Better Buildings
U.S. DEPARTMENT OF ENERGY

Reducing Energy Consumption in Restaurants and Kitchens – Day 1

1:00 – 2:15 PM
2:30 – 3:45 PM

Moderator: Rich Shandross, Navigant Consulting, Inc.

U.S. DEPARTMENT OF ENERGY

Agenda

- Introductions and review of 2013 projects (15 min)
- Demand Control Ventilation for Commercial Kitchens (40 min)
- Energy Management and Information Systems (40 min – 20+20)
- Franchisees and independents (40 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:
  - Jason Greenberg, McDonald's: *Demand Control Ventilation for Kitchen Exhaust (Case Study)*
  - Kim Erickson, CEE: *Leveraging Complementary DCKV Efforts*

Demand Control Ventilation for Commercial Kitchens (DCKV)

- Discussion
  - Industry needs and barriers to DCKV adoption
    - .
    - .
    - .
  - Gaps in resources
    - .
    - .
    - .
  - How BBA and CEE (and NRA, FSTC, and RFMA?) can facilitate market education, adoption, etc.
    - .
    - .
    - .

Energy Management and Information Systems (EMIS)

- Presentations:
  - Jay Fiske, Powerhouse Dynamics: *Enhancing Asset Management with Advanced EMS*

Break

Please return on time – Thanks!

"That's great, but you still have to walk more."

Energy Management and Information Systems (EMIS)

- Discussion
  - Industry needs
    - .
    - .
    - .
  - Gaps in resources
    - .
    - .
    - .
  - How BBA and CEE (and NRA, FSTC, and RFMA?) can facilitate market education, adoption, etc.
    - .
    - .
    - .

Franchisees and Independents

- Presentations:
  - Rich Shandross, Navigant (representing BBA): *Energy Efficiency Approaches for the Resource-Constrained Organization*
  - Adam Jarboe, Yum! Brands: *Recap of the 2014 Better Buildings Case Competition, "A Side of Savings"*

Franchisees and Independents

- Discussion
  - .
  - .
  - .
  - .
  - .

Webinars

- BBA EMS Guidance ✓
- BBA DCKV Guidance?
- BBA EMIS Benefits Quantification Study?
- .
- .
- .

Measuring Success

- Possible metrics:
  - Downloads of BBA-produced documents
  - Entries in food service category in PortfolioManager™
  - Metrics among BBA members:
    - Installations of equipment
    - Actual energy saved
  - Survey (performed by NRA and/or RFMA)
  - Other:
    - .
    - .
    - .

Day 1 – Wrap Up

- Discuss big picture
- Make plans for June decision making team call
- Next steps

Demand Control Ventilation for Kitchen Exhaust

Jason B. Greenberg, P.E., CEM

Lead Mechanical Engineer

McDonald's USA, LLC

Building Design | Real Estate | Interiors + Retail | Constructior

DCV Control Options

Some current technologies include:

- Smoke/vapor sensors
  - By the time smoke/vapor is sensed there is probably effluent spillage
- Temperature sensors
  - Temperature drops when frozen food is dropped into the vat or placed on the grill

DCV Control Options

- Case study control scenario
  - Monitors internal appliance circuits
  - Responds according to appliance activity
- Appliance maintaining temperature vs. cooking
- Future: appliance communication capabilities

DCV Controls

- Exhaust fan control
  - Belt-drive motor – VFD
  - Electronically commutated motor – DC voltage
- Rooftop units
  - Economizer damper positioning
  - Free cooling override
  - No motor speed control

DCV Code Acceptance

- Building codes
  - Do not permit airflows below UL listing
  - Ductwork velocity minimum 500 FPM
- Laboratory testing
  - Necessary for acceptance with AHJ
  - Allows for airflows below UL 710
  - Schlieren/shadowgraph imaging is critical

DCV Exhaust Air Flow Rates

- Visual testing vs. Schlieren imaging
  - UL 710 is only a visual test
  - At part-load cooking – less vapor, more convective heat which is not visible

		Schlieren Imaging	
Fan Speed	UL 710	Fryer	Grill
Low	60%	67%	77%
Medium	80%	75%	85%
High	100%	100%	100%

DCV Challenges

- System complexity
  - Three (3) hoods, three (3) speeds
  - Up to 27 unique operating airflows
- Commissioning
  - Maintaining a positive building pressure
  - Increased test and balance (T&B) costs

DCV Economics

- Manufacturer claimed
  - 5% HVAC and 50% fan energy savings
  - Less than 2 year payback
- Information based on:
  - Based on 60% (low) and 80% (medium) speeds
  - Limited to test sites in TN, IA and AZ
  - Only tested on belt-drive fans
  - Did not reflect all-in cost (e.g. T&B)

DCV Economics

- Payback will vary by:
  - Climate zone
  - Exhaust fan type
- Payback will be extended due to:
  - Increased T&B costs
  - Different low/medium speeds than initial testing

DCV Lessons Learned

- Appliance utilization
  - Fryers
    - Full-load cooking about 10%
    - 0-1 vat usage about 55%
  - Grills
    - Idle about 45%
    - 1 platen about 20%
- Maintenance is a concern

DCV Next Steps

- Recommissioning test restaurants
- Expanding testing to cover Climate Zones 1-7
- Third-party data validation

Thank you

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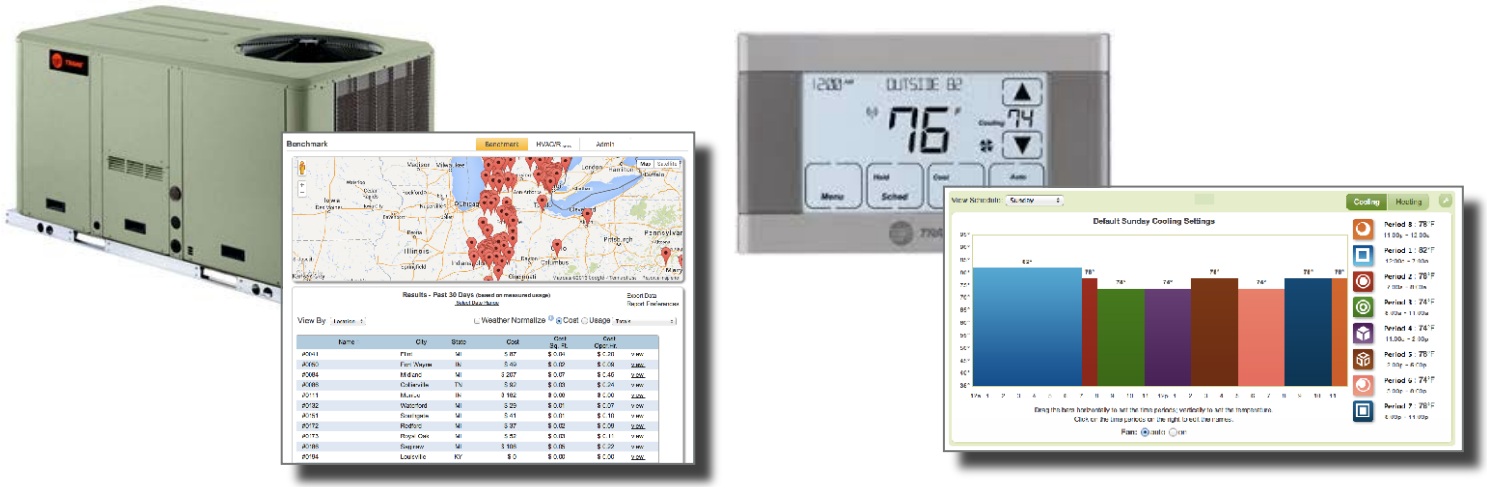


Enhancing Asset Management with Advanced EMS

Jay Fiske

VP Business Development

Powerhouse Dynamics

Challenges with equipment maintenance

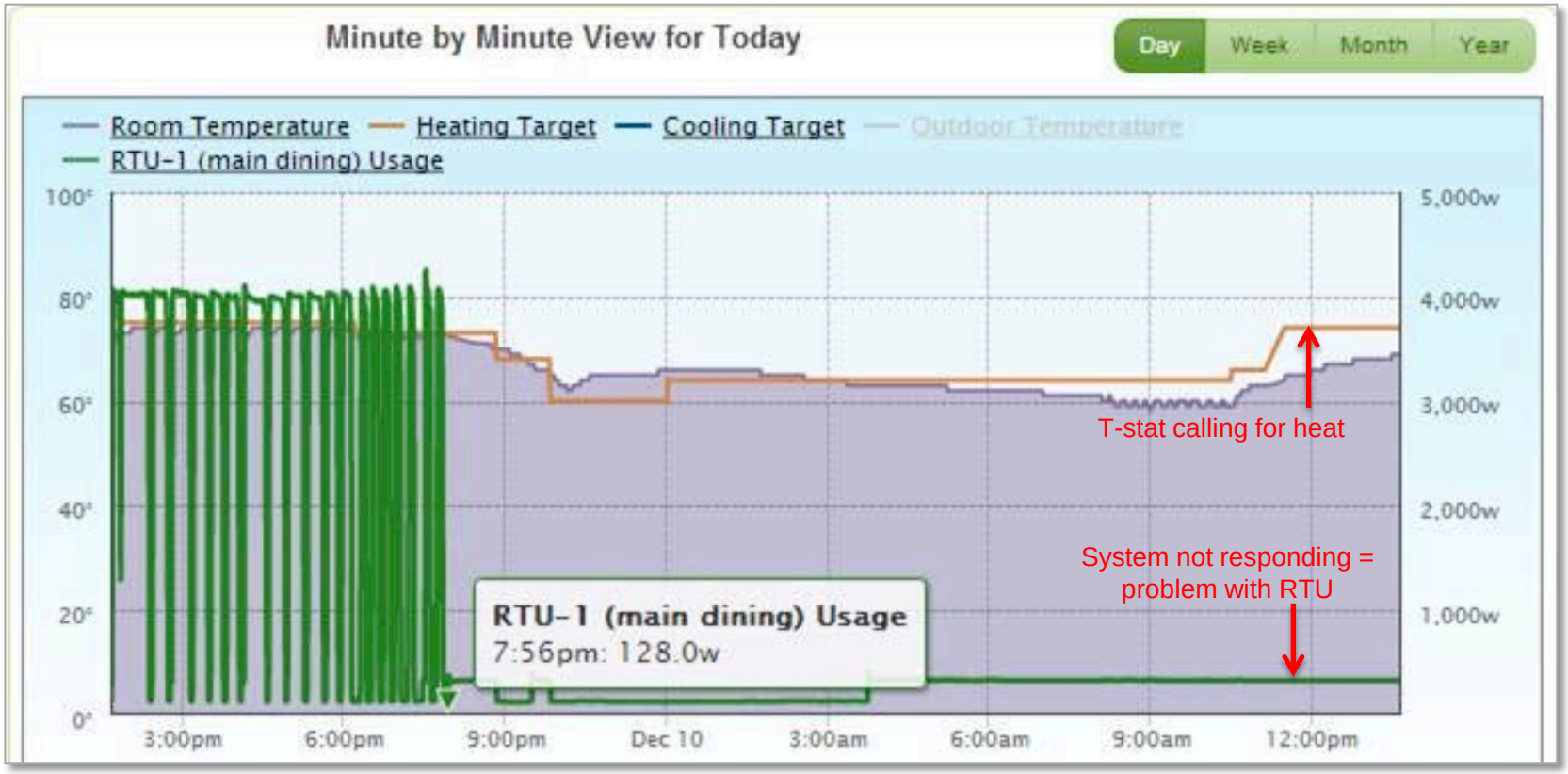
- Common faults in mission-critical equipment such as HVAC can frequently go undetected, yet…
  - Add significantly to maintenance costs
  - Increase energy consumption
  - Decrease equipment lifespan

- A 2012 HVAC survey by the Professional Retail Store Maintenance Association (PRSM) revealed that:
  - Repair procedures are overwhelmingly reactive in nature
  - Reactive repairs cost, on average, $622 per service call
  - Planned repairs cost, on average, $207 per service call

Challenges with equipment maintenance

- There are more profits available for store managers if reactive repairs can be replaced with planned maintenance
- Advanced Energy Management Systems (EMS) systems can help by identifying undetected faults:
  - Short-cycling compressors
  - Broken economizers
  - Overloaded compressors
  - Over / under temperature
  - Thermostat set-point anomalies & excessive overrides
- A few data points in combination can provide valuable insight
  - Real-time energy consumption at the equipment level
  - Thermostat set-points + ambient temperature
  - Supply and Return-air duct temperatures
  - Outside air temperature

Thermostat vs. RTU problems



[Source: SiteSage thermostat report]

Broken Economizer

Select Circuits - Economizer Malfunction Alert

Select Circuits

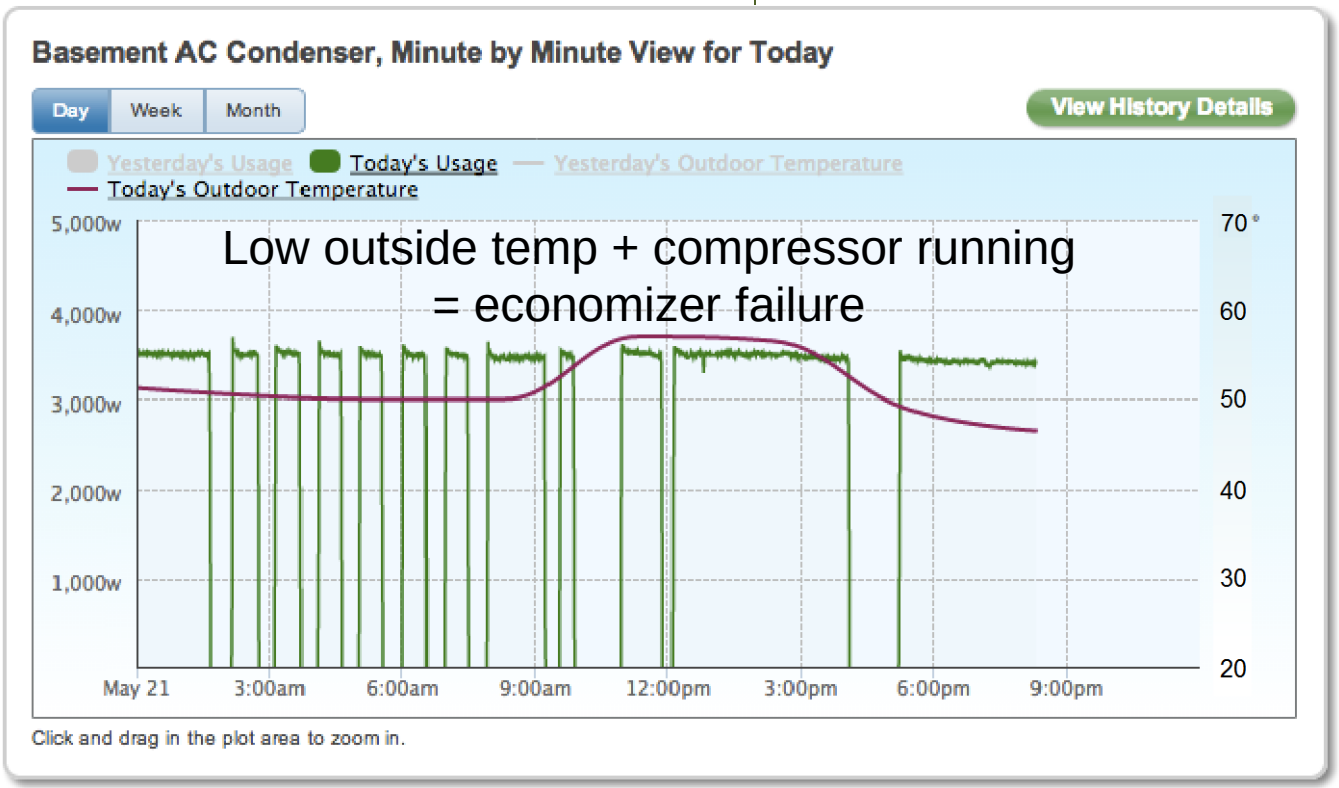
Circuit Name

Heating & Cooling

- Basement AC Condenser
- Basement Air Handler
- Roof GFI/Roof Lights (what is this?)
- RTU (Bar)
- RTU (dining)
- RTU (Kitchen)

Ventilation

- Heated MUA
- Heated MUA for EF 1 and 2



[Source: SiteSage RTU report]

Short-Cycling

Select Circuits - Short Cycling Alert

Select Circuits

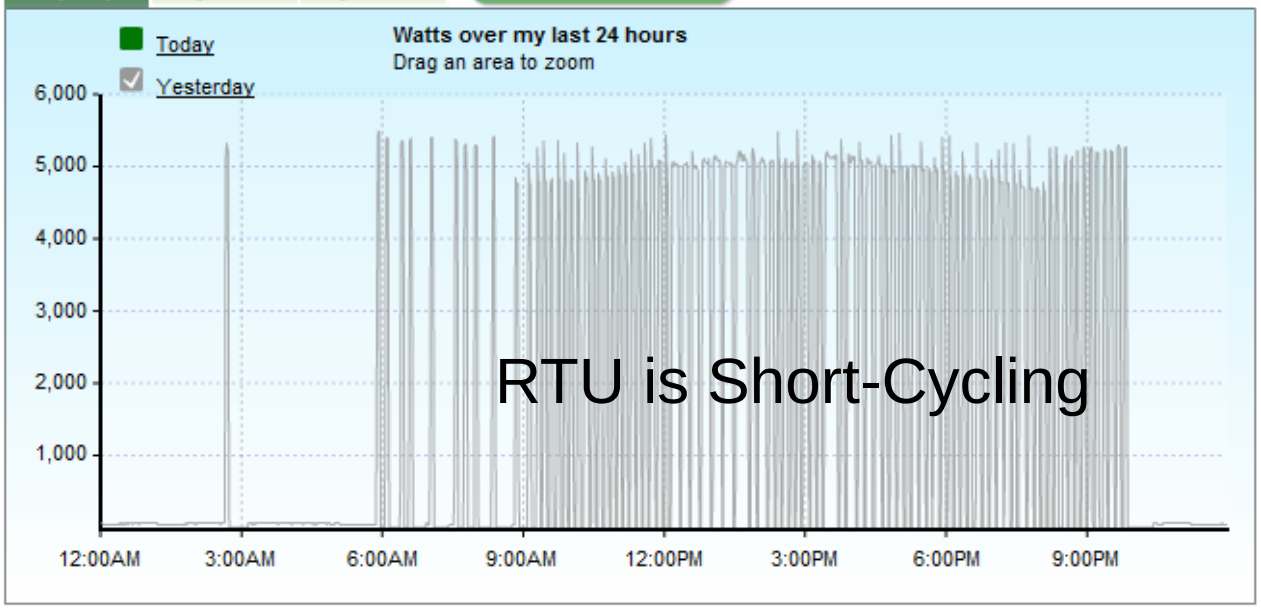
Circuit Name

Heating & Cooling

- [x] Basement AC Condenser
- [x] RTU (Bar)
- [x] RTU (dining)
- [x] RTU (Kitchen)

Asset Management: Proactive Equipment Failure Notification

By day | By week | By month | View History Details



Check a box to show/hide today or yesterday. Drag your mouse horizontally (across time) to zoom into minute by minute detail.
This chart updates every minute. If you are zoomed in, you may be "kicked out" to the 24-hour view.

[Source: SiteSage RTU report]

Over-loaded refrigeration compressor

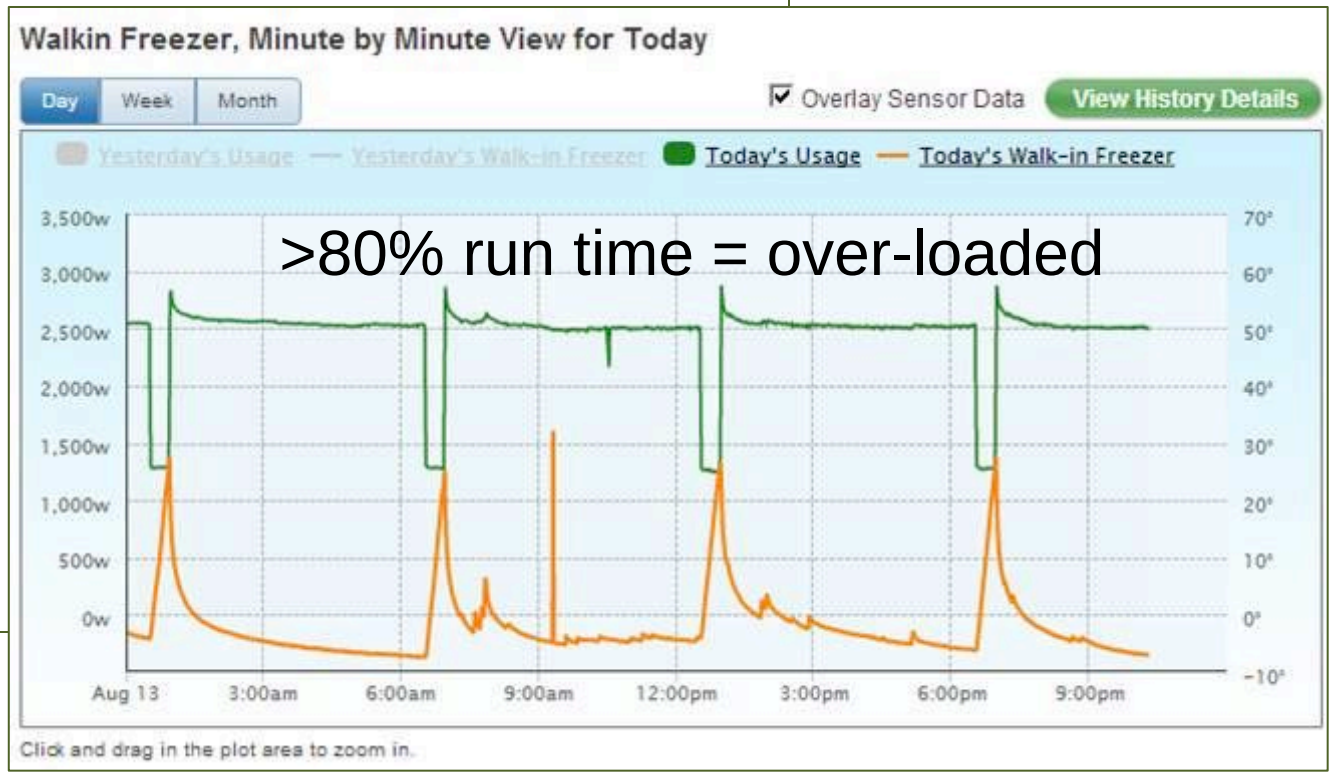
Select Circuits - Refrigeration Overload Alert

Select Circuits

Circuit Name

Refrigeration

- [ ] Back Bar Refrigerator
- [ ] Back Bar Refrigerator (2?)
- [ ] Front Beer Chest ?
- [ ] ice machine
- [ ] mega salad unit "A"
- [ ] mega salad unit "B"
- [ ] Mega Salad Units?
- [ ] New Freezer
- [x] Walk in Compressor (large)
- [x] Walk in Compressor (small)
- [x] Walk-in Cooler (medium)

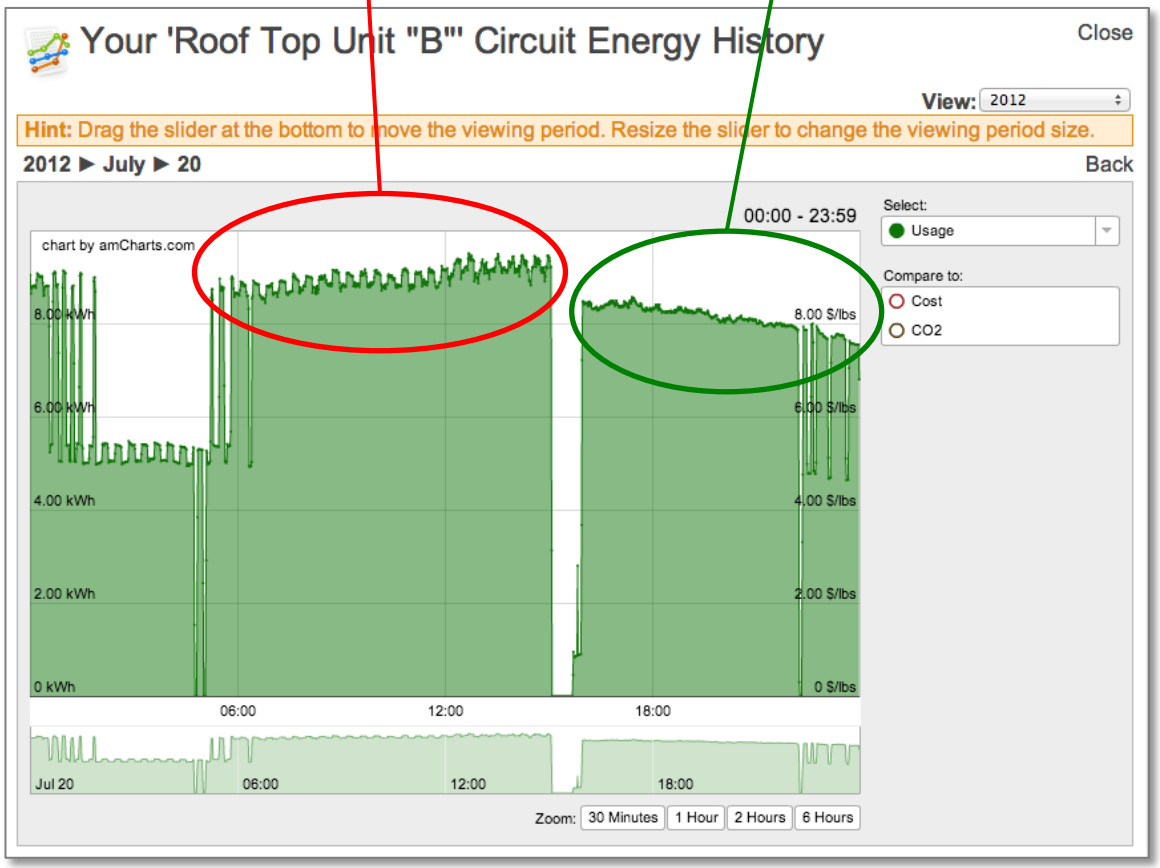


[Source: SiteSage compressor report]

Inefficient Equipment: Roof Top Unit

Problem (failed condenser fan)

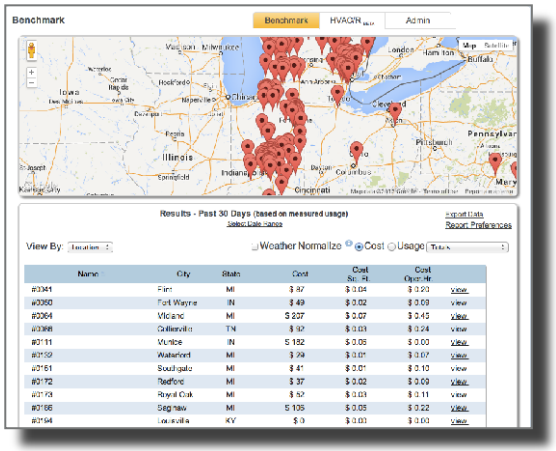
Solved (replaced condenser fan)

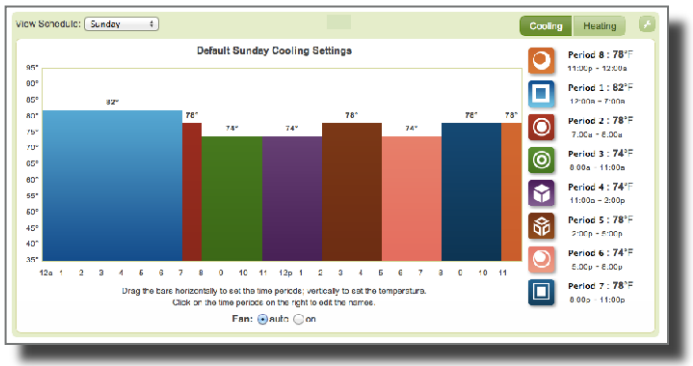


[Source: SiteSage RTU report]

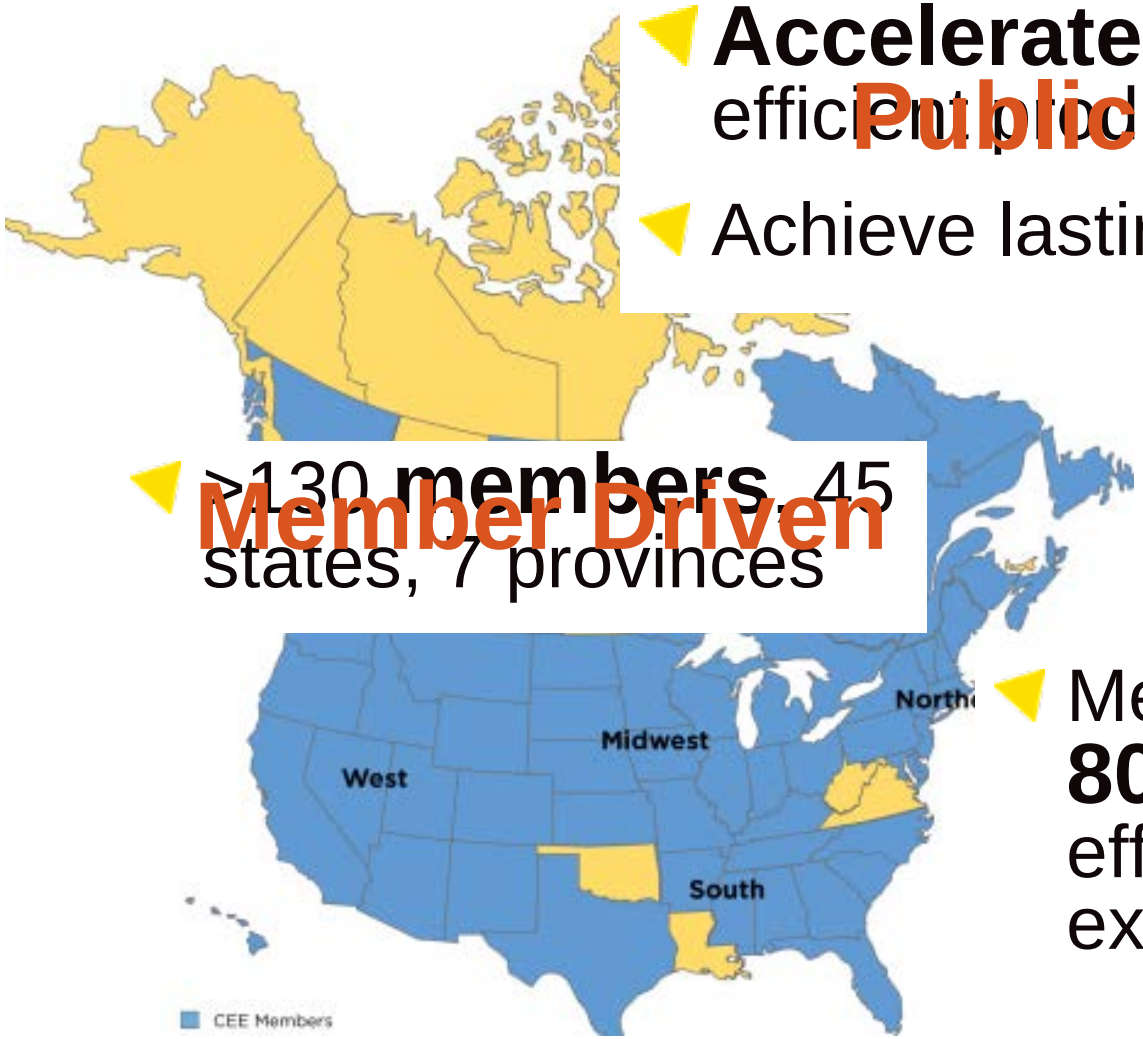
Problems Become Obvious (when you have the visibility)…

- Roll a truck for the most severe problems
  - RTU failure
  - Refrigeration failure
- For less urgent issues
  - Flag them to be addressed during next PM visit
  - Cut back on expensive reactive repairs





CEE Quick Facts



Public Purpose

- **Accelerate market uptake** of efficient products and services
- Achieve lasting **public benefit**

Member Driven

- >130 **members**, 45 states, 7 provinces

Impact

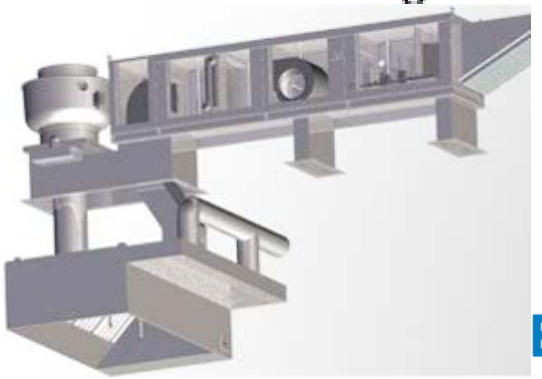
- Members directed **80%** of $8 billion in efficiency expenditures in 2012

* Source: CEE 2012 Annual Industry Report

CEE Commercial Kitchens Initiative

Advance efficiency of cooking, refrigeration, and sanitation equipment

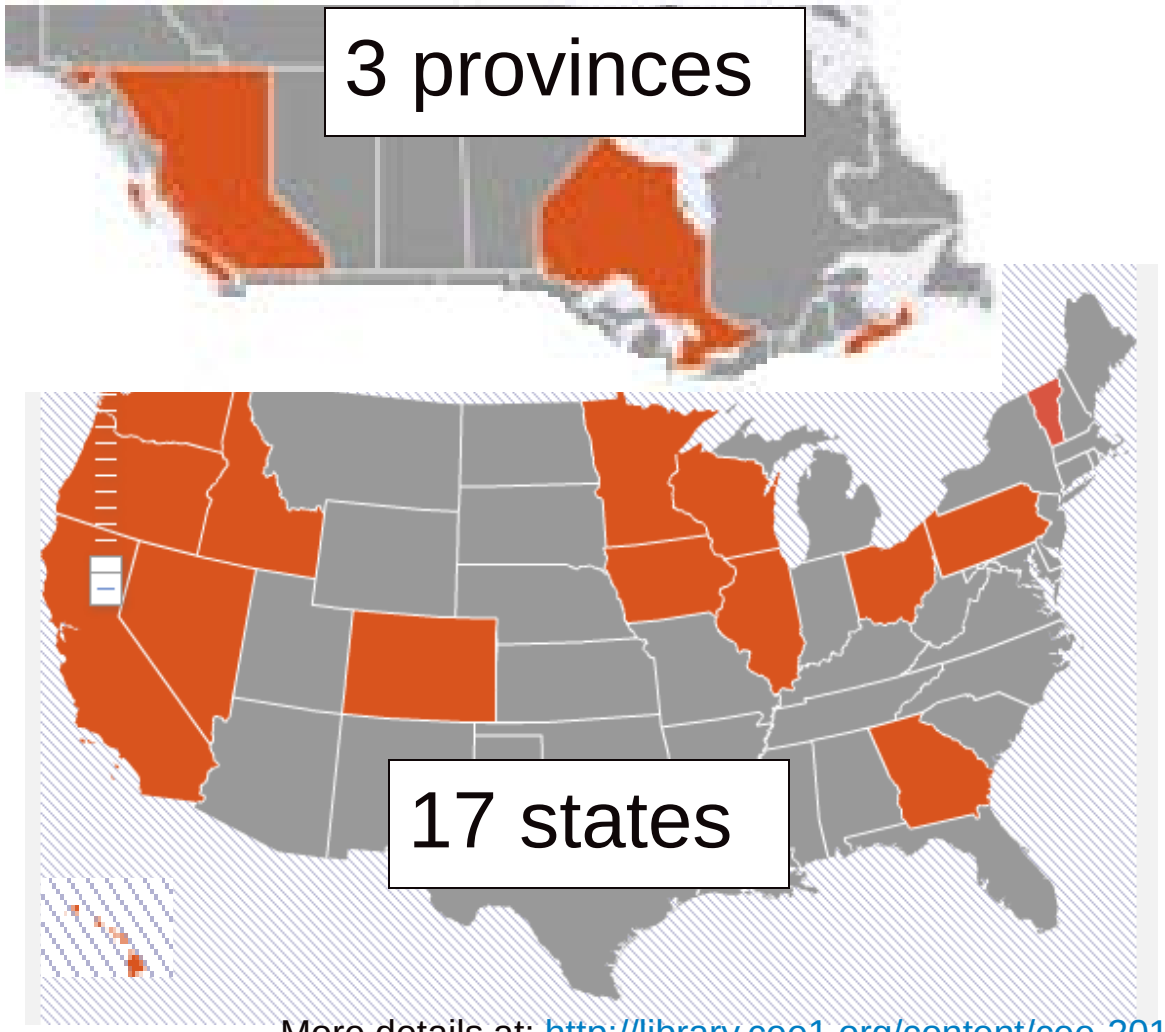
"I'm right there in the room, and no one even acknowledges me."

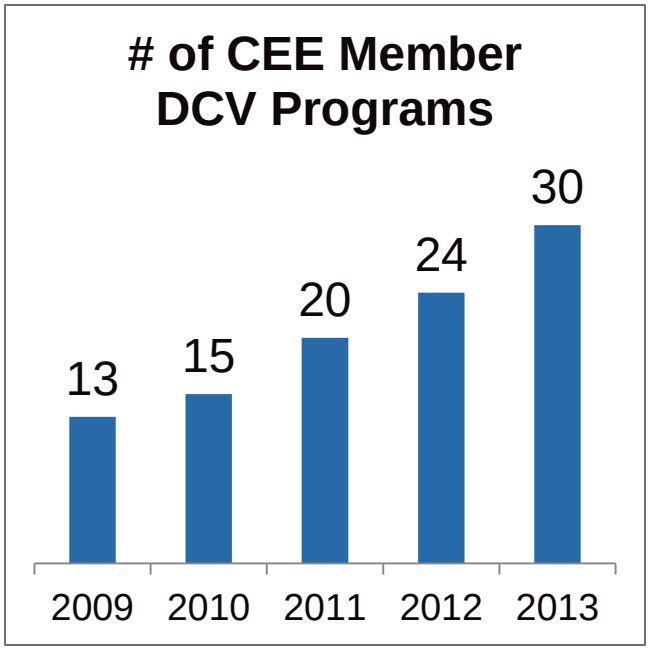


CEE DCKV Efforts to Date

What is it?	• Guide for program administrators
How much energy?	• Test protocol • Field test collection
Define Barriers	• Low awareness • Complexity • Sales channels

CEE Member DCV Programs





- Incentives up to:
  - $500/HP
  - $650/kCFM
  - $8600

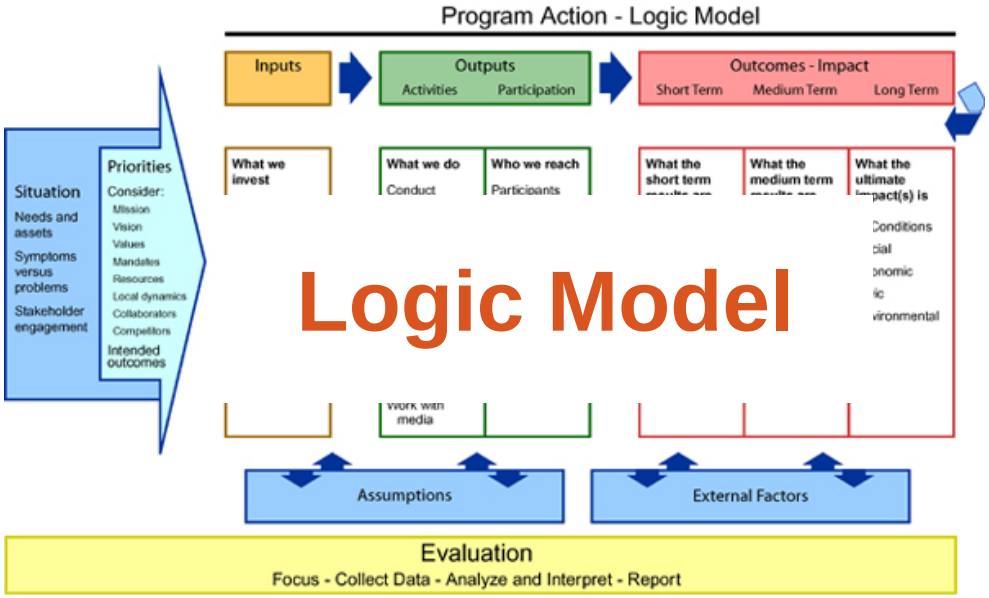
More details at: http://library.cee1.org/content/cee-2013-commercial-kitchens-program-summary/. See columns DW, DX, and DY.

What's Cooking

- Messages and tools
- 'DCKV for Dummies'
  - FAQ
  - Checklists
  - Product directory
- Savings calculator (spec)
  - Ballpark estimate

CEE Next Steps

Vet



Logic Model

Coordinate

Opportunities to Leverage Complementary Efforts

- How might the materials we've drafted inform BBA efforts?
- How might BBA members inform development of CEE materials and approach?
- What coordination needs to happen for efforts to result in market transformation?

CEE Contact

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Energy Efficiency Approaches for the Resource-Constrained Organization

Richard Shandross, Navigant
Technical Lead, BBA Food Service Solutions Team

May 7-8, 2014

Examining the Barriers to Adopting Energy Measures

- One can summarize the phases of a project like eliminating energy waste as:
  - **Getting motivated**
    - Nothing is going to happen until people decide to take on the task
  - **Getting started**
    - This can be complicated stuff – where and how does one get started?
  - **Seeing it through**
    - The project requires money, time, effort, know-how, and perseverance
- *Any and all of these phases can represent a barrier to cutting energy costs in resource-constrained organizations*

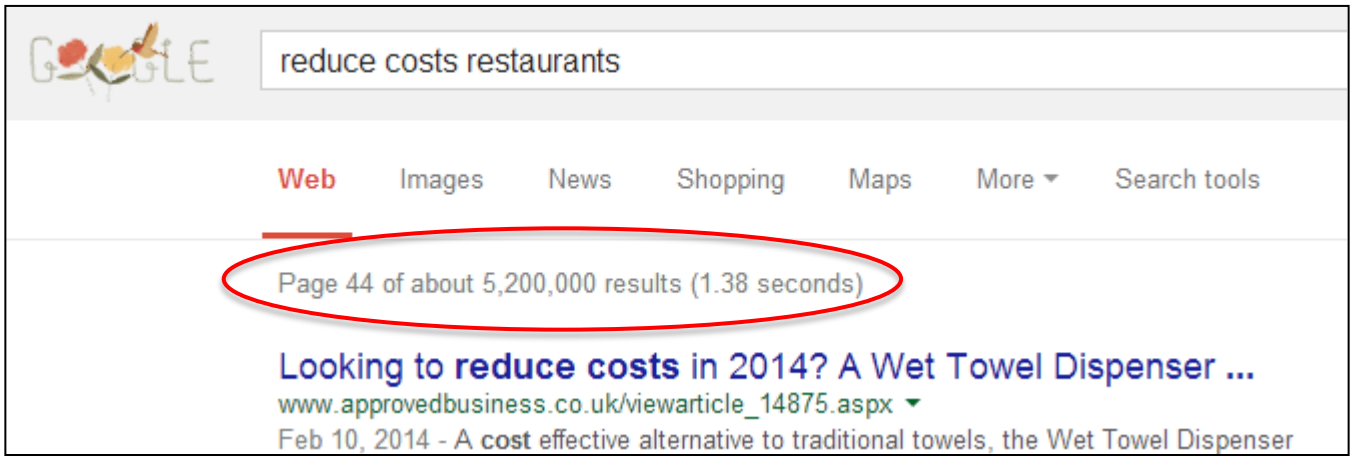
All Aspects Need to be Addressed to Make the Project Feasible

- Get people to feel that it's critical to act
  - But give them a way to make it happen, or there will be anxiety and stress
- Give people a blueprint, tools, and support in addressing wasted energy
  - But give them a way to afford to do it, or there will be frustration and anger
- Help people to get started
  - But if they don't see it through it can erode morale, let the opportunity slip away, and even affect the bottom line (e.g., expenditures without associated savings)

The Typical Perspective on Energy Efficiency is Not Always Motivational

- The usual perspective on energy efficiency improvement is that it results in savings (and that is 100% correct!)
- But there is an entry barrier to efficiency savings: the money, effort, and time it takes to incorporate energy-saving measures
- Note that “savings” often has a connotation of a single, i.e., one-time event
- So when you have significant constraints, “savings” are nice *but they often don’t seem important or urgent compared to the constraints*

But People Do Spend Time and Effort on Cutting Costs In General



- Endless effort is spent on cutting costs
- But the usual cost cutting measures don't involve energy …

(Really! Where's the Beef on Cutting *Energy* Costs?)

GOOGLE SEARCH TERMS: restaurant + cutting + costs

- "Cut Costs, Keep Quality" by Jamie Hartford in *QSR Magazine*: NOTHING about energy
- "Crafty Ways Restaurants Cut Costs" by Neil Parmar in *WSJ*: NOTHING about energy
- "Cutting food costs, not quality" in *Restaurant Business Online*: NOTHING
- "Ideas for Restaurant Cost Cutting" by Russell Huebsch in *Chron*: NOTHING
- "Top 10 Ways to Cut Costs at Your Restaurant," *Aaron Allen blog*: NOTHING
- "Restaurants search for small ways to cut costs" by Amanda Gold in *SF Chronicle*: NOTHING
- "Recession Proof: Restaurant Cost Cutting" by Tom Buswell, *SMTM*: NOTHING
- "Fifty Ways to Cut Costs in Your Restaurant without Reducing Quality or Guests' Experience" by Jim Laube in *Restaurant Startup & Growth*: Only one of the tips (#50!) concerns energy: "Turn off unneeded burners, fryers or ovens during off-peak time."

Why? ⇨ Energy Cost Savings Seem Different from Other Cost Savings

- **Money issues**
  - As an example, changing suppliers to cut cost is free, or close to it. Buying an ENERGY STAR® fryer means spending money
- **Non-monetary issues**
  - "I know food and cooking and service. I don't know anything about this stuff"
  - "I don't have time to do the research"
  - "I don't have the money to hire an expert"
  - "It's going to interfere with my business"
  - "It's not that big a deal"
  - "It probably won't work (especially with my employees)"
  - Etc.

Scope of This Discussion

- We are not going to address time, effort, or technical resources in this talk, but note:
  - *Time and effort* are the operators' responsibility … but we can help immensely by providing resources that reduce the time and effort needed
  - *Technical resources* can also help immensely – **IF** they are provided on a level appropriate to the operators' needs and ability to digest
- Today's discussion will focus on the financial aspects:
  - Financial perspective, associated motivation
  - Couple of thoughts about solutions

"Savings Are Nice, But Not For Us – Too Expensive"

Here is alternative perspective – also accurate – that may be more motivational:

(1) Energy waste is *a credit card for which payments don't reduce the balance*

(2) Freedom from 'energy debt' is not "nice to have" – *It frees bound money* ... month after month

“Energy Debt” Defined

- **“Energy debt” is regular, continued payment for energy that could be avoided with more-efficient equipment and/or procedures**
- Naturally, it’s *not really* a debt
- But it has several important similarities to monetary debt:
  - Takes money out of cash flow
  - Consumes money that would not be otherwise spent (loan ⇨ interest, energy debt ⇨ waste)
- More importantly, energy debt is *worse* than monetary debt! …

Comparison of Monetary and Energy Debt

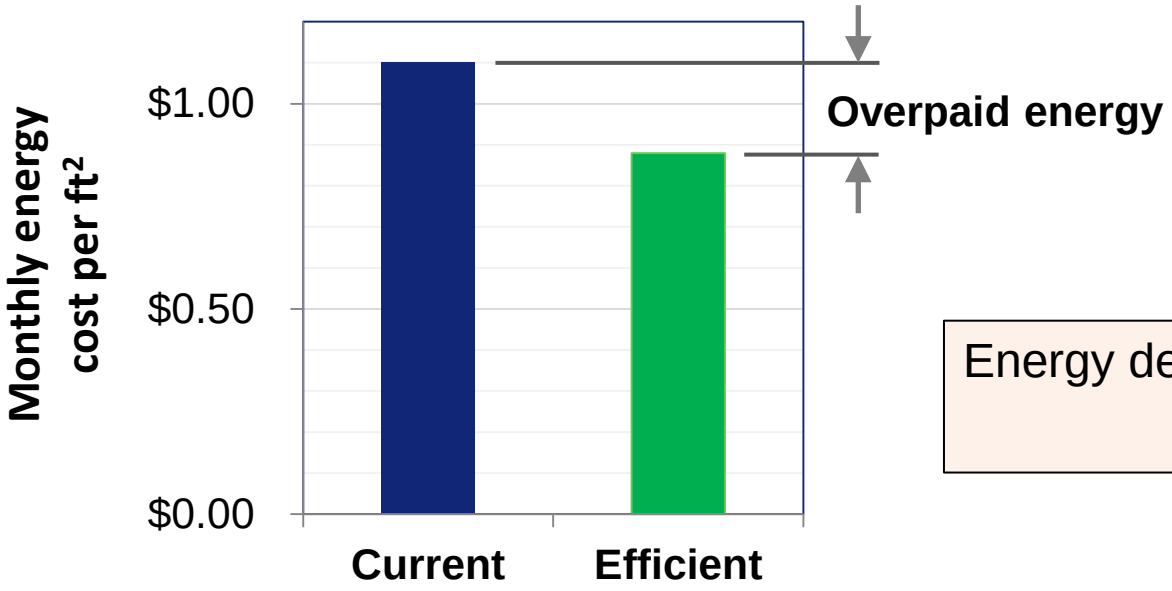
	Monetary Debt	"Energy Debt"
Effect on business	Monthly payments reduce cash flow and profits	Same as monetary debt
Reason for debt	Usually to accomplish a business goal	Avoids spending money, effort, and time to improve efficiency
How do payments† affect the debt?	Debt goes down over time	**No change in debt**
How do you get out of debt?	Make regular payments	**Upgrade equipment, facilities, and/or materials; improve operations**

† An energy debt "payment" refers to the monthly cost of wasted energy

Example of Energy Debt

670 kBtu/ft²/yr, 4,000 ft² QSR "overpays" for energy by 20%*

* E.g., just starting to pay attention to energy issues

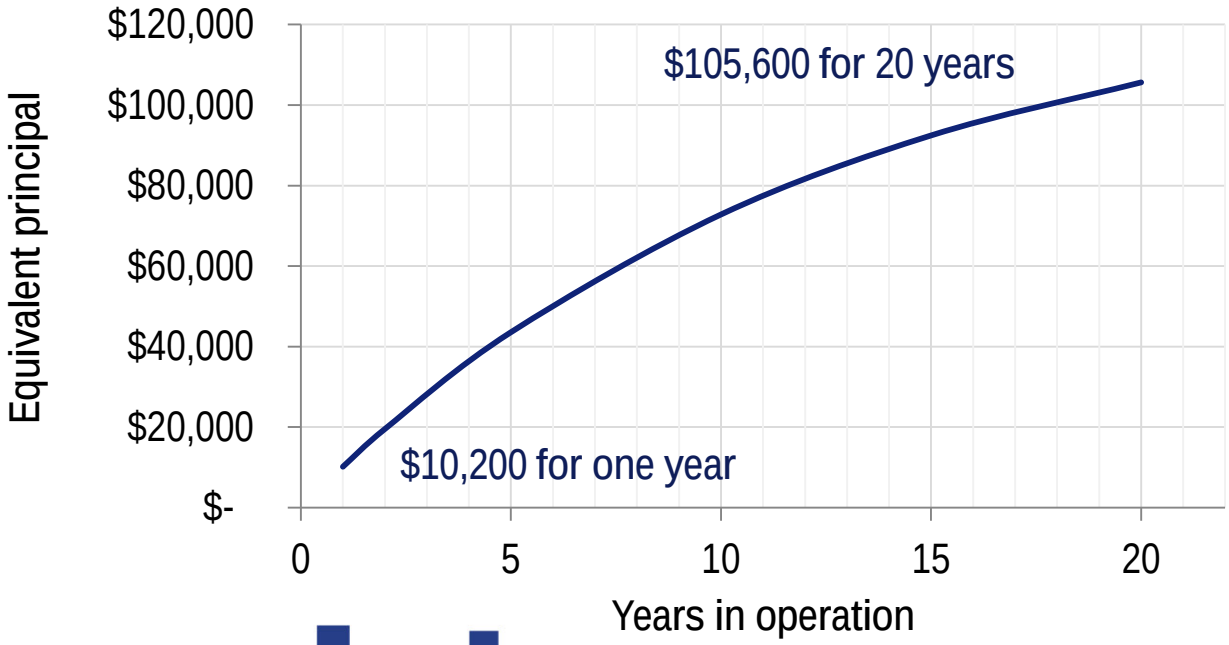


Energy debt = $884 per month
= $10,600 annually

The "Equivalent Loan"

- If the extra energy expenditure were payments on a loan at 8% interest,* what would the equivalent principal be?
- It depends on how long the restaurant will be open:

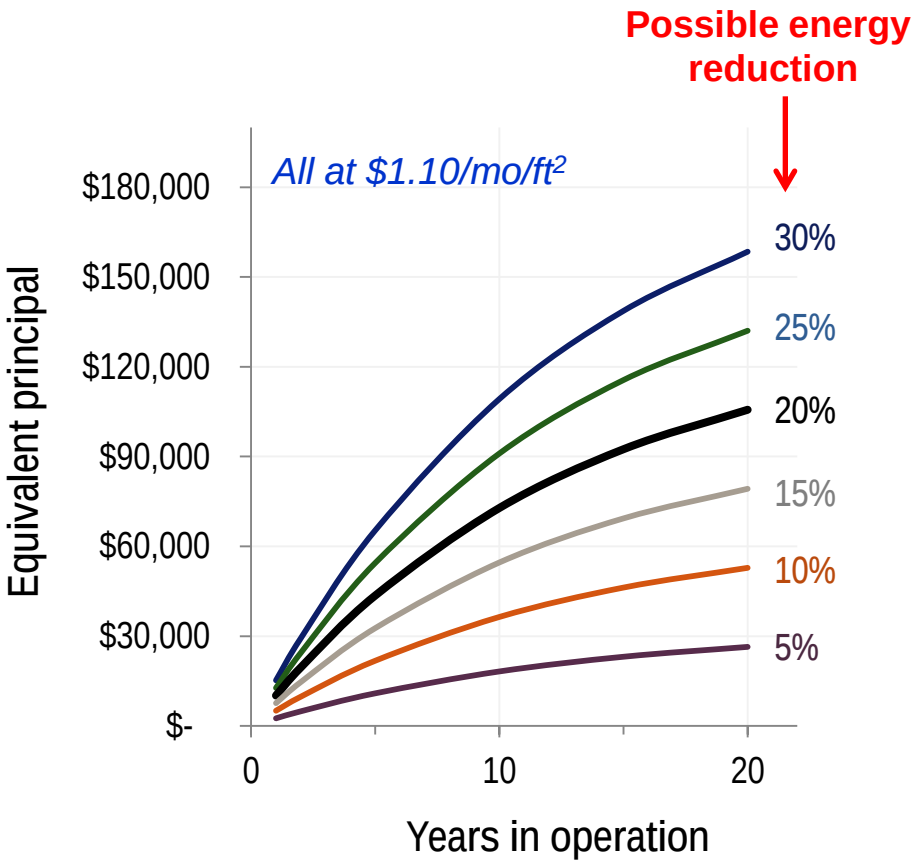
* Approximate food service cost of capital

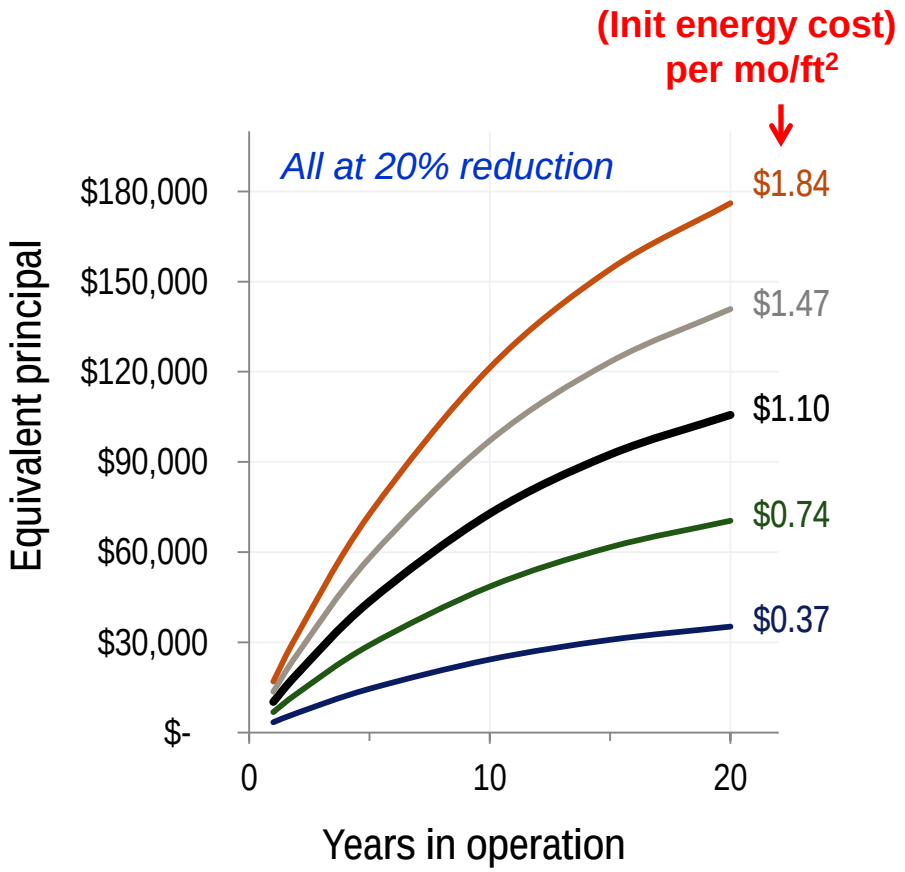


Assumes:

- 20% energy reduction is possible
- $1.10/mo/ft^2 (electric and gas combined)
- 4000 ft^2

Size of the Equivalent Loan for Other Scenarios





Assumes:

- 8% interest, 4000 ft²

Some Approaches to Major Efficiency Efforts

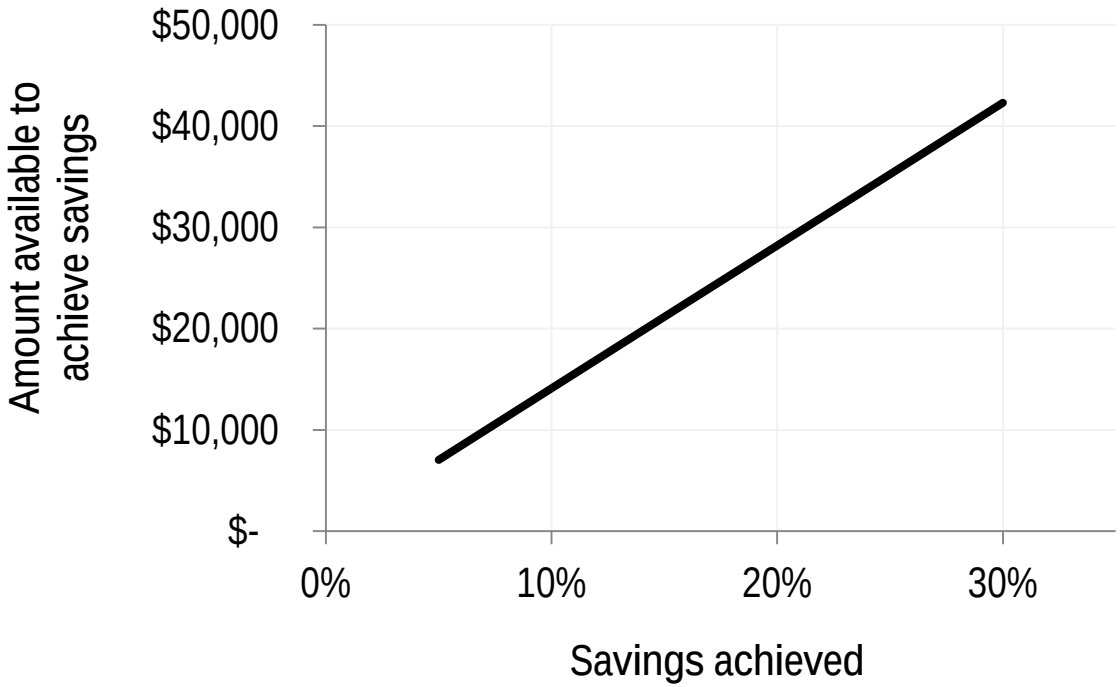
Approach	Cash Flow / Capital Cost	Utility Cost
Piecemeal and partial	Lowest capital cost Sporadic cash flow impact	Difficult to assess and model projects' impact on utility costs
Piecemeal	Sporadic cash flow impact	Difficult to assess and model projects' impact on utility costs
Multi-year plan	Cash flow impact spread over years	Utility costs drop gradually over several years
All at once	Highest cash flow impact if not financed	Utility costs drop immediately

Start with All-At-Once Approach

- Key advantage: immediate, maximum “debt reduction” benefit
  - ROI accumulates immediately
  - Compared to a multi-year or piecemeal plan, this can be a **big** plus
- There are difficulties, of course:
  - Lots of work to do all at once
  - What to do about replacement of newer equipment?
  - Need upfront access to all the capital
- If capital were the only issue, how might we approach planning?

Applying the Equivalent Loan Concept: "All-at-once" Financing for 3-Year ROI

- If financing at 8% with a 3-yr term, *$1,410 is available for each percent of energy reduction planned* (about 1-1½ kW).



Assumptions:

- Energy savings are used to make the loan payment
- "$1,410 per %" assumes $1.10/mo/ft^2, which will vary depending on actual energy usage and energy cost
- "1-1½ kW" assumes 560-850 kBtu/ft^2/yr and 4000 ft^2
- 128 operating hours per week

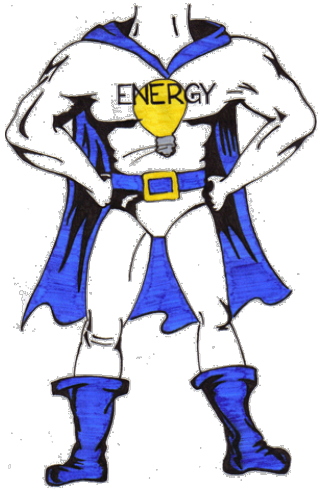
The Multi-Year Plan Approach

- While implementing the plan you are still “in debt” … but less and less
- More manageable for many (especially time and effort)
- But planning effort is greater:
  - If you don’t have upfront access to capital, you have to reinvest freed-up money in further efficiency measures (you shouldn’t spend it elsewhere until you’re done!)
  - Getting started and gaining momentum requires extra thought and analysis
    - A certain amount of financial modeling
    - Clever staging is required – inexpensive measures to earn some seed money, then items with optimized combo of first cost, Btu [kWh] reduction per dollar, and equipment age or condition
    - Still might require capital injection at times; first year is a good idea

To be Continued

- Ultimately, the support for resource-constrained organizations will need concepts and analysis tools worked out and made easy to customize and apply

THANK YOU!



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2014 Case Competition

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What is the Better Buildings Case Competition?

- The Better Buildings Case Competition…
  - started in 2012.
  - engages the next generation of engineers, entrepreneurs and policymakers to develop creative solutions to real-world energy efficiency problems.
- Students are assigned a short case, developed in cooperation with industry, that describes a challenge or barrier endemic to industry. Examples include:
  - difficulty accessing energy data
  - challenges engaging building occupants
  - barriers associated with higher first cost of efficient equipment
  - split incentives
- Interdisciplinary student teams propose solutions.
- Winners are selected by a panel of industry and federal judges.

Why do we do it?

- Supports the Better Buildings Initiative to make commercial and industrial buildings at least 20 percent more efficient over the next 10 years
- Low-cost, high-value way to identify and deploy solutions to persistent barriers
  - This year 28 teams will produce over 75 replicable solutions to six difficult problems
- Engages federal and industry partners in Better Buildings work, advancing our deployment mission
- Highly valued by participants, both by students and industry judges
  - Students engage in energy efficiency field and gain experience that can lead to career opportunities
  - Judges find it to be a good recruitment tool and a source of new and fresh solutions

Universities Participating

2012 (19)

- Columbia University
- Duke University
- Carnegie Mellon University
- University of California, Berkeley
- University of Southern California
- University of California, Irvine
- University of Colorado, Denver
- University of Michigan, Ann Arbor
- Vanderbilt University
- Texas A&M University
- Georgetown University
- The George Washington University
- Georgia Institute of Technology
- Tufts University
- Harvard University
- Babson College
- Massachusetts Institute of Technology
- Dartmouth College
- Yale University

2013 (14)

- Babson College
- Carnegie Mellon University
- Columbia University
- Cornell University
- Dartmouth College
- Tufts University
- Univ. of Michigan Ann Arbor
- University of Chicago
- University of Pennsylvania
- Yale University
- George Washington University
- University of California Irvine
- Univ. of California Santa Barbara
- Mass. Institute of Technology

2014 (25)

- Princeton
- Howard University
- Stanford University
- Georgetown University
- Yale University
- Columbia University
- Rutgers University
- University of Iowa
- University of Guam
- Mass. Institute of Technology
- Tufts University
- University of California, Santa Barbara
- University of California, San Diego
- University of Michigan
- Georgia Tech
- UC Berkeley
- Babson College
- Mississippi State University
- UC Irvine
- University of Maryland
- University of Utah
- Harvard University
- Carnegie Mellon University
- University of Chicago
- George Washington University

Participating Industry Partners

2012 (4)

City of Houston
District of Columbia
Cassidy Turley
HEI Hotels

2013 (17)

The City of Fort Worth, TX
Oncor Electric Delivery
Atmos Energy
Staples
Kohl's
Target
ASHRAE
Maryland Energy Administration
General Services Administration
Institute for Market Transformation
Montgomery County, PA
ACEEE
Alliance to Save Energy
Energy Efficient Buildings Hub
Virginia Department of Mines, Minerals and Energy
Real Estate Roundtable
Senate and House Staff

2014 (38)

Lend Lease
McDonalds
National Restaurant Association
YUM Brands
Environmental Protection Agency
The State of Delaware
The City of Denver, Colorado
The City of Knoxville, Tennessee
California Energy Coalition
Southface Energy Institute
The General Services Administration
The Department of Housing and Urban Development
Clean Energy Solutions
HR&A Advisors
NYSERDA
Federal Practice Group
Stewards for Affordable Housing for the Future
A&R Companies
Weatherization and Intergovernmental Program
Waypoint
Solar Energy Technologies Program
Energize NY
Connecticut Clean Energy Finance and Investment Authority
The City of San Francisco
DC PACE Program
Enfinity Solar
Xcel Energy
EPA Green Power Partnership
The California Public Utilities Commission
The National Association of Regulatory Utility Commissioners
The Lawrence Berkeley National Laboratory
Stanford University
The University of Colorado
UC Berkeley
The National Institute of Health
The Center on Environmental Quality
PACENow

2014 Cases

Welcome Home to Savings: Distributed Generation in Multifamily Housing- Students will develop a replicable strategy to expand energy efficiency and distributed generation at federally assisted housing complexes.

Picking up PACE: Taking Commercial PACE Financing to Scale- Students will develop a program structure and a business plan that states can use to effectively implement PACE financing and achieve scale.

Electri-City: Energy Management in Public Buildings- Students will recommend a scalable, sustainable, and replicable data acquisition and management strategy for publicly owned buildings

Experimenting with Efficiency: Greening the Grant Process for Research Institutions- Students will develop the business case and implementation strategy for universities to promote energy efficiency in all projects funded with external grant funds, considering every perspective (research facility, grant management, and researcher).

Here Comes the Sun: Satisfying RPS with Solar- Students will develop a cost effective solar incentive program strategy for utility companies charged with RPS satisfaction, including a solar carve out.

A Side of Savings: Energy Efficiency in the Restaurant Franchise Model- Students will develop a strategy for franchise's to promote energy efficiency in franchisee locations, including consideration of the complicated ownership, investment, and management

Case Challenge

- Reduce energy usage by 10% by 2020 across portfolio
- Knowns
  - Quick Serve Restaurant
  - 5,000 locations. 90% Franchise, 10% Equity.
  - $750,000 annual sales
  - Utilities cost 3-4% of sales
  - Cooking accounts for 25% of energy used
  - Current Franchise agreement
  - Limited or no upfront available capital

Judges

David McDonald, Lend Lease
Executive Vice President

John Herth, Dunkin' Brands
Sr. Director of Global Design/Const

Jeff Clark, National Restaurant Association
Conserve Program Director

Adam Jarboe, Yum! Brands
Sustainability Associate Manager

Holly Jameson Carr, US Dept of Energy
Fellow

Rich Shandross, Navigant Consulting
Associate Director of Energy

Roy Buchert, McDonalds Corp
Global Energy Director

A Side of Savings

Building Revolutionaries

Solution:

The Sustainability Initiative

Conclusion

We can reach the 2020 goal of reducing energy usage by 10% by 2020

- With energy retrofits
- Siemen's Site Control
- Marketing campaign

Everyone benefits

- Happier customers
- Happier franchisees
- Happier planet

A Side of Savings

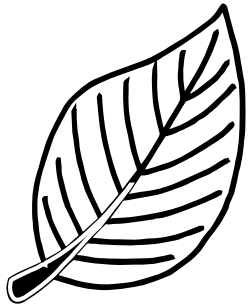
Team Crown Joules

Department of Energy Better Buildings Case Competition

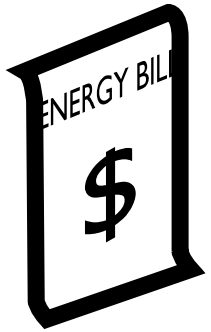
Jordan Smith
Ben Franta
Lauren Hartle

Washington, DC
March 14, 2014

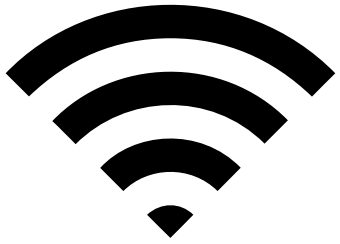
Bundled Selling Points



Eco-consciousness



Energy Efficiency



Wi-Fi

Premium Menu Items

GOODBURGER

Conclusion

This illustration is one proposal which ties revenues to energy savings, but myriad variations based upon the concept are likely to be effective.

- Psychological bias to respond more to revenue growth instead of cost-cutting, even if effect upon profitability is identical.
- Leverage existing strengths and core competencies.
- Support positive incentives rather than threat of negative repercussions.
- Do not dramatically alter the franchise agreement.
- Short payback period and immediately visible results.
- Align incentives and provide equitable returns for both corporate branch and franchisees.

Energy savings at Good Burger using technology, data, and behavioral change

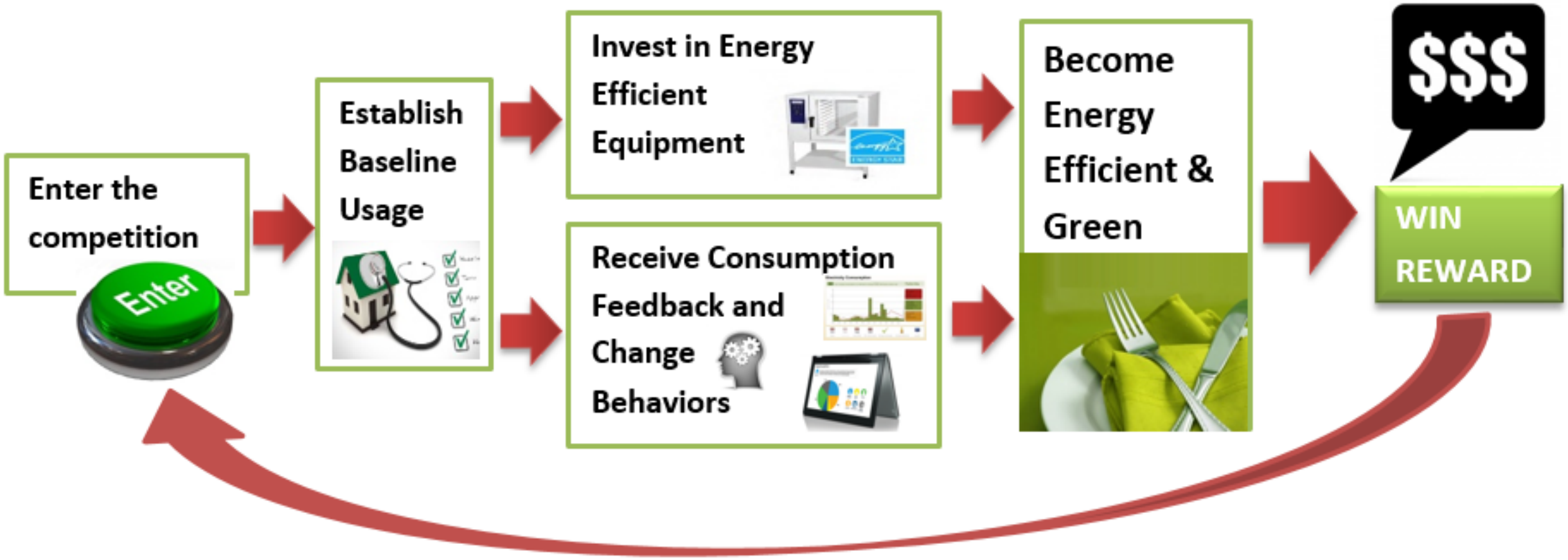
Team EverPower

March 14, 2014

Presenter:
Matt Plunkett

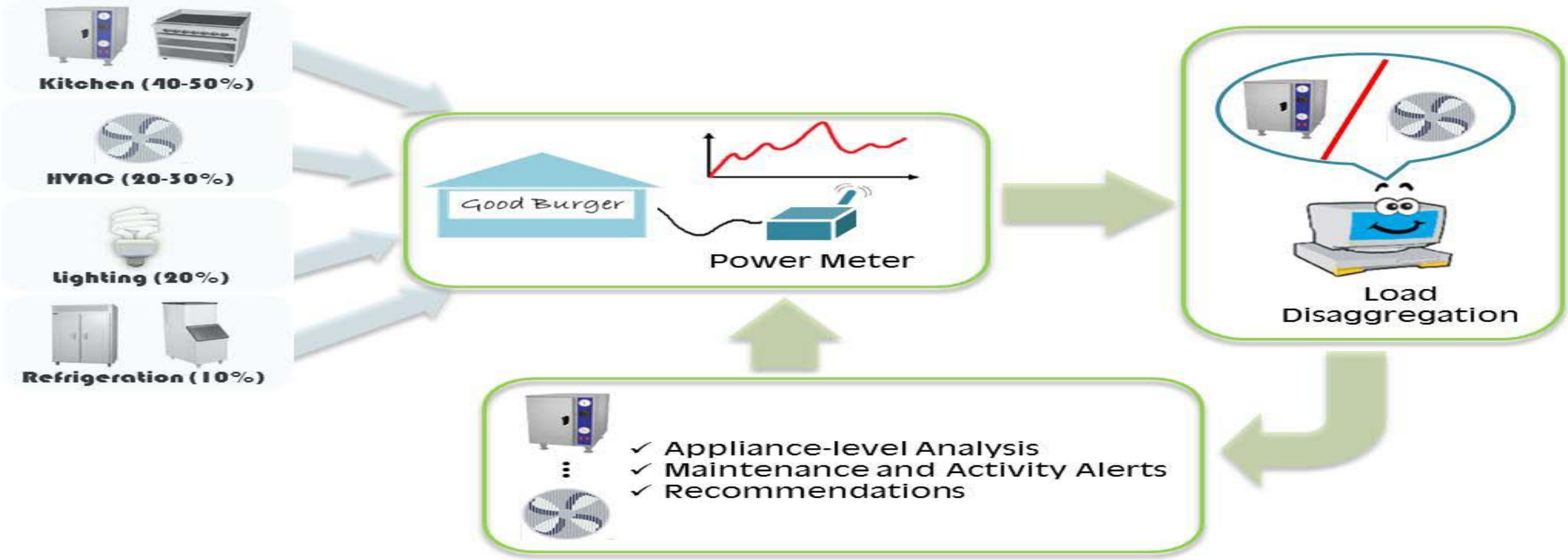
Casey Canfield
Matineh Eybpoosh
Nathaniel Horner
Julian Lamy
Vedran Lesic
Rubén Morón

Recommendation Overview



Technology-driven Behavioral Solutions

- Non-intrusive Load Monitoring



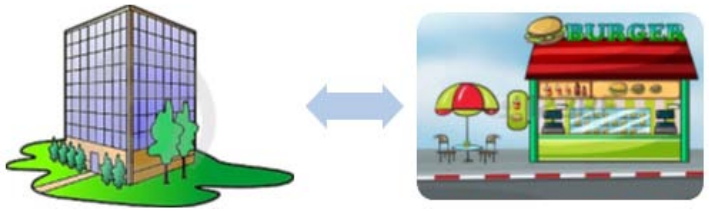
Greenolution

A Side of Savings: Energy Efficiency in the Restaurant Franchise Model

Recommendations

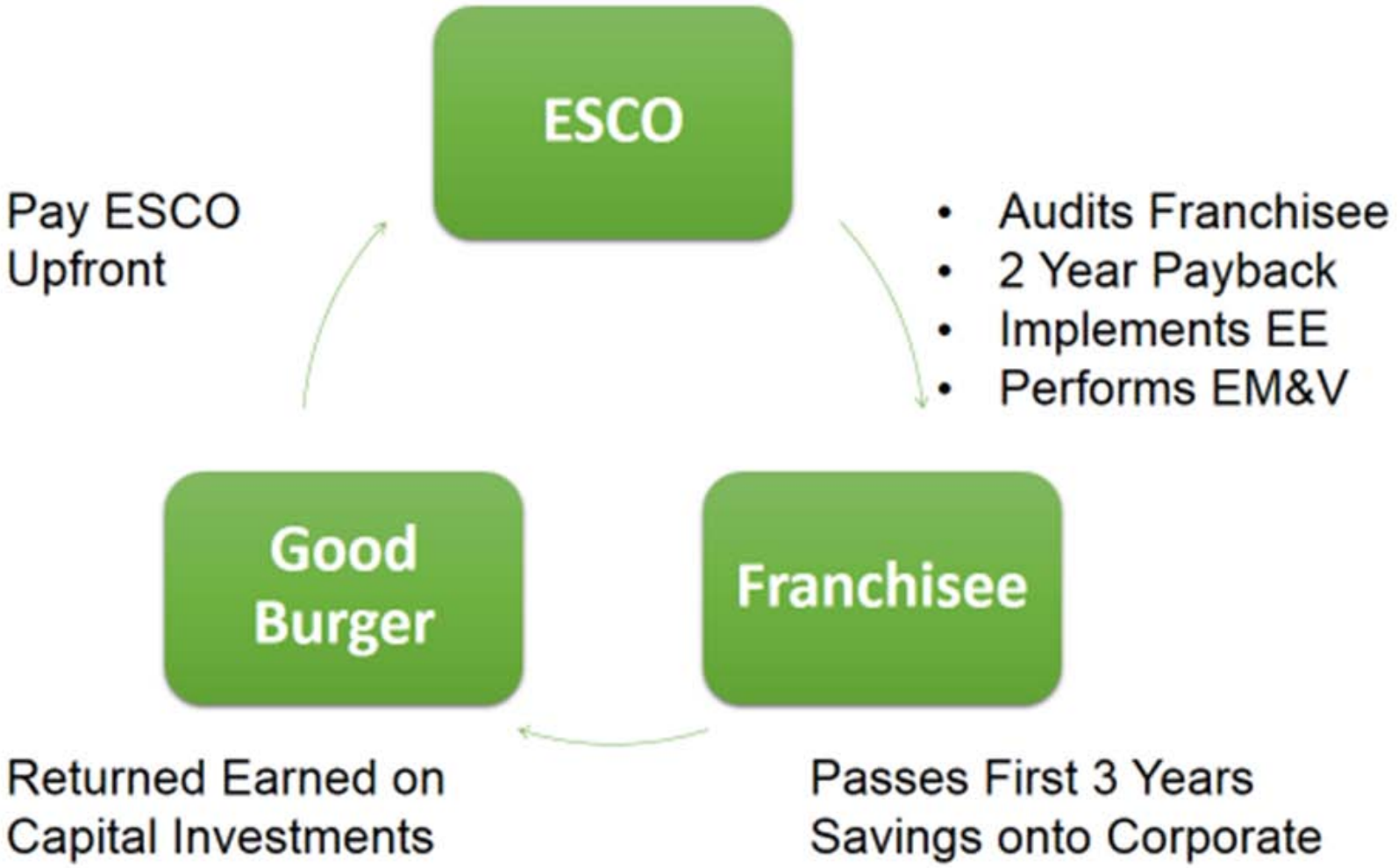
Financing Solution

ESCO
THE ENERGY EFFICIENCY EXPERTS



Employee Engagement Energy Education

Recommendations: Finance



The Lean Green Machines

Energy Efficiency in the Restaurant Franchise Model

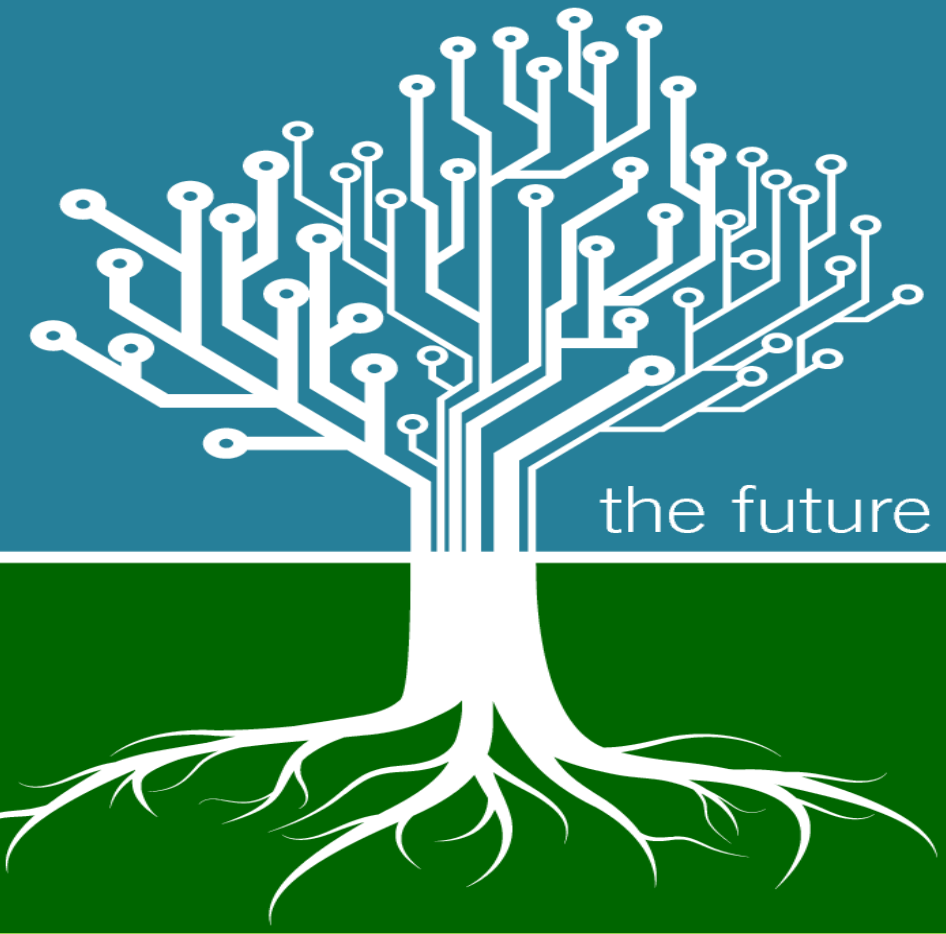
Management - Incentives

Participation Incentives

- Energy STAR participation
  - Cover 5% of purchase price
- Annual franchise fee
  - Reduction of 50 kBTU/yr = 0.25 % reduction
  - Reduction of 100 kBTU/yr = 0.50 % reduction
- Best Franchise Award
  - Based by region
  - Most improved year over year
  - Choice of restaurant upgrade

Conclusion

- Improving long term franchise viability
  - –Upgrade incentives
  - –Participation incentives
  - –Portfolio manager
  - –Siemens EcoView
  - –Hot water delivery system
  - –HVAC



the future of

green business strategy

A SIDE OF SAVINGS

BETTER BUILDINGS CASE COMPETITION

Proteus

Our Solution

Energy Management Agreement (EMA)

+ Centralized Third Party Energy Management Service Provider
+ No costs to Franchisor or Franchisee
+ No Employee Involvement

Food Waste Management

+ Crowd Collection of all Restaurant Food Waste in Region
+ Localized Third Party Waste Management Service Provider
+ No Employee Involvement

Awards

- Best Proposal
  - *Effective and is also feasible to implement*
  - *Replicable by many entities in similar situations.*

Winner: Team EverPower

- Most Innovative
  - *Feasible*
  - *Distinct departure from current industry practice*
  - *Break-through solution that catalyzes market growth*

Winner: Team Crown Joules