class of product
Trade Secrets for Cost Effective Deep Retrofits

1. Pursue the right steps in the right order
2. Deep Triggers
3. Focused analysis: Technical Potential and Bundle measures
4. Define business-as-usual expenditures
5. Quantify the value beyond energy cost savings
#1: Pursue the Right Steps in the Right Order

1. Set Quantifiable Goals
2. Define End-User Needs
3. Understand Existing Conditions
4. Reduce Loads
5. Select Appropriate & Efficient Technology
6. Find Synergies
7. Optimize Controls
8. Incorporate Renewables
9. Realize the Intended Design

Most people start here!
#2: Deep Triggers

1. Planned capital improvement
2. Major system replacement
3. Code upgrades
4. New owner / refinancing
5. New use / occupancy type
6. Building greening
7. Large utility incentives
8. Mitigating an “energy hog”
#3a: Technical Potential

Maximum level of savings possible given today’s technology

**WHY DO WE CARE?**

- Challenges conventional thinking
- Not limited by industry benchmarks/norms
- Leads to more aggressive design targets
- Explicitly determines where ground has been lost
#3b: Bundle measures

- Downsizing or eliminating mechanical and other systems - and therefore avoiding capital costs
- Adding square footage due to reduced mechanical space
- Allowing for more cost-effective measures to "finance" measures that provide value beyond energy cost savings (VBECS)
#4: Estimate the Cost of Business as Usual

- Utility bills
- Maintenance/operation costs
- Replacements
- Incremental upgrades
- Code requirements
- Energy/carbon pricing
- Interruption
#5: Include the Values Beyond Energy Cost Savings

Productive Salaries & Benefits: 86.3%

Energy: 0.8%
Rent: 8.9%
Absenteeism: 2.7%
Presenteeism: 1.3%

Sources: US Department of Labor 2010, BLS 2011; BOMA 2010
#5 The Value Framework

<table>
<thead>
<tr>
<th>Value</th>
<th>This value is created through…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction in Costs</td>
<td>▪ Lower costs to maintain &amp; replace equip.</td>
</tr>
<tr>
<td></td>
<td>▪ Lower health cost (absenteeism, health care)</td>
</tr>
<tr>
<td></td>
<td>▪ Lower employee recruiting and churn costs</td>
</tr>
<tr>
<td>Revenue Growth</td>
<td>▪ Higher occupancy and rent rates</td>
</tr>
<tr>
<td></td>
<td>▪ Increased employee productivity</td>
</tr>
<tr>
<td></td>
<td>▪ Improved marketing &amp; sales</td>
</tr>
<tr>
<td>Improved Reputation and Leadership</td>
<td>▪ Recruiting best employees or tenants</td>
</tr>
<tr>
<td></td>
<td>▪ Employee/tenant satisfaction and retention</td>
</tr>
<tr>
<td></td>
<td>▪ Public relations/brand management</td>
</tr>
<tr>
<td>Compliance with Internal &amp; External Initiatives</td>
<td>▪ Meeting the needs of Corporate Social Responsibility, Carbon Disclosure Project, etc</td>
</tr>
<tr>
<td></td>
<td>▪ Meeting responsible investment fund requirements</td>
</tr>
<tr>
<td>Reduced Risk to Future Earnings</td>
<td>▪ Reduced risk to reputation</td>
</tr>
<tr>
<td></td>
<td>▪ Limit exposure to energy/water price volatility</td>
</tr>
<tr>
<td></td>
<td>▪ Reduced legal risks – sick building syndrome, mold claims, etc</td>
</tr>
</tbody>
</table>
Results from 50 Deep Retrofits

Integrated design & multiple measures are more critical to low-energy buildings than any given technology.

Major renovations offer a major opportunity for deep savings. Re-positioning existing buildings is currently an attractive real estate move.

Readily available technologies/strategies were used to create these deep energy retrofits. Performance feedback is key.

Building ratings, labels, champions and recognition were a strong influence on increased efficiency.

Source: NBI

© U.S. Green Building Council 2012

http://newbuildings.org/meta-report-search-deep-energy-savings
"We can do some of the measures in all of the buildings, and we can do all of the measures in some of the buildings." – Blake Herrschaft, Engineer
Carlos Santamaria
Vice President, Engineering Services
Glenborough, LLC
The Aventine Office Building
Deep Energy Retrofit Project Case Study
Company Overview

Glenborough, LLC brings over three decades of experience to the commercial real estate industry. Formerly a NYSE listed real estate investment trust, the company is a privately held full service real estate investment and management company focused on the acquisition, management, and leasing of high quality commercial properties. We invest in core and value add properties in major markets across the country including San Francisco, Southern California, and Washington DC.
The Aventine Case Study

This case study show’s how Glenborough transformed the Aventine Office Building towards becoming one of the most energy efficient and sustainable buildings in the nation.

During 2008 - 2011, the Aventine Office Building underwent several major equipment retrofits changing its operations towards conducting the highest energy efficient best practices.

Glenborough’s dedication towards Energy Efficiency & Sustainability is reflected by its company wide Commitment and Leadership.
The Aventine Deep Energy Retrofit Project

This project started with the vision of reaching the highest level of energy efficiency and sustainability possible.

Glenborough is committed as an industry leader working towards transforming “ALL” of its office buildings across the nation.

The Aventine Deep Energy Retrofit project consisted of putting together a knowledgeable team of vendor partners interested in contributing to this one-of-a-kind undertaking.
The Aventine Deep Energy Retrofit Case Study

- Located in La Jolla California
- Class-A Office Building / Multi Tenant
- Built in 1990 – 23 Years Old
- Approximately 252,000 Sq.Ft.
- 2007 EPA ENERGY STAR Rating 84
- 2007 Electrical Cost at $2.90 $per/Sq.Ft.
The Aventine Deep Energy Retrofit Case Study

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- Class-A Office Building / Multi Tenant
- Built in 1990 – **23 Years Old**
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- 2007 EPA ENERGY STAR Rating 84
- 2007 Electrical Cost at $2.90 $per/Sq.Ft.
The Aventine Deep Energy Retrofit Case Study

LEED Summary - The Aventine Building Submitted its project to the U.S. Green Building Council in September 2009 earning ”71” LEED Credits Qualifying for Platinum Level Certification. (December 2010)

ENERGY STAR Summary – The Aventine Building has Achieved an ENERGY STAR Score of “100” Rating it as One of the Most Energy Efficient Buildings in the Nation.

Maintained a Score of “100” in 2009 – 2013 Going on 5-years
The Aventine Deep Energy Retrofit Case Study

Sustainability Overview

- Over 1,250,000 Kilowatts of Energy Saved Annually
- 725 (MtCO2e) Emissions Reduced Annually
- Over 1,000,000 Gallons of Water Saved Annually
- Over 50% Waste Diverted from Landfill to Recycling
- 100% of Energy Produced at Site Off-Set by Renewable Energy Credits - Wind Power
- “Strategic Vendor Energy Team” Created to Integrate LEED Project Resources & Expertise
The Aventine Deep Energy Retrofit Case Study

“Strategic Vendor Team”

1. ABM Engineering Services – Energy Services
2. Alpha Mechanical – Engineering & Services
3. Brickman Landscaping – Sustainable Landscaping
4. CentiMark Roofing – Cool Roof Installation
5. CleanSource – Green Cleaning Products
6. Chelsea Group – LEED Consultant
7. Cushman & Wakefield – Leasing Brokers
8. Light Source & G.E. – Sustainable Lighting Products
9. Mitsubishi Elevators – Sustainable Elevators
10. Optimum Energy – Chiller Plant Optimization Software
12. Workspeed – Web Based Tenant Service Programs
The Aventine Deep Energy Retrofit Project Case Study

“LEED Project Team”

**Project Team Administrator** - Carlos Santamaria, Vice President Engineering Services / Glenborough, LLC

**Project Team Manager** – Chris Munn, Regional Technical Manager Chelsea Group, Ltd.

**Project Team Members**

Doug Eagle, Chief Engineer, ABM Eng.
Dave Munn, Chief Technical Officer, Chelsea
Travis Gorzeman, Property Manager, Glb
Dave Peacock, Regional Leasing Director, Glb
Pat Simoni, Manager Corporate Services, Glb
Wayne Wheeler, Building Engineer, ABM Eng.
Alexandra Price, Regional Leasing Assistant, Glb
Kerry Jenkins, Chief Engineer, ABM Eng.
Michelle Micciche, Property Manager, Glb
Nicole Moser, Senior Project Manager, Workspeed
Deep Energy Retrofit
The Aventine Case Study

Started Comprehensive Energy Management Plan
3 - Phase Approach

1. Energy Profile, Identify Hi Energy Uses & Users & Set-Goals
2. Evaluate & Prioritize New Technology Implementation
3. Continue Implementation of Cost Saving Opportunities with Measuring Results
The Aventine Deep Energy Retrofit Case Study

Energy Management Strategies

Largest Areas of Energy Consumption Identified & Upgraded. HVAC Systems

Energy Use Breakdown - Major Loads

- Lighting: 48%
- HVAC: 22%
- Plugs: 18%
- Misc. Bldg: 12%

![The Aventine building image]
The Aventine Deep Energy Retrofit
Case Study
Energy Management

• Chiller Plant Identified as Energy Load with Single Biggest Savings Opportunities

Installs Optimum Energy’s Software Solution / “OptimumLOOP”

- Improved Plant Efficiency from a 1.4 KW/ton to a < .40 - .60 KW/ton Plant Efficiency
The Aventine Deep Energy Retrofit Case Study

Chiller Plant Performance

Using Next Generation Technologies

By using – All Drive – Algorithm Control & Monitoring:

The Aventine Reduced over 501,745 Kilowatts of Energy Saving $75,763 with this one System Upgrade!

Today, the Building Operates at 28kbtu/sf.
The Aventine Deep Energy Retrofit Case Study

Chiller Plant Performance

**Year 1 RESULTS**

- Increased EPA ENERGY STAR score to from “84?” to “100”
- GHG Emission Reduction From Baseline –234 (MtCO2e)
- Pre-Retrofit Electrical Cost at $2.90 $per/Sq.Ft.
- Post-Retrofit Electrical Cost at $2.20 $per/Sq.Ft. – 2013 at 1.95$sf
The Aventine Deep Energy Retrofit Case Study

Chiller Plant Performance (.50 - .60/kW/ton)

New Technology All-Variable Speed Chiller Plants
High-efficiency Optimized Chiller Plants
Conventional Code Based Chiller Plants
Older Chiller Plants
Chiller Plants with Correctable Design or Operational Problems

EXCELLENT

GREAT

FAIR

NEEDS IMPROVEMENT

kW/ton 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2
C.O.P. (7.0) (5.9) (5.0) (4.4) (3.9) (3.5) (3.2) (2.9)

Hi-Efficiency Compressors
The Aventine Deep Energy Retrofit Case Study
Real Time Energy Metering

1. Implemented EnerNoc Insight Energy Solution
2. Voluntary Peak Demand Reduction
3. Ongoing – Demand Side Management
The Aventine Deep Energy Retrofit Case Study

735 Three Carnegie Meter - V349N-016808 - 2nd Highest Peak Demand - 03/26/2013

- Weather - 03/26/2013
- Median Peak Demand Weather - 04/02/2013
- Demand - 03/26/2013
- Median Peak Demand - 04/02/2013
- Peak Demand

EEMs and Recs
The Aventine Deep Energy Retrofit Case Study – Meter Granularity
The Aventine Deep Energy Retrofit
Case Study
Whole Building Integration

1. Looking at Other Systems and Practices Towards Reduction


3. Ongoing Educational Outreach & Industry Thought Leadership That Promotes Ongoing Energy Efficiency Efforts
The Aventine Deep Energy Retrofit
Case Study

Exterior Building Upgrades

• Installed New EPA “Cool” Roof
• Reused over Two Tons of “Old” Red Rock Ballast
• Reduced Over 45,000 Kilowatts of Energy
• Reduced Heat Island Effect
The Aventine Deep Energy Retrofit Case Study

Water Conservation Strategies - Building

- Water Efficient Toilets & Urinals Installed
- Hands Free Faucets Installed
- Hands Free Soap Dispensers Used
The Aventine Deep Energy Retrofit Case Study

Water Conservation Strategies - Landscaping

- The Aventine Uses **100% Reclaimed Water** for Irrigation
- **Smart Controls** Utilizing Drip Irrigation Used
- Drought Resistant & **Native Plants** Installed
- **Open Space** is Maintained for 25% of Project
- **Sustainable Landscape Practices** are Performed
- Environmentally **Safe Chemicals Used**
- Landscape Waste **Composted Off-Site**
The Aventine Deep Energy Retrofit Case Study

Waste Management Program

• Implemented Comprehensive Waste Management Program
• Current Waste Diversion Rate at 50%
• E - Recycling Conducted Throughout Year
• Tenant Education Sessions Conducted Throughout Year
• Web-Based Recycling Program Dashboard Developed
• Comprehensive Waste Audit Conducted
• Construction Recycling Program Standard Used
• Battery & Lamp Recycling Program in Place
The Aventine LEED Platinum Case Study
USGBC & ENERGY STAR Results

LEED Platinum Certification – Just “One of Ten” 20 Plus Year Old Multi-Tenant Office Buildings in World

ENERGY STAR Rating of “100” for last Five Years
Glenborough’s Energy Efficiency & Sustainability Accomplishments

- NAREIT Leader in the Light “Gold” Award for Energy Efficiency - 2005
- EPA Top Leaders Award for Achieving a Portfolio Wide Average ENERGY STAR Score above 75 - 2008
- Flex Your Power Energy Efficiency Award - 2008
- EPA Top Leaders Award for Reducing Energy Across the Portfolio by over 10% - 2009
- EPA – ENERGY STAR National Building Competition Finalist and 4th Place Award Winner – Highest Percentage Reduction
- EPA Top Leaders Award for Achieving a Portfolio Wide Average ENERGY STAR Score above 85 - 2010
Questions

If you would like to contact us, please feel free to send an email to Carlos Santamaria, LEED AP – Vice President – Engineering Services

carlos.santamaria@glenborough.com

Or call 650-343-9300x522
Jim McClendon
Director of Engineering
Walmart Stores, Inc.
Large Scale Energy Reductions
Walmart 2020 Energy Goal

Jim McClendon
Walmart Design

04Dec2013

Be Supplied by 100% Renewable Energy
Formats & Footprint

Quick Stats:

>1 Billion SF
>200 Million Cust/Wk
>2 Million Associates
>10,000 Stores/Clubs
16 Countries
Background Goal

2005 GHG Goal

‘Reduce the greenhouse gases at our existing store, club and DC base around the world by 20% over the next 7 years’

Design and build a new prototype that is 20% more efficient and produces 25% fewer greenhouse gases than our 2005 prototype
**DEVELOPMENT TIMELINE**

- **2003**
  - Concept Development

- **2004**
  - First Test
    - LED Parking Lot Lights
      - NHM #3497 detailed Full
  - Green & White LED signage Testing; Red is Proto

- **2005**
  - First Install
    - McKinney, TX
      - Gen-1 LED Case Lts
  - DOE
  - Green signage is Proto

- **2006**
  - LED Case Lights Proto
  - White signage is Proto

- **2007**
  - First Test
    - LED Parking Retrofit#5260 Rogers, #359 Fayetteville, #3828 Longview
  - DOE

- **2008**
  - First SUP Test
    - LED Parking Retrofit#5260
  - DOE

- **2009**
  - First Install
    - #26 Leavenworth SC
      - New LED parking
  - DOE

- **2010**
  - DOE

- **2011**
  - First Full Store LED
    - #5990 Wichita
  - DOE

- **2012**
  - DOE

**Energy Efficiency Projects → 8000 Projects**

**HE.1 Projects**
- 4553-Kansas City, MO
  - #3837 Rockton, IL
  - #4240 Highland Village, TX
  - Grand Open

**HE.2 Projects GO**
- #4531 Romeoville, IL
- #3731 Bernalillo, NM
- #4321 Wichita, KS
- #1800 Garland, TX

**HE.3 Projects**
- #1954 Sanford, ME
- #3860 Liberty, OH
- #1151 Kansas City, KS
- Grand Open

**HE.4 Projects**
- #2365 Sacramento, CA
- #6622 Sacramento, CA
- #5134 Bakersfield, CA
- Grand Open

**McKinney, TX #206 Experimental Project Open**

**Aurora, CO #5334 Experimental Project Open**

**1st CO2 Refrigeration TEST**
- Sam’s #8202 Sandfly, GA

**HE Proto Pilots**

**HE Proto**
- So Euclid, OH
- DOE

**PROTO LED Parking Lot**

**1st 100% LED SUP**
- DOE
- So Euclid, OH

**Green & White LED signage Testing**

**Red LED signage Testing**
~8,000 Projects Completed (2005 – 2011):

- **AHU Airflow Reduction 12%**
  - ~ 1,000 projects
  - ~ 81,000 MT GHG Reduction

- **LED Freezer Case Lights 25%**
  - ~ 1,700 projects
  - ~ 191,000 MT GHG Reduction

- **Refrigeration Fan Speed Control 21%**
  - ~ 300 projects
  - ~ 35,000 MT GHG Reduction

- **Replace RTU’s 4%**
  - ~ 300 projects
  - ~ 35,000 MT GHG Reduction

- **Replace AHUs 9%**
  - ~ 700 projects
  - ~ 110,000 MT GHG Reduction

- **Replace Perimeter Lighting 25%**
  - ~ 2,000 projects
  - ~ 135,000 MT GHG Reduction

- **LED RR Lights 1%**
  - ~ 100 projects
  - ~ 1,000 MT GHG Reduction

- **LED Produce 2%**
  - ~ 200 projects
  - ~ 2,000 MT GHG Reduction

- **LED Freezer Case Lights Replacement**
  - 25% of projects
  - 1,000 MT GHG Reduction

- **AHU Airflow Reduction**
  - 12% of projects
  - 81,000 MT GHG Reduction

- **Replace RTU’s**
  - 4% of projects
  - 35,000 MT GHG Reduction

- **Replace AHUs**
  - 9% of projects
  - 110,000 MT GHG Reduction

- **Replace Perimeter Lighting**
  - 25% of projects
  - 135,000 MT GHG Reduction

- **LED RR Lights**
  - 1% of projects
  - 1,000 MT GHG Reduction

- **LED Produce**
  - 2% of projects
  - 2,000 MT GHG Reduction

**PLUS:**
- LED Parking Lot Lights
- Anti-Sweat Heater Controls
- ECM Motors on Walk-ins
- GUHs on BAS Control
- Evaporative Pre-Cooling

Replace old fluorescent lighting in freezer case doors with new LED technology.

Remove one of the two lamps on the interior store perimeter lighting, zero cost!

Replace old Metal Halide lighting in Produc with new LED technology.

Replace old ‘end-of-life’ air handlers with new, high efficiency units.

Replace old ‘end-of-life’ rooftop air conditioners with new, high efficiency units.

Install new Variable Speed Drives on refrigeration condensers = fan energy savings.

Reduce excessive airflow from air handling units = fan energy savings.

~ 2,000 projects
~ 100,000 MT GHG Reduction

~ 2,000 projects
~ 100,000 MT GHG Reduction

~ 1,000 projects
~ 81,000 MT GHG Reduction

~ 1,700 projects
~ 191,000 MT GHG Reduction

~ 300 projects
~ 35,000 MT GHG Reduction

~ 700 projects
~ 110,000 MT GHG Reduction

~ 100 projects
~ 1,000 MT GHG Reduction

~ 200 projects
~ 2,000 MT GHG Reduction

~ 8,000 Projects Completed (2005 – 2011):
Energy Achievements
(US Only)
On April 15, 2013 we announced two new corporate energy goals for 2020.

Walmart is on the path to being supplied by 100% renewable energy.

We will take a two tiered approach by both increasing renewable energy usage and increasing energy efficiency with the following commitments:

<table>
<thead>
<tr>
<th>Commitment 1: scale renewables</th>
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<tbody>
<tr>
<td><strong>Public Goal</strong></td>
</tr>
<tr>
<td>Drive the production or procurement of 7 billion kWh of renewable energy globally by December 31, 2020—an increase of over 600% versus 2010</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Commitment 2: accelerate efficiency</th>
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</thead>
<tbody>
<tr>
<td><strong>Public Goal</strong></td>
</tr>
<tr>
<td>By December 31, 2020, reduce the kwh/sq.ft. energy intensity required to power our buildings around the world by 20% versus 2010</td>
</tr>
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2020 Energy Goal → Starting Where We Left Off
Goal is Based in the Existing Footprint

Existing Building Stock_{US}

<table>
<thead>
<tr>
<th>Year</th>
<th>1990</th>
<th>2000</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
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<tbody>
<tr>
<td>1990</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td>1000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td>5000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td></td>
<td></td>
<td></td>
<td>87%</td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6000</td>
</tr>
</tbody>
</table>

2013

87%
Goal is Based in the Existing Footprint

Existing Building Stock_{US}
Footprint Opportunities

Racks

- > 15 yrs: 1500
- < 15 yrs: 14000
Footprint Opportunities

RTUs

<table>
<thead>
<tr>
<th>&gt; 10 yrs</th>
<th>&lt; 10 yrs</th>
</tr>
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<tbody>
<tr>
<td>38000</td>
<td>85000</td>
</tr>
</tbody>
</table>

Walmart
Save money. Live better.
EE Projects Opportunities Example → 2005 Goal vs 2020 Goal

- ~8,000 Projects/7 yrs
- ~25,000 Projects/8 yrs
APPROACH
2020 Energy Goal Strategy

Large scale, portfolio wide energy efficiency project identification;

- **Understand the footprint**
  - Monthly Utility data at minimum / submeter data is better
  - All energy forms; electric, gas, other
  - Sort by format, region, operation

- **Look for patterns & trends → establish ‘normal’ and identify the outliers**
  - Range of deviations
  - Best / worst performers
  - What’s right – what’s wrong

- **Initiative Ideation**
  - Int/Ext SMEs, Utilities, NGOs, GO’s, Formal/Informal…
  - Sort by; 1) Load Reduction, 2) Free Energy, 3) Efficiency
  - Filter by; 1) OTS-ROTS-NT, 2) Return on Investment, 3) Resources
4356, Las Vegas, NV

Previous Year (kWh), 24hr interval reading (bad dehumid reading)

[01/01/2012 00:00 - 01/01/2013 00:00]

M1/STORES/HE STORES/4356 LAS VEGAS, NV, HE5/VIRTUAL METERS/TOTAL HVAC
M2/STORES/HE STORES/4356 LAS VEGAS, NV, HE5/VIRTUAL METERS/TOTAL REFRIG
M3/STORES/HE STORES/4356 LAS VEGAS, NV, HE5/VIRTUAL METERS/TOTAL LIGHTING
M4/STORES/HE STORES/4356 LAS VEGAS, NV, HE5/VIRTUAL METERS/TOTAL SITE MISC
## #924 Sterling Super Center kWh/Year Breakdown by Store Area

<table>
<thead>
<tr>
<th></th>
<th>DEHUMID</th>
<th>HVAC</th>
<th>LIGHTING</th>
<th>REFR</th>
<th>MISC</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back of House</td>
<td>55,624</td>
<td>110,177</td>
<td></td>
<td></td>
<td></td>
<td>165,800</td>
</tr>
<tr>
<td>Sales</td>
<td>110,536</td>
<td>745,664</td>
<td></td>
<td></td>
<td></td>
<td>856,200</td>
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<tr>
<td>Automotive</td>
<td>3,487</td>
<td>31,098</td>
<td></td>
<td></td>
<td></td>
<td>34,585</td>
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<tr>
<td>Garden</td>
<td>6,928</td>
<td>10,732</td>
<td></td>
<td></td>
<td></td>
<td>17,660</td>
</tr>
<tr>
<td>Registers</td>
<td>28,750</td>
<td>13,642</td>
<td></td>
<td></td>
<td></td>
<td>42,392</td>
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<tr>
<td>Grocery</td>
<td>117,667</td>
<td>103,510</td>
<td>300,359</td>
<td>1,148,693</td>
<td>1,670,229</td>
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<tr>
<td>Retail</td>
<td>27,421</td>
<td>11,520</td>
<td></td>
<td></td>
<td></td>
<td>38,941</td>
</tr>
<tr>
<td>Exterior</td>
<td></td>
<td>68,039</td>
<td></td>
<td></td>
<td></td>
<td>68,039</td>
</tr>
<tr>
<td>Misc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>727,055</td>
<td>727,055</td>
</tr>
<tr>
<td>Total</td>
<td>117,667</td>
<td>336,256</td>
<td>1,291,231</td>
<td>1,148,693</td>
<td>727,055</td>
<td>3,620,901</td>
</tr>
</tbody>
</table>

**Gas (Therms)**

79,800

### Breakdown by End Use

- DEHUMID: 3%
- HVAC: 9%
- LIGHTING: 36%
- REFR: 32%
- MISC: 20%

### Energy Distribution by Area and End Use

- **MISC**
- **REFR**
- **LIGHTING**
- **HVAC**
- **DEHUMID**

![Energy Distribution by Area and End Use](image-url)
### Sam's Club #6549 Pueblo, Colorado

<table>
<thead>
<tr>
<th>End Use</th>
<th>Annual kWh Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Temperature</td>
</tr>
<tr>
<td><strong>Compressors</strong></td>
<td></td>
</tr>
<tr>
<td>Compressors</td>
<td>293,556</td>
</tr>
<tr>
<td><strong>Condensers</strong></td>
<td></td>
</tr>
<tr>
<td>Condenser Fans</td>
<td>40,849</td>
</tr>
<tr>
<td><strong>Refrigerated Boxes</strong></td>
<td></td>
</tr>
<tr>
<td>Unit Cooler Fans</td>
<td>166,871</td>
</tr>
<tr>
<td>Unit Cooler Defrost</td>
<td>72,898</td>
</tr>
<tr>
<td>Glass Door Lights</td>
<td>13,937</td>
</tr>
<tr>
<td>Glass Door Anti-sweat Heaters</td>
<td>145,324</td>
</tr>
<tr>
<td>Room Lights</td>
<td>7,353</td>
</tr>
<tr>
<td>Misc. Heat Tape / Door Heaters</td>
<td>3,223</td>
</tr>
<tr>
<td>Walk-In Box Subtotal</td>
<td>409,606</td>
</tr>
<tr>
<td><strong>Refrigerated Cases</strong></td>
<td></td>
</tr>
<tr>
<td>Case Lights</td>
<td>1,429</td>
</tr>
<tr>
<td>Case Fans</td>
<td>2,557</td>
</tr>
<tr>
<td>Case Anti-sweat Heaters</td>
<td>11,022</td>
</tr>
<tr>
<td>Case Defrost</td>
<td>891</td>
</tr>
<tr>
<td>Case Subtotal</td>
<td>15,899</td>
</tr>
<tr>
<td><strong>All Total</strong></td>
<td>759,910</td>
</tr>
</tbody>
</table>

### Refrigerated Boxes and Cases

- Compressors: 1% (36% of total)
- Condensers: 4% (12% of total)
- Refrigerated Boxes: 4% (12% of total)
- Refrigerated Cases: 26% (8% of total)
- Unit Cooler Fans: 12% (4% of total)
- Unit Cooler Defrost: 8% (3% of total)
- Glass Door Lights: 4% (1% of total)
- Glass Door Anti-sweat Heaters: 4% (1% of total)
- Room Lights: 4% (1% of total)
- Misc. Heat Tape / Door Heaters: 4% (1% of total)
- Case Lights: 4% (1% of total)
- Case Fans: 4% (1% of total)
- Case Anti-sweat Heaters: 4% (1% of total)
- Case Defrost: 4% (1% of total)
Objective:

- Define the Objective; ‘Reduce the kWh/sf 20% by 2020’

- Need to ‘Fill the Funnel’…with EE projects that make economic sense → FOCUS ON EXISTING BUILDINGS

Basic Concept;
- Assemble a diverse group of Subject Matter Experts (SMEs), explain the objectives, outline the limits & boundaries, provide them the tools they need…and let them go.

Know your SME’s;
- Internal, Consultants, Utilities, DOE, Universities
Strategy Discussion Path

Priority of Benefits:
1) Load Reduction
2) Time Energy
3) Efficiency Improvement

Is there an OTS technology that will meet objectives?

Can OTS be reworked to achieve objective?

Go to OTS flowchart
Go to ROTS flowchart
Go to NT flowchart

OTS

Begin Here
- Recomendations (section and foundation of current cost)
- CTS flowchart

ROTS

Begin Here
- CTS analysis
- CTS implementation
- CTS evaluation

NT

Begin Here
- CTS implementation
- CTS evaluation
- CTS feedback

Note: Flowchart details are not fully transcribed due to the complexity and nature of the diagram.
Thank You

Be Supplied by 100% Renewable Energy
Additional Resources
For More Information

- Rocky Mountain Institute
  - Retrofit Depot
  - Rocky Mountain Institute
- Glenborough, LLC
  - The Aventine Chiller Plant Optimization
  - A Search of Deep Savings in Existing Buildings
  - Building Performance Tracking: Aventine Success Story
- Walmart Stores, Inc.
  - Walmart Energy
Question & Answer Session
Join Us for the Next Better Buildings Webinar

U.S. Department of Energy Better Buildings Webinar Series

Kick-starting Your Energy Management Program

Tuesday, January 7, 2014
3:00-4:00 PM EST

Jaxon Love, Shorenstein
Kelly Boulton, Allegheny College

Time, money, and expertise are often barriers to a robust energy management program. Join Better Buildings Challenge Partners Shorenstein and Allegheny College as they describe solutions that have helped them jump these hurdles to develop a culture of sustainability within their organizations – and a track record of successful energy efficiency projects. Jaxon Love details Shorenstein’s experience bringing on energy management fellows for summer appointments, which built the case for a full-time sustainability position at the company. Kelly Boulton outlines how she and campus professors have worked together, engaging students to develop and present the business case for campus energy efficiency projects to administrators.

Register
### Additional Questions? Feel Free to Contact Us

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