Making the Cut: Slicing Through Food Service Energy Costs With Cutting-edge Technologies

Better Buildings Summit
Tuesday, May 10, 2016
11:15 AM-12:30 PM
Agenda

11:15  Welcome & Introductions
11:20  David Zabrowski, The Food Service Technology Center
11:35  Jay Fiske, Powerhouse Dynamics
11:50  George Huettel, Ecova
12:05  Group Discussion/Q&A
Today’s Presenters

David Zabrowski
The Food Service Technology Center

Jay Fiske
Powerhouse Dynamics

George Huettel
Ecova
How Restaurants Use Energy and Water

David Zabrowski
MAKING THE CUT: SLICING THROUGH FOOD SERVICE ENERGY COSTS

May 10, 2016
FSTC studies all the ways restaurants use energy and water.

An example of the total energy breakdown (BTU) in a full service restaurant.

- Food Prep: 35%
- HVAC: 28%
- Lighting: 13%
- Refrigeration: 6%
- Sanitation: 18%
More than 3 Billion CFM...

...exhausted from Commercial Kitchens in the U.S.
...dominated by single-speed systems!
Hotel Kitchen 3:00 PM
No appliance use…but exhaust at 100%

Front Line

Back Line
Exhaust and Makeup Fan Power

Without DVC

Avg. Reduction = 8.7 kW
CAUTION:

The CKV system must work effectively as single-speed system before DCV is applied.
What the Eye Sees!

8-Ft Wall Mounted Canopy Hood
What the Camera Sees

- Hood
  - Spillage of Plume at 165 cfm/lf
  - Range Top (side view)

- Hood
  - Capture and Containment at 220 cfm/lf
  - Range Top (side view)
Research Project RP 1202
Effect of Appliance Diversity And Position On Commercial Kitchen Hood Performance
Three Nuggets
Push Back
Overhang Sensitivity for 3 Fryers
Overhang Sensitivity for 3 Fryers at 2400 cfm (240 cfm/ft)

6 inches of Front Overhang

18 inches of Front Overhang
Add Side Panels

A bit more stainless steel can be cheap insurance!
Multiple configurations of appliances under various 10-ft. wall canopy hoods (approx. 90 tests) with and without partial side panels

30% reduction in airflow!
Side Panels Pass the Test!
Bigger Hood
Not enough overhang!
Optimize Your Hood
(Guides available at Fishnick.com)

Then...add DCKV
Future of DCV
For Commercial Kitchens

By Don Fisher, P.Eng., Associate Member ASHRAE, and Rich Swierczyna, Associate Member ASHRAE, Angelo Karas
Corporate Cafeteria
Exhaust System (w/o EMS)

- Exhaust Fan 1 (4000 CFM)
- Exhaust Fan 2 (4500 CFM)
- Make-Up Air

Average Energy Rate (kW)

Time of Day

©2016 PG&E Food Service Technology Center
Exhaust System (with EMS)

- Exhaust Fan 1 (4000 CFM)
- Exhaust Fan 2 (4500 CFM)
- Make-Up Fan
Total Daily Fan Energy

<table>
<thead>
<tr>
<th>Daily Fan Energy (kWh/day)</th>
<th>Original System</th>
<th>Original System with EMS</th>
<th>Retrofit System with Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>$4875/yr @ $0.15/kWh</td>
</tr>
<tr>
<td></td>
<td>$3250 savings @ $0.10/kWh</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

©2016 PG&E Food Service Technology Center
Climate Effect

1000 cfm Outdoor Air
24 hour per day
Heated to 65F
Cooled to 76F
70% RH

Heating/Cooling Load (kBtu/yr)

- Los Angeles
- San Francisco
- Chicago
- Fairbanks
- New York
- Phoenix
- Atlanta
- Miami
DCKV Typical energy/cost savings total 40 to 50%

Case Studies available at:

www.fishnick.com
DCKV-ROI Recap:

- The larger the exhaust airflow (in cfm), the greater the energy savings potential.
- DCKV works best with a mixed duty cookline.
- The CKV system must work effectively as single-speed system before DCKV is applied.
- Effective commissioning of a DCKV system will maximize its performance.
- And in the future, the DCKV system should communicate/integrate with the EMS system.
Thanks

be energy wise

SAVE ENERGY, SAVE MONEY, SAVE THE ENVIRONMENT

CALIFORNIA INVESTOR-OWNED UTILITIES PARTNERING FOR ENERGY EFFICIENCY

SoCalGas
www.socalgas.com/business

Pacific Gas and Electric Company
www.pge.com/fstc

SDGE
www.sdge.com/foodservice

EDISON
www.sce.com/CTAC

©2016 PG&E Food Service Technology Center
SiteSage: Arby’s Corporate Case Study
Jay Fiske
Can you find the lost profits in this picture?

and the thermostats set to 70 degrees?

and the cooler compressor running non-stop?

and the exhaust fan on?

Your guests won’t arrive for 3 hours - so why is every light in your restaurant turned on?
Restaurants spend 3 times more on energy per sq. ft. than other businesses.

Energy costs unknown until the bill arrives - long after anything can be done.

Are there any other products or services you buy this way?

Reactive equipment repairs are 3 times as expensive as planned repairs.

According to PRSM, proactive repairs average ~ $200 vs. $600+ for reactive.

Do you get notified before equipment fails?
Energy Management Success: It’s Not Just About Energy

Centralized, easy to use HVAC & other controls

Integrated with equipment from other companies for advanced control & diagnostics

Real-time monitoring to identify operational inefficiencies

Analytics address equipment performance

Energy Management Success: It’s Not Just About Energy

Centralized, easy to use HVAC & other controls

Integration with equipment from other companies for advanced control & diagnostics

Real-time monitoring to identify operational inefficiencies

Analytics address equipment performance
Components of an Energy- and Asset-Management Solution
Arby’s Case Study

- SiteSage installed in all 970+ US corporate-owned stores after competitive evaluation
- Energy savings alone deliver payback in <2 years
  - Enterprise HVAC Control + HVAC Analytics
- Positioned as Energy Management and Food Safety Platform
  - Kitchen equipment vendors interface with SiteSage as part of Arby’s Smart Kitchen initiative
- SiteSage is also used as repository for all equipment asset data
- Arby’s has reported a >15% reduction in restaurant energy costs across the chain

“We have been very impressed by the capabilities of SiteSage. Not only will the system enable us to get HVAC costs under control, but it will also help identify problems with both rooftop cooling units and refrigeration equipment.”

- Arby’s SVP
Arby’s Case Study: Automating Food Safety Reporting

Implemented Solution with SiteSage

Wireless Module
• Connects to Cook & Hold control board
• Sends data wirelessly to Gateway

Gateway
• Connects to Internet

SiteSage software
• Stores data and automates Beef Sheet HACCP Report
Arby’s Case Study: Automating Food Safety Reporting

**Implemented Solution with SiteSage**

- System generates real-time data on cooking roast
- Automates creation of HACCP Beef Sheet Report & emails report daily
Energy Management Success: It’s Not Just About Energy

Remote control of HVAC & other equipment

Rooting out inefficiencies:
• Off-hours usage
• Water leaks
• Underperforming equipment

Enhanced asset management:
• Advanced fault warnings
• Condition – based maintenance

... also provides:
• Enhanced Food Safety
• Improved guest comfort
• Increased staff productivity
Thank you!

Jay Fiske
Vice President
Business Development
One Bridge Street
Newton, MA 02458
(617) 340-6582 x203
c: (781) 570-9047
f: (617) 849-5655
jay@powerhousedynamics.com
www.powerhousedynamics.com

SiteSage
Manage wisely

Powerhouse Dynamics
Leverage Data, Technology and Services to Reduce Operating Costs
George Huettel
MAKING THE CUT: SLICING THROUGH FOOD SERVICE ENERGY COSTS
Leverage Data, Technology and Services to reduce operating costs
Today’s Agenda

- Strategic Process
- Solid Foundation in Data
- Identify Opportunities
- Take Action
- Continually Monitor
- Client Examples
- Q&A
Implement a Strategic Process

Life-cycle approach

- **Analyze** data to reveal resource saving opportunities
- **Identify** operational patterns to provide insight into cost drivers and outlier sites
- **Take Action** by implementing changes and modifying operational procedures
- **Monitor**, track, and report on cost and operational data and trends to ensure solutions are sustainable

Collaborative engagement with clients guides the energy program towards a best practice, continuous energy improvement approach.
It all starts with the data

ELECTRONIC AND PAPER INVOICES ARRIVE, BATCHED, SCANNED

DETAILED LINE ITEM DATA CAPTURED

EXCEPTIONS ARE CREATED, RESOLVED

PAYMENT PROCESS INITIATED

BILLS CONSOLIDATED, SINGLE FILE PRESENTED TO CLIENT FOR REVIEW AND PAYMENT

DETAILED RESOURCE AND FINANCIAL DATA IS AVAILABLE IN ONLINE REPORTING PLATFORM
Extend to site level meter data

Asset level measurement of energy usage

Analyze Equipment Performance

Track Operating Costs by Asset
Resource Performance Reporting

Benchmark, Trend and Analysis Reports

- Benchmarking Reports – comparing sites nationwide and against industry peers
- Trending Reports – comparing sites to past performance
- Cost drivers – Identify what is influencing energy cost
- Weather and calendar normalized comparison of sites on both a per service and combined kBtu basis to identify performance trends and Outliers
Identify Energy Cost Drivers

What’s really behind year over year performance changes

Identify impact on energy usage absent of weather, utility rates and other important factors
Identify Outliers and Energy Usage Trends

Determine where to focus resources of time, manpower and capital
Determine optimum course of action

Leverage expertise to make sense of all the data

Holistic & Streamlined Approach

- Organizational Engagement
- Strategic Advising
- Data-driven Consulting
- Program Implementation Support

Energy Management Services
Implement Continuous Monitoring

**Primary Components**

- Service Call Response
- Alarm Management
- Workflow Management
- Designated toll-free number and email address to the 24/7/365 OCC
- Web-based Ticket Activity and Performance Dashboard

**Key Benefits**

- More effective maintenance and repair operations through improved issue tracking/reporting
- Improved first-call resolution through accurate diagnoses and description of equipment issues
- Improved visibility into facility operations & better documentation of equipment performance

---

**EMS Data & Alarms**

**Alarm Mgmt**

**Call Mgmt (CSR)**

**Proactive Mgmt**

**Support Specialist**

**Ticketing System**

**Remote Resolution**

**Service Dispatch**

**Activity Dashboard**
Automated Business Rules Engine

- Implement advanced analysis of site data, EMS programmed alarms and advanced system alerts
- Create Business Rules to process and identify meaningful issues, analyze their impact and prioritize actions
- Reduce alarms, site activity, energy and maintenance costs
Example – Slicing through Alarm Data

2015 Statistics

- 403,170 alarms processed
- 70,260 determined actionable
- 59,610 processed by OCC
- 7,470 Avoided Service Dispatch
  - Issues resolved without a dispatch
  - Ecova Building Specialists provide remote resolution
- 3,180 Avoided Risk of Product Loss
  - Issues resolved by early service dispatch resolution
  - Timely identification eliminates food safety product loss event
- Annual cost avoidance is $1.83 million in 2015
Example – Slicing through Operational Data
Example – Slicing through Energy Data

- Detailed breakdown of electricity usage
- Heat lamps use nearly as much energy as the WIC and WIF combined, and 2nd unit can be turned off overnight
- Waffle irons use approximately 4.5% of the total electricity use
- Walk-in freezer doors are left open often
- Ventilation and refrigeration are significant opportunities
Summary

Program Objectives

• Reduce energy consumption and operational costs
• Maintain a comfortable store environment
• Ensure Product Quality, Food Safety and Compliance
• Leverage People, Process and Technology
• Correlate Energy and Site performance
  • Identify and investigate Outlier Sites
  • Identify and prioritize under-performing assets
• Implement Intelligent Dispatch
  • Reduce service dispatch quantity
  • Minimize onsite service technician time
Discussion/Q&A
Thank you!

Contact Information:

- Adam Spitz: Adam.Spitz@icfi.com
- David Zabrowski: Dzabrowski@fishnick.com
- Jay Fiske: Jay@powerhousedynamics.com
- George Huettel: GHuettel@ecova.com