COMMERCIAL SOLUTIONS BASELINE STUDY
FINAL

Prepared for:

AEP TX CENTRAL, AEP TX NORTH, AEP SWEPCO,

EL PASO ELECTRIC, TX-NM POWER, ENTERGY-TX

Prepared by:

OPINION DYNAMICS CORPORATION

1999 Harrison St. Suite 1420
Oakland, CA 94612
(510) 444-5050
www.opiniondynamics.com

Tom Fisher
tfisher@opiniondynamics.com

September, 2011

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report presents the findings from Opinion Dynamics' study of Texas commercial customers in six commercial sectors (July to August 2011). The research was conducted to serve as a baseline for the Commercial Solutions program. The purpose of this report is to enable the six utilities to assess changes in the market over time as a result of the Commercial Solutions program, while also providing insights to help future program efforts. Our study focused on the following six sectors: offices, health care facilities, warehouses and distributors, manufacturers, small retailers, and churches and religious organizations.

Energy savings opportunities exist in the two major equipment types; lighting and HVAC. Some of our key findings across multiple sectors include the following:

➢ Nearly half of all customers (49%) reported that they still have T-12 linear fluorescent lighting at their facility, while just over a quarter (27%) have T-8 lighting and less than one in ten (8%) have T-5 lighting at their facility.

➢ Energy saving opportunities exist in five out of six sectors (with the exception of warehouses) with HVAC. Nearly one-third (32%) of their HVAC equipment is over 7 years in age; prime candidates for early retirement.

Regarding attitudes and awareness our results show:

➢ Respondents recognize there is room for energy efficiency improvements at their facilities as they rated the energy efficiency of their facility a mean of 5.9 (on a scale of 1 to 10).

➢ The six sectors cited cost as the main reason, and often the only reason, that they would not purchase energy efficient equipment. This demonstrates the need for utility incentives or access to financing as an option to encourage customers to take action.

➢ Additionally, many organizations are unable to recognize energy saving opportunities on their own; 29% believe they are very knowledgeable about energy saving opportunities in HVAC, 40% with lighting and 33% with other equipment opportunities.

➢ As such, a large percentage of customers in most sectors expressed a need for technical assistance. With the exception of the manufacturing sector, approximately 70% expressed at least some interest (and approximately 40% are very interested) in receiving technical assistance to help choose the right energy efficiency improvements.

The marketplace demonstrates a need for technical training, and education in the commercial trades (architects, contractors, interior designers, etc.), regarding how they specify equipment and assist customers in making energy efficient decisions.

Our research shows a need for utility incentives and financing to encourage energy efficient equipment replacement, but that incentives alone are not likely to transform the market. Technical assistance and other program elements can help move over 70% of the market.

OPINION DYNAMICS
CORPORATION

This study presents detailed findings and opportunities by sector (with comparisons between sectors) as well as data on the presence of energy efficient and non-efficient equipment.

OPINION DYNAMICS
CORPORATION

2. INTRODUCTION AND METHODOLOGY

This report presents the findings from Opinion Dynamics' study of Texas commercial customers. This study was designed to provide a baseline for the Commercial Solutions program. The Commercial Solutions program includes outreach and technical assistance to help commercial customers install and pay for measures (through utility incentives and assistance in finding additional funding assistance), as well as to identify opportunities for savings of which they might not be aware. CLEAResult is implementing the program on behalf of six Texas utilities: AEP Texas Central, AEP Texas North, AEP SWEPCO, Entergy Texas, Texas-New Mexico Power, and El Paso Electric.

The primary objective of this research effort is to measure customer awareness, attitudes, and knowledge regarding energy efficiency. This report also provides baseline metrics for major equipment types in use at commercial facilities in these six territories. Our baseline study targeted six sectors: offices, health care facilities, warehouses, manufacturers, small retailers, and churches and religious organizations. We selected these sectors based on two factors: (1) the potential for growth in participation in the Commercial Solutions program, and (2) the potential for energy savings through the program. Appendix A presents our detailed rationale for choosing each of the sectors studied.

We conducted our baseline study in four phases: a program database review; a technical review of key equipment (lighting, HVAC, and roofing) in place nationwide for the studied sectors; phone interviews with lighting, HVAC, and roofing contractors to explore the installation activity of energy consuming equipment in the six utilities marketplace; and a telephone survey of commercial customers to learn about the specific equipment in place as well as the potential for energy efficiency upgrades. This report primarily presents the findings from the commercial customer phone survey and contractor interviews, supplementing these results with key findings from the database review and technical review, where relevant.

2.1 Customer Survey Methodology

Opinion Dynamics made nearly 22,000 telephone calls to complete 364 total interviews with randomly selected customers in the six studied commercial sectors. We classified interviewed customers into the six sectors in the sample based on their primary Standard Industrial Classification (SIC) code from public records, and confirmed their sectors in the survey based on their self-identification.

Table A-2 in Appendix A presents the SIC codes used to identify each sector. Note that these six sectors are not intended to be representative of the entire commercial populations in these utility territories.

Opinion Dynamics conducted the customer phone interviews from July 6 to August 4, 2011, with an initial goal to complete up to 70 interviews per sector. We completed 364 interviews,

OPINION DYNAMICS
CORPORATION

with an overall response rate of 7%[1] , and an average interview length of just over 20 minutes.

Across all sectors, Opinion Dynamics also designed a proportional sample by utility. We used these proportions only in creating the sample, and not in weighting the final results. Table 1 lists the proportions of the population and final completed interviews.

Table 1. Distribution of Population and Interview Sample by Utility

Utility	% of total population	% of interviews (n=364)	Number of completed interviews
AEP Texas Central	34%	26%	97
El Paso Electric	19%	14%	52
Entergy Texas	13%	23%	82
TNMP	12%	9%	34
AEP Texas North	11%	10%	36
SWEPCO Texas	10%	17%	63

Our survey instrument had two overarching modules: the equipment module and the non-equipment module. The equipment module asked respondents to describe the current lighting, cooling equipment, roofing, and refrigeration equipment in their businesses. The non-equipment module included questions on the business's awareness, knowledge, and attitudes concerning energy efficiency, as well as planned energy efficiency purchases and overall equipment decision-making processes.

We present the equipment findings across all sectors to highlight each sector's individual equipment differences.

We present the non-equipment findings separately by sector, with arrows indicating areas where the sector is significantly different from all other sectors with a margin of error of +/- 10% at the 90% confidence level. A green arrow pointing "up" means that figure is significantly higher than some of the other sectors, a red arrow pointing "down" means it is significantly lower.

Sections with asterisks next to the heading (Knowledge and Attitudes, Program Awareness, Energy Efficiency Barriers and Importance in Equipment Purchases), are areas with baseline metrics developed through this research, that over time can be influenced by the commercial program and should be measured again in the future to determine if any change has occurred.

2.2   Contractor Interview Methodology

Opinion Dynamics conducted in-depth interviews with fourteen trade allies with specialties in lighting, HVAC systems, and/or roofing technology in June and July 2011. These trade allies included both rebate administrators and local contractors. Of these third parties, eleven perform lighting work, three perform HVAC work, and three perform roofing work. Six of the

---

[1] AAPOR Response Rate 4.

interviewed trade allies were rebate agents[2] while eight were local contractors who carry out lighting, HVAC, or roofing work.

The trade allies interviewed cover the territories of all six utilities that participated in the baseline study. The lighting and HVAC contractors provide service to all six building sectors, but the roofing contractors we interviewed only served five building types, with no work done by roofing contractors on health care facilities.

The purpose of these interviews was to investigate the presence of energy efficiency in the three key equipment types in the six utility territories, as well as to explore barriers to adoption of energy efficient technology in the Texas marketplace. These interviews mostly asked about equipment practices overall but went into detail on differences between sectors when possible. Because these findings mostly relate to equipment in place, we present them in the Findings by Equipment Type section.

2.3   Study Limitations

While the primary purpose of this research effort was to measure customer awareness, attitudes, and knowledge regarding energy efficiency, we also obtained data regarding the energy consuming equipment that currently exists in the six commercial sectors. However, because we obtained this equipment data through customer telephone interviews rather than through on site visits, our equipment analysis relies on customer self-report rather than onsite verification. We found in our interviews that customers were able to identify the presence of equipment in their facilities more easily than they could describe the amount of equipment in use. Therefore, our study focuses on the penetration (presence) of equipment, rather than saturation. We did not conduct site visits due to budget limitations. In addition, because data are self reported they may not be fully representative of actual field conditions or of future actions that will be taken by customers.

---

[2] Rebate agents are energy consultants who provide a variety of activities for their clients including utility rebate administration.

3. KEY FINDINGS

We present our key findings from the customer phone baseline study below, supplemented with our findings from our database review, technical review, and contractor interviews where relevant. We first present our findings by sector for our non-equipment module.

3.1   Findings by Sector

Here we present portraits of the six sectors studied in our baseline research: offices, health care facilities, warehouses and distributors, manufacturers, small retailers, and churches. The portraits list key findings from our research; we also present dashboards which graphically summarize detailed findings from our phone survey to highlight both baseline measurements and program opportunities. These dashboards also call out any areas where each sector differs significantly from the other five (e.g., offices compared with non-offices, retailers compared with non-retailers) at the 90% confidence level.

3.1.1   Offices

The office sector includes a broad spectrum of business types, including most service industries such as law offices, banks, real estate offices, and nonprofit organizations. Because offices cover such a broad range of business types, office buildings also represent the largest percentage of the commercial population in the six utility territories (34%).

Based on our review of the Standard Offer and Commercial Solutions program databases,[3] we found that offices encompass approximately 20% of the Commercial Solutions program participants and 3% of the Standard Offer program. Savings from offices are among the highest of the Commercial Solutions program by sector, with offices comprising 16% of reported program kW savings and 20% of reported kWh savings. Top Commercial Solutions projects in the office sector were lighting (60%), roofing (24%), and HVAC (16%). Our key findings from our customer phone survey include the following:

➤ Our survey found that many offices still have T-12s installed (42%), though the percentage is not significantly higher than non-offices. Our technical review found that lighting accounts for the largest percentage of office energy usage (29%), indicating that offices provide a significant potential for savings in lighting programs, especially through replacing inefficient T-12 lighting.

- Offices may need some outreach in improving their awareness of the lighting in use at their facility: A moderately high percentage of offices (31%) said that they do not know whether they have T-12s installed at their businesses at all.

- Our technical review[4] found that 0.2% of offices used lighting controls; respondents from our telephone study reported a much higher presence of

---

[3] See our "Baseline Segment Proposal and Database Review Results" memo, dated June 3, 2011.

[4] Note, however, that our technical review was based on the Energy Information Administration (EIA) Commercial Building Energy Consumption Survey (CBECS), which was most recently conducted in 2003 and thus is likely to be out of date on newer technological developments such as lighting controls.

OPINION DYNAMICS
CORPORATION

lighting controls overall (39% have any lighting controls).[5] Offices' usage of lighting controls is moderate compared to the other sectors, but they still have a low percentage of indoor occupancy sensors (13%) and a significantly lower percentage of daylighting sensors (1%) compared to other sectors. A moderate percentage of offices (22%) use lighting timers compared with non-offices.

➢ HVAC is also a particular need for the office sector: 82% of offices have conditioned space on average, which is significantly higher than the remaining sectors. Offices have a relatively high presence of rooftop packaged AC units: 43%, which is significantly higher than the other sectors. Two-thirds of offices have programmable thermostats.

- Offices also have a lower percentage of new HVAC units compared with other sectors, with 26% having HVAC equipment less than four years old, a significantly lower percentage than non-offices.

Barriers in Offices

➢ Key barriers in the office sector include less involvement with or knowledge of their energy usage: 8% of offices say they do not pay their own utility bills, which is significantly higher than in the other sectors. Furthermore, 15% say that they rent their facility and cannot make changes to its equipment.

- Participants in the office sector state that they are the least likely to buy any energy efficient equipment in the next two years (14%). Office sector participants are also significantly less likely than other sectors to give the highest rating (10 out of 10) to the importance of energy efficiency in their most recent equipment purchase (17%).

- Offices also report a moderately high number or participants who felt that they did not have enough information about energy efficiency (49%) compared with other sectors. Furthermore, about one in four offices (25%) said that they did not know what information they would need before buying energy efficient equipment, indicating that the owners and managers of offices may need to learn more about the energy efficient technologies that are available.

Opportunities in Offices

➢ One of the key opportunities in the office sector is that offices have few decision-makers: 70% of offices said that only one person is responsible for decisions on capital investments, which is a significantly higher percentage than found in non-offices. The mean number of decision makers is 1.7, which is significantly lower than in the other sectors we studied. This indicates that the program should encounter less bureaucracy in the decision-making process to move the business toward energy efficiency improvements.

---

[5] "Lighting controls" are defined as indoor occupancy sensors, indoor day lighting sensors, outdoor motion sensors, outdoor photocells, and lighting timers. See Table 5.

- Furthermore, offices were moderately aware of energy efficiency incentive programs (28%), but were significantly more likely than non-offices to be aware of tax breaks for efficiency upgrades (8%). This may present an opportunity for the program to help offices leverage tax incentives when finding opportunities most relevant to them.
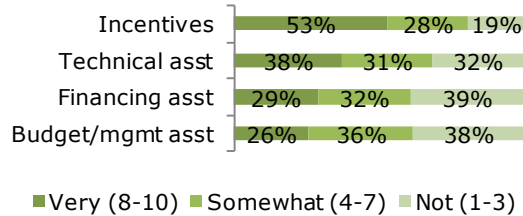
Offices

Company Size
85% Small ↑
13% Medium
3% Large

↓3,611 Avg. Sq. Ft.   94% <50 Employees
↓92% Pay Util. Bills   53 Avg. Hours/Wk
61% Own Building ↑82% Avg. Cond. Sq.
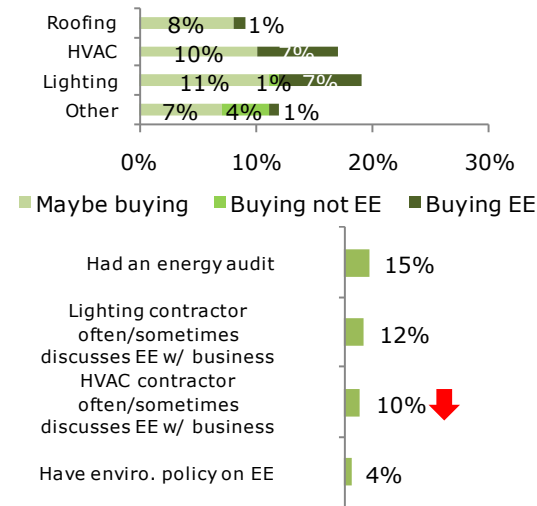34 yr. Avg. Bldg Age   10% >1 TX Facility

Needs in Marketplace

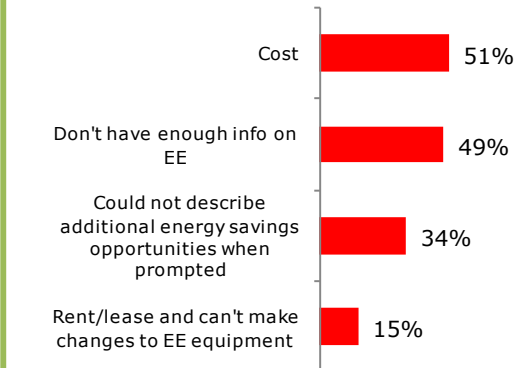|	
New EE equip in last 2 years	26%
Received any incentives	1%
Buying EE equip in next 2 years	14% ↓
% with T-12s installed	42%
% w/programmable thermostats	67%
% with AC units < 4 years old	26% ↓

Interest in Program Offerings

	Very (8-10)	Somewhat (4-7)	Not (1-3)
Incentives	53%	28%	19%
Technical asst	38%	31%	32%
Financing asst	29%	32%	39%
Budget/mgmt asst	26%	36%	38%

■ Very (8-10) ■ Somewhat (4-7) ■ Not (1-3)

Opportunities

	Maybe buying	Buying not EE	Buying EE
Roofing	8%		1%
HVAC	10%	7%	
Lighting	11%	1%	7%
Other	7%	4%	1%

■ Maybe buying ■ Buying not EE ■ Buying EE

Had an energy audit	15%
Lighting contractor often/sometimes discusses EE w/ business	12%
HVAC contractor often/sometimes discusses EE w/ business	10% ↓
Have enviro. policy on EE	4%

*Knowledge & Attitudes (Mean, 0-10)

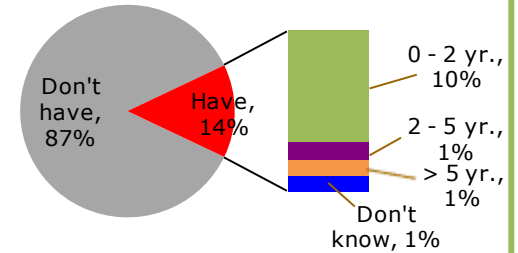|	
Buys most EE equip possible	7.4
Knowledge of lighting savings	6.3
Efficiency of facility	5.9
Knowledge of HVAC savings	5.8
Knowledge of other savings	5.8
Top measure mentioned: building envelope	

*Program Awareness

Any non-federal programs (unaided)	18%
Incentives (aided)	28%
Technical assistance (aided)	18%
Financing assistance (aided)	11%
Budget/mgmt assistance (aided)	10%
Federal programs	18%

*Energy Efficiency Barriers

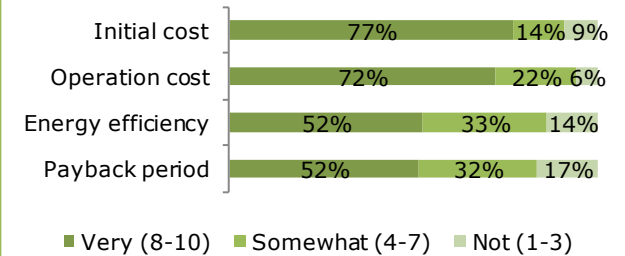|	
Cost	51%
Don't have enough info on EE	49%
Could not describe additional energy savings opportunities when prompted	34%
Rent/lease and can't make changes to EE equipment	15%

↑↓ indicate significant differences between offices and non-offices at 90% confidence. Note that some percentages may not add up to 100% due to rounding.
*Indicates baseline data.

Payback Period

Don't have, 87%
Have, 14%

0 - 2 yr., 10%
2 - 5 yr., 1%
> 5 yr., 1%
Don't know, 1%

*Importance in Equipment Purchases

	Very (8-10)	Somewhat (4-7)	Not (1-3)
Initial cost	77%	14%	9%
Operation cost	72%	22%	6%
Energy efficiency	52%	33%	14%
Payback period	52%	32%	17%

■ Very (8-10) ■ Somewhat (4-7) ■ Not (1-3)

Decision-Making Process

Bureaucratic	3%
Committee of depts ↓	4%
Group or team	23%
One person ↑	70%

■ Bureaucratic
■ Committee of depts ↓
■ Group or team
■ One person ↑
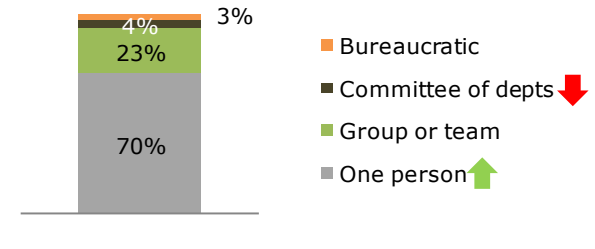
Mean # involved in equip. decisions: 1.7 ↓

3.1.2   Health Care Facilities

The health care sector includes businesses that conduct medical care, including hospitals, doctors' offices, dentists' offices, and outpatient facilities (including nursing homes and long-term care facilities). Health care facilities comprise 9% of the commercial facilities in the population of the six utility territories.

Based on our previous database review, we found that health care facilities comprised approximately 7% of the Commercial Solutions program participants. Savings through the health care sector are moderate (ranked fourth out of the twelve sectors provided in the program database we initially evaluated by savings per project), with health care facilities comprising 10% of reported program kW savings and 9% of reported kWh savings. Top Commercial Solutions projects in the health care sector were lighting (69%), HVAC (21%), and roofing (10%). Our key findings from our customer phone survey include the following:

➢ Nearly all health care facilities (98%) report having linear fluorescent lighting – a significantly higher percentage than non-health care facilities.

- Our survey found that close to half (47%) of health care facilities have T-12s, which is similar to the other sectors studied. There are multiple types of bulbs in many healthcare facilities as 38% have T-8s, the highest penetration of all the studied sectors.

- Health care facilities reported a significantly higher penetration of indoor LED lighting (11%) than offices, warehouses, and small retailers.

➢ Our technical review found that HVAC equipment accounts for 23% of energy usage in the health care sector[6]. HVAC is a particular need for the health care sector: health care facilities have a mean of 97% air-conditioned space, which is significantly higher than non-health care facilities.

- Penetration of programmable thermostats (not including EMS) is high (83%) compared to other sectors included in this study - significantly higher than non-health care facilities.

- Health care facilities have a high presence of rooftop packaged AC units: 46%, which is significantly higher than non-health care facilities overall. Health care facilities also reported a relatively high presence of chillers (10%, significantly higher than non-health care facilities).

- HVAC units in health care facilities are beginning to age, with significantly more units in health care facilities (25%) than non-health care facilities that are seven to twelve years old. Furthermore, health care facilities were more likely than all other sectors to say that they did not know how old their HVAC equipment was (15%).

---

[6] 2003 CBECS database.

Barriers in Health Care

➢ One key barrier to program participation in the health care sector is the lack of awareness about their equipment.

- Forty percent of participants from health care facilities reported that they did not have enough information about energy efficiency.

- Health care facilities generally rated their knowledge about equipment low for equipment other than lighting, with a significantly lower mean knowledge rating about HVAC (4.8 mean using a 1 to 10 scale) than found in non-health care facilities.

- Health care facilities are particularly unlikely to be familiar with their roofing needs: health care facilities are more likely than non-health care facilities to say they do not know their roofing type (35%), its color (30%), or when they had their most recent roofing upgrade (25%). Our technical review found that health care roofing was metal surfaced 59% of the time, and built-up roofing (BUR) or asphalt shingle roofing 21% of the time. We found that 17% of buildings have multiple, unspecified types of roofing.

➢ Another possible barrier for health care facilities is that some do not have the authority to make changes at their facilities. Slightly more than half of health care facilities (55%) said that they rent their facilities, which is significantly higher than non-health care facilities. Furthermore, health care facilities who gave low ratings to their interest in one or more Commercial Solutions program offerings, did so primarily because they do not have the authority to decide to participate (38%), which is higher than the other sectors we studied.

Opportunities in Health Care

➢ While personnel in health care facilities report more efficient lighting than other sectors, they also lack the knowledge to identify potential additional energy savings, with 54% unable to describe energy savings opportunities other than lighting and HVAC when asked. Additionally, only 17% have received an energy audit.

- It is important to note that of all the equipment this sector is likely to purchase in the next two years, HVAC equipment was most likely, with 18% of health care organizations planning to purchase it.

- Based on previous studies, we have found that health care facilities can present opportunities for refrigeration upgrades due to use of refrigeration for both food service and laboratories. Our phone survey found that 11% of the health care sector had walk-in coolers and freezers, which is significantly higher than in the other sectors.

➢ While opportunities exist in health care, there needs to be additional outreach for this sector, as their unaided awareness of energy efficiency programs (6%) was significantly lower than discovered in the other sectors. However, the equipment that health care facilities report having is often more efficient than that of other sectors. For example, health care facilities have significantly higher penetration of T-8 lighting

than non-health care facilities. This indicates that health care facilities may be performing more efficient upgrades than other sectors that are not already part of the program. Health care facilities have started taking first steps on their own but, as indicated by the high percentage of health care facilities unable to name additional savings opportunities at their facilities (54%), may be most in need of program assistance to encourage additional energy saving actions.
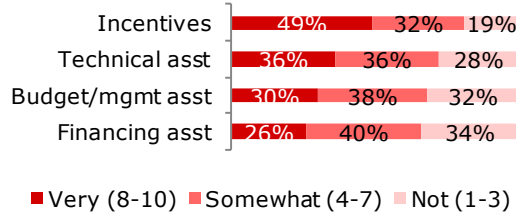
Health Care

Company Size
71% Small
16% Medium
13% Large ⬆

23,014 Avg. Sq. Ft. ⬇71% <50 Employees
94% Pay Util. Bills ⬆76 Avg. Hours/Wk
⬇45% Own Building ⬆97% Avg. Cond. Sq.
⬇27 yr. Avg. Bldg Age 15% >1 TX Facility

Needs in Marketplace

New EE equip in last 2 years	15%	⬇
Received any incentives	0%	
Buying EE equip in next 2 years	19%	
% with T-12s installed	47%	
% with occupancy sensors	6%	
% with AC units 7+ years old	33%	

Interest in Program Offerings

	Very (8-10)	Somewhat (4-7)	Not (1-3)
Incentives	49%	32%	19%
Technical asst	36%	36%	28%
Budget/mgmt asst	30%	38%	32%
Financing asst	26%	40%	34%

■ Very (8-10) ■ Somewhat (4-7) ■ Not (1-3)

Opportunities

Refrigeration	7%
Roofing	6%
HVAC	4% 2% 16%
Lighting	4% 6%
Other	2% 4% 2%

■ Maybe buying ■ Buying, not EE ■ Buying EE

HVAC contractor often/sometimes discusses EE w/ business	27%
Had an energy audit	17%
Lighting contractor often/sometimes discusses EE w/ business	16%
Have enviro. policy on EE	11%

*Knowledge & Attitudes (Mean, 0-10)

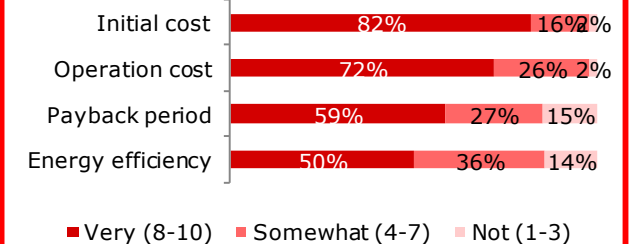|	
Buys most EE equip possible	7.3
Knowledge of lighting savings	5.7
Efficiency of facility	5.6
Knowledge of other savings	5.4
Knowledge of HVAC savings	4.8 ⬇

*Program Awareness

Any non-federal programs (unaided)	6% ⬇
Incentive (aided)	19%
Technical assistance (aided)	9%
Budget/mgmt assistance (aided)	6%
Financing assistance (aided)	6%
Federal programs	13%
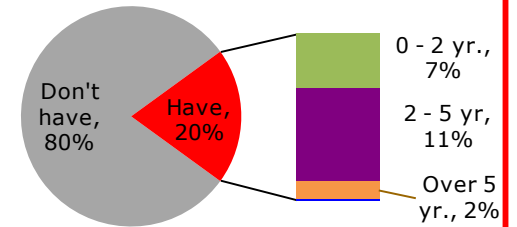
*Energy Efficiency Barriers

Cost	60%
Could not describe additional energy savings opportunities when prompted	54% ⬆
Don't have authority to decide about participation in EE programs	21% ⬆
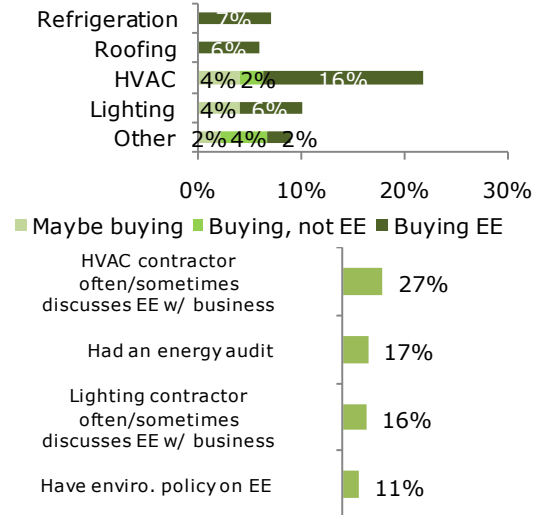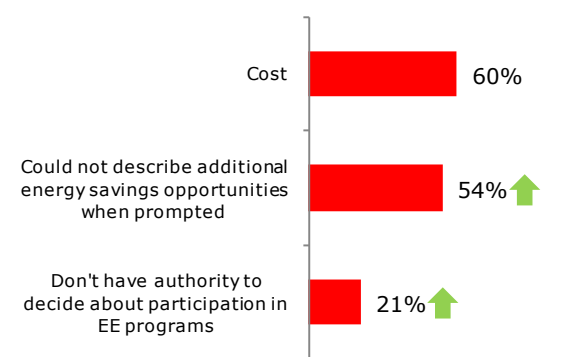
⬆⬇ indicate significant differences between health care facilities and non-health care facilities at 90% confidence. Note that some percentages may not add up to 100% due to rounding.
*Indicates baseline data.

Payback Period

Don't have, 80%
Have, 20%

- 0 - 2 yr., 7%
- 2 - 5 yr, 11%
- Over 5 yr., 2%

*Importance in Equipment Purchases

	Very (8-10)	Somewhat (4-7)	Not (1-3)
Initial cost	82%	16%	2%
Operation cost	72%	26%	2%
Payback period	59%	27%	15%
Energy efficiency	50%	36%	14%

■ Very (8-10) ■ Somewhat (4-7) ■ Not (1-3)

Decision-Making Process

Bureaucratic	11%
Committee of depts	9%
Group or team	41% ⬆
One person	39% ⬇

■ Bureaucratic ■ Committee of depts ■ Group or team ■ One person
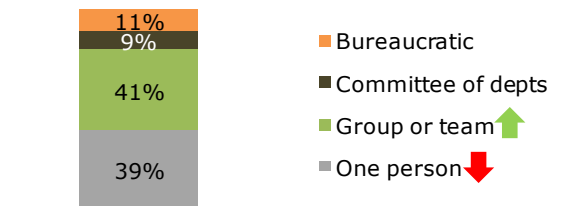
Mean # involved in equip. decisions: 3.5

3.1.3   Warehouses

The warehouse sector includes facilities that primarily store goods, including warehouses, storage facilities, distribution facilities, and wholesalers. Warehouses are a moderate percentage of the overall population (7%).

Based on our previous database review, we found that warehouses comprised approximately 4% of the Commercial Solutions program participants, which represents a small portion of the warehouse population. Warehouses have the second-highest savings per project by sector, and account for 6% of reported program kW savings and 6% of reported kWh savings. Nearly all Commercial Solutions projects in the warehouse sector were lighting (94%), followed by "other" projects (6%).

➢ Most warehouses (91%) report having some type of linear fluorescent lighting, with 54% of warehouses still using T-12 fixtures. Thirty percent also report having lighting other than linear fluorescents, which is moderate compared to non-warehouses. Our technical review found that lighting accounts for more than two-thirds of warehouse energy usage (68%), indicating that warehouses provide a significant potential for savings in lighting programs, especially through the replacement of inefficient T-12 lighting.

- Warehouses' usage of lighting controls is moderate compared to the other sectors (43% using any efficient lighting controls[7]), but warehouses have a low percentage of indoor occupancy sensors (8%) and a significantly lower percentage of day lighting sensors (2%) compared to other sectors. Warehouses also use lighting timers (26%) on a level similar to non-warehouses.

➢ HVAC is a lower priority for the warehouse sector than for other sectors. Warehouses have a mean of 47% air-conditioned space, which is the lowest of all studied sectors and is significantly lower than in the other sectors. This is, however, higher than our technical review, which found (nationwide) that only about 15% of the square footage at warehouses is air-conditioned. Warehouses are more likely to have newer HVAC equipment than other facility types, reporting that 47% of their HVAC equipment is less than four years old, a significantly higher percentage than non-warehouses. The penetration of programmable thermostats is moderate compared with non-warehouses (70%).

➢ Warehouses are also significantly more likely than non-warehouses to say that they have metal or metallic-surfaced roofing (62%). This is consistent with our technical review, which found that 72% of warehouses had metal roofing. Most of this roofing is not cool roofing; our phone survey found that only 16% of warehouses said they had bright white (cool) roofing, indicating that there are many opportunities in this sector to improve the efficiency of its metal roofing.

➢ Fewer warehouses reported purchasing energy efficient equipment in the last two years than non-warehouses (17%).

---

[7] Efficient lighting controls identified as occupancy or daylighting sensors, timers, and EMS controls.

- Forty percent of Warehouse participants reported that they did not have enough information on energy efficiency.

➢ Sixty-eight percent of warehouses said that only one person is responsible for decisions on capital investments, with the mean number of decision makers being 2.5, which is significantly lower than some of the other industries we investigated. This indicates that the program has to sway fewer people at a warehouse to move the business toward energy efficiency improvements.

Opportunities in Warehouses

➢ The program also has several opportunities to intervene and help improve warehouse equipment and knowledge: About one in four warehouses (26%) said that they did not know what information they would need before buying energy efficient equipment, indicating that warehouses may need to learn more about the energy efficient technologies that are available to make educated, informed decisions. Furthermore, because so few warehouses have upgraded their equipment in the last two years, they may have more upcoming opportunities as older equipment needs to be replaced, most likely in lighting where 21% intend to upgrade in the next two years.

- Warehouses gave a moderately high rating to the importance of energy efficiency in their most recent equipment purchase (mean of 7.2), and gave significantly higher ratings than non-warehouses to the importance of the payback period (7.8 mean rating, 70% rating "very important") in their last purchase.
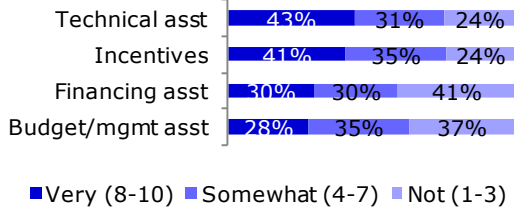
Warehouses

Company Size
66% Small
28% Medium
6% Large

13,371 Avg. Sq. Ft.   94% <50 Employees
100% Pay Util. Bills   51 Avg. Hours/Wk
59% Own Building ⬇ 47% Avg. Cond. Sq.
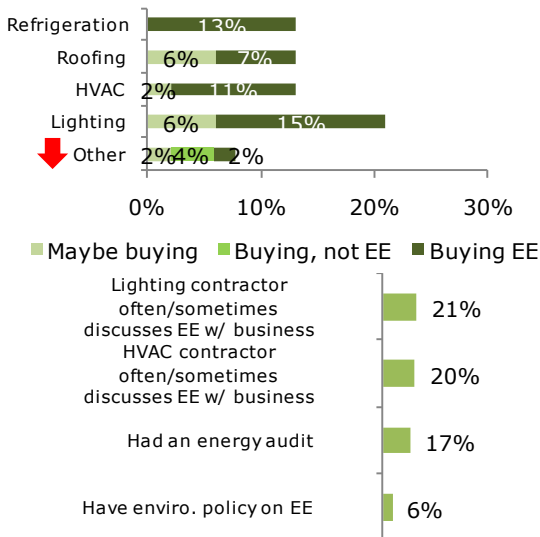29 yr. Avg. Bldg Age   16% >1 TX Facility

Needs in Marketplace

New EE equip in last 2 years	17% ⬇
Received any incentives	0%
Buying EE equip in next 2 years	22%
% with T-12s installed	54%
% with indoor occupancy sensors	8%
% with cool roofing	16%

Interest in Program Offerings

	Very (8-10)	Somewhat (4-7)	Not (1-3)
Technical asst	43%	31%	24%
Incentives	41%	35%	24%
Financing asst	30%	30%	41%
Budget/mgmt asst	28%	35%	37%

■ Very (8-10) ■ Somewhat (4-7) ■ Not (1-3)

Opportunities

	Maybe buying	Buying, not EE	Buying EE
Refrigeration		13%	
Roofing	6%	7%	
HVAC	2%	11%	
Lighting	6%	15%	
Other	2% 4%	2%	

0%   10%   20%   30%

■ Maybe buying ■ Buying, not EE ■ Buying EE

Lighting contractor often/sometimes discusses EE w/ business	21%
HVAC contractor often/sometimes discusses EE w/ business	20%
Had an energy audit	17%
Have enviro. policy on EE	6%

*Knowledge & Attitudes (Mean, 0-10)

Buys most EE equip possible	7.5
Knowledge of lighting savings	6.8
Knowledge of other savings	6.5
Top measure mentioned: Building envelope	
Knowledge of HVAC savings	6.0
Efficiency of facility	6.0

## *Program Awareness

Any non-federal programs (unaided)	22%
Incentives (aided)	28%
Budget/mgmt assistance (aided)	13%
Technical assistance (aided)	20%
Financing assistance (aided)	13%
Federal programs	13%

*Energy Efficiency Barriers

Cost	43%
Could not describe additional energy savings opportunities when prompted	38%
Already done all can to save energy	7%

Payback Period

Don't have, 90%
Have, 10%

0 - 2 yr., 4%
2 - 5 yr., 2%
> 5 yr., 2%
Don't know, 2%

*Importance in Equipment Purchases

	Very (8-10)	Somewhat (4-7)	Not (1-3)
Initial cost	81%	15%	4%
Operation cost	77%	17%	6%
Payback period ⬆	70%	20%	11%
Energy efficiency	63%	24%	12%

■ Very (8-10) ■ Somewhat (4-7) ■ Not (1-3)

Decision-Making Process

10% Bureaucratic
4% Committee of depts ⬇
18% Group or team ⬇
68% One person ⬆

■ Bureaucratic
■ Committee of depts
■ Group or team
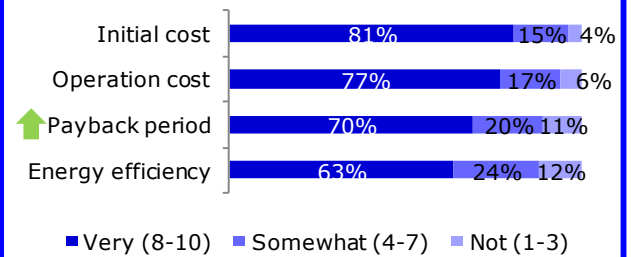■ One person

Mean # involved in equip. decisions: 2.4 ⬇

⬆ ⬇ indicate significant differences between warehouses and non-warehouses at 90% confidence. Note that some percentages may not add up to 100% due to rounding.
*Indicates baseline data.
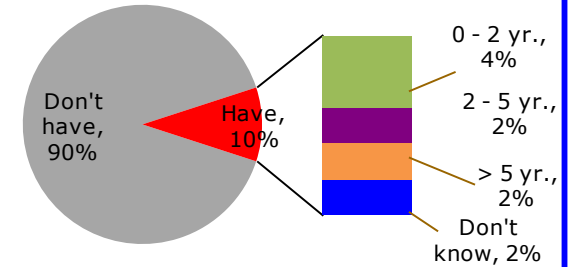
3.1.4   Manufacturers

Our study mostly focused on small manufacturers, who comprised about 80% of the manufacturers we contacted. Manufacturers are a moderate percentage of the overall facility population (6%).

Based on our previous database review, we found that manufacturers comprised approximately 13% of the Commercial Solutions program participants. Manufacturers have the highest savings per project by sector, and account for the largest portion of Commercial Solutions program savings: 23% of reported program kW savings and 29% of reported kWh savings. Most Commercial Solutions projects for the manufacturing sector are lighting projects (74%), followed by HVAC (17%), roofing (7%), and "other" projects (2%).

➢ Most warehouse lighting is some type of linear fluorescent: 84% report having linear fluorescents, fewer than in non-manufacturing facilities. Forty-three percent also report having lighting other than linear fluorescents.

➢ Our survey found that penetration of T-12s is high in manufacturing facilities (53%), though not significantly higher than in other facility types. Penetration of T-5s, however, is low (4%), and approximately one-third (31%) said that they do not know whether they have T-5s in their businesses at all.

   • Manufacturers' usage of lighting controls overall is significantly lower than non-manufacturers (33%), and manufacturers have a low percentage of indoor occupancy sensors (9%) and day lighting sensors (5%). Manufacturers also report a significantly lower presence of timers (9%) than non-manufacturers. Our trade ally interviews revealed that safety concerns may be an especially strong barrier to lighting controls in this sector, as discussed in the Lighting Controls section.

➢ HVAC is a lower priority for the manufacturing sector than for other sectors: Manufacturers have a mean of 60% air-conditioned space, which is significantly lower than non-manufacturers. Manufacturers are more likely to have newer HVAC equipment, reporting that 54% of their HVAC equipment is less than four years old – the highest of all six sectors and significantly higher than non-manufacturers. A significantly higher percentage of manufacturers (11%) than non-manufacturers said that they have no air conditioning at their facility.

   • Of the space that is air-conditioned, however, there is an opportunity to move manufacturers toward installing programmable thermostats. Penetration of programmable thermostats is significantly lower for manufacturers than for non-manufacturers (51%).

Opportunities in Manufacturing

➢ Manufacturers are also significantly more likely than other facility types to say they have metal roofing (70%). This is consistent with our technical review, which found that 80% of manufacturers have metal roofing. Manufacturers are significantly more likely than non-manufacturers to say that their roof was last upgraded more than 15 years ago (30%).

➢ Furthermore, as we found in our database review, manufacturing facilities produce the highest amount of Commercial Solutions program savings both in terms of overall savings and savings per project, potentially there are opportunities for a deep level of savings moving forward.

Barriers in Manufacturing

➢ The key barrier in the manufacturing sector is that energy efficiency is not a priority in their businesses. Manufacturers gave themselves the lowest mean rating (6.3) on buying the most efficient equipment possible, and also gave a significantly lower mean rating than other sectors to the importance of energy efficiency in their most recent equipment purchase (6.3).

  • The primary reasons manufacturers said they would not buy efficient equipment is because of concerns about its availability, performance, and effect on production (12%). Furthermore, 14% of manufacturers who said they were not interested in one or more Commercial Solutions program offerings said that their business is too small to change.

➢ The barriers that manufacturers cited (unavailability of equipment, their business being too small to change) indicates they may not be aware of specific savings opportunities for the equipment they have. Manufacturers appear to be the most knowledgeable about their equipment compared to the other sectors we studied, with few manufacturing respondents said that they did not know the attributes of their equipment types. Furthermore, significantly more manufacturers than non-manufacturers said that they have enough information on ways to save energy (67%); this is most likely due to the fact that their profession is "blue collar" compared to most of the other sectors we studied which are more "white collar". Additionally, this sector appears to interact with market actors who are pushing energy efficiency more than some of the other sectors we studied. Manufacturers are more likely to identify ways to save energy, yet upfront cost is a large barrier for this segment, expressing the need for utility incentives.

➢ The strongest opportunities with manufacturers lie in the lighting sector. Manufacturing is the least likely to have outdoor sensors than any other sector (9%). Manufacturers have the highest penetration of T-12s (63%) and incandescent bulbs (38%).

  • A significantly higher percentage of manufacturing facilities (30%) reported that their roofing is old (last upgraded more than 15 years ago) and will likely need replacement soon.
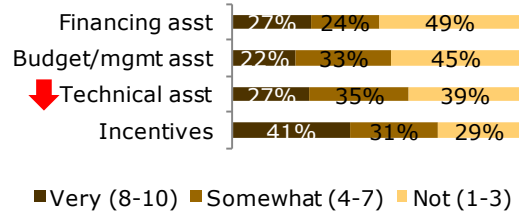

Manufacturing

Company Size		
80% Small	10,850 Avg. Sq. Ft.	87% <50 Employees
17% Medium	98% Pay Util. Bills	49 Avg. Hours/Wk
2% Large	71% Own Building ⬇	60% Avg. Cond. Sq.
	31 yr. Avg. Bldg Age	0% >1 TX Facility

Needs in Marketplace

New EE equip in last 2 years	23%
Received any incentives	2%
Buying EE equip in next 2 years	25%
% with T-12s installed	53%
% w/programmable thermostats	51% ⬇
% with roofing 15+ years old	30% ⬆

Interest in Program Offerings

	Very (8-10)	Somewhat (4-7)	Not (1-3)
Financing asst	27%	24%	49%
Budget/mgmt asst	22%	33%	45%
⬇ Technical asst	27%	35%	39%
Incentives	41%	31%	29%

Opportunities

	Maybe buying	Buying, not EE	Buying EE
⬇ Refrigeration	2%	2%	
Roofing	4%	4%	9%
HVAC	2%	14%	
Lighting	2%	12%	
Other	2%	11%	0%

(scale 0% – 30%)

Had an energy audit	22%
HVAC contractor often/sometimes discusses EE w/ business	21%
Lighting contractor often/sometimes discusses EE w/ business	19%
Have enviro. policy on EE	10%
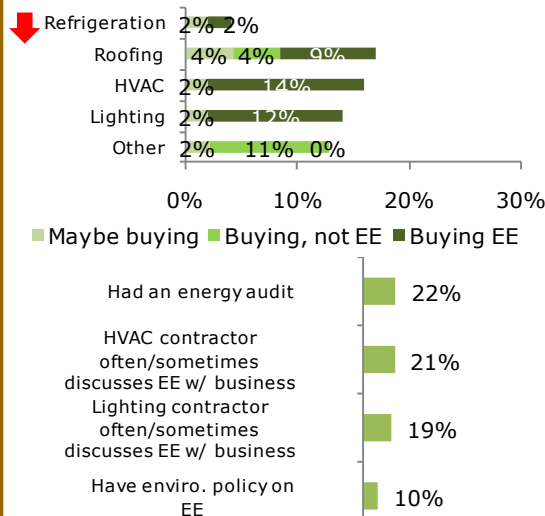
*Knowledge & Attitudes (Mean, 0-10)

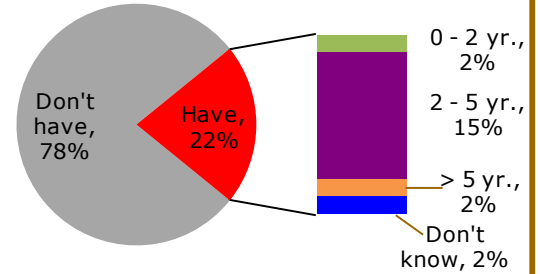|	
Knowledge of other savings	6.4
Top measure mentioned: renewables	
Knowledge of lighting savings	6.3
Buys most EE equip possible	6.3 ⬇
Efficiency of facility	5.9
Knowledge of HVAC savings	5.4

*Program Awareness

Any non-federal programs (unaided)	16%
Technical assistance (aided)	18%
Financing assistance (aided)	18% ⬆
Incentives (aided)	18%
Budget/mgmt assistance (aided)	12%
Federal programs	18%

*Energy Efficiency Barriers

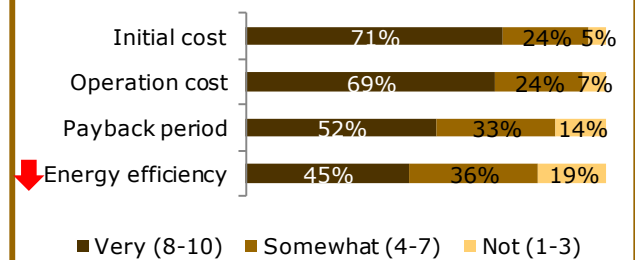|	
Could not describe additional energy savings opportunities when prompted	48%
Cost	41%
Available EE equipment	16% ⬆
EE equipment performance	12% ⬆
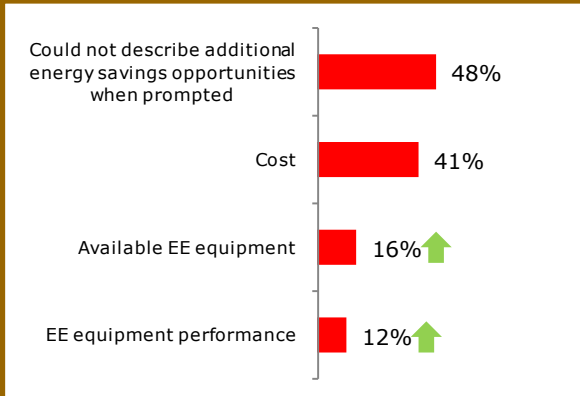
⬆ ⬇ indicate significant differences between manufacturers and non-manufacturers at 90% confidence. Note that some percentages may not add up to 100% due to rounding.
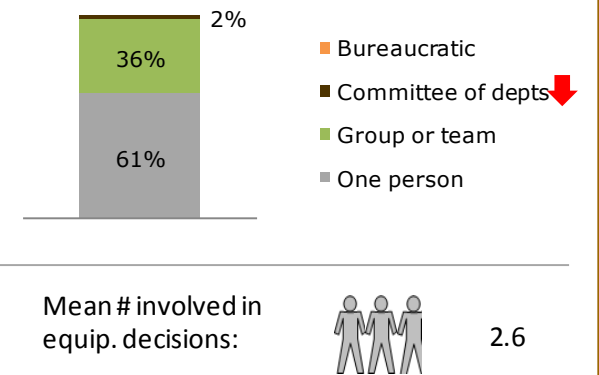*Indicates baseline data.

Payback Period

Don't have, 78%
Have, 22%

- 0 - 2 yr., 2%
- 2 - 5 yr., 15%
- > 5 yr., 2%
- Don't know, 2%

*Importance in Equipment Purchases

	Very (8-10)	Somewhat (4-7)	Not (1-3)
Initial cost	71%	24%	5%
Operation cost	69%	24%	7%
Payback period	52%	33%	14%
⬇ Energy efficiency	45%	36%	19%

Decision-Making Process

2%	Bureaucratic
36%	Committee of depts ⬇
61%	Group or team
	One person

Mean # involved in equip. decisions: 2.6

3.1.5 Small Retailers

Small retailers include businesses involved in the sales of goods to the general public. Our sampling specifically targeted retailers we classified as "small," defined as a retailer with revenues of less than $5 million per year (based on public records). Of the respondents we interviewed, 81% classified themselves as small and only one respondent classified itself as large. We found that retailers comprise about 17% of the total commercial population. Our count of the overall retail population does not calculate the percentage of small retailers alone.

Based on our previous database review, we found that retailers comprise approximately 4% of the Commercial Solutions program participants and account for a high percentage of program savings, 22% of reported program kW savings and 19% of reported kWh savings. Most Commercial Solutions projects for the retail sector are lighting projects (58%), followed by HVAC (29%), roofing (8%), and "other" projects (5%).

Opportunities

➢ The opportunities for lighting energy savings in the small retail sector are mostly in upgrading linear fluorescent lighting, which has a 50% penetration rate of T-12s among small retailers. Penetration of lighting other than linear fluorescent (21%) and outdoor lighting (36%) is significantly lower in small retailers than non-retailers. Our technical review found that lighting accounts for 34% of retailer energy use, indicating that small retailers provide a significant potential for savings in lighting programs, especially through replacing inefficient T-12 lighting.

- Small retailers are among the most knowledgeable of all sectors about their lighting, with only 13% unable to name any lighting type, and only 19% (significantly lower than non-retailers) unsure whether they had T-12s at their facility.

- Small retailers' usage of lighting controls is moderate (40%) compared to the other sectors, but small retailers still have a low percentage of indoor occupancy sensors (6%) and day lighting sensors[8] (6%). Small retailers report a similar percentage of lighting timers (25%) to non-retailers.

➢ Small retailers report a mean of 70% air-conditioned space, and our technical review found (nationwide) that air conditioning only accounted for about 18% of small retailers' energy usage.

- Small retailers, however, reported having the oldest HVAC systems: 20% of small retailers, significantly more than non-retailers, reported that their HVAC system is more than 12 years old.

- Penetration of programmable thermostats is also significantly lower for small retailers than for non-retailers (55%).

---

[8] Many retailers may not be likely to use occupancy sensors; however, daylighting may be an opportunity.

➢ The opportunities in the roofing sector are lower for the small retail sector than other sectors. Twenty-two percent of small retailers said that their roof is bright white, and half (50%) said that they had upgraded their roof in the last five years.

Barriers in Small Retail

➢ A key barrier in the small retail sector is that many may not be able to implement major equipment changes. Seventeen percent of small retailers, a significantly larger percentage than non-retailers, said they rent their facility and cannot make changes to their equipment. Furthermore, more than one in five (21%) small retailers who were not interested in the program offerings said that they did not have the authority to decide whether to participate.

• Small retailers may be unlikely to have already investigated energy efficiency. Only 7% of small retailers, significantly fewer than non-retailers, said they had ever gotten an energy audit at their facility. Small retailers also reported fewer instances of their lighting contractors (4%) or HVAC contractors (9%) talking to them about energy efficiency.

➢ Small retailers were significantly more likely than the remaining sectors to give the highest rating (10 out of 10) to the importance of energy efficiency in their last equipment purchase (34%). Additionally, while small retailers may not be aware of energy efficiency opportunities, they are not against being energy efficient. More small retailers than non-retailers said that there were no barriers to being energy efficient (22%).

• Furthermore, small retailers are already among the more knowledgeable sectors about the equipment at their facility, with few respondents unable to answer questions about the equipment types that they had in use.
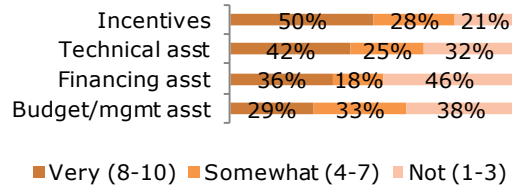
Small Retail

Company Size
81% Small ↑
17% Med.
1% Large

4,461 Avg. Sq. Ft. ↑ 97% <50 Employees
97% Pay Util. Bills   51 Avg. Hours/Wk
58% Own Building ↓ 70% Avg. Cond. Sq.
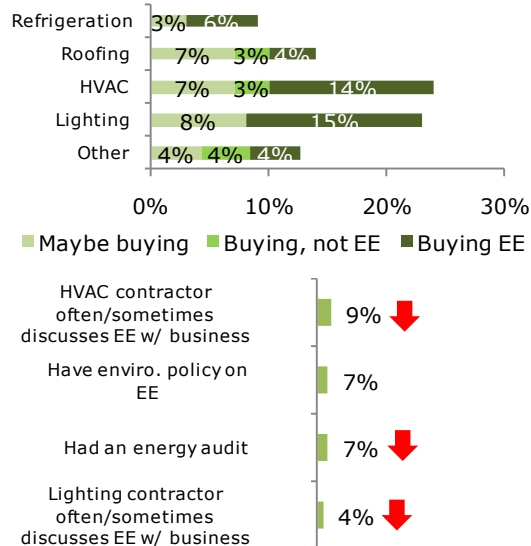37 yr. Avg. Bldg Age 6% > 1 TX facility

Needs in Marketplace

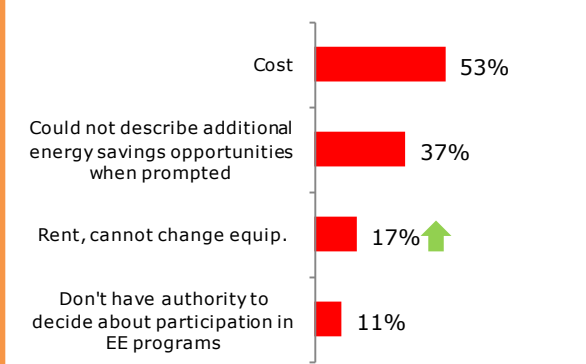|	
New EE equip in last 2 years	21%
Received any incentives	0%
Buying EE equip in next 2 years	31%
% with T-12s installed	50%
% w/programmable thermostats	55% ↓
% AC systems 12+ years old	20% ↑

Interest in Program Offerings

	Very (8-10)	Somewhat (4-7)	Not (1-3)
Incentives	50%	28%	21%
Technical asst	42%	25%	32%
Financing asst	36%	18%	46%
Budget/mgmt asst	29%	33%	38%

■ Very (8-10) ■ Somewhat (4-7) ■ Not (1-3)

Opportunities

	Maybe buying	Buying, not EE	Buying EE
Refrigeration	3%	6%	
Roofing	7%	3%	4%
HVAC	7%	3%	14%
Lighting	8%		15%
Other	4%	4%	4%

0%   10%   20%   30%

■ Maybe buying ■ Buying, not EE ■ Buying EE

HVAC contractor often/sometimes discusses EE w/ business	9% ↓
Have enviro. policy on EE	7%
Had an energy audit	7% ↓
Lighting contractor often/sometimes discusses EE w/ business	4% ↓

*Knowledge & Attitudes (Mean, 0-10)

Buys most EE equip possible	7.3
Knowledge of lighting savings	6.3
Knowledge of other savings	5.8
Top measure mentioned: renewables ↑	
Efficiency of facility	5.8
Knowledge of HVAC savings	5.4

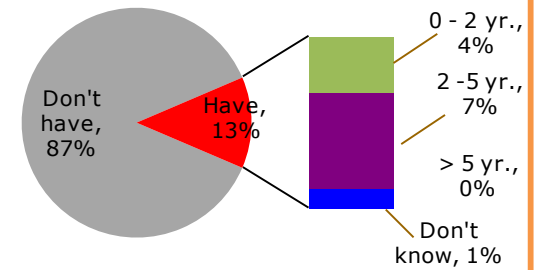## *Program Awareness

Any non-federal programs (unaided)	15%
Incentives (aided)	14% ↓
Technical assistance (aided)	10%
Budget/mgmt assistance (aided)	4% ↓
Financing assistance (aided)	0%
Federal programs	12%

*Energy Efficiency Barriers

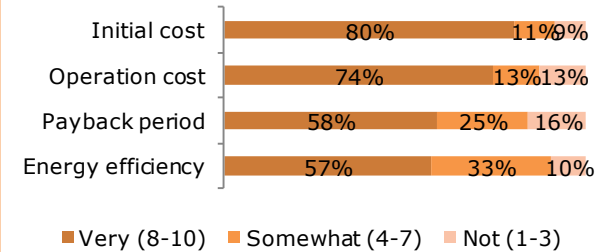|	
Cost	53%
Could not describe additional energy savings opportunities when prompted	37%
Rent, cannot change equip.	17% ↑
Don't have authority to decide about participation in EE programs	11%

↑ ↓ indicate significant differences between small retailers and non-retailers at 90% confidence. Note that some percentages may not add up to 100% due to rounding.
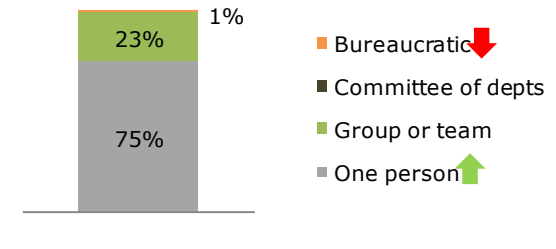*Indicates baseline data.

Payback Period

Don't have, 87%
Have, 13%

0 - 2 yr., 4%
2 - 5 yr., 7%
> 5 yr., 0%
Don't know, 1%

*Importance in Equipment Purchases

	Very (8-10)	Somewhat (4-7)	Not (1-3)
Initial cost	80%	11%	9%
Operation cost	74%	13%	13%
Payback period	58%	25%	16%
Energy efficiency	57%	33%	10%

■ Very (8-10) ■ Somewhat (4-7) ■ Not (1-3)

Decision-Making Process

1%
23%
75%

■ Bureaucratic ↓
■ Committee of depts
■ Group or team
■ One person ↑

Mean # involved in equip. decisions: 1.4 ↓

3.1.6   Churches and Religious Organizations

The church and religious organization sector includes any building primarily used by a religious group, excluding any religiously affiliated schools or colleges. Religious organizations comprise about 3% of the total commercial population in the six utilities' territories.

Based on our previous database review, we found that religious organizations comprised approximately 11% of the Commercial Solutions program participants. This represents a larger portion of the religious organization population than other sectors, but a relatively smaller percentage of Commercial Solutions program savings, 6% kW savings and 5% kWh savings. Most Commercial Solutions projects for the religious organization sector are lighting projects (59%), followed by HVAC (34%) and roofing (6%).

Opportunities in Religious Organizations

➢ Religious organizations present an opportunity for savings through lighting upgrades: Religious organizations have by far the largest reported use of non-fluorescent lighting in their facilities (74%), and also have significantly higher penetration of incandescent lighting (60%) than non-religious organizations. However, churches also have the highest penetration of CFLs (44%), indicating that many churches likely have both incandescent and CFL lighting installed.

- Religious organizations have a high level of inefficient lighting. More than six in ten religious organizations have incandescent lighting (60%), and half (50%) have T-12 lighting. These organizations especially need assistance in identifying opportunities to upgrade their linear fluorescent lighting – significantly more religious organizations than non-religious organizations said that did not know the type of any of the linear fluorescent lighting at their facility (29%), so there potentially could be a larger amount of T-12s.

- Most religious organizations said that they had outdoor lighting at their facility (89%), which is significantly higher than non-religious organizations. Despite the high penetration of outdoor lighting, religious organizations had low levels of knowledge about their outdoor lighting compared to other sectors. Significantly more religious organizations than non-religious organizations said they were unable to identify their specific outdoor lighting equipment (10%), indicating that more outreach may be useful to this sector in identifying outdoor lighting savings opportunities.

- Religious organizations report significantly higher usage of efficient lighting controls than non-religious organizations overall (77%), but their usage of indoor occupancy sensors is significantly lower than non-religious organizations (1%). Religious organizations are significantly more likely than non-religious organizations, however, to use outdoor motion sensors (39%) and indoor or outdoor lighting timers (47%).

➢ HVAC presents large opportunities for savings in the religious organization sector. Our survey found that 96% of the square footage in religious organizations is air

conditioned, significantly higher than non-religious organizations. Furthermore, our technical review found that cooling accounts for 33% of religious organizations' energy usage, compared with only 18% of energy used for lighting[9]. This is the only sector included in this study where cooling accounts for more energy use than lighting. Nearly half of religious organizations report having a residential-style split AC system (47%),

- However, knowledge about their equipment is also an issue in the religious organization sector for HVAC equipment: significantly more religious organizations than non-religious organizations said that they did not know their system type (16%).

- Penetration of programmable thermostats is significantly higher for religious organizations than for non-religious organizations (85%).

➢ Religious organizations are also significantly more likely than non-religious organizations to say that they have built-up roofing (BUR (43%) and wood shingle or shake roofing (13%). Our technical review[10] found a similar percentage of wood shingle or shake roofing nationwide (14%), but a much higher percentage of metal roofing (77%) than we found in our phone study (37%).

- The religious organizations included in our study have some potential for roofing upgrades, as significantly more religious organizations than non-religious organizations said that they had brown or wood-colored roofs (35%), and few religious organizations said that they had bright white roofing (4%). Non-white, cool roofing products do exist, and churches with concerns about their roof's appearance can still be encouraged to install more energy efficient roofing options.

➢ Though religious organizations indicated lower levels of knowledge about their lighting and HVAC in the equipment sections, their interest in energy efficiency was higher than that of the other five sectors studied, indicating that the program has the potential to serve this sector very well.

- Religious organizations indicate that they value energy efficiency in their equipment purchases. Forty-one percent said that they had purchased energy efficient equipment in the last two years, and religious organizations gave significantly higher mean ratings than non-religious organizations to selecting the most efficient equipment possible (8.0) and the importance of energy efficiency in their most recent equipment purchase (8.1).

- The vast majority of religious organizations (89%) said that they own their facility, significantly higher than non-religious organizations, and only 3% of religious organizations said that they were renters who could not change their equipment (3%).

---

[9] Technical review of CBECS database, 2003.

[10] The technical review of CBECS data looked at three states, not just Texas, and had a very small religious sample from data collected in 2003.

Barriers in Religious Organizations

➢ One of the main barriers to energy efficiency is that religious organizations have a more complex decision-making process than the other five sectors studied. Few religious organizations said they only had one decision-maker on equipment purchases (9%), and they had the highest mean number of people (10.5) involved in making equipment decisions. However, because religious organizations rate their interest in energy efficiency so highly, tend to own their facilities, and have already taken energy efficiency actions, these barriers may be easier to overcome for this sector.
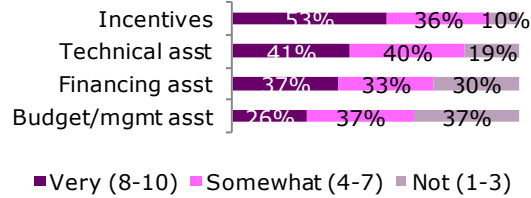
Churches

Company Size
51% Small
40% Medium
9% Large

14,061 Avg. Sq. Ft. 99% <50 Employees
100% $ Util. Bills 45 Avg. Hours/Wk
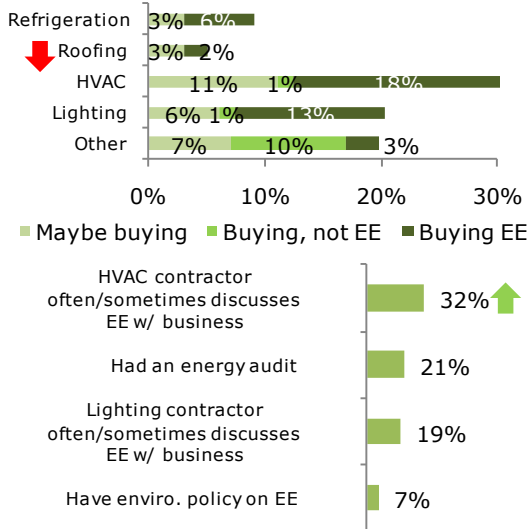89% Own Bldg 96% Avg. Cond. Sq.
41 yr. Avg. Bldg Age 16% >1 TX Facility

Needs in Marketplace

New EE equip in last 2 years	41%
Received any incentives	0%
Buying EE equip in next 2 years	30%
% with incandescents/T-12s	60%/51%
% of HVAC 7+ years old	33%
% with refrigeration	30%

Interest in Program Offerings

	Very (8-10)	Somewhat (4-7)	Not (1-3)
Incentives	53%	36%	10%
Technical asst	41%	40%	19%
Financing asst	37%	33%	30%
Budget/mgmt asst	26%	37%	37%

Opportunities

	Maybe buying	Buying, not EE	Buying EE
Refrigeration	3%	6%	
Roofing	3%	2%	
HVAC	11%	1%	18%
Lighting	6%	1%	13%
Other	7%	10%	3%

(axis: 0% 10% 20% 30%)

HVAC contractor often/sometimes discusses EE w/ business	32%
Had an energy audit	21%
Lighting contractor often/sometimes discusses EE w/ business	19%
Have enviro. policy on EE	7%

*Knowledge & Attitudes (Mean, 0-10)

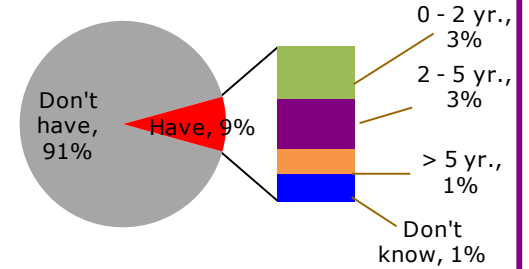|	
Buys most EE equip possible	8.0
Knowledge of lighting savings	6.3
Knowledge of other savings	5.9
Top measure mentioned: Building envelope	
Efficiency of facility	5.9
Knowledge of HVAC savings	5.3

*Program Awareness

Any non-federal programs (unaided)	11%
Incentives (aided)	17%
Technical assistance (aided)	10%
Budget/mgmt assistance (aided)	9%
Financing assistance (aided)	7%
Federal programs	14%

*Energy Efficiency Barriers

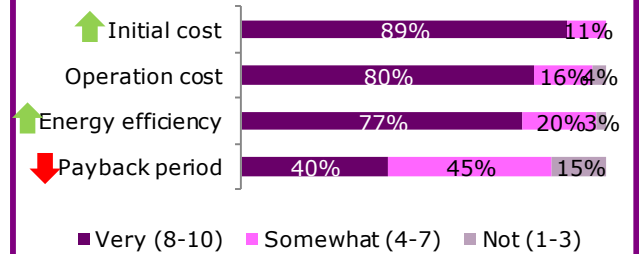|	
Cost	59%
Could not describe additional energy savings opportunities when prompted	37%
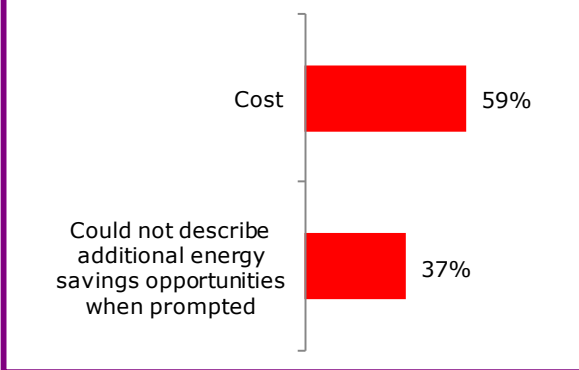
↑↓ indicate significant differences between religious organizations and non-religious organizations at 90% confidence. Note that some percentages may not add up to 100% due to rounding.
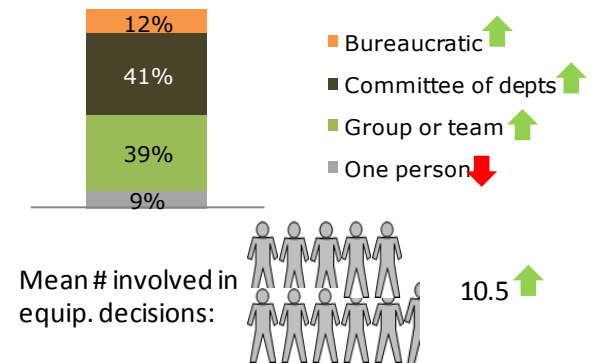*Indicates baseline data.

Payback Period

Don't have, 91%
Have, 9%

0 - 2 yr., 3%
2 - 5 yr., 3%
> 5 yr., 1%
Don't know, 1%

*Importance in Equipment Purchases

	Very (8-10)	Somewhat (4-7)	Not (1-3)
Initial cost	89%	11%	
Operation cost	80%	16%	4%
Energy efficiency	77%	20%	3%
Payback period	40%	45%	15%

Decision-Making Process

Bureaucratic	12%
Committee of depts	41%
Group or team	39%
One person	9%

Mean # involved in equip. decisions: 10.5

3.2 *Findings by Equipment Type*

In this section, we present our findings from the equipment module of our phone baseline study. We present our findings by sector, comparing each sector both to all other sectors combined and to all other sectors individually. We also supplement these with findings from our trade ally interviews, which offer high-level insights on the types of equipment in use in the marketplace.

3.2.1 Lighting

Our phone survey found that T-12s still have the highest overall level of penetration in the sectors studied, with 49% of all interviewed businesses reporting that they have T-12s installed. We present our lighting findings overall and by sector in Table 2 through Table 4, which provide the following information:

> **Penetration of lighting types**: The percentage of respondents who reported having each lighting type for linear fluorescent lights, indoor lighting other than linear fluorescent, and outdoor lights. Because respondents may have multiple types of lights, these percentages may add up to more than 100%. For context, we also report the percentage of respondents who said they did not know what types of lighting they had.

Interior Lighting Technology

While trade allies indicated that T-12 lighting is no longer installed in new fixtures or in retrofits or replacement of existing fixtures, trade allies do find a significant amount of T-12 lighting still in use in the existing facilities they serve. Trade allies report that they find T-12s in "most," "almost all," or "all" buildings more than ten years old, or they find it in 70% of offices and 80-90% of the other facilities they serve. This existing T-12 lighting is estimated to be at least ten years old, and is found mainly in manufacturing, and warehouse spaces. Our phone survey also found that T-12 penetration was higher than any other lighting type, with 49% of businesses reporting that they have T-12s in use (note that an additional 23% of respondents said they did not know if they had T-12s or not).

All trade allies said that their standard replacement for T-12 lighting was T-8 lighting with electronic ballasts. Trade allies reported installing T-8 fixtures with 32-watt lamps over 80% of the time. They use 28-watt lamps just 17% of the time, and 25-watt lamps only 1% of the time. One contractor mentioned that the 25-watt lamps are more expensive, and have lower returns on investment over time due to the higher costs of regular lamp replacement. This information demonstrates the need for training, education and help specifying lighting equipment.

Some trade allies also report seeing significant amounts of incandescent lighting in the facilities they retrofit. Two say they see incandescent lighting in many churches, where light quality and the ability to dim the lights are important. Incandescent lighting in churches can be harder to replace, but one lighting trade ally reports using LED fixtures as a replacement. Incandescent lighting is also reportedly found in 75 to 80% of task lights that use screw-in bulbs, and at least half the can or spot lighting used in retail facilities use incandescent or

halogen lighting. Screw-in fixtures and can lights are routinely replaced with twist CFLs or specialty CFL flood lights.

Table 2 shows the reported penetration of indoor lighting types from our customer phone survey. In these tables, we highlight percentages per sector that are significantly higher than all other sectors (e.g., churches compared to non-churches) in green, and those that are significantly lower than all other sectors in red. We also indicate differences between individual sectors (e.g., retailers compared with offices, retailers compared with health care facilities) with letters indicating that the percentage in one sector is significantly higher at the 90% confidence level than that of the sector(s). The letter next to the percentage identifies each sector and also appears at the top of each column (a-f).

Table 2. Penetration of Indoor Lighting Types by Sector

Lighting Type	Offices (n=72) (a)	Health Care (n=47) (b)	Ware-house (n=54) (c)	Manuf (n=49) (d)	Sm. Retail (n=72) (e)	Church (n=70) (f)	All 6 Sectors (not weighted) (n=364)
Indoor Linear Fluorescents	89%	98% ad	91%	84%	94%d	93%	91%
T-12	42%	47%	54%	53%	50%	51%	49%
T-8	22%	38%ade	30%	18%	33%d	21%	27%
T-5	6%	6%	11%	4%	8%	10%	8%
Don't know any linear fluorescent types	15%	19%	15%	10%	13%	29%acde	17%
Non-Linear Fluorescent Indoor Lighting	28%	38% e	30%	43% ae	21%	74%abcde	39%
CFL	10%	19%c	7%	22%ac	13%	44%abcde	20%
Incandescent	19%	26%e	20%	16%	11%	60%abcde	20%
Halogen	7%	9%	4%	14%c	10%c	23%abce	11%
LED	1%	11%ace	2%	4%	3%	14%acde	6%
Other indoor lighting	4%	4%	0%	4%	4%	7%	4%
Don't know any non-linear fluorescent types	0%	0%	0%	0%	0%	1%	<1%
Don't know any facility lighting types	3%	0%	2%	8%	1%	3%	3%

Colored boxes indicate significant differences between the sector and all remaining sectors collectively at 90% confidence. Letters indicate significant differences between individual sectors at 90% confidence.
Base: All respondents.

Barriers and Energy Efficiency Standards

Opinion Dynamics interviewed 11 trade allies who conduct work in lighting in the six utility territories. Our trade ally interviews found that the main barrier to participation in utility programs was a lack of money to install the energy efficient products that meet program requirements. This finding is consistent with our phone survey, which found that 51% of all businesses said cost would prevent them from buying energy efficient equipment of any type.

Some trade allies also discussed a concern for the quality of energy efficient lighting as a reason it is not always installed. Two said that some clients did not believe that energy efficient lighting would provide the right ambiance in their facility.

Exterior Lighting Technology

In our interviews, only five of the lighting trade allies reported installing lights in exterior areas, like parking lots or parking garages. Of the five that replace exterior lighting, the fixtures being replaced vary from mercury or high pressure sodium lighting, to metal halide, to T12 fixtures. LED technology for exterior lighting applications is starting to be installed in Texas, with one trade ally reporting that they always install LED lighting in exterior spaces, and another saying they install LEDs 15% of the time. Most of the trade allies replace existing lighting with T5 lighting or metal halide fixtures. This represents an opportunity to educate lighting contractors about the benefits of LED lighting in exterior applications.

Our phone study found that more than half (56%) of all businesses have exterior lighting, and that halogen and mercury vapor are the two most common types reported.

Table 3 shows the reported penetration of outdoor lighting types from our customer phone survey. In these tables, we highlight percentages per sector that are significantly higher than all other sectors (e.g., retailers compared to non-retailers) in green, and those that are significantly lower than all other sectors in red. We also indicate differences between individual sectors (e.g., retailers compared with offices, retailers compared with health care facilities) with letters indicating that the percentage in one sector is significantly higher at the 90% confidence level than that of the sector(s). The letter next to the percentage identifies each sector and also appears at the top of each column (a-f).

Table 3. Penetration of Outdoor Lighting Types by Sector

Lighting Type	Offices (n=72) (a)	Health Care (n=47) (b)	Ware-house (n=54) (c)	Manuf (n=49) (d)	Sm. Retail (n=72) (e)	Church (n=70) (f)	All 6 Sectors (not weighted) (n=364)
Outdoor lighting	50% e	60% e	52% e	47%	36%	89%abcde	56%
Halogen	7%	15%	9%	16%	15%	34% abcde	16%
Metal halide	4%	13%ae	13%ae	4%	4%	10%	8%
Mercury vapor	6%	9%	11%	16%a	15%a	33%abcde	15%
High-pressure sodium	6%	15%ade	7%	2%	3%	14%ade	8%
Low-pressure sodium	1%	4%	0%	2%	1%	3%	2%
LED	6%	11%cd	2%	2%	8%	7%	6%
Other outdoor lighting	19%	13%	11%	16%	32%abcdf	14%	18%
Don't know outdoor lighting types	4%	9%	2%	0%	0%	10%	4%

Colored boxes indicate significant differences between the sector and all remaining sectors collectively at 90% confidence. Letters indicate significant differences between individual sectors at 90% confidence.
Base: All respondents.

LED Lighting Technology

In our interviews, we asked trade allies where they are installing any types of LED lighting. These interviews revealed that trade allies are not necessarily ready to adopt LED lighting in the commercial sector. Two of eleven trade allies report never installing LEDs at all, and three trade allies mentioned concerns about LED lighting, including whether LEDs will last as long as promised, what options exist for replacement when they eventually do wear out, (i.e., replacing bulbs versus replacing entire fixtures), and the belief that they create glare. One trade ally gave a positive assessment of LEDs, saying that LEDs produce crisper, more natural light than many other lighting technologies, and appreciates their ability to be dimmed.

Our phone survey found that LED penetration was low across all sectors, with only 10% of customers reporting having either interior or exterior LED lighting. To increase penetration of LEDs, therefore, the program may need to target trade allies first to educate them and address their concerns, so that trade allies can become stronger promoters of LEDs in the marketplace as this technology matures

Table 4 shows the reported penetration of LED lighting overall from our customer phone survey. In these tables, we highlight percentages per sector that are significantly higher than all other sectors (e.g., retailers compared to non-retailers) in green, and those that are significantly lower than all other sectors in pink. We also indicate differences between individual sectors (e.g., retailers compared with offices, retailers compared with health care facilities) with letters indicating that the percentage in one sector is significantly higher at the 90% confidence level than that of the sector(s). The letter next to the percentage identifies each sector and also appears at the top of each column (a-f).

Table 4. Overall LED Penetration by Sector

Lighting Type	Offices (n=72) (a)	Health Care (n=47) (b)	Ware-house (n=52) (c)	Manuf (n=49) (d)	Sm. Retail (n=72) (e)	Church (n=70) (f)	All 6 Sectors (not weighted) (n=364)
% with any LEDs installed	7%	15%$_c$	4%	6%	10%	20%$_{acde}$	10%
Indoor LEDs	1%	11%$_{ace}$	2%	4%	3%	14%$_{acde}$	6%
Outdoor LEDs	6%	11%$_{cd}$	2%	2%	8%	7%	6%

Colored boxes indicate significant differences between the sector and all remaining sectors collectively at 90% confidence. Letters indicate significant differences between individual sectors at 90% confidence.
Base: All respondents.

Lighting Controls

We present our lighting controls findings overall and by sector in Table 5, which provide the following information:

> ➢ **Penetration of lighting controls**: The percentage of respondents who reported having each of five types of lighting controls: indoor occupancy sensors or day lighting controls (out of those who have indoor lighting), outdoor motion sensors or photocells (out of those who have outdoor lighting), and those who have lighting timers (out of those who have indoor or outdoor lighting).

Our phone study found that nearly half (46%) of businesses overall had at least one type of lighting control. These controls were primarily outdoor lighting controls and timers, with 39% of businesses with outdoor lighting saying that they have outdoor motion sensors. Only 7% of interviewed businesses overall said that they have indoor occupancy sensors. In Texas, occupancy sensors do not have kW demand reduction associated with them.

Our trade ally interviews explored the use of lighting controls and found their use varied by sector, particularly for indoor occupancy sensors. The trade allies we interviewed reported installing occupancy sensors most often in warehouses, with occupancy sensors installed in 80 to 100% of the warehouses they serve. Occupancy sensors are least frequently installed in manufacturing spaces, where they are only used in places where they will not create a safety hazard, i.e., storage areas, offices with occasional use, restrooms, and in some aisles and hallways.

According to these trade allies, they install occupancy sensors in offices about 40% of the time. Two trade allies do not install any occupancy sensors in offices since they do not think typical office use is sporadic enough to make the sensors cost effective. Two say they almost always install occupancy sensors as part of their standard energy efficient upgrades. The remaining contractors say they only install them in spaces where they make sense, such as offices used intermittently, restrooms, break rooms and some stairwells. Occupancy sensors are reportedly never used in retail facilities, though our survey found that a few small retailers (6%) do use occupancy sensors.

The trade allies also do not install daylighting controls very often. Five of the lighting contractors we interviewed never install daylighting, and do not think it is cost effective. The others install it only occasionally in office, warehouse, manufacturing, and retail applications. One trade ally has installed some light tubes along with daylighting sensors in warehouses. Another trade ally says many of his manufacturing clients could not use daylighting at all because they must control the climate of their facilities.

Of the five trade allies who install exterior lighting, all use controls on the lighting they install. This is consistent with our phone survey, which found that outdoor lighting controls were more common than indoor lighting controls. Three trade allies exclusively use photosensors to control exterior lighting, and the other two install both photocells and some timers.

Because of the variation between sectors in their lighting needs and preferences seen in both our trade ally interviews and phone survey, the program may need to pay special attention to customizing lighting control recommendations based on business type.

Table 5 shows the reported penetration of lighting controls from our customer phone survey. In these tables, we highlight percentages per sector that are significantly higher than all other sectors (e.g., retailers compared to non-retailers) in green, and those that are significantly lower than all other sectors in pink. We also indicate differences between individual sectors (e.g., retailers compared with offices, retailers compared with health care facilities) with letters indicating that the percentage in one sector is significantly higher at the 90% confidence level than that of the sector(s). The letter next to the percentage identifies each sector and also appears at the top of each column (a-f).

Barriers to Lighting Controls

One trade ally said that some clients do not want to use occupancy sensors in their facilities, even in applications where they would be effective. Another, These clients are skeptical of occupancy sensor technology in general, thinking the sensors would turn lights off if people sit still for too long, believing their lights are already properly controlled using standard switches, and seeing no reason to spend extra money on lighting equipment. Another trade ally mentioned distrust in the quality of energy efficient products in general, mentioning that he regularly sees batches of ballasts and fixtures with high malfunction rates.

Table 5. Penetration of Lighting Controls by Sector
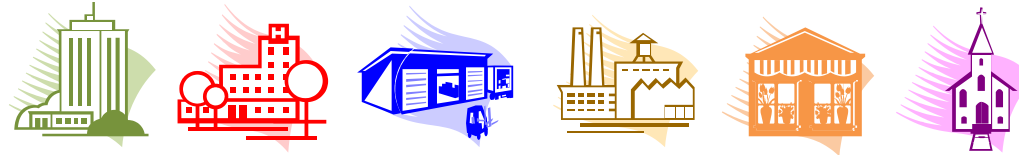
Lighting Type	Offices (n=72) (a)	Health Care (n=47) (b)	Ware-house (n=52) (c)	Manuf (n=49) (d)	Sm. Retail (n=72) (e)	Church (n=70) (f)	All 6 Sectors (not weighted) (n=364)
Indoor Occupancy Sensors	13% f	6%	8%	9% f	6%	1%	7%
Less than 25% of lights*	56%	67%	25%	25%	25%	100%	44%
25-49%	22%	0%	25%	25%	0%	0%	16%
50-74%	11%	33%	25%	25%	25%	0%	20%
75-99%	0%	0%	25%	0%	0%	0%	4%
100%	11%	0%	0%	25%	50%	0%	16%
Indoor Daylighting Sensors	1% f	6%	2%	5%	6%	12% ac	5%
Outdoor Motion Sensors	19%	21%	14%	9%	23%	39% abcd	24%
Less than 25% of lights*	57%	83%	0%	50%	67%	67%	61%
25-49%	14%	0%	25%	0%	17%	25%	18%
50-74%	0%	0%	50%	0%	17%	0%	6%
75-99%	0%	0%	25%	0%	0%	0%	2%
100%	14%	0%	0%	50%	0%	8%	8%
Don't know	14%	17%	0%	0%	0%	0%	4%
Outdoor Photocells	11%	29% a	43% a	35% a	35% a	37% a	32%
Indoor or Outdoor Lighting Timers	22% d	26% d	26% d	9%	25% d	47% abcde	26%

Colored boxes indicate significant differences between the sector and all remaining sectors collectively at 90% confidence. Letters indicate significant differences between individual sectors at 90% confidence.

Note: The outdoor lighting controls penetration rate is based only on those who report having outdoor lighting at their facility. The indoor lighting penetration rate is based only on those who report having indoor lighting at their facility.

*Base: Those with lighting control type above.

3.2.2   HVAC

We interviewed three trade allies who provide HVAC services. These three trade allies varied in the types of services that they provided to their clients.

Regarding HVAC controls, all three trade allies report that they frequently install controls (programmable thermostats or EMS) with HVAC upgrades, and they are pushing businesses towards the use of EMS (reportedly up to 60% to 75% of upgrades they conduct). Our phone survey found that most facilities that control their equipment have programmable thermostats (69%), but very few have EMS (2%).

As to other types of HVAC equipment, most packaged and split systems are set up to use economizer cooling, but this is not effective in many climate regions of Texas. It is often too humid, or temperatures never get cool enough to be effective. The three contractors interviewed usually deactivate the economizer, or change the factory settings to adjust it to the climate. Utilities should evaluate the climate in their region and provide specific recommendations for economizer use to their clients. Instead of deactivating the economizer completely, properly setting it up can allow some energy saving during cooler portions of the year.

Our trade ally interviews also explored the use customers variable frequency drives/variable speed drives (VFDs/VSDs), although we did not ask customers about VFDs/VSDs. Variable speed or variable frequency drives are also not extremely common in the facilities these contractors visit in Texas. One trade ally we interviewed says VFD/VSDs are always installed on new construction projects, but have only been added on four of thirty retrofit projects recently completed in Texas. Another trade ally includes the cost of VFD/VSD upgrades on all his project bids, but these upgrades are not always undertaken due to a lack of up-front funding. The third trade ally has only seen VSDs used in one Texas school. It is important to note that in Texas the focus is on kW rather than kWh savings which prevents utilities from focusing on these measures.

Table 6 shows the penetration of HVAC types and ages by sector. In this table, we highlight percentages per sector that are significantly higher than all other sectors (e.g. health care compared non-healthcare) in green, and those that are significantly lower than all other sectors in red. We also indicate differences between individual sectors (e.g., retailers compared with offices, retailers compared with health care facilities) with letters indicating that the percentage in one sector is significantly higher at the 90% confidence level than that of the sector(s). The letter next to the percentage identifies each sector and also appears at the top of each column (a-f).

## Table 6. Reported Penetration of HVAC Systems by Sector
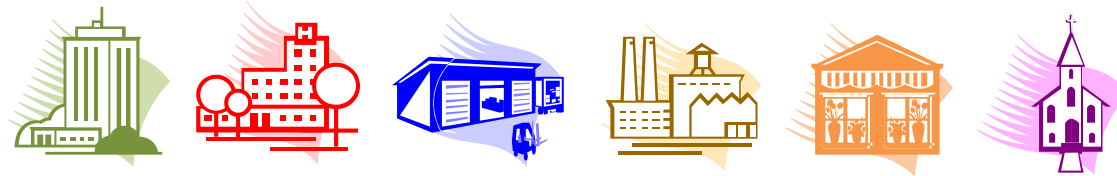
HVAC Type*	Offices (n=61) (a)	Health Care (n=40) (b)	Ware-house (n=50) (c)	Manuf (n=47) (d)	Sm. Retail (n=60) (e)	Church (n=68) (f)	All 6 Sectors (not weighted) (n=326)
Programmable Thermostat	67%	83% de	70%	51%	55%	85% acde	69%
Energy Management System	3%	8%	4%	2%	2%	0%	2%
HVAC Type (multiple response)							
Split systems	25%	42% ac	26%	40% a	35%	47% ac	36%
Rooftop AC units or packaged units	43% df	45% df	38% df	11%	33% df	19%	31%
Room air conditioners	7%	8%	12%	15% e	5%	16% ae	10%
Heat pumps	7%	10%	8%	2%	3%	4%	6%
Evaporative Coolers	3%	0%	10% f	6%	3%	1%	4%
Chillers	0%	10%	0%	4%	0%	3%	2%
Other	20% b	8%	10%	21% b	18% b	21% b	17%
None	0%	0%	0%	11%	7%	0%	3%
Don't know system type	3%	8%	10% e	4%	2%	16% ade	7%

Colored boxes and arrows indicate significant differences between the sector and all remaining sectors collectively at 90% confidence. Letters indicate significant differences between individual sectors at 90% confidence.

*Base: Owners and renters able to make changes to the facility equipment. Note that 11% of all respondents were renters who cannot change this measure type.

Figure 1. Ages of HVAC Systems by Sector

HVAC Type*	Offices (n=61) (a)	Health Care (n=40) (b)	Ware-house (n=50) (c)	Manuf (n=47) (d)	Sm. Retail (n=60) (e)	Church (n=68) (f)	All 6 Sectors (not weighted) (n=326)
Don't know age of system	8%	15% ef	6%	0%	3%	3%	6%
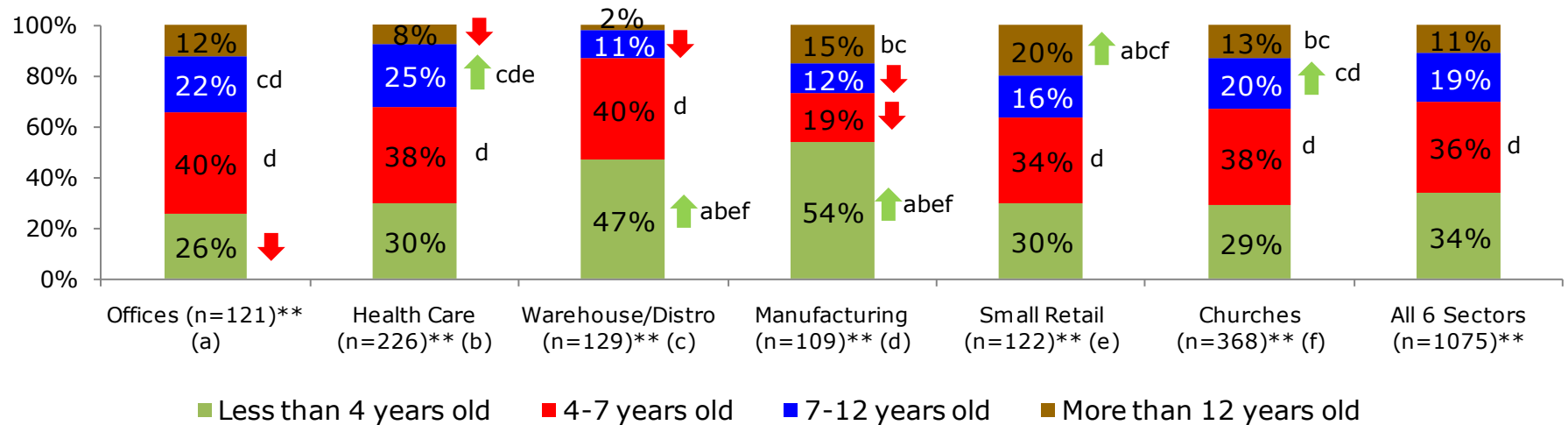
Colored boxes and arrows indicate significant differences between the sector and all remaining sectors collectively at 90% confidence. Letters indicate significant differences between individual sectors at 90% confidence.

*Base: Owners and renters able to make changes to the facility equipment. Note that 11% of all respondents were renters who cannot change this measure type.

**Base: Total number of units identified by respondents. Respondents in the "don't know" category could not state how many total units they have.

OPINION DYNAMICS CORPORATION

3.2.3   Roofing

We interviewed three trade allies who conduct roofing work. Notably, one of these three trade allies was not aware of utility programs for roofing, and another had never advised their clients about these programs or helped them receive incentives. However, our database review found that a significant percentage of Commercial Solutions projects (10%) during the first two years were for roofing.

According to our trade ally interviews, the main barrier to the implementation of cool roofing is the lack of knowledge about this technology, not just by the building owners and facility managers, but also by energy efficiency professionals and roofers themselves. The one roofing-only contractor we interviewed knew nothing about cool roofing, had never heard of ENERGY STAR® roofing or the Cool Roof Rating Council, and was unable to say whether the products they usually installed were cool or not. This firm gets their business by bidding on requests for proposals, where architects and facility managers have already developed the specifications. The roofer had no control over the specification process, and did not seem curious about the various types of roofing that were specified for different jobs. Neither of the other two contractors was much better informed, but they did at least have awareness of cool roof options and the availability of utility incentives for them.

Despite a lack of awareness, a proportion of roofs being installed in Texas are cool. One contractor reports installing Duro-last[11] roofing on roofing upgrades (mainly on retail facilities). A second roofing contractor reports that bright white single-ply roofing is installed on about 30% of their projects.

Other reported roofing installations are probably not cool. The remaining 70% of installations by the second roofing contractor are reportedly modified bitumen roofing (either Styrene Butadine Styrene or Atactic Polypropylene) or built-up roofing, both with a granulated white surface. It is not clear if these roofs were surfaced with special, cool, bright white granules (with a solar reflectance of 65% or more), or if they were the more typical grayish white granules (with solar reflectance of 25%).

One of the contractors we interviewed reported that most roofs on the warehouses and manufacturing facilities he works with have aluminum coatings. Metallic coatings and bare metal roofs tend to have somewhat higher solar reflectance, but their low thermal emissivity keeps them from being cool.

Because our database review indicates that there may be a special interest in roofing projects through the Commercial Solutions program, the program can increase its participation in the roofing component by focusing on trade ally education about roofing and its effects on energy usage. If roofer knowledge about energy efficiency increases, program participation should increase to even higher levels.

Table 7 and Table 8 show the penetration of roofing types by sector. In these tables, we highlight sector percentages that are significantly higher than all other sectors (e.g., offices compared to non-offices) in green, and those that are significantly lower than all other sectors in red. We also indicate differences between individual sectors (e.g., retailers

---

[11] Duro-last is a cool, bright white, PVC single-ply membrane roof product.

compared with offices, retailers compared with health care facilities) with letters indicating that the percentage in one sector is significantly higher at the 90% confidence level than that of the sector(s). The letter next to the percentage identifies each sector and also appears at the top of each column (a-f).

OPINION DYNAMICS
CORPORATION

Table 7. Reported Roof Types and Colors by Sector

Roofing Type*	Offices (n=61) (a)	Health Care (n=40) (b)	Ware-house (n=50) (c)	Manuf (n=47) (d)	Sm. Retail (n=60) (e)	Church (n=68) (f)	All 6 Sectors (not weighted) (n=326)
Roof Type (multiple resp.)							
Built-Up Roofing (BUR)	31%	28%	20%	21%	25%	43%cde	29%
Modified Bitumen	5%	0%	0%	0%	2%	1%	2%
Metal	30%b	13%	62%abef	70%abef	47%ab	37%b	43%
TPO Single-Ply	0%	3%	0%	0%	2%	3%	1%
EPDM Single-Ply	0%	5%	0%	0%	0%	0%	1%
Slate/Tile	2%	0%	0%	2%	0%	1%	1%
Wood shingle or shake	2%	8%	2%	0%	7%	13%ac	6%
Other	11%d	13%d	4%	2%	10%	7%	8%
Don't know	21% ef	35%cdef	18%	11%	8%	9%	16%
Roof Color (single resp.)							
Light grey or white	15%	25%	16%	32%acef	15%	18%	19%
Dark grey or black	23%	15%	16%	13%	20%	14%	17%
Brown or wood	8%	5%	8%	2%	10%d	35%abcde	13%
Metallic	11%	8%	18%f	15%f	15%f	4%	12%
Bright white	7%	5%	16%bf	11%	22%abf	4%	11%
Tan or beige	5%	5%	8%	15%a	7%	10%	8%
Other	11%cd	5%	2%	2%	5%	7%	6%
Don't know	20% ef	30% def	16% f	11%	7%	6%	14%

Colored boxes and arrows indicate significant differences between the sector and all remaining sectors collectively at 90% confidence. Letters indicate significant differences between individual sectors at 90% confidence.
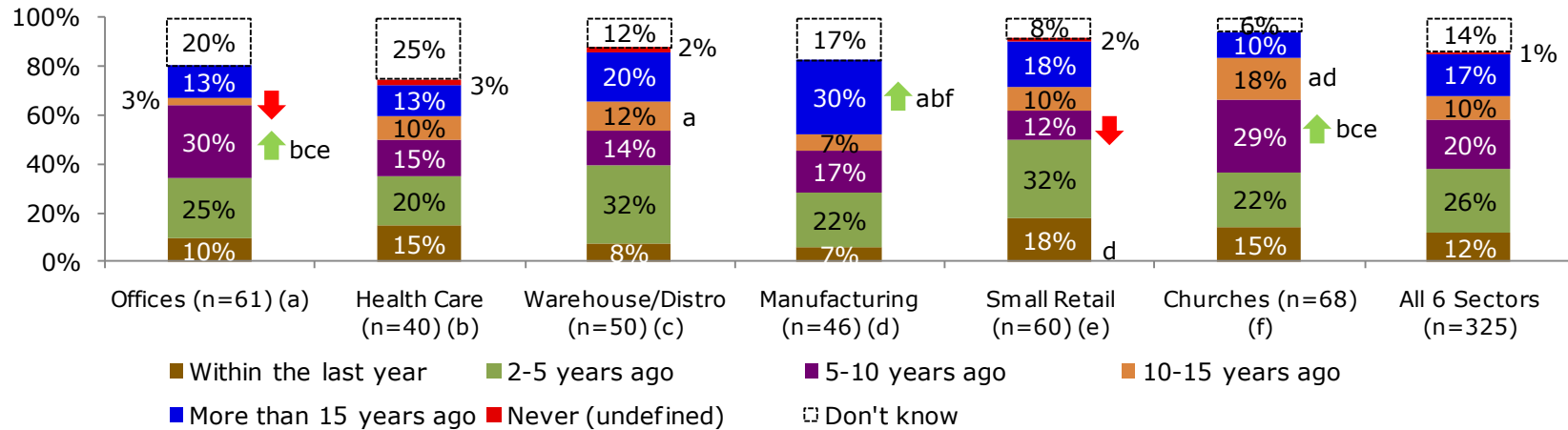
*Base: Owners and renters able to make changes to the facility equipment. Note that 11% of all respondents were renters who cannot change this measure type.

Table 8. Reported Roof Textures and Ages by Sector

Roofing Type*	Offices (n=61) (a)	Health Care (n=40) (b)	Ware-house (n=50) (c)	Manuf (n=47) (d)	Sm. Retail (n=60) (e)	Church (n=68) (f)	All 6 Sectors (not weighted) (n=326)
Roof Texture							
Smooth	31%	30%	52% abf	49% abf	43%	31%	39%
Granular	30% cd	25% d	16%	11%	23% d	44% abcde	26%
Ballasted or rocky	8%	9%	10%	9%	8%	7%	9%
Other	7%	5%	10%	15%	15% b	13%	11%
Don't know	20% f	28% ef	16% f	17% f	10%	4%	15%

Timing of Most Recent Roofing Upgrade

Legend:
- Within the last year
- 2-5 years ago
- 5-10 years ago
- 10-15 years ago
- More than 15 years ago
- Never (undefined)
- Don't know

*Base: Owners and renters able to make changes to the facility equipment. Note that 11% of all respondents were renters who cannot change this measure type. Colored boxes and arrows indicate significant differences between the sector and all remaining sectors collectively at 90% confidence. Letters indicate significant differences between individual sectors at 90% confidence.

3.2.4   Refrigeration

Penetration of refrigeration was low among the sectors we studied: Only 18% of all businesses interviewed said that they had commercial refrigeration at their facility.[12] Our survey also asked customers to describe the amount of refrigerated space for case coolers and walk-in coolers, but too few customers answered these questions to provide data by sector. Overall, customers who had reach-in or case coolers had a mean of approximately 32 linear feet of refrigerated space. Customers who had walk-in coolers or freezers had a reported mean of approximately 870 square feet of refrigerated space.

We did not conduct interviews with any trade allies who specialized in commercial refrigeration.

Table 9 presents our refrigeration penetration findings by sector. In these tables, we highlight sector percentages that are significantly higher than all other sectors (e.g., churches compared to non-churches) in green, and those that are significantly lower than all other sectors in red. We also indicate differences between individual sectors (e.g., retailers compared with offices, retailers compared with health care facilities) with letters indicating that the percentage in one sector is significantly higher at the 90% confidence level than that of the sector(s). The letter next to the percentage identifies each sector and also appears at the top of each column (a-f).

---

[12] This percentage excludes offices, who were not asked about commercial refrigeration.

Table 9. Penetration of Refrigeration Types by Sector

Refrigeration Type	Health Care (n=46) (b)	Ware-house (n=54) (c)	Manuf (n=48) (d)	Sm. Retail (n=72) (e)	Church (n=70) (f)	All 5 Sectors (not weighted) (n=290)
Facility has refrigeration	15%	13%	10%	17%	30%bcde	18%
Refrigerator type						
Reach-in cooler or freezer	4%	6%	0%	4%	22%bce	8%
Walk-in cooler or freezer	11%cf	2%	4%	6%	1%	4%
Case cooler or freezer	0%	0%	0%	3%	0%	1%
Process cooling or freezing	0%	2%	2%	0%	0%	1%
Other	2%	4%	6%	6%	3%	4%
Don't know	0%	0%	0%	0%	2%	1%

Note: Offices did not receive these questions. Base: All respondents for all sectors but offices.
Colored boxes indicate significant differences between the sector and all remaining sectors collectively at 90% confidence. Letters indicate significant differences between individual sectors at 90% confidence.

A. APPENDIX: SECTOR DEFINITIONS AND SIC CODES

There were two primary criteria for selecting these six sectors: (1) The sector has low participation rates in the Standard Offer program (relative to their overall population), indicating that the sector may need additional support to participate in energy efficiency programs; (2) The sector has high potential for savings through the Commercial Solutions program (either through large numbers or customers and/or a large number of potential measures that could be installed). Note that we analyzed average savings among those already participating in the Commercial Solutions program to determine this second criterion. Figure 2 below compares program participation to the population from the geography selected in the six sectors we studied.

Figure 2: Participation in Programs compared to Population
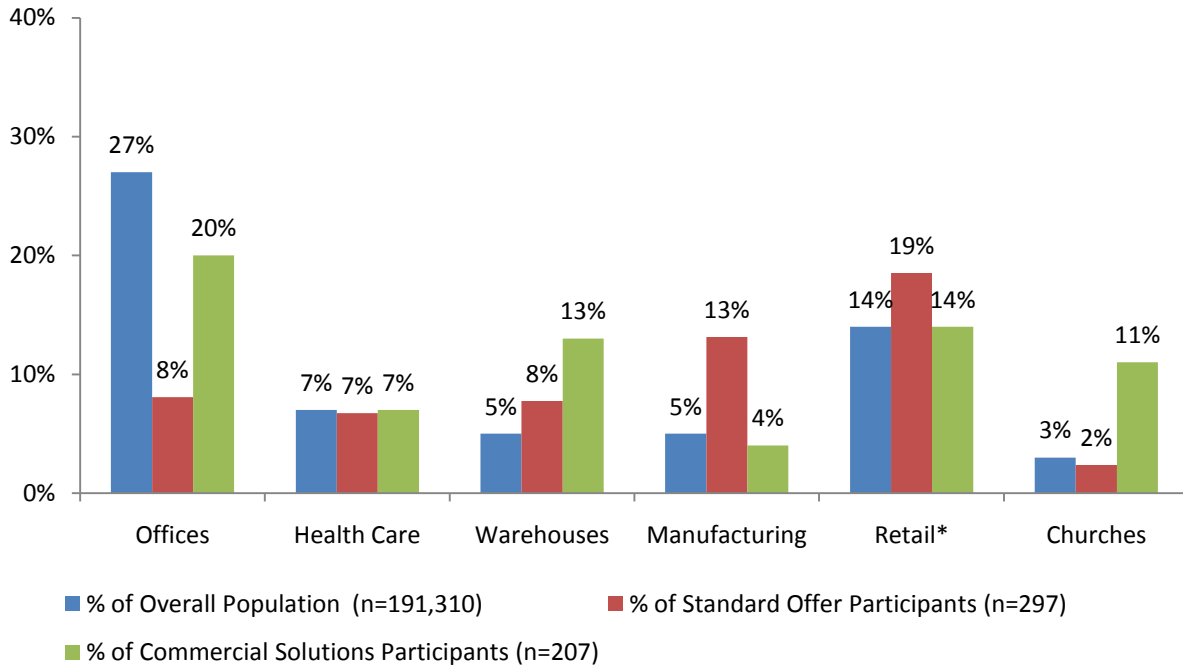
Based on our review of the sectors, Opinion Dynamics proposes focusing the baseline efforts on the following six sectors:

> ➢ Offices
> ➢ Health care providers
> ➢ Warehouses
> ➢ Manufacturing facilities
> ➢ Churches and religious organizations

OPINION DYNAMICS
CORPORATION

➢ Small retailers

Table A-1 provides the savings estimates and participation rates for both the Standard Offer program and Commercial Solutions program. The proposed sectors are indicated in boldface.

Table A-2 indicates the SIC codes used in identifying each sector in the general population. Below, we go into more detail on our justifications for the sectors we propose.

Table A-1. Participation and Savings from Commercial Solutions and Standard Offer Programs

Building Type	Percentage of Utilities' Target Population (based on SIC code) (n=126,305)	Standard Offer Program Projects			Commercial Solutions Projects		
		% of total population participating	Mean Peak Savings (kW) Per SOP Project	Mean Total Savings (kWh) Per SOP Project	% of total population participating	Mean Peak Savings (kW) Per CS Project	Mean Total Savings (kWh) Per CS Project
Office	34%	0.10% (low)	4 (40.6)	4 (181,356)	0.21%	3 (21.5)	3 (89,042)
Retail**	17%	1.84%	6 (31.3)	6 (144,095)	0.64%	9 (12.4)	9 (53,673)
Health care or hospital	9%	0.47% (low)	3 (51.7)	3 (267,842)	0.36%	4 (19.1)	4 (85,642)
Government (local, state, or federal; including military) [a]	8%	1.07%	8 (27.6)	5 (148,965)	0.48%	10 (10.9)	10 (35,354)
Restaurant or food service	7%	0.41% (low)	12 (5.3)	12 (17,256)	0.45%	12 (7.7)	11 (32,406)
Warehouse, storage, or distribution	7%	0.42% (low)	2 (84.1)	2 (556,868)	0.19%	2 (31.0)	2 (145,262)
Manufacturing	6%	0.82%	1 (116.0)	1 (748,250)	0.56%	1 (42.0)	1 (271,277)
Grocery store	4%	2.23%	9 (27.0)	7 (138,414)	0.49%	6 (16.0)	6 (70,890)
School or university [a]	3%	8.19%	7 (28.5)	9 (77,664)	0.87%	11 (10.3)	12 (27,122)
Church or religious institution	3%	0.23% (low)	10 (16.7)	10 (60,367)	0.80%	8 (13.9)	8 (55,495)
Lodging	1%	1.59%	5 (33.0)	8 (136,451)	0.64%	7 (16.0)	7 (69,236)
Gym	1%	0.38% (low)	11 (9.1)	11 (22,951)	1.25%	5 (16.5)	5 (70,955)

[a] Local governments and schools were the subject of the Opinion Dynamics Texas School and Local Government Energy Efficiency Market Assessment and Baseline Study conducted for CLEAResult in 2009, so they are not eligible for the Commercial Solutions baseline study. They are included only for reference. **Note that our baseline targets only small retailers as described in the text.

Sectors for Study

Offices

The office sector includes both large and small office customers. Offices comprise the largest sector of the utilities' target market population overall (34%), but the Standard Offer program has reached only a small portion of this population (0.10%, which is the lowest participation rate of all the sectors).

Offices also comprise 16% of applications in the Commercial Solutions program (number not shown in table above), indicating that there is a need for additional assistance among this sector. Moreover, the potential for energy savings in the office sector is one of the highest among all potential sectors. Office-sector projects under the Commercial Solutions program had a mean estimated annual 21.5 kW demand reduction and 89,042 kWh total savings. These were the third-highest mean savings estimates, behind only warehouses and manufacturing.

Health Care Providers

The health care sector includes hospitals, doctors' offices, outpatient facilities, nursing homes, and any other businesses that are dedicated to providing medical treatment. While it is the third-largest sector in the target population (9%), this sector's participation rate in the Standard Offer program is among the lowest.

Health care providers also offer moderately high potential for savings, both in terms of peak demand savings and overall usage savings, ranking fourth (behind offices, warehouses, and manufacturing) in terms of average savings for those in the Commercial Solutions program (19.1 kW and 85,642 kWh, respectively).

Warehouses

The warehouse sector includes warehouses, storage facilities, distribution facilities, and wholesalers. Warehouses also have low participation rates in the Standard Offer program, but produced the second-highest savings overall (after manufacturing) among participants in the Commercial Solutions program (31 kWh and 145,262 kWh).

Manufacturing Facilities

The manufacturing sector has the highest potential for savings of all program sectors, ranking number one in terms of average savings in both the Standard Offer and Commercial Solutions program. Manufacturing has had moderate participation across both programs (0.82% in Standard Offer and 0.56% in Commercial Solutions), but is included because it provides the largest energy savings both in peak usage and overall usage. Further, the Standard Offer program tends to attract larger, metropolitan, manufacturing facilities while the Commercial Solutions program tends to attract smaller facilities in remote locations. Given that some manufacturing facilities are choosing to participate in the Commercial Solutions program, some of these groups appear to benefit from the additional support

provided by the Commercial Solutions program.

Churches and Religious Organizations

While churches make up a relatively small portion of the overall target population (3%) and past projects provided moderately low savings (ranked 8 out of 12), this sector falls among the sectors with the lowest participation rates in the Standard Offer program. In addition, it includes a much larger proportion of the population participating in the Commercial Solutions program (0.80%) than in the Standard Offer program (0.23%), indicating that the religious organization sector seems to benefit from the Commercial Solutions program.

Small Retailers

The sixth sector does not meet the same criteria in that retailers are well represented in the Standard Offer program. The retail sector also has only moderately low savings; however, a large number of retailers are choosing to participate in the Commercial Solutions program. The difference, however, is in the types of retailers that are participating.

Based on our review of the program databases, Commercial Solutions retail participants tend to be smaller retailers with single projects that are handled directly by the customer. Standard Offer retail participants tend to be large national chains with bundled projects.

Many Standard Offer projects are handled through rebate administrators or other third parties, who work with large, national chains to help them identify and apply for utility incentive programs. These third parties are overwhelmingly participating in the Standard Offer program rather than the Commercial Solutions program. An analysis of the Standard Offer database revealed that known rebate administrators accounted for 43% of all applications in the retail sector. The Commercial Solutions database did not have any applications from third parties in the retail sector.

Therefore, we propose specifically targeting small retailers for the Commercial Solutions baseline, as these retailers are less likely to partner with a rebate administrator and thus are more likely to be better served by the Commercial Solutions program offerings.

Table A-2. Sector SIC Codes

Sector Name	SIC Code (2 or 4-digit)
Office	60, 61, 62, 63, 64, 65, 67, 7291, 7299, 73, 81, 83, 8611, 8621, 8631, 8641, 8651, 8699, 87
Health Care	80
Warehouse	4214, 4221, 4222, 4225, 4226, 50, 51
Manufacturing	20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39
Church or religious organization	8661
Small Retailers*	52, 53, 55, 56, 57, 59, 7221, 7231, 7241, 7251, 7841

* In this study, we defined "small retailers" as those with less than $5 million in revenue per year.

Sectors Excluded from Study

Government and Schools

We studied governments and schools in the Opinion Dynamics Texas School and Local Government Energy Efficiency Market Assessment and Baseline Study conducted for CLEAResult in 2009, so they are not eligible for the Commercial Solutions baseline study. Therefore, we did not analyze them for meeting any criteria for inclusion.

Grocery Stores

Participation in the Standard Offer Program has been relatively high (2.23%) with Grocery stores, while participation has been limited in the Commercial Solutions program (0.44% of the population). The average energy savings is typical of a program participant thus far. As such, we have not targeted this sector.

Restaurants

Although restaurants have been moderately unlikely to participate in either program (0.45% of the population in Commercial Solutions and 0.41% in Standard Offer), the potential for savings is lower (lowest for peak savings and second-lowest in overall savings). As such, we did not include restaurants in the top six sectors.

Lodging

Like grocery stores, lodging may be better suited to the Standard Offer program. The Standard Offer program (1.59% of the population) has had stronger participation than the Commercial Solutions program (0.64%) in this sector.

Gyms

Gyms indicate differences between the two programs, with a much higher percentage of the population participating in the Commercial Solutions program (1.25%) than in the Standard Offer program (0.38%). This indicates that gyms may be a target sector for the Commercial Solutions program. Gyms also achieved moderate estimated savings per project (ranked fifth in peak demand reduction and overall savings). Savings per project have been higher for gyms participating in the Commercial Solutions program than in the Standard Offer program; gyms were only one of two sectors (the other being restaurants) where this was the case. However, gyms made up such a small portion of the overall target population (only 1%) that we determined this sector was too small to include in the top six sectors.

OPINION DYNAMICS
CORPORATION