BTO Program Peer Review

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Images courtesy of REMIS AMERICA, LLC.

Retrofitting Doors on Open Refrigerated Cases

BBA Refrigeration Project Team

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Background and Motivation

- Adding doors to open cases (retrofits) greatly reduces cold air loss – 50-80% load reduction
  - Load reduction = system energy savings
- Food retail is a very energy-intensive application
  - Typical supermarket: 2 to 3 million kWh/year per store
  - Refrigeration is the largest energy consumer (~50%)
- Open cases spill cold air (see figure), requiring added refrigeration energy and ambient reheat

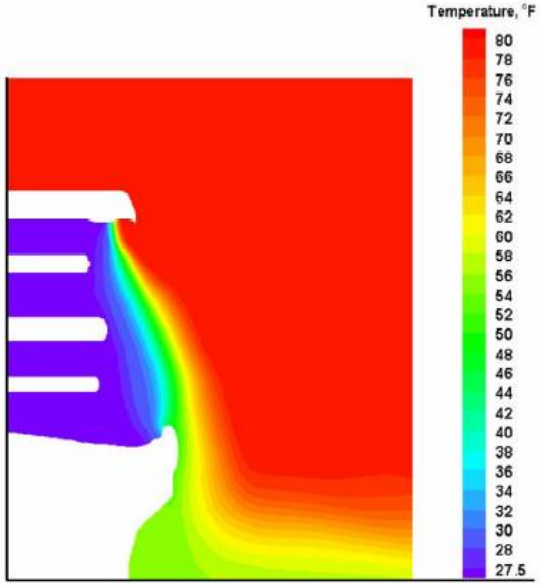


Image from *Investigation of Energy-Efficient Supermarket Display Cases. 2004, Oak Ridge National Laboratory.*

Image Courtesy REMIS AMERICA, LLC.

- Typical store - roughly 50% of display cases are open medium-temperature – large potential retrofit market
- Additional non-energy benefits include increased shopper comfort, increased product life, and reduced product losses

Purpose & Objectives

Problem Statement:

- BBA members expressed concerns over barriers to implementation
  - Uncertainty over technical requirements – what steps must be taken?
  - Reported disparities between anticipated and actual energy benefits – project results not consistent with expectations from design/planning stage
  - Cost concerns – food retailers very sensitive to capital costs
  - Perceptions that door retrofits may hurt product sales

- Many of these barriers result from knowledge gaps
  - Poor retrofit performance often due to inadequate planning or improper execution
  - The need for system-wide changes in conjunction with retrofits is often overlooked
  - Financial impact and payback are often misunderstood

Purpose & Objectives, Cont.

Impact of Project:

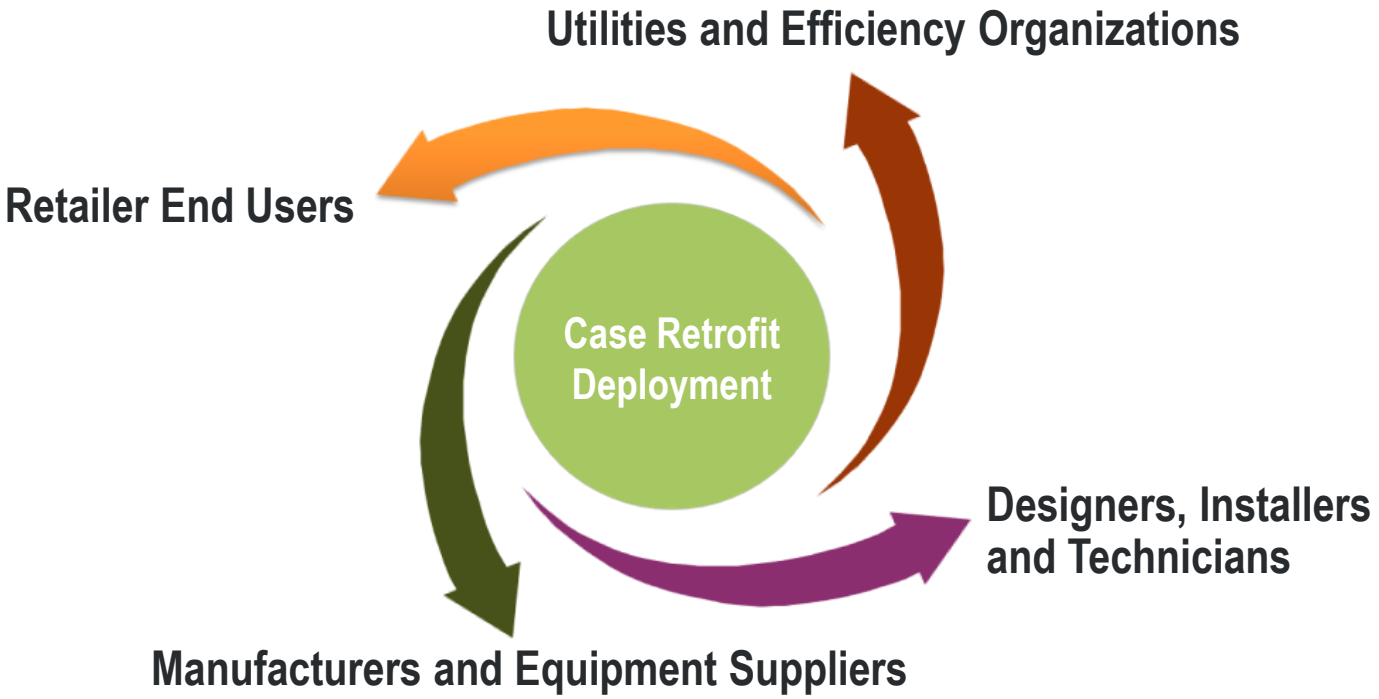
- Goal: break down existing knowledge gaps and barriers to implementation
  - Shift industry attitudes towards the technology
- Large potential for energy and cost impacts
  - 2.5 TWh annual national energy savings technical potential
  - $5-10K annual energy-cost savings for a typical supermarket

Project Focus:

- Primary target – supermarkets, pharmacies, convenience stores
  - Many owned by chains with national/regional presence and large energy footprints
- Broad applicability
  - Technology available to a wide range of stores – independent, chain, large, small
  - Far lower cost than case replacement
- Member-driven initiative
  - Project guided by refrigeration project team (RPT) member needs
- High energy savings at modest capital cost

Approach:

- Develop and disseminate best practices guide (now online*) to reduce technical barriers
- Demonstrate cost/performance benefits (~4-6 year payback) in the field
- Promote technology and practices through multi-party collaboration



*Available: www1.eere.energy.gov/buildings/commercial/pdfs/cbea_open_case_retrofit_guide.pdf

Approach, Cont.

Key Issues (Potential Risks of Approach):

- Guide may not be fully utilized – mitigate through collaboration with BBA members and other partners
- End-users face internal project hurdles such approval from marketing – reduce risk by facilitating communication and supplying supporting data

Distinctive Characteristics:

- Extensive stakeholder collaboration – table of participants below

Retailers	Walmart, Target, Whole Foods Market, SUPERVALU
Suppliers	Hill PHOENIX, HUSSMANN, ZERO ZONE, REMIS AMERICA, LLC, DC ENGINEERING
Trade Organizations	RSES The HVACR Training Authority, the NEWS (Air Conditioning | Heating | Refrigeration)
Utility/ Efficiency Groups	Southern California Gas Company, A Sempra Energy utility, CEE

Accomplishments and Progress

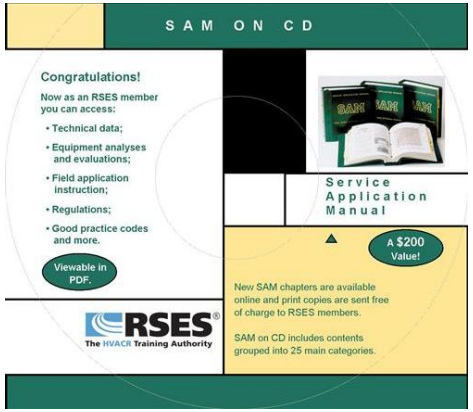
Accomplishments:

- DOE published the *Guide for the Retrofitting of Open Refrigerated Display Cases with Doors** in November 2012
- Major industry publication, *ACHR News*, will run a series on the guide spring/summer 2013
- Developed Excel-based retrofit project cost/benefit and payback period calculator


Air Conditioning | Heating | Refrigeration

the NEWS

Distributors Go Extra Mile for Contractors



- Working with Refrigeration Service Engineers Society, a major trade organization, to showcase guide
  - Potential feature in RSES newsletter
  - Interested in adaptation of guide into Service Application Manual for use by field staff

***Available:** www1.eere.energy.gov/buildings/commercial/pdfs/cbea_open_case_retrofit_guide.pdf

Accomplishments and Progress, Cont.

Progress on Goals:

- Achieved goal of publishing guide
- Initiated deployment and promotion phase

Awards/Recognition:

- Industry, utilities, and efficiency organizations have responded enthusiastically to the guide

"I think this is going to be an excellent measure to add to our incentive program." – *Ahmed Abdullah, Southern California Gas Company*

"What a timely topic for our readers. We would like to present this information in a series of 3 to 4 articles." – *Peter Powell, ACHR News*

"You folks did an awesome job with this guide! This is clearly another step toward successful implementation of the national energy plan. You should be proud!" – *Carl Roberts, Zero Zone*

Project Plan & Schedule

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- **Met all original project milestones to date**
- Original project initiation March 2012; plan included development and publication of retrofit best practice guide. Published Nov. 2012; project focus shifted to deployment
- Current and future work consists of deployment and promotion activities with a number of project partners.

Summary	Legend
WBS Number or Agreement Number	Work completed
Project Number	Active Task
Agreement Number	Milestones & Deliverables (Original Plan)
	Milestones & Deliverables (Actual)

	FY2012			FY2013			
Task / Event	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)	Q1 (Octt-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)
Project Name: Retrofitting Doors on Open Refrigerated Cases							
Q2 Milestone: Project initiation based on RPT member input	◆						
Q3 Milestone: Perform background research and present initial draft to RPT		◆					
Q4 Milestone: Deliver draft report to DOE for review			◆				
Q1 Milestone: Publish final report to DOE website				◆			
Current work and future plans							
Host webinar on technology featuring manufacturers and end users					◆		
Collaborate with industry organizations to publicize guide							
Work with utilities to develop incentive programs							

Project Budget

Project Budget: $100K in FY2012; $150K in FY2013

Variances: None

Cost to Date: Approximately $125K (FY2012-13)

Additional Funding: None

Budget History					
FY2010		FY2011		FY2012	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
N.A.	N.A.	N.A.	N.A.	$100k	N.A.

Project Integration, Collaboration & Market Impact

Partners, Subcontractors, and Collaborators:

- Project was initiated through the BBA Refrigeration Project Team, at the suggestion of Retailer Energy Alliance members
  - Members include Target, Wal-Mart, SUPERVALU, Whole Foods, and others
  - Provided input, guidance, and feedback throughout the process.

- Best practice guide developed with input from numerous stakeholders, including major refrigeration equipment manufacturers and installers
  - DC Engineering
  - Hill Phoenix
  - Hussmann Corporation
  - REMIS America, LLC and REMIS GmbH
  - Zero Zone, Inc.

- Trade organizations, industry publications, end users, and utilities are all collaborating with the team on deployment and promotion activities
  - RSES, *ACHR News*, SoCal Gas, CEE

Project Integration, Collaboration & Market Impact, Cont.

Technology Transfer, Deployment, Market Impact:

- Desired project impact: increase awareness, technical understanding, and implementation of retrofit technology by end users
  - Provide adopters with reliable information to fill knowledge gaps
  - Collaborate to reduce barriers, increase market acceptance, and push retrofits towards standard practice
- Positive initial response to guide indicates interest and desire for action

Communications:

- Published guide to DOE website for public use
- Held webinar on 2/14 with end-user and industry presenters, >50 attendees
- Discussed guide and deployment with members at four RPT meetings
- Aforementioned coverage in *ACHR News* and RSES publications

Next Steps and Future Plans:

- Promote guide and best practices through publications
  - RSES – over 11,000 members
  - *ACHR News* - over 100,000 subscribers
- Raise awareness of technology through partnerships
  - Work with utilities to distribute promotional materials to their customers
  - Leverage industry organizations to reach thousands of potential adopters
  - Selectively initiate dialogue with specific large potential end users
- Partner with utilities to implement incentives to reduce first costs
  - Currently working with Southern California Gas Company to develop rebate – would be one of the few utilities to offer gas rebate for retrofits
  - Program readiness package has been submitted, received positive response from SoCal Gas, will be reviewed and submitted to CPUC
- Showcase technology by documenting field studies/demonstrations
  - Developing case study using data from Fresh & Easy stores in California