



## **Reducing Energy Consumption in Restaurants and Kitchens – Day 2**

**11:15 AM – 12:30 PM**

Moderator: Rich Shandross, Navigant Consulting, Inc.

# Agenda

- Introductions and review of 2013 projects (10 min)
- Best practices for food service energy reduction:
  - Demand Control Ventilation for Commercial Kitchens (20 min)
  - Energy Management and Information Systems (20 min)
  - Measures for franchisees and independents (20 min)
- Putting it all together (15 min)

# Introductions and Review of 2013 Projects

- Introductions
- 2013 project summary:
  - ENERGY STAR® food service building performance scale and certification
  - EMS Guidance
  - EMS Quantification of NSNS Benefits (Maintenance)
  - DCV Guidance
  - Food service Energy Achievement Highlights

# Demand Control Ventilation for Commercial Kitchens (DCKV)

- Presentations:
  - Rich Catan, Halton: *Demand Control Ventilation for Commercial Kitchens – What Makes a Successful Installation?*
  - Don Fisher, Fisher Consultants (representing PG&E Food Service Technology Center): *DCKV Retrofit Evaluation Strategy*

# Energy Management and Information Systems (EMIS)

- Presentations:
  - Juliann Rogers, CKE: *Best Practices for EMS Rollout in Quickservice Restaurants*

# Franchisees and Independents

- Discussion on how franchisees and independents can “get the ball rolling” on energy reduction
- If many new attendees relative to Wednesday, may have a short talk:
  - Rich Shandross, Navigant (representing BBA): *Energy Efficiency Approaches for the Resource-Constrained Organization*

# Day 2 – Wrap Up

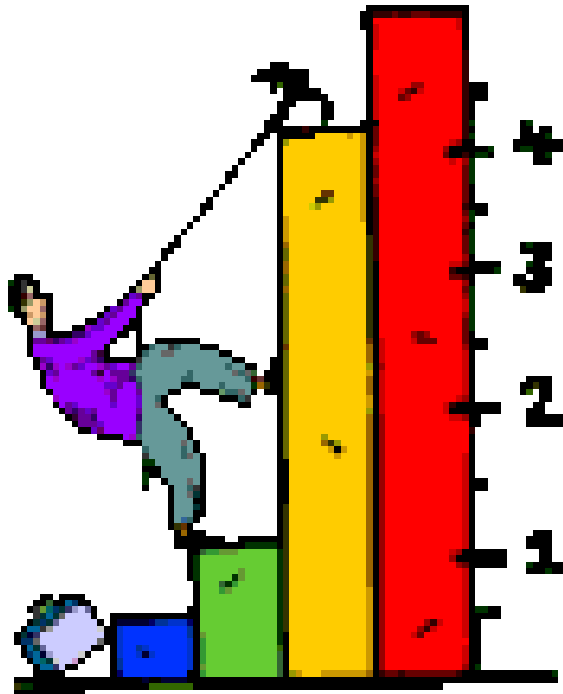
- Revisit big picture
- Have we captured everything for June decision making team call?
- Final thoughts

# Demand Control Ventilation for Commercial Kitchens

What makes a successful installation



# What does ASHRAE say about Demand Control Ventilation



## ASHRAE 90.1 in CKV

- Promotes efficient kitchen hoods and energy efficiency without penalizing indoor environment
- Requires at least one energy conservation measure for kitchens that exhaust more than 5000 CFM (e.g. Heat recovery, demand control ventilation, maximum use of transfer air)

# Types of Demand Control Systems

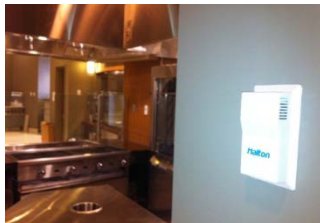
- \* Temp only



- \* Temp only with Opacity sensor



- \* Space, duct and infrared cooking activity sensor



# Keys to a Successful Application

- \* Have an R.O.I report run
  - \* Use weather data for site location
  - \* Get accurate energy costs
  - \* Model operational usage

## First Year Energy Costs Savings

- Heating	\$3,264	[2,511 Therms]
- Cooling	\$4,591	[45,900 kWh]
- Exhaust Fan	\$3,685	[36,849 kWh]
- Supply Fan	\$2,250	[22,499 kWh]
- Lights	\$420	[4,205 kWh]

**First Year Energy Costs Reduction**     **\$14,210**

**Pay Back Period, years**     **.9**  
Payback = Capital Expenses / Avg. Energy Savings  
Where average energy savings = \$14,210

**Net Present Value**     **\$140,824**  
NPV calculated at Year 15

**Return on Investment (ROI):**     **1,103%**  
ROI Calculation:  $ROI = NPV / Cost * 100$   
Where NPV = Net Present Value at Year 15  
Cost = Net Capital Expenditure

# Who is designing?

- \* Mechanical Engineer is typically responsible for building automation
- \* Food Service Consultant is typically responsible for selection of exhaust hoods and exhaust airflows
- \* Generally speaking, Mechanical Engineer is responsible for everything above the ceiling line.
- \* Food Service Consultant is responsible for everything below the ceiling.
- \* **Coordination is KEY!**

# System Considerations

- \* Single exhaust hood tied to a single fan or multiple hoods tied to a single fan
  - \* Discussion with F.S.C. and M.E. on operational use of the system (prep area versus front of house server ex.)
- \* How is replacement air being handled?
  - \* Discussion with M.E. on controls strategy
  - \* Dedicated Air Handler, Multiple Systems?
  - \* Zoning of supply Air
  - \* Selection of appropriate terminal diffusers
    - \* Minimize velocity around the hood (less than 50 fpm at hood)

# Identify the Scope of Work

- \* Multiple trades are involved
  - \* Kitchen Equipment Contractor
  - \* Sheet Metal Contractor
  - \* Fire Suppression Contractor
  - \* Controls Contractor
  - \* Mechanical Contractor



# ***Retrofitting Demand Controlled Kitchen Ventilation (DCKV)***

## ***ROI Perspective!***

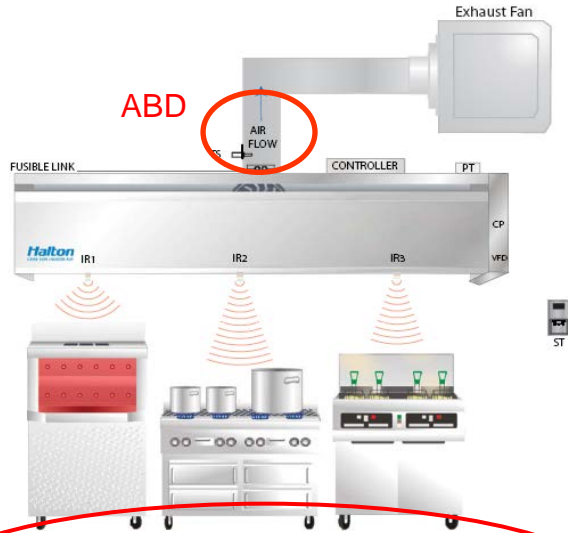
Don Fisher  
*Fisher Consultants,  
PG&E Food Service Technology Center  
12949 Alcosta Blvd., Suite 101  
San Ramon, CA 94583  
925-866-5770    dfisher@fishnick.com*

**F I S H E R**  
N I C K E L <sup>inc.</sup>

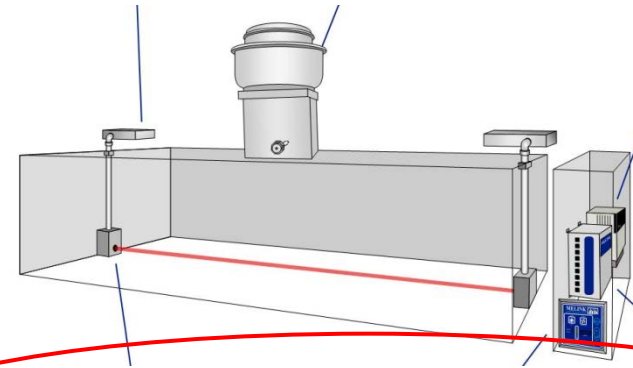


**Pacific Gas and  
Electric Company<sup>®</sup>**

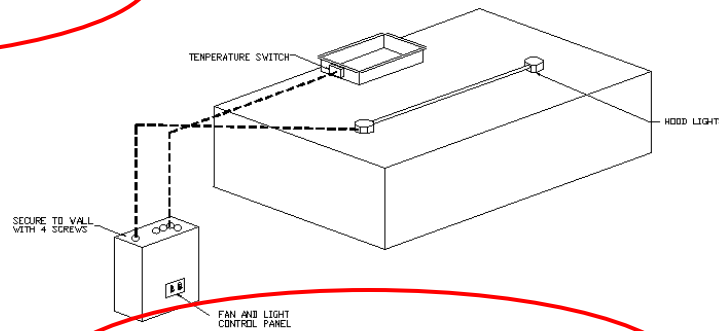
# Demand Ventilation Control Technologies



Duct Temperature Sensor & Infrared Sensors



Duct Temperature Sensor & Smoke Detection



Duct Temperature Sensor



# Standard 90.1 - 2010

If a kitchen/dining facility has a total kitchen hood exhaust airflow rate greater than 5,000 cfm then it shall have one of the following:

- a) At least 50% of all replacement air is transfer air that would otherwise be exhausted.
- b) Demand ventilation system(s) on at least 75% of the exhaust air. Such systems shall be capable of at least 50% reduction in exhaust and replacement air system airflow rates, including controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and idle.
- c) Listed energy recovery devices with a sensible heat recovery effectiveness of not less than 40% on at least 50% of the total exhaust airflow.

START

(1) Do you know about DCKV hood control and its energy saving potential?

NO  
Refer to industry literature on DCKV

(2) Do you have more than 12 (linear) feet of exhaust hood (typically more than 3000 cfm)?

NO  
ROI Challenge!

(3) Are the exhaust hoods in your kitchen a backshelf or proximity style (versus canopy style)

YES  
Backshelf hoods are generally more efficient and typically operate at lower airflow.  
ROI caution

(6) Do the exhaust hoods fail to capture & contain cooking heat & smoke?

YES  
Undertake a hood "tune-up" or upgrade to improve capture

(5) Are there times during the day when appliances are not actively cooking food while the hood is operating?

NO  
ROI Challenge!

(4) Do you operate your exhaust hoods less than 8 hrs per day?

YES  
ROI Challenge!

(7) Do you have single island hoods over heavy duty equipment?

YES  
DCKV caution.

(8) Do you have multiple exhaust hoods connected to one exhaust fan?

YES  
ROI Challenge!

(9) Do you have a large underfired broiler (charbroiler) on your cookline?

YES  
Caution. Charbroiler exhaust reduction is limited

(12) Is the noise from the exhaust hood excessive?

NO  
Noise reduction not justification for DCKV

(11) Do you cool your makeup air?

NO  
ROI caution

(10) Do you heat your makeup air?

NO  
ROI Challenge!

(13) Are the utility rates in your area considered high? (ex. \$.06/kWh is low, \$.15/kWh is high) Gas rates over \$1.00/therm are considered high)

NO  
ROI Challenge!

(14) Do you know the total exhaust air flow rate (in cfm) for your exhaust hoods? Do you know your nameplate horsepower of the exhaust and makeup fans?

NO  
Engage an energy professional

**YOU ARE LIKELY TO GET GOOD ROI ON A DCKV SYSTEM**

END

NO

YES

YES

YES

NO

YES

NO

NO

YES

NO

NO

YES

YES

NO

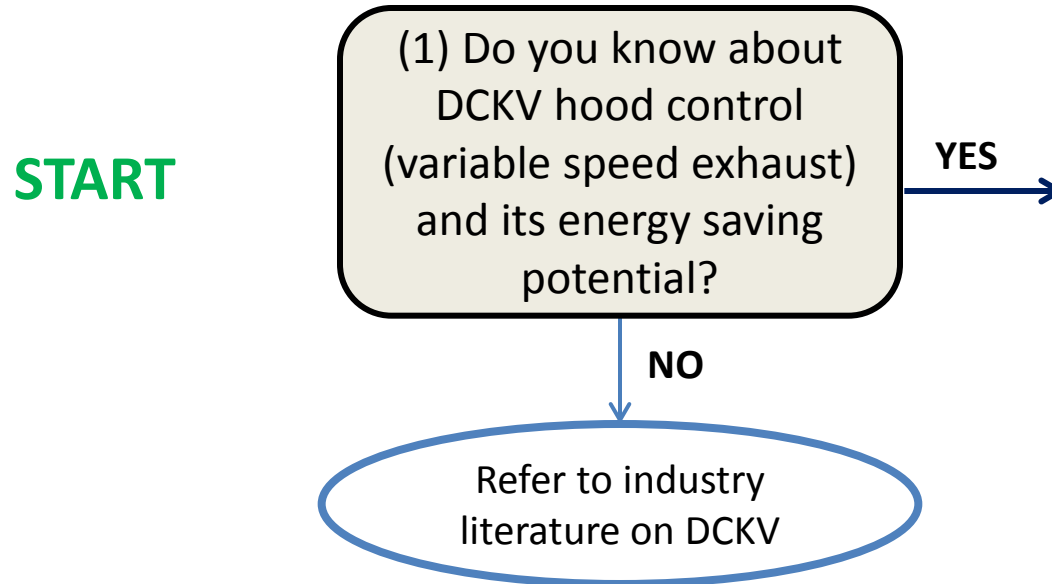
YES

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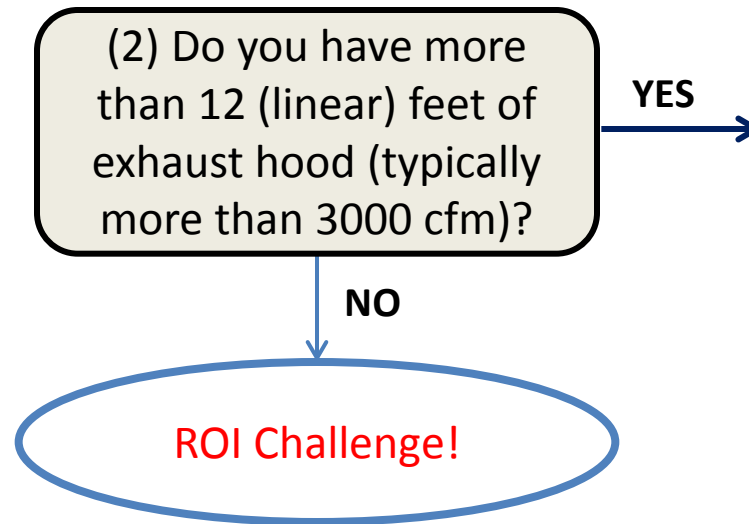
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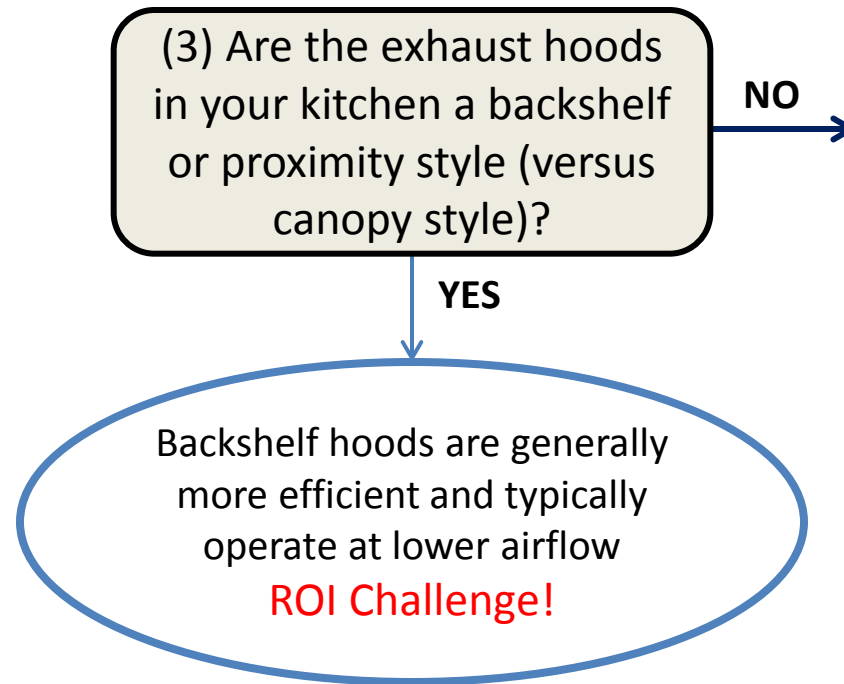
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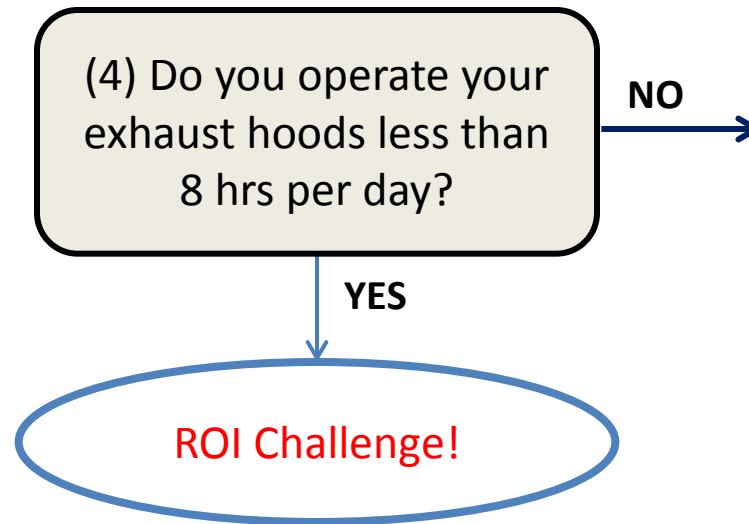


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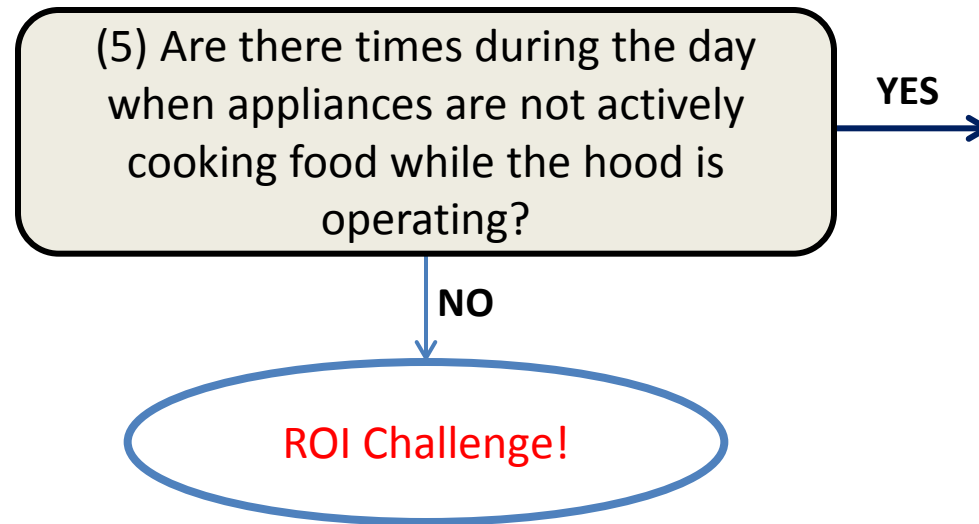


Note: Several leading QSR chains are rolling out DCKV systems that communicate directly with the cooking appliances, making the ROI more attractive.

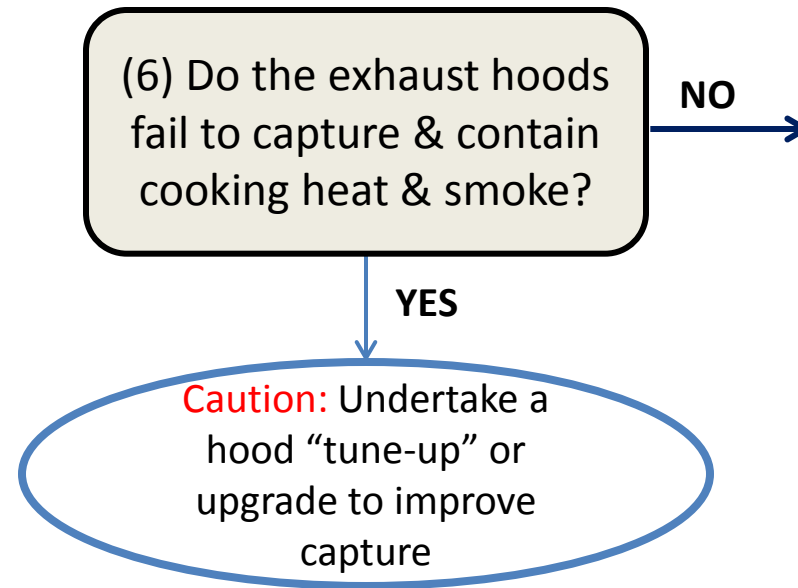
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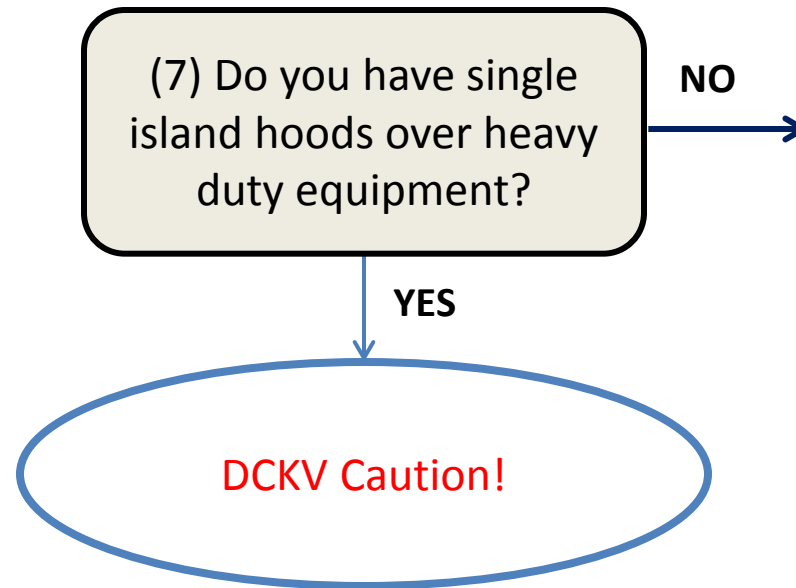
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Note: An exhaust hood that is not working satisfactorily at full speed is not going to work well at reduced speed.

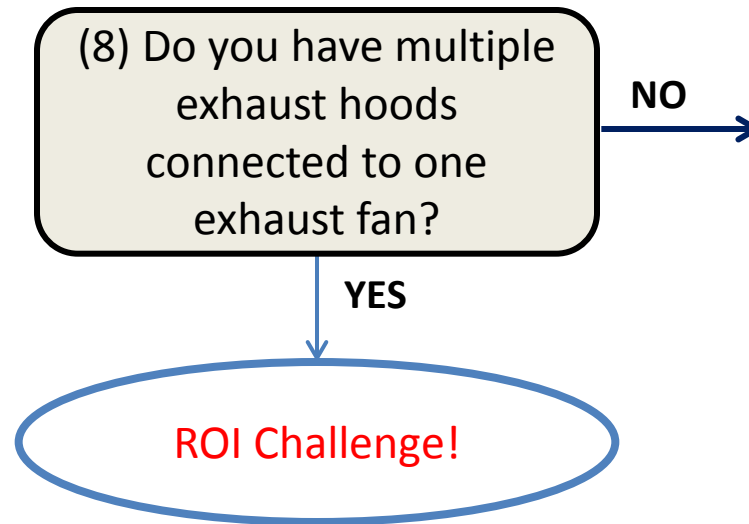


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Note: Single island hoods are notorious for not capturing and containing smoke produced by heavy duty cooking equipment. They may perform even worse when the DCKV system reduces the exhaust airflow.

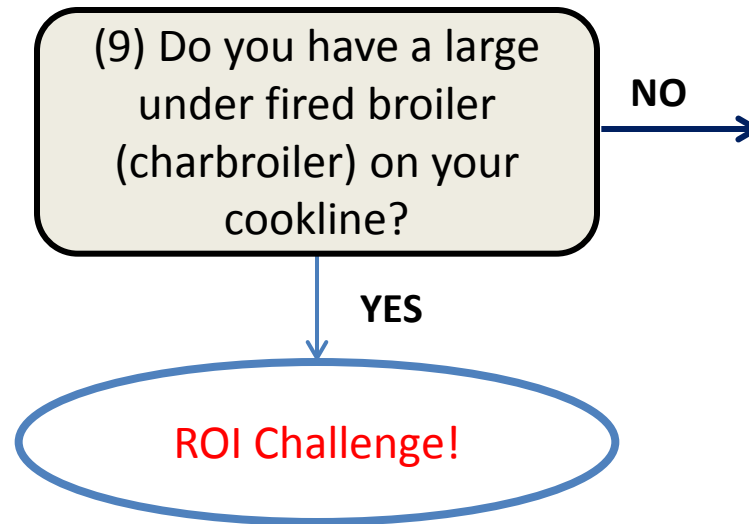
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Note: It is difficult to reduce the exhaust airflow from multiple hoods serving different production roles when connected to one exhaust fan. For example, if cooking is going on under one hood, then all hoods need to be operating at full speed.

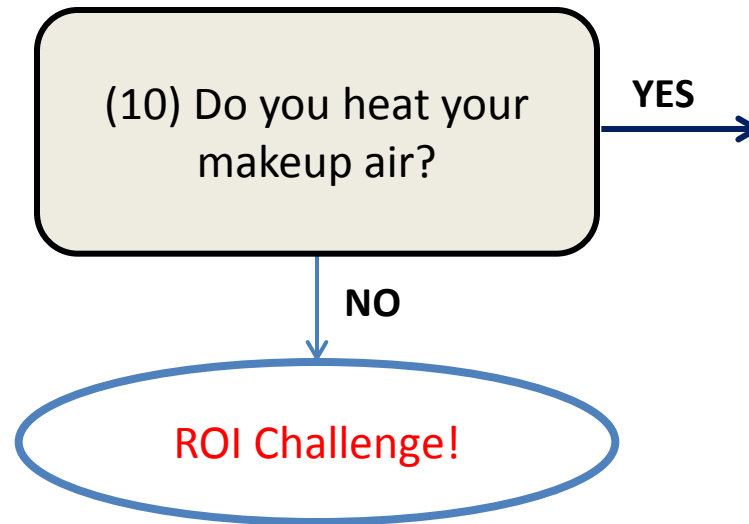
Exception: When the DCKV system incorporates code approved dampers to modulate air flow to the individual hoods.

# Is a Demand-Controlled Kitchen Ventilation (DCKV) System Appropriate for Your Restaurant?



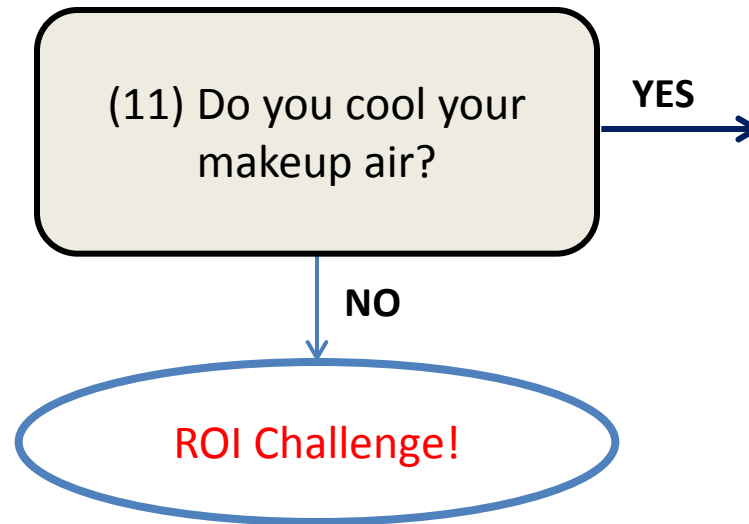
Note: A charbroiler needs almost as much exhaust airflow in a “ready-to-cook” mode of operation as it does when cooking meat products. Thus the reduction in exhaust air may be limited and the ROI challenged. However, if a charbroiler part of a much larger cookline, this issue may be less significant.

# Is a Demand-Controlled Kitchen Ventilation (DCKV) System Appropriate for Your Restaurant?



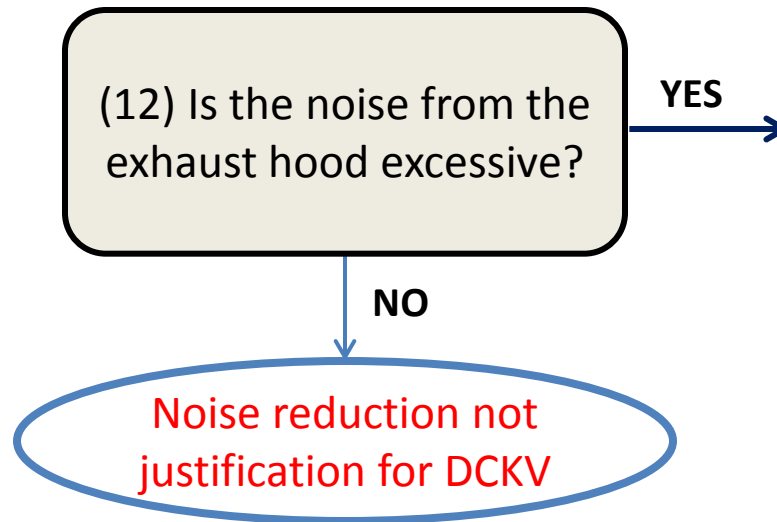
Note: Makeup air heating savings with DCKV can be significant, supporting the ROI.

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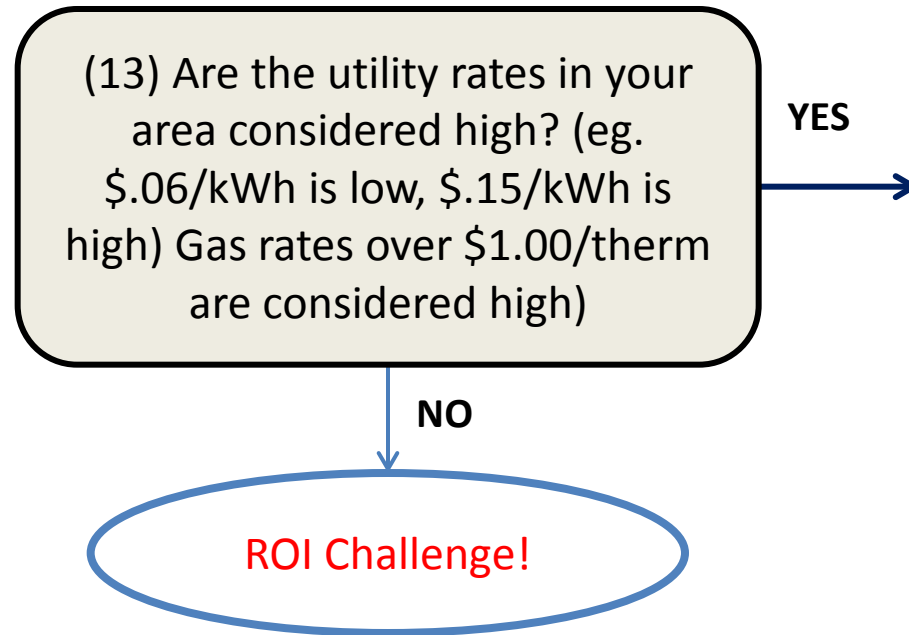


Note: The energy required to cool makeup air in many areas of the country is not significant and does not impact ROI.

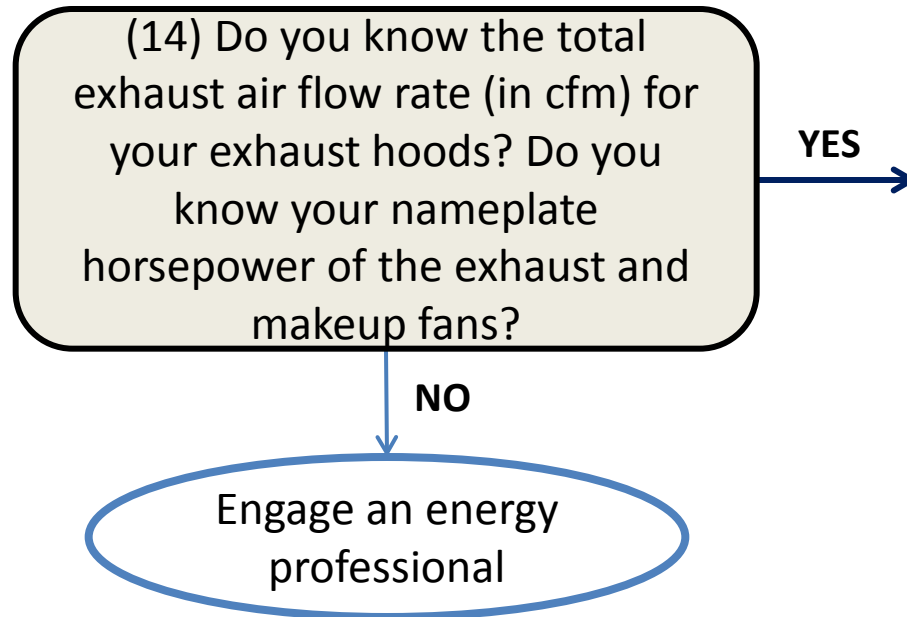
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# Is a Demand-Controlled Kitchen Ventilation (DCKV) System Appropriate for Your Restaurant?

**YOU ARE LIKELY TO GET  
GOOD ROI ON A DCKV  
SYSTEM**



Secure quote(s) from  
DCKV  
supplier/installer

# DCKV-ROI Recap:

- The larger your exhaust hoods and airflow (in cfm), the larger the exhaust and makeup air fans (in H.P.), the longer the operating hours, the higher your utility rates, the more you condition your makeup air, the more often you have appliances in “idle” (typical of 24 h facilities), if charbroiling is not a major part of food production, the more cost-effective will be the installation of a DCV system.
- The CKV system must work effectively as single-speed system before DCV is applied.
- Effective commissioning of a DVC system will maximize its performance.

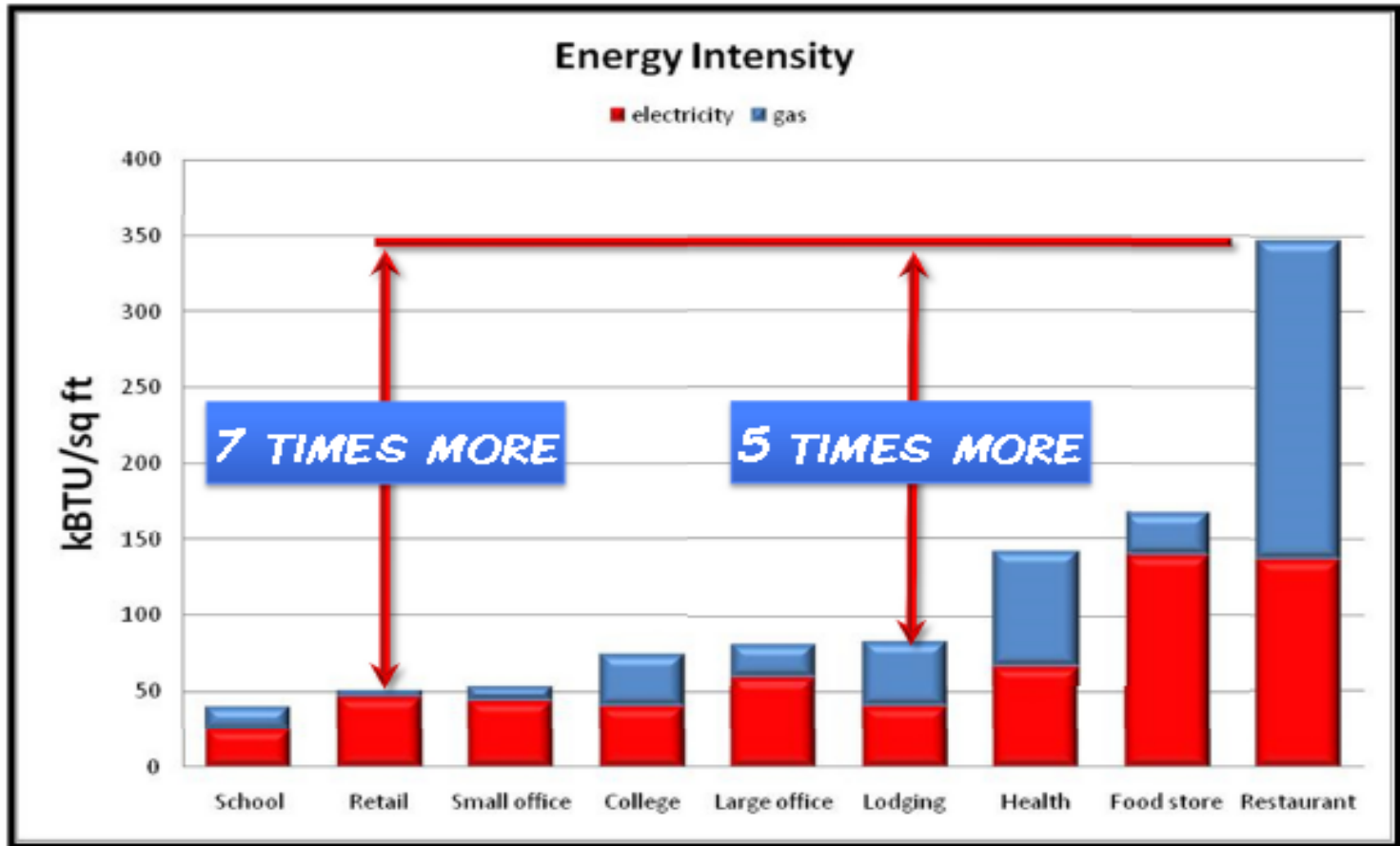


**CKE** RESTAURANTS™

**Best Practices for QSR EMS  
Rollout  
BBA Summit 2014**

Juliann Rogers  
Director of Energy  
CKE Restaurants, Inc.

# Food Service is Energy Intensive!



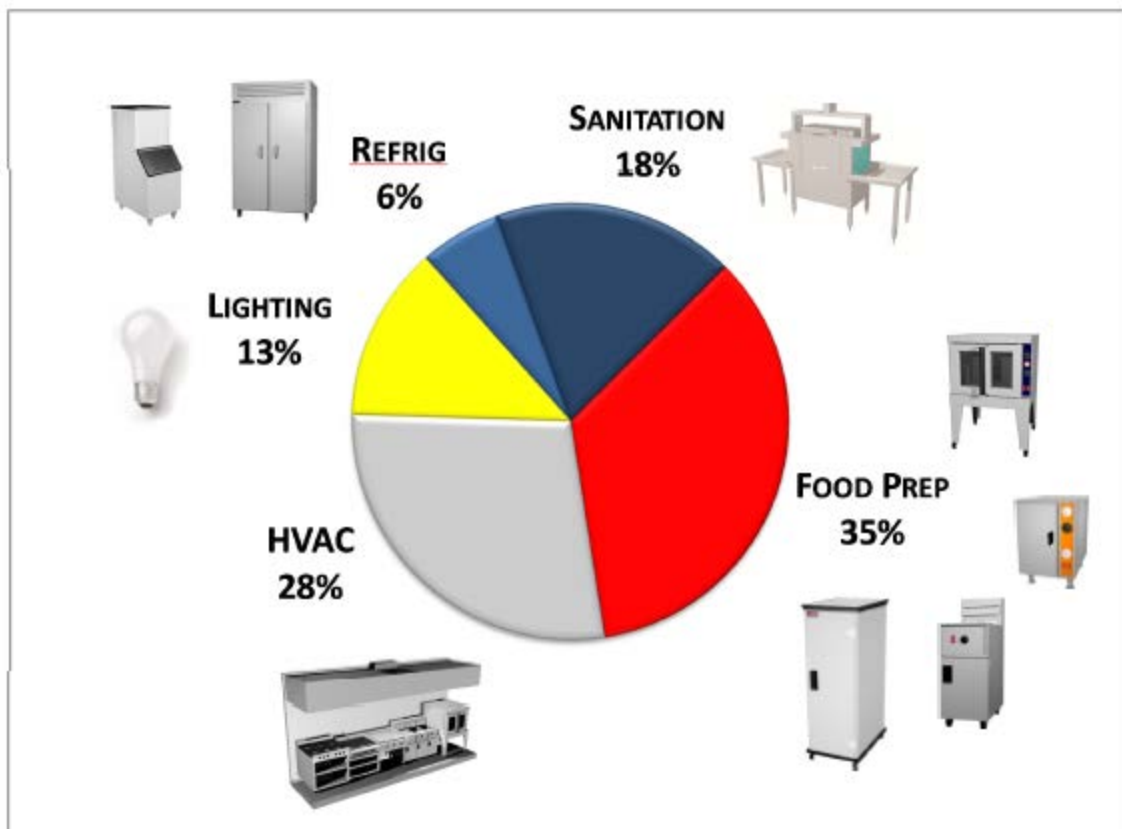
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**CKE RESTAURANTS**®



# An example of the total energy breakdown (BTU) in an average restaurant





# CKE EMS Rollout

Carl's Jr. – 1,435

Hardee's – 1,995

Company Operated 894

- Phase 1
  - 26 test sites
- Phase 2
  - 100 systems installed
- Phase 3 - 2014
  - 105 systems approved



**CKE RESTAURANTS**®



# KISS – Keep it Simple and Sustainable

- **Simple**

- Operators
- Technicians

- **Sustainable**

- Clearly defined strategies and configuration standards
- Limit user interaction & permissions
- Develop and maintain a protocol for alarm management
- Training
- Implement a cost-effective EMS monitoring call center
- Open Source / Scalable Solution





## Keep it Simple

- **Operators**
  - High employee turnover
  - Labor cost priority
- **Technicians**
  - Small local service provider
  - Maintains all equipment and the building envelope for 20-50 sites
  - Often takes shortcuts to temporarily satisfy the operators at the expense of energy







# Keep it Sustainable



- **Clearly defined strategies**
  - Temperature set points
  - Optimize start/stop programs and equipment start up staging
  - Sensor placement
- **Limit user interaction & permissions**
  - Temperature adjustments 2 degrees up/down
  - Local Override buttons w/ timed off programming





# Keep it Sustainable



- **Develop and maintain a protocol for alarm management**
  - Alarm
    - System generated
    - Fix me now
  - Supervisory
    - Data review identifies anomalies
  - Trouble –
    - System generated
    - EMS component failure
- Assign ownership and detail how the alarms are to be prioritized and closed out





# Keep it Sustainable



- **Training**
  - General Managers
    - Integrate training modules into existing systems for new and transferring General Managers and Shift Leaders
  - District Managers
    - Create online training videos
  - Service Technicians
    - Identifying EMS issues vs. mechanical issues
    - Dashboard training if applicable





## Keep it Sustainable



- Implement a cost-effective EMS monitoring call center
  - Field support
  - Triage alarms
  - Data analytics
  - Close out alarms
- In house
- EMS vendor
- 3<sup>rd</sup> party





## Old energy management system....

Installed 20 plus years ago





## New energy management system





# What's New?

- EMS controls replaced:
  - Thermostats
  - Time clocks
  - Exterior lighting switches
  - Griddle hood switch
- Remote Connectivity
  - Scheduling
  - Temperature changes
  - Lighting on/off adjustments
- Email Alerts
  - Freezer/Cooler High Temp
  - Hot in Restaurant
  - Fan Failure



# How does the EMS work?

The EMS acts as a smart time clock, turning systems on and off according to the restaurant's open/closed schedule and when employees arrive and leave. These schedules are referred to as:

- Occupied – open to the public
- Unoccupied – closed to the public
- Pre-occupied – when the first employee arrives
- Post-occupied – when the last employee leaves

Exterior lighting also works in sync with a photo cell, kicking the lights on and off at pre-determined outside light levels







# What can I control at the restaurant?

- Temperature
  - ± 2 degrees
  - AC Override

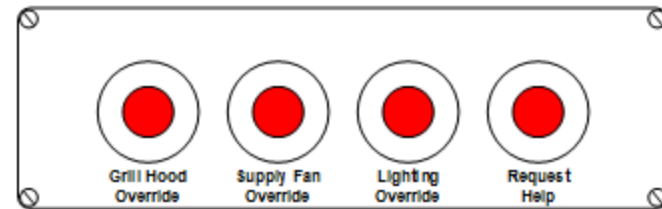


## Air Conditioning

To override the air conditioning for 2 hours press the override button located on the space temperature sensors for 10 seconds.

To adjust the temperature, move the slider temperature sensor, located on the space temperature sensor.

- Overrides
  - Exterior lights
  - Griddle hood



Press and hold for 10 seconds to activate the override



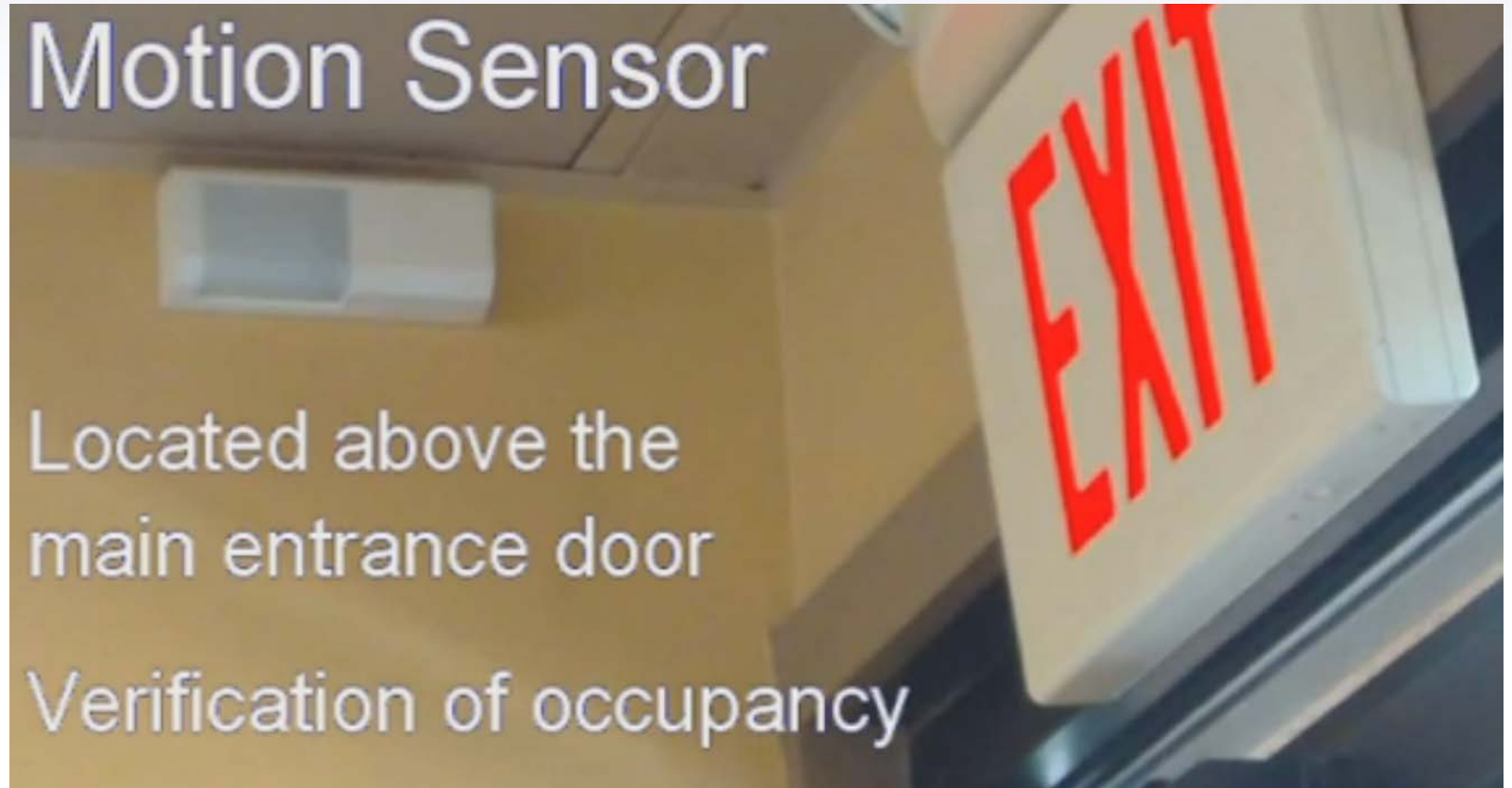


# Motion Sensor

## Motion Sensor

Located above the  
main entrance door

Verification of occupancy





# Who do I call?

Call Voyant Tech Support at **866-757-0399** if you are experiencing any of the following:

- Experiencing extreme hot or cold temperatures inside the restaurant
- Griddle Hood not coming on or going off at required time
- Exterior Parking Lot Lights, building signs, and pole signs not coming on or going off at required times

Voyant may be able to resolve the problem over the phone, if not; they will provide you with a recommendation. If a service call is required, follow standard R&M procedures for emergency and non-emergency service calls.





# Major Alarm Notification

Ticket Assignment - Store#1100226 - Message (HTML)

Message

Reply Respond   Reply to All   Forward   Delete   Move to Folder   Create Rule   Other Actions   Block Sender   Safe Lists   Junk E-mail   Categorize   Follow Up   Mark as Unread   Find   Related   Select   Find

From: CKE Energy Management Server [cke@voyantems.com]   Sent: Tue 3/18/2014 5:38 AM  
To: jim.engle@voyantsolutions.com  
Cc: carol.spencer@voyantsolutions.com; dave.irish@voyantsolutions.com; jim.engle@voyantsolutions.com; john.hensen@voyantsolutions.com; Rogers, Juliann; Darger, Mike; mike.dismore@voyantsolutions.com  
Subject: Ticket Assignment - Store#1100226

### XtraVision Ticket Assignment

**1100226 - Fontana**  
FONTANA, CA

Tagged: **Freezer**  
Contact/Caller: - ,  
Priority: **Standard**  
Ticket Status: **Follow Up**

Description: **Freezer high temp alarm was generated.**

Resolution: **The freezer is typically maintaining below 10 dF with spikes up in the 40's which I suspect are due to defrost cycles and as of the writing of this ticket the freezer temp is at 6.8 dF. Two things to check at the next regular scheduled service call:**

- 1. Please check the door closer and door seals for proper operation. (Last night there was an abnormal length of time where the freezer temp stayed above 30 dF. This could be due to a very busy evening, inventory or the door not closing properly.)**
- 2. Check the defrost system for proper operation. (It looks like the defrost cycles are taking between 1.5 and 2 hours which is longer than normal)**

*Ticket assigned to [jim.engle@voyantsolutions.com](mailto:jim.engle@voyantsolutions.com) by:jim.engle@voyantsolutions.com*

[Ticket Details](#)  
[Enterprise Home](#)  
[Store#1100226 Dashboard](#)