IMPACT EVALUATION

NYSERDA CFL Expansion Program: Random Digit Dial and Onsite Survey Results

FINAL Report

Prepared for

The New York State
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Victoria Engel-Fowles
Project Manager

Prepared by

David Filiberto
Lisa Wilson-Wright
Betty Tolkin
Jesse Ram
Lynn Hoefgen
Erin Coates
NMR Group, Inc

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ABSTRACT

This report summarizes the results of Random Digit Dial (RDD) surveys and on-site (onsite) saturation studies conducted in New York State, New York City, and one comparison area, Houston, Texas, as part of an impact evaluation of the Compact Fluorescent Lamp (CFL) Expansion Fast Track Program, which is a part of the **New York Energy $mart**[SM] Products Program. The surveys were conducted under the direction of NMR Group Inc. (NMR), which is part of the Market Characterization and Assessment team led by Navigant Consulting. APPRISE Inc. managed the data collection efforts. The purpose of the surveys was to gather information on CFL awareness, use, and purchase behavior. The surveys also explored lighting purchase behavior, awareness of and experience using light emitting diodes (LEDs), as well as customer attitudes toward climate change, and demographics. The report discusses the results of these surveys, focusing on similarities and differences between New York State, New York City, and Houston, including comparisons between 2009 and 2010, where applicable.

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TABLE OF CONTENTS

NOTICE ..... **I**

ABSTRACT ..... **III**

ACKNOWLEDGEMENTS ..... **V**

TABLE OF CONTENTS ..... **VII**

List of Tables viii

List of Figures xi

EXECUTIVE SUMMARY ..... **I**

Study Objectives I

Synopsis of Findings I

Conclusions and Recommendations VI

SECTION 1 INTRODUCTION **1-1**

SECTION 2 METHODOLOGY **2-1**

2.1 Random Digit Dial Surveys 2-1

2.1.1 Survey Design and Implementation 2-1

2.1.2 Sample Frames, Design and Sampling Error 2-2

2.2 Onsite saturation Studies 2-8

2.2.1 Recruitment 2-8

2.2.2 Onsite Visit Data Collection 2-9

2.3 Data analysis procedures 2-10

SECTION 3 AWARENESS OF CFLS **3-1**

3.1 Awareness and Familiarity with CFLs 3-1

SECTION 4 USE AND SATISFACTION WITH CFLS **4-1**

4.1 Prior Use of CFLs 4-2

4.2 Current CFL Usage 4-4

4.3 SOCKET SATURATIONS 4-5

4.4 Satisfaction with CFLs 4-21

4.5 CFL Storage 4-24

SECTION 5 LIGHT BULB PURCHASING BEHAVIOR 5-1

5.1 Date of CFL Purchase 5-2

5.2 Estimating Purchases from Revisit Sample 5-7

5.3 Retailers Where Light Bulbs were Purchased 5-9

5.4 Federal Lighting Policy 5-15

SECTION 6 LIGHT EMITTING DIODES 6-1

SECTION 7 CLIMATE CHANGE ATTITUDES 7-1

SECTION 8 CONCLUSIONS 8-1

8.1 CFL Awareness and Familiarity 8-1

8.2 Useand Satisfaction with CFLs 8-2

8.3 Light Bulb Purchasing Behavior 8-3

8.4 Light Emitting Diodes 8-3

8.5 climate change attitudes 8-4

8.6 Recommendations 8-4

APPENDIX A DEMOGRAPHICS A-1

Housing Characteristics A-1

Demographic and Socioeconomic Characteristics A-6

APPENDIX B COMPARISON OF REVISIT AND NEW VISIT HOUSEHOLDS 8-1

APPENDIX C NMR FIRST DRAFT OF LIGHTING CONSUMER SURVEY 8-1

LIST OF TABLES

Table 1: Key Indicators by Comparison Areas: Awareness, Familiarity, Prior Purchase, and Prior Use II

Table 2: Key Indicators by Comparison Areas: Average Use, Storage, and Purchases III

Table 3: Summary of CFL-Related Changes in Revisit Onsite Sample Homes, 2009 to 2010 IV

Table 4: CFL Expansion Program RDD Survey Specifics 2-3

Table 5: Response Rates for the RDD Telephone Survey by Comparison Area 2-4

Table 6: RDD Survey Sample Disposition: NYS 2-4

Table 7: RDD Survey Sample Disposition: NYC 2-5

Table 8: RDD Survey Sample Disposition: Houston 2-5

Table 9: Frequency of 2010 Comparison Area Breakdown 2-6
Table 10: Response Rates for the Onsite Saturation Study 2-9
Table 11: Onsite Saturation Study Survey Specifics 2-10
Table 12: Awareness and Familiarity with CFLs by Comparison Area 3-3
Table 13: Awareness and Familiarity with CFLs by Onsite Comparison Area 2010 3-6
Table 14: Familiarity with Different Types of CFLs by Comparison Area 2010 3-8
Table 15: Use of CFLs by Comparison Area 2009 and 2010 4-2
Table 16: History of CFL Use by Comparison Area, 2009 and 2010 4-3
Table 17: Current Number of CFLs in Use at Respondents Home by Comparison Area 4-5
Table 18: Socket Saturation – New York State 4-6
Table 19: Socket Saturation – New York City 4-7
Table 20: Socket Saturation – Houston 4-8
Table 21: Socket Saturation – CFLs Installed by Socket Type by Comparison Area 4-9
Table 22: Socket Saturation Revisit Households– NYS 4-9
Table 23: Socket Saturation Revisit Households– NYC 4-10
Table 24: Socket Saturation Revisit Households– Houston 4-10
Table 25: Socket Saturation – Socket Type by Percent of all Sockets 4-12
Table 26: Socket Saturation – Bulb Features by Percent of all Sockets, New York State 4-15
Table 27: Socket Saturation – Bulb Features by Percent of all Sockets, New York City 4-16
Table 28: Socket Saturation – CFLs Installed by Bulb Shape by Comparison Area 4-17
Table 29: Socket Saturation – Room types by percent of room sockets, New York State 4-19
Table 30: Socket Saturation – Room types by percent of room sockets, New York City, by Onsite Comparison Area 2010* 4-20
Table 31: Average Wattage by Bulb Type 4-21
Table 32: Satisfaction with Currently Installed CFLs by Comparison Area 4-22
Table 33: Reason for Dissatisfaction with CFLs by Comparison Area 4-23
Table 34: Current Number of CFLs in Storage at Respondents' Home, New York State 4-24
Table 35: Current Number of CFLs in Storage at Respondents' Home, New York City 4-25
Table 36: Current Number of CFLs in Storage at Respondents' Home, Houston 4-26
Table 37: CFLs Purchased before 2009 by Comparison Area 5-3
Table 38: CFLs Purchased in 2009 by Comparison Area 5-5
Table 39: CFLs Purchased in first half 2010 by Comparison Area 5-6
Table 40: CFLs installed and stored, 2009 to 2010 by comparison area 5-7
Table 41: Accuracy Check on Revisit Purchase Analysis 5-8
Table 42: Type of Store where CFL bulbs were purchased by Comparison Area 5-10
Table 43: Type of Store where Incandescent bulbs were purchased by Comparison Area 5-11
Table 44: Store Type by Percent of CFLs Purchased 5-13

Table 45: Average Time to Nearest Discount or Home Improvement Store 2010 5-14
Table 46: Awareness of Federal Standard for Lighting by Comparison Area 2010 5-15
Table 47: How Likely to Purchase Additional Incandescent Bulbs by Comparison Area 2010 5-16
Table 48: Familiarity with LEDs by Comparison Area 6-1
Table 49: Familiarity with Type of Various LED Applications by Comparison Area 2010 6-2
Table 50: Type of Various LED Applications Owned in Household by Comparison Area 2010 6-3
Table 51: Belief in Anthropogenic Causes of Climate Change by Comparison Area 2010 7-1
Table 52: Attitude toward Environmental Protection and Economic Growth by Comparison Area 2010 7-2
Table 53: Energy-Related Concerns by Comparison Area 2009 7-3
Table 54: Energy Use and Climate Change Beliefs by Comparison Area 2010 7-4
Table 55: Early Adopter Behavior by Comparison Area 2010 7-6
Table 56: Homeownership Status and Type of Home by Comparison Area A-2
Table 57: Onsite Homeownership Status and Type of Home by Comparison Area A-3
Table 58: Decade Home was built by Comparison Area A-4
Table 59: Size of Home by Comparison Area A-5
Table 60: Highest Level of Education by Comparison Area A-6
Table 61: Highest Level of Education by Comparison Area A-7
Table 62: Household Income by Comparison Area A-8
Table 63: Household Income by Comparison Area A-9
Table 64: Race and Ethnicity by Comparison Area A-10
Table 65: Race and Ethnicity by Comparison Area A-11
Table 66: Primary Language Spoken in the Home by Comparison Area A-12
Table 67: Primary Language Spoken in the Home by Comparison Area A-12
Table 68: Gender by Comparison Area A-13
Table 69: Number and Age Group of Persons Living in the Home by Comparison Area A-13
Table 70: Satisfaction with Standard of Living by Comparison Area 2010 ..... A-14
Table 71: Method of Electric Bill Payment by Comparison Area 2010 ..... A-14
Table 72: Method of Electric Bill Payment by Comparison Area A-15
Table 73: Comparison of New York State Revisit and First Visit Onsite Samples – CFL Related Factors 8-2
Table 74: Comparison of New York State Revisit and First Visit Onsite Samples – Demographic Factors 8-2
Table 75: Comparison of New York City Revisit and First Visit Onsite Samples – CFL Related Factors 8-3
Table 76: Comparison of New York City Revisit and First Visit Onsite Samples – Demographic Factors 8-3

Table 77: Comparison of Houston Revisit and First Visit Onsite Samples – CFL Related Factors.....8-4
Table 78: Comparison of Houston Revisit and First Visit Onsite Samples – Demographic Factors.....8-4

LIST OF FIGURES

Figure 1: Awareness with CFLs by Comparison Area 2009 and 2010 3-4
Figure 2: Familiarity with CFLs by Comparison Area 2009 and 2010 3-5
Figure 3: Awareness and Familiarity with CFLs by Onsite Comparison Area 3-7

EXECUTIVE SUMMARY

This report summarizes the results of Random Digit Dial (RDD) surveys and onsite saturation studies conducted in New York State excluding New York City and Nassau and Suffolk Counties (hereafter NYS), New York City (NYC), and Houston, Texas. The latter is used as a comparison area as it lacks CFL programs. The surveys are part of an impact evaluation of the Compact Fluorescent Lamp (CFL) Expansion Fast Track Program, which is a part of the Energy Efficiency Portfolio Standard (EEPS) Program offering. The surveys were conducted under the direction of NMR Group Inc. (NMR), which is part of the Market Characterization and Assessment team led by Navigant Consulting. APPRISE, Inc. managed the data collection efforts.

The onsite surveys comprise two distinct groups. The first includes households visited as part of the impact evaluation of the 2009 CFL Expansion Program; the report refers to this group as the "revisit" sample. The second group includes households newly recruited through the 2010 evaluation activities, and are called the "first visit" sample. Otherwise for the purpose of this report, the analysis of the onsite sample was completed on a combined first visit and revisit sample. Likewise, the study compares key results from the 2009 RDD and onsite surveys with similar results from the 2010 surveys. The study also compares results between NYS and NYC and where appropriate, between NYC and Houston; it generally does not draw comparisons between NYS and Houston because they differ too dramatically in terms of demographic and economic characteristics.

STUDY OBJECTIVES

The goals of the CFL Expansion Program evaluation are to assess 1) the extent to which program support engenders more sales than are directly incentivized by the program; 2) the remaining potential for replacing incandescent and halogen bulbs with CFLs; 3) the net savings achieved by the program; 4) the sustainability of program savings; and 5) how to modify the current and future program to maximize cost-effective net savings from energy efficient residential lighting. While this report provides findings and recommendations addressing these goals, the multistate statistical modeling effort will more specifically address the last three objectives.

SYNOPSIS OF FINDINGS

Table 1 summarizes key findings from the RDD surveys related to CFL awareness, familiarity, purchase, and use history for NYS, NYC, and the Houston comparison area. Overall, the results in Table 1 indicate that the CFL market—including awareness and familiarity—was more developed in NYS compared to NYC both in 2009 and in 2010. The analysis of the 2010 RDD survey data reveals significantly greater awareness of CFLs in NYS (90% in NYS vs. 72% in NYC), a higher proportion of households that have ever used CFLs (69% in NYS vs. 57% in NYC), and a higher proportion of households that have ever

purchased CFLs (69% in NYS vs. 53% in NYC). Awareness in Houston stood at 81% and familiarity at 21%; 66% of Houston households claimed that they have used CFLs. Compared to 2009, awareness stayed relatively constant in NYS (91% and 90%). However, a significantly smaller percentage of respondents in NYC were aware of CFLs in 2010 than in 2009 (72% vs. 79%), a finding that may be an artifact of the smaller sample size in 2010 compared to 2009 but could also reflect the characteristics of the samples in the two years. Specifically, the 2010 RDD sample in NYC was less likely than the 2009 sample to have a high school diploma and more likely to have a lower income, self-identify as non-white, and report speaking Spanish at home (See Appendix A for details). It is also important to note increased self-reported CFL use and purchase behavior in Houston, another signal that the CFL market there is growing rapidly.

Table 1: Key Indicators by Comparison Areas: Awareness, Familiarity, Prior Purchase, and Prior Use[1]

(Based on all RDD respondents)

	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Aware of CFLs	91%	90%	79%ab	72%abc	76%	81%
Very familiar with CFLs	31	38c	28	32	21ab	21
Not at all familiar with CFLs[1]	14	13	27ab	30ab	32ab	24
Ever purchased CFLs	66	69	50ab	53ab	47	58
Ever used CFLs	69	69	54ab	57ab	52	66
Sample Size	1001	341	502	174	503	180

[1] Includes "Don't know/Refused"

a Statistically significant at $\alpha = 0.05$, which is the one-tailed test for the 90% confidence level. NYC is compared to NYS and Houston is compared to NYC.

b Statistical power exceeds 80% for one-tailed hypothesis testing; and NYC is compared to NYS, and Houston is compared to NYC.

c Statistically significant across years for a given area at $\alpha = 0.05$, which is the one-tailed test for the 90% confidence level.

As can be seen in Table 2, there were notable differences in self-reported CFL usage, storage, and purchases across the three areas in the study. Current use was higher in NYS than in NYC (12.3 CFLs per household vs. 7.6), which may be due more to the larger home size in NYS than NYC. Use among NYC respondents was also less than the sample in Houston (7.6 vs. 10.7, respectively). Use in all three areas was higher in 2010 than it had been in 2009. Storage rates were fairly similar between NYS and NYC in 2010, at 1.6 bulbs per household stored in NYS and 1.5 in NYC on average. Houston respondents stored

fewer CFLs (0.4) than NYC respondents. The number of CFLs purchased in the past year increased in all three areas, with NYC leading the way at 4.4 CFLs purchased on average. Finally, looking at the first-half of 2010, the results indicate that the average number of CFLs purchased in Houston (5.8) increased a great amount compared to 2009. In contrast, CFL purchase rates for the first-half of 2010 in NYS and NYC were smaller than in Houston, but on target to match or exceed the number of CFLs reported as purchased in 2009, assuming the same patterns held in the second-half of 2010 as observed in the first half of 2010. These results suggest that the CFL market in NYS and NYC is more mature than in Houston. In other words, households in the NYSERDA area bought large numbers of CFLs in the past, but their purchase rates have stabilized even as the market in Houston appears to have recently taken off. Note that the factors driving CFL use, purchases, and saturation in NYS, NYC, and across the nation are explored in detail in the multistate modeling report.

Table 2: Key Indicators by Comparison Areas: Average Use, Storage, and Purchases[1]

(Based on all onsite respondents)

	NYS		NYC		Houston	
	2009	2010[1]	2009	2010[1]	2009	2010[1]
CFLs currently installed	11.3	12.3	7.4	7.6	6.4	10.7
CFLs in storage	1.1	1.6	1.0	1.5	0.04a	0.4
CFLs purchased last year[2]	3.9	4.3	3.0	4.4	1.4	2.4
CFLs purchased in first-half of 2010	NA	2.5	NA	1.9	NA	5.8
Sample Size	203	200	100	100	99	100

[1] Results subject to rounding error.

[2] "Last year" is 2008 for the 2009 results and 2009 for the 2010 results.

One advantage of the 2010 effort was the ability to visit some of the same homes that had taken part in the 2009 onsite study. Table 3 summarizes some of the key findings from the *revisit analysis*, which is limited to just those homes visited in both years. Saturation increased in these revisit homes in all three areas of the study, with NYS and Houston seeing a six percent increase in saturation and NYC—which already had the highest saturation—increasing eight percent. Given that each area experienced a gain in both installed and stored CFLs, the average increase in the number of CFLs serves as the best estimate of the average number of CFLs purchased—2.9 in NYS, 2.4 in NYC, and 3.1 in Houston, amounts that are very similar across these three areas.

Table 3: Summary of CFL-Related Changes in Revisit Onsite Sample Homes, 2009 to 2010
(Based on onsite revisit respondents)

	NYS		NYC		Houston	
	2009 Visit	2010 Visit	2009 Visit	2010 Visit	2009 Visit	2010 Visit
CFL saturation (weighted)	17%	23%	25%	33%	15%	21%
CFLs installed (weighted)	902	1,182	380	501	293	431
Stored CFLs (weighted)	69	120	51	93	3	22
Overall change in CFLs 2009 to 2010[1]	331		163		157	
Average number of CFLs gained per household (weighted)	2.9		2.4		3.1	
Weighted Number of Households[2]	114	114	67	67	50	50
Sample size	94	94	59	59	45	45

[1] Net increase of CFLs installed minus stored CFLs that were taken out of storage for 2010 plus those gained in storage for 2010.

[2] The evaluators report the weighted number of households because the weighting scheme APPRISE developed based on its agreement with NYSERDA means that the weighted sample sizes differ somewhat from the unweighted ones. The mean number of CFLs in storage is calculated from these weighted households, and the evaluators wanted to report all necessary information in the table to recreate these means.

The average number of CFLs gained between 2009 and 2010 (Table 3) differs greatly from the self-reported differences presented in Table 2. The data in these two tables diverge in important ways, explaining this difference. Table 2 presents *self-reported* CFL purchases from 2009 to the first-half of 2010 and does so for *all onsite participants*—new visits and revisits. The data in Table 3, in contrast, derive from the *observations* of the onsite technician in *revisit homes only*. Put another way, Table 3 figures represent the change in the number of CFLs between the first and second onsite visits as observed by the technician's count of bulbs of the revisit households, while Table 2 reports what participants told us they did in the respective time period. Ideally these figures should not differ, yet self reports suffered from lack of accurate recall of when CFLs were obtained, and the technician observations exhibited measurement error.

Other key findings from the 2010 analysis include the following:

- Overall, the evaluation team estimates that one in four sockets in NYS and almost one in three in NYC (31%) contain a CFL, based on the results of the 2010 onsite saturation studies. Of the remaining potential for CFLs in NYS and NYC, in the best case scenario, 63% of sockets in NYS and 58% in NYC could be filled with CFLs or LEDs that adhere to the standard A-shaped profile and screw-in base socket. However, the actual potential for CFLs and LEDs is likely lower—by how much is uncertain—due to fixture shape and size, the application for which the socket is used, and preferences of householders for one type of bulb over another.

- Bedrooms, bathrooms, kitchens, and living rooms have the most CFLs installed. However, even in these rooms, a substantial number of sockets could still be converted to CFLs, so bedrooms, bathrooms, kitchens, and living rooms continue to offer some of the largest absolute potential for additional CFL saturation. Exterior lighting offers a unique opportunity for CFL potential, given that NYS and NYC exterior fixtures for both samples have between 19% to 35% halogens which may be replaced with CFLs.

- On average, CFLs installed in NYS were 16 watt bulbs, while the incandescent bulbs had wattage of 58. In NYC, the average CFL wattage was 15, while incandescent wattage was 55. Generally, the 13 watt spiral is marketed as the appropriate replacement for a 60 watt incandescent; if it is assumed that the currently installed CFLs by and large replaced 60 watt incandescent bulbs, then it appears that households have a slight tendency to "size up" their CFLs, buying a CFL with slightly higher than the 60 watt equivalent, most likely to add lumens to the lighting application while not adding wattage.

- The majority of respondents from the 2010 RDD survey reported they were generally satisfied with CFLs, with 60% or more in each comparison area saying they were "very satisfied" with the CFLs currently installed in their homes. The few respondents who reported being dissatisfied with CFLs generally cited the following reasons, which are similar to those in 2009: the bulbs are not bright enough, the bulbs burned out, there is a delay in the light coming on, the savings are not readily apparent, there is a disposal hazard due to the mercury in the bulbs, and the light color is unsatisfactory.

- Onsite NYS participants purchased about 6. 5 CFLs prior to 2009, while NYC respondents purchased about 2.5 CFLs prior to 2009. Onsite NYS participants purchased about seven CFLs from January 2009 through June of 2010, while NYC respondents purchased about six CFLs during the same time period. In other words, in just eighteen months, NYS participants bought as many CFLs as they had in all the years prior to 2009, and NYC respondents bought more CFLs in the same time period than they had before 2009. Houston respondents had purchased only 2.4 CFLs prior to 2009 but they then purchased an average of 8.2 CFLs from January 2009 through June

2010, an increase of nearly 250%. These results suggest a more mature but still growing CFL market in New York but a young and rapidly growing CFL in Houston.

- More than one-half of the RDD respondents from NYS and NYC purchased CFLs from home improvement stores in both 2009 and 2010. More NYC respondents purchased CFLs from home improvement stores in 2010 (65%) than in 2009 (55%); there were also increases in NYC households purchasing CFLs in mass merchandise (*aka* discount department, 19% in 2009; 33% in 2010) and hardware stores (12% in 2009; 26% in 2010). About one-half of NYS respondents said they could get to the nearest home improvement and mass merchandise / discount department store in less than 15 minutes. The same is true for approximately 40% of NYC respondents.
- No more than one-fifth of RDD respondents in any area were aware of the Energy Independence and Security Act (EISA) of 2007. More than one-third of respondents (34% in NYS and 37% in NYC) said they were very or somewhat likely to stockpile incandescent light bulbs after EISA provisions were briefly explained to them.
- About one-half of NYS (51%) RDD respondents were aware of light emitting diodes (LEDs) in 2010, approximately the same awareness as in 2009. LED awareness in NYC stood at 39%, an increase in awareness of 5% from 34% last year and significantly different from NYS.
- During the 2010 onsite visits, technicians observed LEDs installed in one percent or fewer of sockets in each comparison area, similar to 2009 results.
- 2010 RDD respondents were asked a series of questions concerning their attitudes toward global warming, environmental protection, economic growth, fossil fuel, energy use and climate change. Most respondents (72% in NYS and 85% in NYC) said they believe in man-made causes of climate change. In addition, two-thirds to three-quarters (67% in NYS; 78% in NYC) of all respondents felt that protecting the environment should be made a priority even if economic growth was at risk.

CONCLUSIONS AND RECOMMENDATIONS

The results presented in the RDD and onsite survey report suggest that the CFL Expansion component of NYSERDA's **New York Energy $mart**^{SM} Products Program has succeeded in moving the market for CFLs toward transformation in both NYS and NYC, but there is still untapped potential for energy savings with CFLs in the NYSERDA territory. The percent of current CFL users is similar between NYS (89%) and NYC (87%). The average number of CFLs in use per home in NYS is 12.3, while in NYC it is 7.6. Saturation rates hover at 24% in NYS and 31% in NYC, yet 58% to 63% of the remaining sockets contain incandescent or halogen bulbs that could easily be converted to CFLs or screw-in LEDs. The 2010 onsite results indicate that purchases of CFLs in NYS appear to have slowed in 2009 and early 2010 compared to early 2009, while those in NYC fluctuated. In comparison, CFL purchases in Houston increased steadily over the eighteen-month time period. The majority of RDD survey respondents continue to report

purchasing CFLs from home improvement and mass merchandise / discount department retailers, which have not generally been Partners in the **New York Energy $mart**[SM] Products Program. Finally, most RDD survey respondents are not aware of EISA, but a sizeable minority (about 35% in NYS and NYC) indicate that they will "hoard" incandescent bulbs in anticipation of the new federal lighting standards.

Based on the findings from the RDD and onsite surveys summarized above and others discussed in the full body of this report, the following conclusions and recommendations emerge. Additional conclusions and recommendations are being developed from the multi-state modeling effort, which will be presented under separate cover.

Conclusion: Until the CFL Expansion Fast Track program started, most of NYSERDA's resources for CFLs had gone toward retailer support and consumer education rather than incentives. In the NYSERDA territory, the vast majority of consumers have known that CFLs exist; consumer awareness as measured in the RDD surveys was over 90% in NYS and 70% in NYC in both 2009 to 2010. There was, however, an increase in the much smaller numbers of consumers who said they were very familiar with CFLs (from 31% in 2009 to 38% in 2010 in NYS; from 28% in 2009 to 32% in 2010 in NYC). Over the same time, the percentage of Houston respondents who said they are very familiar remained constant at 21%. This increase in NYS and NYC may be considered as evidence of the CFL Expansion Program's effectiveness. Moreover, CFL saturation stands at 24% in NYS and 31% in NYC, but ample potential still exists for converting sockets to CFLs and LEDS even in homes that currently use CFLs.

Recommendation: Continue outreach messaging to CFL users encouraging additional purchases of CFLs, rather than focusing on improving consumer awareness. Future marketing campaigns may want to educate committed current CFL users on the benefits of further increasing the number of sockets where they install CFLs.

Conclusion: Of those in NYS and NYC purchasing CFLs in 2010, most purchased between one and fifteen CFLs. NYS and NYC respondents purchased the majority of their CFLs from home improvement stores and mass merchandise / discount department stores, indicating that CFLs move in large numbers from these stores even though they are not program partners.

Recommendation: Continue to incentivize the bulk purchase of CFLs as there is a small but committed group that still purchases more than 25 CFLs per household. However, the successful, non-incented sales of CFLs at home improvement and discount stores suggests that NYSERDA may want to continue its program focus on smaller retailers rather than allocating limited program resources to retailers who will likely still sell large amounts of CFLs without NYSERDA support. If NYSERDA decides to target specialty CFLs, however, they may wish to pursue agreements with these large retailers, who nationally have shown a greater propensity to carry specialty products when incented by CFL programs.

Conclusion: Less than one-fifth of 2010 RDD respondents in the NYSERDA service area are familiar with EISA. In addition, while most respondents are not likely to stockpile incandescent light bulbs to be used

after the federal standard goes into effect, the percentage who said they were somewhat or very likely to do so (34% in NYS and 37% in NYC) could indicate the possibility of hoarding of incandescent bulbs, although self-reported intentions of future behavior are generally not reliable. Of respondents who were aware of the federal standard, one-half of those surveyed in NYC said they were very likely to stockpile incandescent bulbs. This could result in the decreased use and flat future purchases of CFLs until the supply of incandescent bulbs is used up—but again, stated intentions are not a reliable measure of future behavior.

Recommendations: Continue outreach messaging to CFL users focusing on the energy savings benefits and comparable quality of light to incandescent bulbs which may discourage stockpiling the bulbs as the federal standard goes into effect. Also, track actual incandescent storage behavior and its relationship to awareness of EISA and intent to hoard.

Conclusion: Many NYSERDA territory households continue to use CFLs, but not in nearly as many sockets as could take a CFL or an LED. The 2010 onsite survey found that 89% of NYS households and 87% of NYC households used CFLs. One in four sockets in NYS (24%) and almost one in three sockets in NYC (31%) contain CFLs. Yet, the highest remaining potential for CFLs or LEDs in NYS and NYC is between 58% to 63% of all sockets. Most sockets have screw-in bases in which A-shaped or spiral-shaped CFLs or screw-in LEDs could be installed. However, the unique characteristics of individual fixtures and applications as well as customer preferences means the achievable potential for CFLs and LEDs is likely lower, but the data do not allow us to estimate how much lower. Exterior lighting offers a unique opportunity for CFL installation, since NYS and NYC exteriors have between 19% to 35% halogens installed, which could be replaced by CFLs.

Recommendation: Continue to incentivize products to encourage consumers to purchase CFLs. Specifically target replacement of exterior lighting with CFLs to increase penetration of CFLs in this segment.

Conclusion: Storage of CFLs by the onsite survey participants has increased slightly over time. Most households in NYS (65%) and NYC (64%) did not have any CFLs in storage. On average, households in NYC and NYS increased storage of CFLs from less than one in 2009 to between one and two bulbs in 2010.

Recommendation: Continue incentives for multipacks of CFLs so that households can easily have extra CFLs available. Because most consumers prefer to keep bulbs on hand, if they can reach for a CFL without making a special trip to a retailer, they will be more likely to use one the next time a bulb burns out.

Recommendation: To capture program savings from CFLs in multipacks immediately, consumer outreach can also educate consumers about the value of replacing incandescent bulbs with CFLs right away, rather than waiting for them to burn out.

Conclusion: Specialty bulbs comprise a small but important portion of the remaining CFL potential in households in NYS and NYC. Moreover, A-shaped specialty CFLs could fit in most of the sockets currently filled with A-shaped incandescent bulbs.

Recommendation: Consider increasing support for selected specialty bulbs, while maintaining support for standard CFLs. Substantial potential could be reached with A-shaped specialty CFLs in those sockets that at least some households find unattractive when filled with a standard spiral CFL.

Conclusion: As LED technology progresses and prices decrease, there will likely be increased energy savings potential that exceeds that currently available for CFLs. Roughly one-half of NYS respondents and more than one-third of NYC respondents are familiar with LEDs. Most LED use is for holiday lights, flashlights and nightlights, with a large remaining potential for LEDs in common lighting applications. LEDs offer a potential area for future program focus after the implementation of new lighting efficiency standards resulting from EISA, and with continuing increases in LEDs' lighting efficacy.

Recommendation: Consider increasing the support for common LED lighting applications in tandem with consumer outreach to educate consumers about the value of this emerging lighting technology.

Conclusion: Environmental awareness and positive attitudes toward environmental protection are expressed by most NYSERDA territory respondents. Between 72% (NYS) and 85% (NYC) of all 2010 RDD respondents had some degree of belief in the anthropogenic causes of climate change. At that at least two-thirds of all respondents agreed that the "Protection of the environment should be given priority, even at the risk of curbing economic growth." Climate change is a powerful motivator toward reducing energy use.

Recommendation: Promote the environmental or 'green' benefits of CFL adoption in the continued outreach to consumers.

Section 1

INTRODUCTION

The **New York Energy $mart**[SM] Products Program partners with retailers and manufacturers to increase the supply of and demand for energy efficient ENERGY STAR® products within NYSERDA's service territory. The Program currently partners with more than 930 retailers and 34 manufacturers of various energy efficient ENERGY STAR products, including compact fluorescent lamps (CFLs). Current program efforts include working with retailers by providing staff training, point-of-purchase materials for stores, financial assistance with marketing and promotional efforts, and market share incentives. The CFL Expansion Fast Track Energy Efficiency Portfolio Standard Program (hereafter CFL Expansion Program or simply the Program) component of the **New York Energy $mart**[SM] Products Program aims to:

- Increase marketing and co-op advertising promotions with retail stores and lighting manufacturers;
- Continue to increase the network of retail partners and manufacturers;
- Increase consumer accessibility to a wider variety of CFLs by providing incentives to retailers to increase the number of CFLs sold and increase permanent shelf space for these products
- Increase in-store promotions and point-of-purchase information to educate consumers;
- Increase participation in the CFL Collection Center Program; and
- Promote the manufacture, sale, and usage of high power factor CFLs.

Through the CFL Expansion Program, it is estimated that 16.9 million CFLs will be installed within NYSERDA System Benefits Charge (SBC) territory between 2009 and 2011, saving approximately 1,083,861 MWh. Of the estimated 16.9 million CFLs sales the Program will impact, 37% (approximately 6,775,701 CFLs) will be purchased as a result of direct program incentives and 63% (approximately 10,151,815 CFLs) will be purchased as spillover from program marketing, outreach, and education efforts.

NMR Group, Inc. (NMR) is conducting an impact evaluation of the CFL Expansion Program; NMR is part of the Market Characterization and Assessment team led by Navigant Consulting. APPRISE, Inc. managed the data collection efforts. The goals of the CFL Expansion Program evaluation are to assess 1) the extent to which program support engenders more sales than are directly incentivized by the program; 2) the remaining potential for replacing incandescent bulbs with CFLs; 3) the net savings achieved by the program; 4) the sustainability of program savings; and 5) how to modify the current and future program to maximize cost-effective net savings from efficient residential lighting.

This report summarizes the results of two related evaluation tasks in the CFL Expansion Program Evaluation—random digit dial (RDD) telephone surveys and onsite saturation studies of NYS, NYC, and Houston. The evaluators chose the comparison area in the 2009 impact evaluation of the CFL Expansion

Program based on its similarities to NYC and decided to include the area again in the 2010 effort to assess how the CFL market in Houston had changed relative to NYS and NYC. However, it should be noted that last year Houston was paired with the District of Columbia (DC) to serve as a comparison area to NYC. This year NYSERDA and the New York State Department of Public Service (DPS) decided not to survey DC because it began offering CFL programs later in 2009.[1] Houston alone may not be an appropriate comparison to NYC, and based on the advice of a consultant to the DPS, the evaluators do not perform statistical comparisons of Houston to NYC or NYS, but instead use the area as a simple comparison to the NYSERDA service territory in order to exemplify key characteristics of the CFL market locally and nationally. The results of a complementary task—the multistate modeling effort—will be delivered separately. The modeling task will include analyses that statistically control for demographic and economic differences among areas throughout the United States using regression analysis in an attempt to explain what drives CFL sales in New York and beyond. After NYSERDA has reviewed the multistate modeling report, the evaluation team will provide a joint summary report that highlights the key findings of the RDD survey, the onsite saturation study, and the multistate modeling effort.

[1] The 2009 effort also included most of the State of Ohio but utilities in that state also started or greatly expanded their CFL programs in 2009 and 2010, making it a program area.

Section 2

METHODOLOGY

This section of the report summarizes survey design and implementation, sample frames, sampling error, and the analysis approaches used, including tests for statistical significance and power for a random digit dial (RDD) telephone survey conducted in New York State, less Nassau and Suffolk Counties and New York City (hereafter NYS), New York City (NYC), and Houston, Texas. It further describes the recruitment and data collection procedures for onsite saturation surveys in NYS, NYC, and Houston.

2.1 RANDOM DIGIT DIAL SURVEYS

The evaluators fielded a random digit dial (RDD) survey in each of the three areas in an effort to ascertain the respondents' level of awareness and familiarity with CFLs and LEDs as well as historical and recent experiences purchasing and using CFLs and LEDs. The RDD survey also allowed the evaluation team to recruit participants for the onsite saturation studies.

2.1.1 Survey Design and Implementation

The RDD telephone survey was conducted under the direction of APPRISE, NYSERDA's data collection contractor. The evaluation team designed the survey instrument to be comparable with survey instruments being fielded in 14 areas across the nation by the ten CFL program administrators who are taking part in the multistate modeling effort. Among NYS, NYC, and Houston, slight changes were made to account for differences in the CFL market and the fact that NYSERDA is not well known in Houston (the Appendix includes the survey questionnaire fielded in NYS). The evaluation team pre-tested the survey prior to fielding to ensure that all questions were understandable and that survey skip patterns were properly programmed. The telephone interviewers received training on the survey questions and procedures. During the training, interviewers conducted mock interviews so that they became completely familiar with the survey instrument prior to fielding with actual respondents. APPRISE and NMR research staff monitored interviews throughout the field period to ensure that interviewers were effective in collecting the data and coding the survey responses. In addition, APPRISE conducted on-going monitoring to assess the quality of work by all interviewers. The survey was translated into Spanish for use in the NYC and Houston samples. The evaluation team implemented the surveys from June 14, 2010 through July 5, 2010.

The RDD survey focused on issues related to CFL awareness and familiarity, prior use, and satisfaction, as well as stores where respondents purchase lighting, awareness and use of LEDs and other energy-efficient lighting, environmental opinions, knowledge of federal lighting policy, and demographics.

The evaluation team made some important changes to the 2010 RDD survey compared to the 2009 RDD survey. Both surveys ask nearly identical questions about CFL awareness, familiarity, whether the

individual has ever purchased or used a CFL, duration of CFL use, CFL satisfaction, and a various household demographics. However, findings from the 2009 RDD survey effort led the evaluation team to drop entire survey sections about RDD survey self-reported use, storage, and purchase of CFLs as well as respondents' detailed information on where CFLs were purchased as these data were found to be unreliable when compared to the same data gathered during the onsite saturation surveys.

The team also altered the survey section on light emitting diodes (LEDs) in an effort to shorten the survey and to remove a focus on holiday lights, which had been included in the 2009 effort solely because the survey was fielded during and immediately following the 2008 holiday season in which NYSERDA promoted LED holiday lights. The 2010 effort added questions about awareness of and reaction to the Energy Independence and Security Act of 2007, global warming and knowledge of other energy-efficient lighting products. In most cases, these changes have not affected comparability between the 2009 and 2010 efforts—instead, the team simply does not report results from 2009 if similar results are not available from 2010. However, a few topics, notably the retailers from which households buy lighting products and the section on LEDs, potentially exhibit measurement bias related to the change in questions. The team notes in the report when changes in the questionnaire may be affecting results.

2.1.2 Sample Frames, Design and Sampling Error

The RDD survey sample frames for each of the three locations were provided by Survey Sampling International (SSI). The NYS frame included all counties of New York excepting those on Long Island (*i.e.,* Nassau and Suffolk Counties) and in NYC. The NYC frame included the five boroughs of the City. The Houston frame included all of Harris County.

The random digit sampling procedure provides representation of both listed and unlisted (including not-yet-listed) numbers by random generation of the last two digits of telephone numbers selected on the basis of their area code, telephone exchange (the first three digits of a seven digit number), and bank number (the four and fifth digits). Telephone exchanges are selected with probabilities proportionate to their size by county and by exchange within county. Only working banks of telephone numbers were selected. A working bank is a group of 100 contiguous telephone numbers that contain at least one working residential listing. Using working banks improves the efficiency of the sample in locating households and provides the opportunity for households with numbers in a new exchange to be included in the sample.

The sample was released for interviewing in replicates, which are random subsamples of the larger sample. Using replicates controls the release of sample to ensure that all released sample numbers receive the full call procedures and to maintain appropriate regional distribution of called numbers. Interviewers had a minimum effort requirement of at least two daytime, evening, and weekend phone calls per sample telephone number. If the interviewer reached an answering machine at the number dialed, he/she left a message on the first contact and on every third contact thereafter.

The evaluation team relied on simple random sampling at the state or city level when conducting the survey. They set no quotas for utility service territories within New York or elsewhere. The sampling precision at the 90% confidence level, assuming a proportion of 50%, for NYS was 4.5%, while the sampling precision for NYC and Houston was 6.3% and 6.1% (Table 4). The sampling precision for comparisons between NYS and NYC was 7.7% and between NYC and Houston was 8.8%.

Table 4: CFL Expansion Program RDD Survey Specifics

Target Group	Estimated Population Size	Sample Size	Sampling Precision (90% confidence)[1]
Total NYS less NYC & Long Island (NYS)	2,926,768	341	4.5%
NYS compared to NYC			7.7%
Households in New York City	3,021,588	174	6.3%
Households in Houston	717,945	180	6.1%
NYC compared to Houston			8.8%

[1] Proportion of 50%

Table 5 reports the final response rates for NYS, NYC, and Houston. The 2010 response rates increased compared to the 2009 rates and ranged in 2010 from a low of 35% in NYC to a high of 48% in Houston. Table 6 through Table 8 list the disposition of all telephone numbers contacted by state or city as part of this study.

Table 5: Response Rates for the RDD Telephone Survey by Comparison Area

	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Number of Interview	1001	341	502	174	503	180
Eligible Sample Size	3,053	773	1,911	491	1,458	377
Response Rate	33%	44%	26%	35%	35%	48%

Table 6: RDD Survey Sample Disposition: NYS

Disposition		Number	Percent	Number	Percent
		2009		2010	
Complete	Complete	1001	25%	341	18%
	Partial	56	1	29	2
Contacted	Refused	1,418	36	276	15
	Not Completed	578	15	771	40
Excluded	Unusable Number	915	23	464	24
	Not Eligible	2	0	22	1
Total		3,970	100	1,903	100

Table 7: RDD Survey Sample Disposition: NYC

Disposition		Number	Percent	Number	Percent
		2009		2010	
Complete	Complete	502	21%	174	16%
	Partial	33	2	18	2
Contacted	Refused	867	36	193	18
	Not Completed	509	21	389	37
Excluded	Unusable Number	489	20	282	26
	Not Eligible	0	0	10	1
Total		2,400	100	1,067	100

Table 8: RDD Survey Sample Disposition: Houston

Disposition		Number	Percent	Number	Percent
		2009		2010	
Complete	Complete	503	21%	180	23%
	Partial	43	2	20	3
Contacted	Refused	700	29	126	16
	Not Completed	212	9	233	30
Excluded	Unusable Number	939	39	221	28
	Not Eligible	3	0	6	1
Total		2,400	100	786	100

Table 9 reports the frequency breakdown of the 2010 RDD respondents. In NYS the number of respondents per county ranges from a low of one in multiple counties to a high of thirty-six respondents in Westchester County. In NYC Kings County (Brooklyn) had the greatest number of RDD respondents.

Table 9: Frequency of 2010 Comparison Area Breakdown

(Based on all 2010 RDD survey respondents)

NYS		NYC	
County	**Sample Size**	**County**	**Sample Size**
Westchester	36	Kings	51
Erie	35	Queens	44
Orange	22	New York	42
Monroe	21	Bronx	27
Niagara	16	Richmond	10
Saratoga	14		
Onondaga	13		
Oneida	12		
Washington	11		
Wayne	10		
Albany	9		
Otsego	8		
Rockland	8		
Sullivan	7		
Ulster	7		
Wyoming	7		
Broome	6		
Cayuga	6		
Chautauqua	6		
Dutchess	6		
Rensselaer	6		
Chemung	5		
Schenectady	5		

NYS		NYC	
County	**Sample Size**	**County**	**Sample Size**
Chenango	4		
Genesee	4		
Jefferson	4		
Oswego	4		
Schoharie	4		
Tioga	4		
Cattaraugus	3		
Columbia	3		
Delaware	3		
Franklin	3		
Greene	3		
Herkimer	3		
Madison	3		
Ontario	3		
Allegany	2		
Clinton	2		
Cortland	2		
Putnam	2		
Tompkins	2		
Warren	2		
Fulton	1		
Lewis	1		
Livingston	1		
Orleans	1		
St. Lawrence	1		

NYS		NYC	
County	**Sample Size**	**County**	**Sample Size**
Steuben	1		
Seneca	0		

2.2 ONSITE SATURATION STUDIES

Although the RDD survey method provides vital information to the impact evaluation, the approach was found to be prone to respondent self-report error regarding CFL use, storage, and purchase behavior in the 2009 CFL Expansion Program evaluation. For this reason, the team again paired the RDD survey method with an onsite saturation study in which a trained technician visited respondents' homes and recorded the total number of lighting sockets in the home. Likewise, the technician also asked when the respondent purchased each individual CFL found in the home. While the method still relies on customer self-report for purchase behavior, the 2009 effort concluded that asking these questions onsite was generally a more accurate approach than asking them during an RDD survey. The respondent had more time to think about an answer and the visual cue of looking at a specific CFL increased the respondents' ability to provide a reliable date of purchase. In 2010, the team only used data gathered during the onsite survey to estimate the number of CFLs in use, and the number of CFLs in storage. Therefore, as with use and storage data, the team relied only on data collected during the onsite survey to estimate CFL purchases in 2009 and 2010.

2.2.1 Recruitment

The evaluators recruited households for the onsite surveys in two different ways. First, during the telephone survey, the RDD survey respondents were offered an incentive to participate in an onsite visit to their homes. APPRISE then scheduled onsite visits with randomly selected households from among those indicating their interest in the onsite. These households comprise the "new visit" onsite sample. The second recruitment approach involved revisiting a sub-set of the households who took part in the 2009 onsite visits as part of the 2009 study; these households comprise the "revisit" onsite sample. To recruit the revisit sample, APPRISE called a random selection of the 2009 participants and offered them an incentive to take part in this year's effort. The incentives offered varied by the location of the home and the number of sockets observed in 2009.

Table 10 provides a summary of the number of onsite visits completed in each area and the incentive offered to participants. Since the evaluation team has found that survey cooperation rates in large metropolitan areas are lower than in other regions, larger incentives were offered in NYC to encourage greater willingness to participate in the onsite survey.

Because the "new visit" sample sizes are so small, it would be difficult to draw meaningful conclusions from separate analyses of just these households. Therefore, based on the advice of a consultant to the DPS, the evaluators combined the revisit and first visit households into one sample for all but a few analyses restricted solely to the revisit households. Appendix B offers a comparison of the revisit and onsite samples on CFL awareness, use, and purchases as well as key demographic data.

Table 10: Response Rates for the Onsite Saturation Study

	NYS			NYC			Houston		
	2009	2010 Revisits	2010 First Visit	2009	2010 Revisits	2010 First Visit	2009	2010 Revisits	2010 First Visit
Incentive	$100	$100-150	$100	$150	$150-250	$150	$100	$100-200	$100
Number of Onsites	203	132	68	100	65	35	99	64	36

2.2.2 Onsite Visit Data Collection

The on-site data collection instrument was designed to collect detailed information on each socket in the home. Information collected included:

- Bulb type
- Wattage
- Application
- Socket type
- Room location
- Specialty features

For CFLs, the model numbers of installed CFLs were also collected and respondents were asked the time of year and store where they purchased each CFL.

Table 11 shows the final sample sizes and the associated error margin at the 90% confidence level for each of the onsite saturation samples and for comparisons between areas (*e.g.* when NYS is compared to NYC).

Table 11: Onsite Saturation Study Survey Specifics

Target Group	Estimated Population Size	Sample Size	Sampling Precision (90% confidence)[1]
Total NY less NYC & Long Island (NYS) Revisit	2,926,768	132	7.2%
Total NY less NYC & Long Island (NYS) First Visit	2,926,768	68	10.0%
NYS Revisits to New Visits			12.4%
Households in New York City Revisit	3,021,588	65	10.3%
Households in New York City First Visit	3,021,588	35	14.1%
NYC Revisits to New Visits			17.5%
Households in Houston Revisit	717,945	64	10.4%
Households in Houston First Visit	717,945	36	13.9%
Houston Revisits to New Visits			17.3%

[1]Proportion of 50%

2.3 DATA ANALYSIS PROCEDURES

Since RDD surveys tend to under-represent certain parts of this target population (*e.g.,* households containing only young adults, households where household heads have a high school education or less, and single person households), relative weights were developed to furnish results that are consistent with the geographic and demographic distribution of households in these areas. The population parameters used to calculate the weights were derived from the American Community Survey (ACS).[2]

Weighting the data is an important means of mitigating the effects of differential non-response by geographic or demographic group and the inability of RDD samples to include households that have no other telephone besides cell phones. Current data indicates that 14.8% of American households are cell-

[2] Bureau of the Census. *American Community Survey*. <http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=ACS&_submenuId=datasets_2&_lang=e>

phone only households.[3] These cell phone only households are more likely to contain younger adults and to be single adult households. The weighting is intended to represent these types of households more appropriately, balance the sample, and bring it into alignment with population parameters on geographic location, household member age, highest level of education by head of household, and household size.

The weighting for the NYS and NYC studies was calculated in two stages: a geographic weight and a demographic weight. These two weights were calculated separately but then combined into one final weight. The Houston study included only a demographic weight as there was no way to subgroup Houston to create a geographic weight. The following procedures were employed:

- Geographic Weight: NYS and NYC Studies Only
    - Counties were combined into regions based on NYSERDA **New York Energy $mart**[SM] Community Regions.
    - The population parameter for the geographic weighting was developed using household counts by county from ACS 2006-2008 three year average data. Schuyler and Hamilton counties were accepted from this process. Data for these counties is from 2000 Census.
    - Geographic weights were created to bring the sample distribution across regions into alignment with distribution of households across regions.
- Demographic Weight: All Studies
    - Demographic data on the ages of adult household members, highest level of education of the household head, and household size were obtained from ACS 2008 data.
- Complete Weight
    - The sample data were weighted with a geographic weight described above for only the New York State and New York City studies. The weighted sample distribution was compared on demographics (*i.e.,* age, education, household size) to population parameters. A demographic weight was calculated to bring sample distributions into alignment with population parameters. The weight at this stage is the geographic weight multiplied by the demographic weight.
    - The weights were trimmed so no individual case had too much impact on weighted data.[4]

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[3] C/National Center for Health Statistics. NHIS – Wireless Substitution, July December 2007. <http://www.c.gov/nchs/data/nhis/earlyrelease/wireless200805/htm>

[4] When weights are calculated iteratively based on several characteristics, sometimes a few respondents (because their unique configuration of characteristics may be unusual) will end up requiring larger weights than the other respondents. For example, the vast majority of cases will have weights that run between one and three, but a few respondents require weights of eight or more. The responses of these few cases would

The evaluators also applied a similar weighting scheme to the onsite data, correcting for demographics and geography to make them more comparable with those of the state or city.

The survey data were analyzed using the Statistical Package for Social Sciences (SPSS) [5] and Excel. The team conducted exploratory data analysis on all variables, producing descriptive statistics such as means and proportions based on the type of question being summarized. RDD survey results are reported for all three comparison areas for 2009 and 2010, while onsite saturation study results are reported for the three comparison areas for 2009 and 2010. The evaluators also tested for both Type I (statistical significance at the 90% confidence level) and Type II (statistical power of 80%) and denoted in tables those comparisons that achieved significance of 90% and/or power of 80%. More specifically, the team tested for the so-called "Type I Error" in which one concludes a difference exists between two groups when it really does not (*i.e.*, in statistical language, rejects the null hypothesis when it should be accepted) by using the following formulas:

$$(Abs\ p_1 - p_2) > 1.645\ sqrt\ (((p_1(1-p_1))/n_1)+((p_2\ (1-p_2))/n_2))\ \textit{(for differences between proportions)}$$

The formula for determining whether the difference between two means is significant at the 90% confidence level is as follows:

$$Abs(mean_1 - mean_2)/sqrt\ ((sd_1^2\ /n_1)+(sd_2^2\ /n_2)) > 1.645\ \textit{(for differences between means)}$$

The team also tested the probability of the so-called "Type II Error" in which one concludes no difference exists, when, in reality, there is a difference (*i.e.*, accepts the null, when it should be rejected). This probability is determined by the *statistical power* of the data, such that the probability of a Type II error is denoted as β and the statistical power is $1-\beta$ (note that the probability associated with the Type I error is denoted as α and $1-\alpha$ is the confidence level). One way of improving statistical power and thus reducing the chances of a Type II error is to increase sample size, but this step can actually increase the chance of a Type I error because small differences achieve statistical significance when sample sizes are large. From a practical standpoint, larger sample sizes also increase the costs of conducting a study. Therefore, applied social and behavioral researchers commonly accept 80% as a desirable level of statistical power (or 20% probability of Type II error), which generally allows for reasonable sample sizes that do not lead to overly sensitive tests of statistical significance for Type I errors at the 90% confidence level.[6]

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have a very large influence on than resulting weighted data. Therefore, we trim their weight back to three or four, bringing them in line with how they should be counted in the sample without giving them such large weights. Trimming is done on very few cases (usually 5% or less of the cases).

[5] SPSS Inc. (2008) *Statistical Package for Social Sciences 16.0*. SPSS, Inc: Chicago, IL.

[6] *HyperStat Online Contents* Chapter 11: Power. 2009. http://davidmlane.com/hyperstat/A3266.html Accessed 2/16/09.

Note that tests for statistical significance and power were performed for all comparisons between NYS and NYC and within NYS and NYC but across time period. Based on the advice of a consultant to DPS, the team did not perform statistical comparisons between the NYSERDA service territories and Houston, as it may be that Houston no longer serves as an appropriate comparison area to NYC. Statistical power was determined using the G Power Program (Version 3).[7] In text, the team states whether comparisons achieved statistical significance, but results for tests of statistical power are noted only in tables.

In comparing results from 2009 and 2010, one should keep changes in sample sizes into account. In 2009, the evaluators sampled greater numbers of people in both the RDD and onsite surveys than in 2010. In 2010, NYSERDA and DPS opted for a smaller study in light of the fact that a large CFL impact study had been completed in 2009 and that the lighting market will undoubtedly change in 2012 when the Energy Independence and Security Act of 2007 (EISA) goes into effect and raises the efficiency standards for lighting products. Small sample sizes—and the ability to generalize from them—serve as one drawback of the reduced scope in 2010.

[7] *G-Power 3*. Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. 2007. "G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences." *Behavior Research Methods, 39*, 175-191.

Section 3

AWARENESS OF CFLS

The evaluation team asked random digit dial (RDD) survey respondents from 2009 and 2010 about their awareness and familiarity with compact fluorescent lamps (CFLs). These questions served two purposes. First, they served as "screeners" for later RDD questions so that those not aware of or at all familiar with CFLs were not asked questions about CFL use or purchases. Second, the questions allowed the researchers to identify differences in awareness of and familiarity with CFLs among the three areas in the study as well as between respondents who only took part in the RDD and those who also participated in the onsite studies.

The findings indicate that both 2009 and 2010 RDD respondents from New York State, less Nassau and Suffolk Counties (hereafter NYS) were significantly more likely to be aware of CFLs compared with the New York City (NYC) respondents. Likewise, RDD respondents in NYS in both years were also more likely than NYC respondents to rate themselves as "very familiar" with CFLs. Awareness among RDD respondents remained stable between 2009 and 2010 in NYS, but those rating themselves as "very familiar" increased significantly.

The evaluation team also compared the 2010 onsite participants for each area in the analysis to assess possible differences. Participants in NYS were most aware and familiar with CFLs, while Houston displayed less awareness and familiarity.

3.1 AWARENESS AND FAMILIARITY WITH CFLS

Table 12 and Figure 1 and

Figure 2 summarize the 2009 and 2010 RDD survey respondents' self-reported awareness of and familiarity with CFLs in all three areas. NYS RDD respondents in 2010 voiced significantly greater awareness of CFLs than 2010 NYC respondents. Ninety percent of NYS respondents were aware of CFLs while only 72% of NYC respondents were aware of them. Most NYS (77%) and NYC (63%) respondents rated themselves as either "somewhat" or "very familiar" with CFLs. Eighty-one percent of respondents in Houston were aware of CFLs, an increase from last year's reporting of 76% awareness, likely suggesting that the Houston CFL market is growing rapidly even as the more mature market in NYS shows more stability in awareness and that in NYC demonstrates volatility. The volatility in NYC could be an artifact of the smaller sample size of the 2010 RDD survey than in 2009 or perhaps the representation of a greater number of households headed by someone lacking a high school diploma, who self-identifies as non-white, or who does not primarily speak English, all factors associated with lower levels of CFL awareness (see Appendix A for a comparison of demographic results for the two surveys).

Additional comparisons of 2009 to 2010 illustrate several significant results. Significantly fewer NYC respondents (72%) were aware of CFLs this year when compared to NYC residents from 2009 (79%). This may reflect a significant change in awareness, but it could also be an artifact of the smaller sample size in 2010. NYS respondents in 2010 rated themselves more familiar with CFLs this year (38% "very familiar") compared with last year (31% "very familiar"). Familiarity also increased from 2009 to 2010 in NYC from 28% to 32% for those "very familiar" with CFLs. Those "not too familiar" with CFLs in NYC decreased from 13% in 2009 to 5% in 2010.

Table 12: Awareness and Familiarity with CFLs by Comparison Area

(Based on all RDD respondents)

Awareness / Familiarity with CFLs	NYS		NYC		Houston	
AWARENESS	2009	2010	2009	2010	2009	2010
Aware of CFLs	91%	90%	79%ab	72%abc	76%	81%
Not aware of CFLs	9	10	21	28abc	24	19
FAMILIARITY	2009	2010	2009	2010	2009	2010
Very familiar	31%	38%c	28%	32%	21%	21%
Somewhat familiar	39	39	31a	31a	33	43
Not too familiar	14	11	13	5acd	13	12
Not at all familiar[1]	14	13	27ab	30ab	32a	24
Don't know / refused	2	0	1	1	1	0
Sample Size	1001	341	502	174	503	180

[1] Includes those not aware of CFLs.

a Statistically significant within a given year at $\alpha = 0.05$, which is the one-tailed test for the 90% confidence level. NYC is compared to NYS.

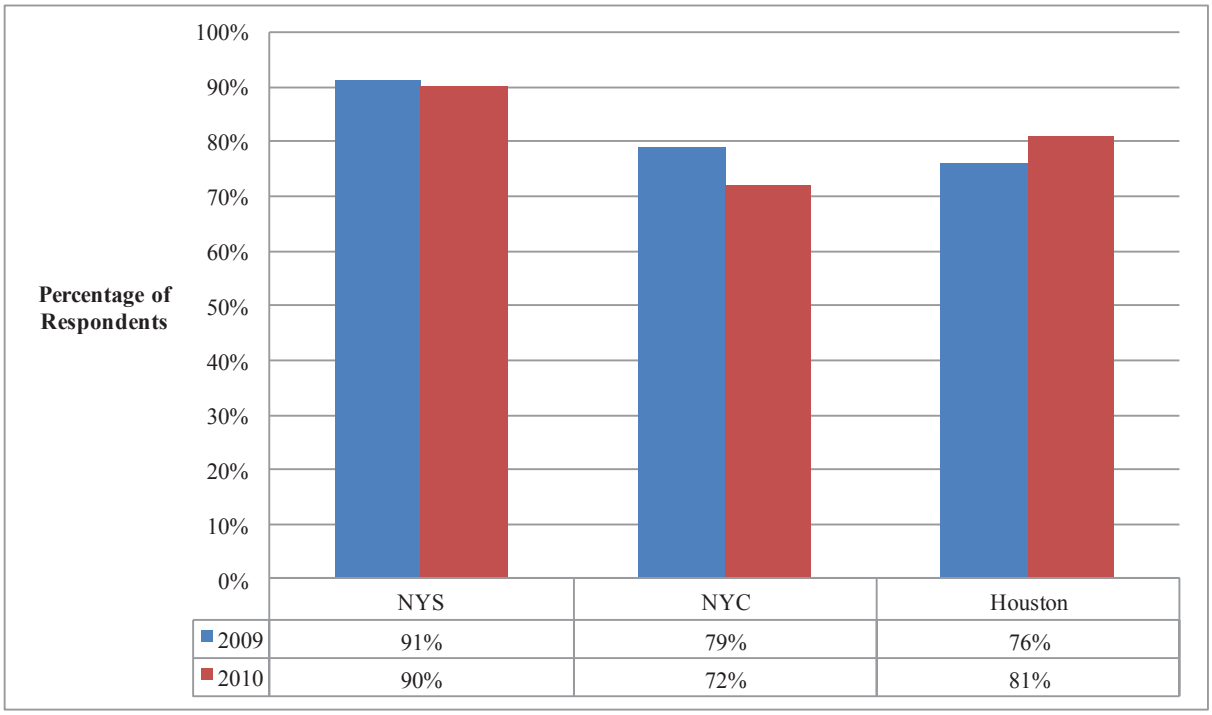
b Statistical power exceeds 80% for one-tailed hypothesis testing. NYC is compared to NYS.

c Statistically significant across years for a given area at $\alpha = 0.05$, which is the one-tailed test for the 90% confidence level.

d Statistical power exceeds 80% across years for a given area for one-tailed hypothesis testing.

Figure 1: Awareness with CFLs by Comparison Area 2009 and 2010

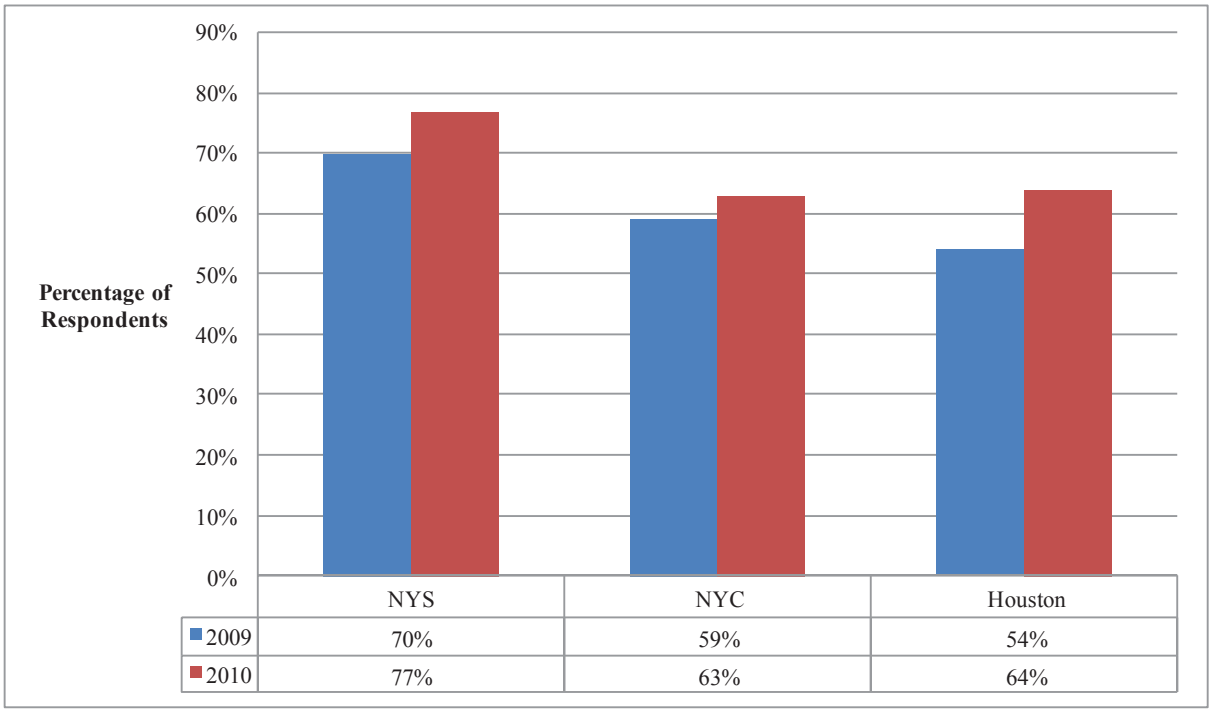
(Based on all RDD respondents)



	NYS	NYC	Houston
2009	91%	79%	76%
2010	90%	72%	81%

Figure 2: Familiarity with CFLs by Comparison Area 2009 and 2010[1]

(Based on all RDD respondents)



[1] Familiar includes those rating themselves as "somewhat" or "very familiar" with CFLs.

As illustrated in Table 13 and Figure 3 a comparison of CFL awareness between *onsite* participants in the three comparison areas revealed the greatest awareness and familiarity with CFLs in NYS and the least in Houston. Ninety-one percent of NYS onsite participants were significantly more aware of CFLs and 77% very or somewhat familiar with CFLs compared to only 81% of the NYC onsite participants aware while 59% of the NYC onsite participants were very or somewhat familiar with CFLs.[8]

[8] Note that the evaluators base the revisit sample awareness and familiarity on their 2009 responses to the RDD survey because, by taking part in the 2009 effort, the evaluation activities made these respondents 100% aware of and more familiar with CFLs even if they had not heard of CFLs before taking part in the evaluation effort.

Table 13: Awareness and Familiarity with CFLs by Onsite Comparison Area 2010

(Based on 2010 onsite respondents)

Awareness / Familiarity with CFLs	NYS	NYC	Houston
AWARENESS			
Aware of CFLs	91%	81%ab	77%
Not aware of CFLs	9	19ab	23
FAMILIARITY			
Very familiar	39%	30%	25%
Somewhat familiar	38	29	39
Not too familiar	10	19	9
Not at all familiar[1]	4	3	5
Don't know / refused	10	19	23
Sample Size	200	100	100

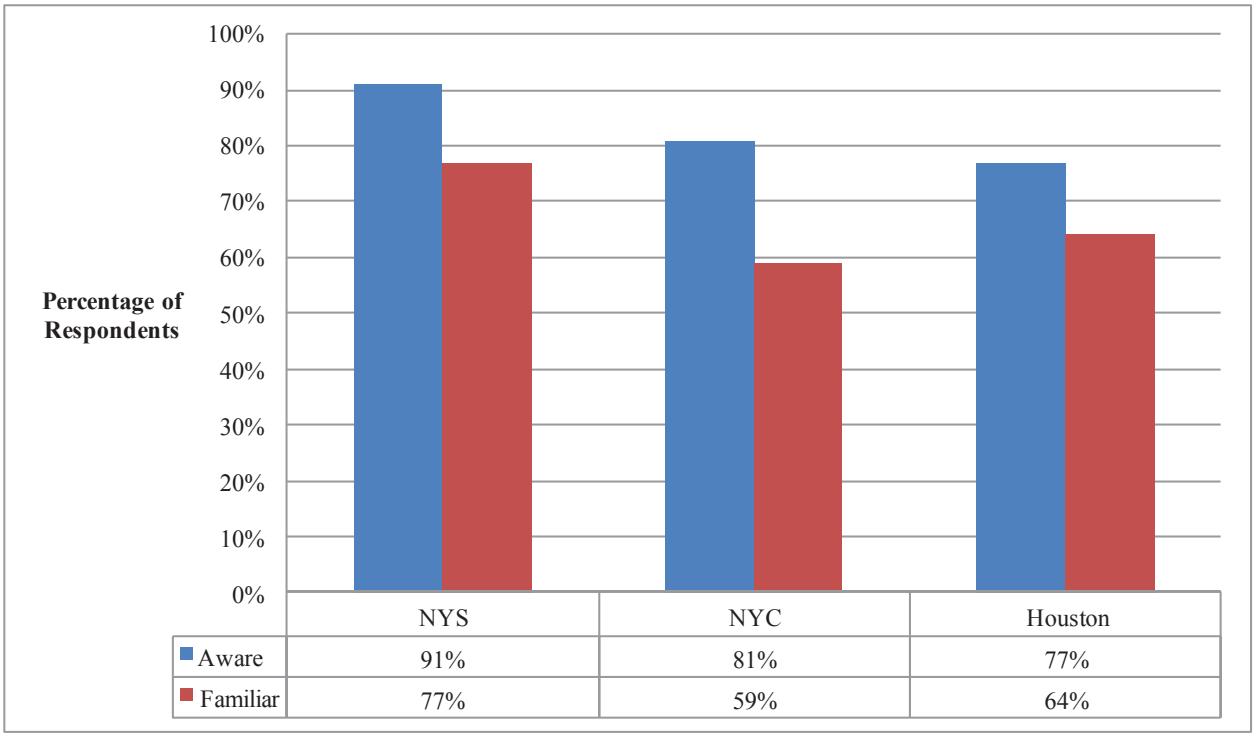
[1] Includes those not aware of CFLs.

a Statistically significant at $\alpha = 0.05$, which is the one-tailed test for the 90% confidence level.

b Statistical power exceeds 80% for one-tailed hypothesis testing.

Figure 3: Awareness and Familiarity with CFLs by Onsite Comparison Area

(Based on 2010 onsite respondents)



	NYS	NYC	Houston
Aware	91%	81%	77%
Familiar	77%	59%	64%

The 2010 RDD respondents were also asked specific questions regarding their familiarity with different types of specialty CFLs (Table 14). The results reveal that many respondents in all three areas voiced very low levels of familiarity with most types of specialty CFLs, with a majority often stating that they were not at all familiar with the various types of specialty CFLs. Respondents were most familiar with globe shaped CFLs (54% for NYS, 47% for NYC and 57% for Houston).

Table 14: Familiarity with Different Types of CFLs by Comparison Area 2010

(Based on all RDD respondents)

Familiarity with Types of CFLs		NYS	NYC	Houston
Dimmable CFLs	Very familiar	12%	17%	11%
	Somewhat familiar	21	19	25
	Not too familiar	17	8	13
	Not at all familiar[1]	49	56	52
	Don't know / refused	1	1	0
3-way CFLs	Very familiar	20%	15%	13%
	Somewhat familiar	19	16	21
	Not too familiar	12	12	14
	Not at all familiar[1]	49	57	52
	Don't know / refused	0	1	0
Flood or recessed lighting CFLs	Very familiar	16%	12%	16%
	Somewhat familiar	18	16	21
	Not too familiar	13	9	10
	Not at all familiar[1]	53	62	54
	Don't know / refused	0	1	0
Candelabra CFLs	Very familiar	16%	12%	13%
	Somewhat familiar	21	16	23
	Not too familiar	15	9	14
	Not at all familiar[1]	48	62	50
	Don't know / refused	0	1	0
Globe CFLs	Very familiar	18%	16%	16%
	Somewhat familiar	26	22	30
	Not too familiar	10	9	11

Familiarity with Types of CFLs		**NYS**	**NYC**	**Houston**
	Not at all familiar[1]	46	53	44
	Don't know / refused	0	0	0
A-shaped CFLs	Very familiar	14%	9%	13%
	Somewhat familiar	20	16	24
	Not too familiar	12	14	15
	Not at all familiar[1]	54	61	49
	Don't know / refused	1	1	0
Sample Size		341	174	180

[1] Includes those not aware of CFLs.

Section 4

USE AND SATISFACTION WITH CFLS

Prior experience with compact fluorescent lamps (CFLs) likely affects current use and purchase of the products. In order to explore prior experience with CFLs, the team asked random digit dial (RDD) survey respondents if they have ever purchased or received a CFL, if they have ever used CFLs, and, if so, when they first used CFLs. Self-identified CFL users were then asked how satisfied they were with CFLs.

The onsite saturation study explored current use of CFLs and other lighting products, and for the revisit sample, compared use in 2009 to 2010.[9] The onsite saturation study found that the current number of CFLs in use at a respondent's home was numerically higher in New York State (less Nassau and Suffolk County and New York City; hereafter NYS) than in New York City (NYC) and Houston. Current 2010 CFL saturations stood at about one in four sockets for NYS and Houston households and one out of three sockets for NYC households. The study found that, in the best case scenario, about 60 to 65% of all sockets in NYS and NYC could still be filled with CFLs, most of which have medium screw bases and adhere to the standard A-shape profile, into which an A-shaped or many spiral shaped CFLs could be installed. However, fixture shape, lighting application, and householder preference mean that actual potential will fall short of these best case scenarios, although the data do not allow the team to estimate by how much. Specialty bulb use is also on the rise as evidenced from the 2010 onsites compared to the overall 2009 sample.

Turning to CFL storage, a majority of onsite respondents in each comparison area stored more CFLs at the time of the 2010 survey than they did in 2009.

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[9] Several households in the 2009 and 2010 onsite revisit sample for all three areas exhibited substantial differences in overall socket counts. The evaluators identified these households and performed further analyses to explain the discrepancies. The team successfully explained enough differences in NYS and NYC to achieve an adequate sample size, but the evaluators performed follow-up calls with some Houston households in an effort to understand the discrepancies. Households where discrepancies could be explained were adjusted and included in the revisit analysis sample; those households with substantial differences (socket count differences greater than 10 remaining) were removed from the analysis. Removal of households from the analysis lowered the overall sample but provided adequate sample for the intended analysis.

4.1 PRIOR USE OF CFLS

The evaluation team asked respondents a few different questions about their prior use of CFLs. The team determined not only if respondents had ever purchased a CFL or received one for free, but also if the respondents knowingly had used CFLs inside or outside of the home. In most cases, the percentage responding that they have ever used a CFL on the inside or outside of their home is slightly larger than the percentage who ever bought CFLs (Table 15). The source of the differences could be CFLs that were installed at the time the respondent moved into their home.

Comparing across areas, the results in Table 15 indicate that NYS respondents in both 2009 and 2010 (66 and 69%, respectively) are significantly more likely than NYC (50% and 53%, respectively) respondents to report that they have purchased or received CFLs. Likewise, NYS respondents in 2010 (69%) are also significantly more likely to report having used CFLs at some point when compared to NYC (53%) respondents. The percentage of respondents in Houston (58%) who have purchased or received CFLs in 2010 is similar to that in NYC (53%). In fact, the Houston comparison area shows a consistent significant improvement in the percentage of respondents having ever purchased or received a CFL from 2009 to 2010 (47% to 58%).

Table 15: Use of CFLs by Comparison Area 2009 and 2010

(Based on all RDD respondents)

	NYS		NYC		Houston	
HAVE EVER PURCHASED OR RECEIVED CFL						
	2009	2010	2009	2010	2009	2010
Yes	66%	69%	50%ab	53%ab	47%	58%
No	19	18	21	15c	20	17
Not aware of CFLs	16	13	28ab	31ab	33	24
Don't know/refused	0	1	1a	1	1	0
Sample Size	1001	341	502	174	503	180

a Significantly significant at 90% confidence level. NYS compared to and NYC.

b Statistical power exceeds 80% for one-tailed hypothesis testing, NYC is compared to NYS.

c Statistically significant across years for a given area at $\alpha = 0.05$, which is the one-tailed test for the 90% confidence level.

While it is important to note that at least 52% of all RDD respondents have used CFLs in both years, there is still a large percent of respondents that have never used them. The 2010 respondents in NYC (46%) are more likely to have never used CFLs when compared to NYS where only one third of respondents have never used them in both years.

When comparing the first use history of CFL use by area between 2009 and 2010, 2010 respondents have been using CFLs longer than 2009 respondents simply because another 1.5 years had passed between fielding the 2009 RDD survey and the 2010 RDD survey. The percentage of respondents who first used CFLs within the past three years decreased from 51% to 35% in NYS between 2009 and 2010, 38% to 32% in NYC and 43% to 28% in Houston (Table 16). In addition, a greater portion of respondents had first used CFLs for more than three years in 2010 than in 2009. In 2009, only 9% of respondents in Houston had first used a CFL for three or more years compared to 34% in 2010, implying a large increase in CFL use from early 2009 to mid-2010.

Table 16: History of CFL Use by Comparison Area, 2009 and 2010

(Based on all RDD respondents)

Years	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Ever Used CFLs	69%	69%	54%ab	57%ab	52%	66%
FIRST USED CFLS						
Never/Don't know[1]	34%	33%	48%ab	46%ab	49%	39%
Less than 1 year	14	6cd	13	3cd	14	5
One to Three years	37	29cd	25ab	29	29	23
More than 3 years	15	32cd	13	22acd	9a	34
Sample Size	1001	341	502	174	503	180

[1] Includes those who do not know if they have used CFLs and who do not know when first used CFLs.

a Significantly significant at 90% confidence level. NYS compared to and NYC.

b Statistical power exceeds 80% for one-tailed hypothesis testing, NYC is compared to NYS.

c Statistically significant across years for a given area at $\alpha = 0.05$, which is the one-tailed test for the 90% confidence level.

d Statistical power exceeds 80% across years for a given area for one-tailed hypothesis testing.

4.2 CURRENT CFL USAGE

In the 2010 onsite visits, a trained technician visited the homes of revisit and first visit participants and identified the type of bulb installed in each socket in the home in order to determine saturation and gather estimates of when respondents recall purchasing CFLs.

Overall, the percent of current CFL users (that is, have at least one CFL installed) is similar between NYS (89%), NYC (86%) and Houston (82%) (Table 17). The average number of CFLs installed in NYS and Houston (12.3 and 10.7, respectively) is also greater than in NYC (7.6), which is likely accounted for by the smaller size of homes in NYC than in NYS or Houston. Compared to 2009, CFL use in NYC remained relatively stable (7.4 in 2009 vs. 7.6 in 2010), while use in NYS increased by one CFL from 11.3 in 2009 to 12.3 in 2010. In Houston, usage increased dramatically from 6.4 CFLs in 2009 to 10.7 CFLs in 2010. In each area, the evaluators find that the relatively few households with more than ten CFLs installed collectively account for the greatest percentage of CFLs installed, meaning a minority of households account for the vast majority of CFLs installed in each area.

Table 17: Current Number of CFLs in Use at Respondents Home by Comparison Area

(Based on 2010 onsite respondents)

# of All CFLs in Use	Category	NYS	NYC	Houston
Zero	% of households	11%	24%	18%
	% of CFLs	0%	0%	0%
One to Five	% of households	26	28	28
	% of CFLs	6	8	7
Six to Ten	% of households	18	24	22
	% of CFLs	12	26	15
More than Ten	% of households	45	35	33
	% of CFLs	83	66	78
All CFLs in Use		2,450	758	1,066
Mean CFLs in Use		12.3	7.6	10.7
Sample Size		200	100	100
Comparison to 2009				
Mean CFLs in Use, 2009		11.3	7.4	6.4
Sample Size, 2009		203	100	99

4.3 SOCKET SATURATIONS

As Table 18 to Table 20 show, the socket saturations for CFLs are increasing in each of the three areas over time. Moreover, as in 2009, saturation rates in NYC (31% in 2010) continued to be higher than NYS (24%) or Houston (23%), in part because of the small size of homes and the fewer number of sockets found in them. However, about two out of three sockets in NYS, three out of five sockets in NYC and almost seven in ten in Houston contain an incandescent or halogen bulb that could be converted to CFLs, if the fixture shape and application are appropriate and the householder desires conversion. Specialty CFLs account for five percent of sockets in NYS, eight percent in NYC and three percent in Houston.

Table 18: Socket Saturation – New York State

(Based on 2009 and 2010 onsite respondents)

Sockets Containing	NYS	
	2009	2010
Total Sockets	12,177	11,559
Incandescent bulbs	65%	57%
CFLs	19	24
Fluorescent	10	12
Halogen	5	6
LED	1	1
Any specialty bulb	33%	48%
Any specialty CFL	8	5
Any dimmable socket	7	6
Any dimmable CFL	<1	0
Any three-way socket	3	3
Any three-way CFL	1	0
Sample Size	203	200

Table 19: Socket Saturation – New York City

(Based on 2009 and 2010 onsite respondents)

Sockets Containing	NYC	
	2009	2010
Total Sockets	3,503	2,909
Incandescent bulbs	62%	53%
CFLs	21	31
Fluorescent	9	10
Halogen	8	5
LED	1	0
Any specialty bulb	34%	48%
Any specialty CFL	1	8
Any dimmable socket	14	8
Any dimmable CFL	1	0
Any three-way socket	2	2
Any three-way CFL	<1	0
Sample Size	100	100

Table 20: Socket Saturation – Houston

(Based on 2009 and 2010 onsite respondents)

Sockets Containing	Houston	
	2009	2010
Total Sockets	4,295	4,849
Incandescent bulbs	68%	67%
CFLs	15	23
Fluorescent	15	7
Halogen	2a	2
LED	<1	0
Any specialty bulb	29%	43%
Any specialty CFL	2	3
Any dimmable socket	2	3
Any dimmable CFL	<1	0
Any three-way socket	1	1
Any three-way CFL	<1	0
Sample Size	99	100

The socket saturation of CFLs by socket type displays the expected pattern (Table 21). Screw base type CFLs represents more than nine out of ten CFLs found onsite.

Table 21: Socket Saturation – CFLs Installed by Socket Type by Comparison Area

(Based on all onsite respondents)

	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Total Sockets with CFLs	929	2,767	433	913	295	1,108
Candelabra	2%	1%	0%	1%	0%	3%
GU Base	<1	1	1	1	0	1
Pin base	2	3	6	6	<1	0
Screw base	97	95	93	92	99	96
Other socket types	0	1	0	0	0	0
Don't know	0	0	0	<1	0	<1

Looking more closely at socket saturation of the revisit households from 2009 to 2010, Table 22 to Table 24 illustrates the increase in saturation of CFLs in each comparison area over time. The NYC sample gained the highest percentage of CFLs at an 8% increase. Both NYS and NYC exhibited a decrease in total sockets from 2009 to 2010, but this may be due to differences in data collection and cleaning procedures rather than an actual removal of sockets from the homes.

Table 22: Socket Saturation Revisit Households– NYS

(Based on revisit onsite respondents)

Sockets Containing	NYS*		
	2009 First Visits	2010 Revisits	Change
Total Sockets	5,651	5,245	-406
Incandescent bulbs	68%	63%	-5%
CFLs	17	23	6
Fluorescent	11	10	-1
Halogen	4	3	-1
LED	1	1	0
Sample Size	94	94	NA

*Analysis based on adjusted 2009 and 2010 onsite revisits taking into account data collection measurement error.

Table 23: Socket Saturation Revisit Households– NYC

(Based on revisit onsite respondents)

Sockets Containing	NYC*		
	2009 First Visits	2010 Revisits	Change
Total Sockets	1,743	1,505	-238
Incandescent bulbs	56%	49%	-7%
CFLs	25	33	8
Fluorescent	12	11	-1
Halogen	5	5	0
LED	1	0	-1
Sample Size	59	59	NA

*Analysis based on adjusted 2009 and 2010 onsite revisits taking into account data collection measurement error.

Table 24: Socket Saturation Revisit Households– Houston

(Based on revisit onsite respondents)

Sockets Containing	Houston*		
	2009 First Visits	2010 Revisits	Change
Total Sockets	2,002	2,021	19
Incandescent bulbs	66%	69%	3%
CFLs	15	21	6
Fluorescent	16	8	-8
Halogen	3	1	-2
LED	<1	1	0
Sample Size	45	45	NA

*Analysis based on adjusted 2009 and 2010 onsite revisits taking into account data collection measurement error.

Table 25 summarizes the distributions of socket types by the bulb currently installed for the 2010 onsite sample.[10] Overall CFL saturation for both NYS and NYC areas is about one- quarter of all sockets. The majority of sockets in homes in NYS (72%) and NYC (71%) have screw-in bases, and nearly all CFLs are installed in screw-in socket bases. Based on the number of sockets containing either incandescent or halogen bulbs, the remaining available potential opportunity for CFLs or light emitting diodes (LEDs) in NYS is 63% of all sockets, of which more than 73% are screw-in base sockets. The remaining available potential for CFLs or LEDs in NYC (again, based on sockets currently filled with incandescent or halogen bulbs) is 58% of all sockets, of which 68% are screw-in base sockets.

[10] The 2010 onsite revisits for NYS and NYC utilized the original, non-adjusted data for analyses.

Table 25: Socket Saturation – Socket Type by Percent of all Sockets* (Based on 2010 onsite respondents)

	NYS								
Sockets Type	All Bulb Types	Incandescent	CFLs	Fluorescent	Halogen	LED	Other Bulb Types	Don't know	Potential for CFLs or LEDs
Total Sockets	11,559	6,534	2,767	1,352	713	102	66	25	7,247
All Socket Types	100.0%	57%	24%	12%	6%	1%	1%	<1%	63%
Candelabra	9%	16%	1%	0%	<1%	2%	0%	0%	
GU Base	1	0	1	0	10	0	0	0	
Pin base	16	<1	3	98	53	36	68	11	
Screw base	72	83	95	2	33	3	19	6	
Other types	1	<1	1	0	2	43	13	4	
Don't know	1	<1	<1	<1	2	16	0	80	
	NYC								
Sockets Type	All Bulb Types	Incandescent	CFLs	Fluorescent	Halogen	LED	Other Bulb Types	Don't know	Potential for CFLs or LEDs
Total Sockets	2,909	1,539	913	284	144	7	10	13	2,032
All Socket Types	100.%	53%	31%	10%	5%	<1%	<1%	1%	58%

Candelabra	14%	25%	1%	0%	1%	0%	0%	0%	
GU Base	<1	0	1	0	0	0	0	0	
Pin base	15	<1	6	99	45	87	85	0	
Screw base	71	74	92	<1	49	0	15	0	
Other types	<1	<1	0	0	0	0	0	68	
Don't know	1	1	<1	0	6	13	0	32	

* Houston is dropped from the comparison tables and associated text unless it was found to provide insightful or significant comparisons.

Table 26 summarizes the distribution of sockets by bulb and bulb feature for the 2010 onsite sample. Approximately one-half or more of all sockets in NYS and NYC contain a standard A-shaped incandescent bulb or a standard twist / spiral CFL. Spot, tube and bullet shaped bulbs make up the remaining majority of bulb types installed. In NYS, the greatest potential for CFLs is in replacing standard A-shaped incandescent bulbs (56%); there is also a notable potential to replace bullet-shaped incandescent bulbs (19%). In NYC, the greatest potential for CFLs is also in replacing standard A-shaped incandescent bulbs at a slightly lower percentage (51%) and the potential to replace bullet-shaped (34%) is substantially notable. It should be noted that spiral shaped CFLs often fit in sockets that contain A-shaped bulbs, so an A-shaped CFL is not always required to replace an A-shaped incandescent.

Table 26: Socket Saturation – Bulb Features by Percent of all Sockets, New York State[1*]

(Based on 2010 onsite respondents)

	NYS							
Sockets Containing	All Bulb Types	Incandescent	CFLs	Fluorescent	Halogen	LED	Other Bulb Types	Don't know
Total Sockets	11,559	6,534	2,767	1,352	713	102	66	25
All Bulb Shapes	100%	57%	24%	12%	6%	1%	1%	0%
A-shaped[1]	33%	56%	6%	0%	1%	1%	0%	0%
Bug	0	0	1	0	0	0	0	0
Bullet / Torpedo	12	19	1	0	10	52	79	5
Circline	0	0	0	4	0	0	0	0
Globe	6	10	2	0	0	1	0	0
Spot / Reflector / Flood	13	13	3	0	79	0	5	11
Twist / Spiral	19	0	81	0	0	0	0	0
Tube	13	1	6	95	7	0	7	1
Other	1	0	0	1	3	35	8	4
Don't Know	0	0	0	0	0	10	0	80

[1] Data starting with the row labeled "A-shaped" should be read down the row; percentages sum to 100% separately for each bulb type.

* Houston is dropped from the comparison tables and associated text unless it was found to provide insightful or significant comparisons.

Table 27: Socket Saturation – Bulb Features by Percent of all Sockets, New York City[1*]

(Based on 2010 onsite respondents)

	NYC							
Sockets Containing	All Bulb Types	Incandescent	CFLs	Fluorescent	Halogen	LED	Other Bulb Types	Don't know
Total Sockets	2,909	1,539	913	284	144	7	10	13
All Bulb Shapes	100%	53%	31%	10%	5%	<1%	<1%	1%
A-shaped[1]	29%	51%	0%	0%	0%	0%	0%	0%
Bug	0	0	0	0	0	0	0	0
Bullet / Torpedo	22	34	5	0	13	22	0	64
Circline	5	0	0	46	0	0	0	0
Globe	5	8	2	0	0	0	0	0
Spot / Reflector / Flood	10	6	10	0	75	0	9	0
Twist / Spiral	20	0	75	0	0	0	0%	0
Tube	9	0	9	54	11	0	2	0
Other	0	0	0	0	1	73	0	0
Don't Know	0	0	0	0	0	5	0	36

[1] Data starting with the row labeled "A-shaped" should be read down the row; percentages sum to 100% separately for each bulb type.

* Houston is dropped from the comparison tables and associated text unless it was found to provide insightful or significant comparisons.

As Table 28 shows, the distribution of CFLs by shape from 2009 to 2010 is similar between all three comparison areas with the exception of the NYS 2010 sample for A-shaped CFLs, the NYC 2010 sample for twist / spiral CFLs and the NYC 2010 sample for spot/flood/reflector CFLs. A total of eight percent of sockets in NYS in 2010 contains an A-shaped CFL compared to one percent in NYC and two percent in Houston. NYC exhibits 12% saturation of spot/flood/reflector CFLs installed in 2010 compared with o two percent in NYS and five percent in Houston.

Table 28: Socket Saturation – CFLs Installed by Bulb Shape by Comparison Area

(Based on all onsite respondents)

	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Total Sockets	2,285	2,111	728	844	638	691
A-shaped	2%	8%	2%	1%	1%	2%
Bug	<1	1	0	0	0	0
Bullet / Torpedo	1	1	1	3	<1	0
Circline	0	0		0	0	0
Globe	2	1	<1	0	9	5
Spot / Reflector / Flood	2	2	2	12	4	5
Twist / Spiral	87	81	85	74	83	85
Tube	5	6	10	9	2	2
Other	0	0	<1	0	0	0
Don't Know	0	0	0	0	0	0

Table 29 and Table 30 summarize the distributions of bulb types by room for the 2010 onsite sample. Although bedrooms, bathrooms, living rooms and kitchens have the most CFLs installed, they continue to offer some of the largest absolute potential for CFLs. Similarly, dining rooms, exterior areas, and foyers also have substantial numbers of CFLs installed but they continue to offer substantial potential for CFL

penetration.[11] Exterior lighting offers a unique opportunity for CFL potential, whereby NYS and NYC exteriors for both samples have between 19% to 35% halogen bulbs installed.

[11]Halogen and incandescent bulbs offer the best potential to be replaced by a CFL. CFL potential is calculated by summing the amount of halogen and incandescent bulbs in use divided by the total sockets available.

Table 29: Socket Saturation – Room types by percent of room sockets, New York State*

(Based on 2010 onsite respondents)

	NYS							
Socket Type	Total Sockets	CFL	Fluorescent	Halogen	Incandescent	LED	Don't know	Potential for CFLs or LEDs
Total	11,559	2,767	1,352	713	6,534	102	25	6,676
Bedroom	1,926	24%	5%	3%	67%	1%	0%	70%
Bathroom	1,460	20	2	5	70	2	1	76%
Living Room	913	29	3	3	64	0	0	67%
Kitchen	1,378	22	24	9	43	1	0	52%
Dining Room	668	16	1	16	67	1	0	83%
Exterior	903	23	2	19	55	1	0	74%
Hall	725	23	4	1	71	1	1	72%
Basement	869	23	39	1	37	0	0	37%
Family Room	485	25	5	6	64	0	0	70%
Foyer	140	23	2	2	73	0	0	75%
Office	255	20	11	4	66	0	0	70%
Garage	479	10	48	1	41	0	0	42%

* Houston is dropped from the comparison tables and associated text unless it was found to provide insightful or significant comparisons.

Table 30: Socket Saturation – Room types by percent of room sockets, New York City, by Onsite Comparison Area 2010*

(Based on 2010 onsite respondents)

	NYC							
Socket Type	Total Sockets	CFL	Fluorescent	Halogen	Incandescent	LED	Don't know	Potential for CFLs or LEDs
Total	2,909	913	284	144	1,539	7	23	1,617
Bedroom	615	33%	3%	2%	61%	1%	0%	63%
Bathroom	325	22	15	4	57	0	2	61%
Living Room	396	31	2	6	61	0	0	67%
Kitchen	361	30	34	6	29	0	1	34%
Dining Room	224	10	1	1	88	0	0	89%
Exterior	124	25	0	35	38	0	2	73%
Hall	266	32	8	3	56	0	0	59%
Basement	59	34	40	0	26	0	0	26%
Family Room	112	40	12	9	40	0	0	49%
Foyer	93	10	2	3	86	0	0	88%
Office	56	33	12	7	47	0	0	55%
Garage	13	0	13	0	84	3	0	84%

* Houston is dropped from the comparison tables and associated text unless it was found to provide insightful or significant comparisons.

The average wattage of bulbs found onsite was calculated for incandescent and CFL bulbs. Wattages of installed incandescent bulbs and CFLs ranged from 3 watts to 300. Several households had three-way bulbs installed ranging in wattage from the 13/18/29 General Electric three-way CFLs to the 100/200/300 incandescent three-way bulbs, and the evaluators used the highest number in their averages. On average the three comparison areas had installed CFLs in the 16 watt range and incandescent bulbs in the 55 to 60 watt range (Table 31).

Table 31: Average Wattage by Bulb Type

(Based on 2010 onsite respondents)

Average Wattage	NYS	NYC	Houston
Incandescent bulbs	58	55	60
CFLs	16	15	16
Sample Size	200	100	100

4.4 SATISFACTION WITH CFLS

The RDD survey asked respondents a series of questions about their satisfaction with CFLs. The vast majority of CFL users in NYS, NYC, and Houston were "satisfied" or "very satisfied" with the CFLs that were currently installed in their homes (Table 32). In NYS, 90% said they were "satisfied" or "very satisfied" with their CFLs in both years and in NYC CFL users reported satisfaction ratings of 94%. The percent of "very satisfied" customers remained relatively stable in NYS and NYC at 60% and 63%, respectively.

Table 32: Satisfaction with Currently Installed CFLs by Comparison Area

(Based on RDD Respondents reported current CFL Users), 2009 and 2010

Satisfaction	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Very satisfied	60%	60%	59%	63%	51%a	61%
Somewhat satisfied	30	30	34	31	37	32
Neither satisfied nor dissatisfied	3	3	3	2	3	1
Somewhat dissatisfied	3	4	3	3	6a	2
Very dissatisfied	3	4	1	0	3a	4
Don't know/refused	1	1	0a	1	0	0
Sample Size	721	235	281	103	295	121

a Significantly significant at 90% confidence level. NYS compared to and NYC. NYC compared to Houston.

b Statistical power exceeds 80% for one-tailed hypothesis testing, NYC is compared to NYS, and Houston is compared to NYC.

c Statistically significant across years for a given area at $\alpha = 0.05$, which is the one-tailed test for the 90% confidence level.

The small numbers of respondents who rated themselves as dissatisfied (as indicated by a satisfaction rating of "very dissatisfied," "somewhat dissatisfied," or "neither satisfied nor dissatisfied") with CFLs named reasons such as the CFLs were not bright enough, light color, and the bulbs burned out, broke, or stopped working (Table 33). A delay in the light coming on was mentioned more often in NYS (15%) than in NYC (0%). More NYC respondents in 2010 than in 2009 cited concern about mercury in CFLs or special disposal needs, with the percentage stating these concerns increasing from 5% to 12%. Note that the high level of dissatisfaction in NYC with CFL brightness in both years may reflect high usage of bulbs with smaller wattages or lumens, but it could also be related to the fact that many NYC residences have fewer windows and are built in close proximity to others, limiting the ambient light that enters the home. The saturation study may provide additional information to explain this finding.

Table 33: Reason for Dissatisfaction with CFLs by Comparison Area*

(Based on RDD respondents with CFL satisfaction ratings of "very dissatisfied," "somewhat dissatisfied," or "neither satisfied nor dissatisfied"; Multiple response) 2009 and 2010

Reason for Dissatisfaction	NYS		NYC	
	2009	2010	2009	2010
Bulb not bright enough	25%	29%	41%	49%
Delay in light coming in	20	15	7a	0
Burned out	18	30	13	24
Light color	15	7	19	27
Fit in the fixture	11	8	0	0
Disposal/mercury hazard	11	11	5	12
No savings/savings not obvious	6	21	4	12
Broke/Stopped working	3	7	4	0
Do not like	3	0	0	0
Appearance	1	6	4	0
Need special bulb outdoors	1	0	0	0
Too bright	0	8	0	0
Did not work with dimmer/3-way switch	0	0	4	0
Flickering	0	0	0	0
Other health concerns	0	0	0	0
Expensive	0	0	0	0
Noisy/hum/whine	0	0	0	0
Brightness (unspecified if too bright, or not enough)	0	0	0	0
Other	0	0	0	0
Don't know/Refused	5	0	0a	0
Sample size	73	23	21	5

* Houston is dropped from the comparison tables and associated text unless it was found to provide insightful or significant comparisons.

4.5 CFL STORAGE

Turning to storage data collected through the onsite saturation studies in 2009 to 2010, as Table 34 and Table 35 show, storage of CFLs by NYS and NYC households is increasing. In 2009 fewer than 28% of NYS and NYC respondents overall were storing CFLs. By 2010, 35% of NYS households and 36% of NYC respondents were storing CFLs. Most households in both years stored fewer than 16 CFLs. In both 2009 and 2010, Houston households stored very few CFLs (Table 36), especially when compared to NYS and NYC.

Table 34: Current Number of CFLs in Storage at Respondents' Home, New York State
(Based on all onsite respondents)

# of All CFLs in Storage		NYS	
	Category	2009	2010
Zero	% of households	72%	65%
	% of CFLs	0%	0%
One to Five	% of households	22	23
	% of CFLs	46	32
Six to Fifteen	% of households	6	12
	% of CFLs	44	60
16 or more	% of households	<1	1
	% of CFLs	10	8
Total CFLs Stored		223	317
Mean		1.1	1.6
Sample Size		203	200

Table 35: Current Number of CFLs in Storage at Respondents' Home, New York City

(Based on all onsite respondents)

# of All CFLs in Storage		**NYC**	
	Category	2009	2010
Zero	% of households	72%	64%
	% of CFLs	0%	0%
One to Five	% of households	24	28
	% of CFLs	55	47
Six to Fifteen	% of households	3	6
	% of CFLs	23	30
16 or more	% of households	1	2
	% of CFLs	22	23
Total CFLs Stored		100	155
Mean		1.0	1.5
Sample Size		100	100

Table 36: Current Number of CFLs in Storage at Respondents' Home, Houston

(Based on all onsite respondents)

# of All CFLs in Storage		Houston	
	Category	2009	2010
Zero	% of households	97%	81%
	% of CFLs	0%	0%
One to Five	% of households	3	19
	% of CFLs	100	80
Six to Fifteen	% of households	0	1
	% of CFLs	0	11
16 or more	% of households	0	<1
	% of CFLs	0	9
Total CFLs Stored		4	42
Mean		.04	0.4
Sample Size		100	100

Section 5

LIGHT BULB PURCHASING BEHAVIOR

Section 5 addresses respondents' light bulb purchasing behavior for both random digit dial (RDD) survey respondents and onsite saturation study participants. The team limited the RDD survey to questions about where respondents shop for lighting products and the distance from respondents' homes to a discount or home improvement store. The onsite saturation survey gathered more information on purchases, asking respondents to state in which time period they purchased each compact fluorescent lamp (CFL) installed or stored in their homes and the type of store where the bulbs were purchased. The time periods under examination in the 2010 onsites included bulbs purchased prior to 2009, in 2009, and in the first half of 2010.

When onsite participants were asked when they obtained their CFLs, respondents in NYS stated that they bought about as many CFLs, on average, prior to 2009 (that is, before the CFL Expansion Program) than they did in the eighteen-month period of January 2009 through June 2010. In NYC, respondents purchased more CFLs in the same eighteen-month period than prior to 2009. Likewise, Houston respondents recalled purchasing more CFLs in the January 2009 to June 2010 period than prior to 2009, but the purchase rates for Houston households in the recent eighteen-month period were greater than for NYC or NYS and represented a greater than 240% increase in purchases than prior to 2009. These different time periods of concentrated CFL purchases may reflect different stages in the maturity of the CFL market, with NYS having the most mature market, NYC being moderately mature, and Houston's CFL market being the least mature of the three but starting to embrace CFLs in large numbers in the first-half of 2010. Put another way, households in the NYSERDA area bought large numbers of CFLs in the past and this offsets the number of CFLs they purchase currently; in contrast, Houston households have just begun to embrace CFLs, leading to rapidly expanding numbers of CFLs purchased.

Respondents to the RDD surveys were most likely to say they *typically* buy CFLs and incandescent bulbs from home improvement, mass merchandise / discount department, and grocery stores. Onsite respondents were asked where they recalled purchasing each *specific* CFL found in their home, and they also named home improvement and mass merchandise / discount department stores *(e.g*. Target or Wal-Mart).

Additionally, for 2010, RDD respondents were asked how familiar they are with federal lighting policy resulting from the Energy Independence and Security Act (EISA) of 2007. This Act requires roughly 25% greater efficiency for light bulbs to be phased in from 2012 through 2014. As the phase in progresses, EISA effectively bans the sale of most incandescent light bulbs currently sold. Most respondents indicated that they were not familiar with EISA, however among those aware of the policy, approximately 34% of NYS respondents and 37% of NYC respondents indicated they would be likely to stock up on incandescent bulbs in anticipation of the Act.

5.1 DATE OF CFL PURCHASE

Onsite participants from 2010 were asked when they obtained their CFLs: prior to 2009, in 2009, or in the first half of 2010. In these onsite visits, a trained technician identified CFLs in storage and in use. The technician then asked the participants when they obtained each CFL. The respondent had to account for an estimated purchase date for each CFL found installed or in storage in the home while looking at the product, thus reducing, but not eliminating, self-report error regarding the date of purchase compared to the error that would have been present had the evaluators simply asked during the RDD survey how many CFLs they had purchased in a given time period.

Table 37 summarizes data on the CFLs purchased prior to 2009 as reported by onsite respondents. Among the three comparison areas, just 40% of NYS respondents had purchased zero CFLs before 2009 compared to 61% of NYC households, suggesting a longer history of CFL use in NYS than in NYC. The households purchasing CFLs prior to 2009 tended to buy one to five CFLs; a greater percentage of NYS respondents reported purchasing six or more CFLs prior to 2009 than in NYC, but this could reflect the larger size of homes in NYS. The data further illustrate that the small percentage of households buying numerous CFLs accounted for a large percentage of total CFL purchases. For example, the six percent of NYS households buying more than 25 CFLs accounted for 34% of all reported CFL purchases prior to 2009. When comparing the mean number of CFLs purchased before 2009, respondents from NYS purchased more than double the number of CFLs per household than respondents in NYC and Houston.

Table 37: CFLs Purchased before 2009 by Comparison Area

(Based on 2010 onsite respondents)

Number of CFLs	Category	NYS	NYC	Houston
Zero	% of households	40%	61%	66%
	% of CFLs	0%	0%	0%
1 to 5	% of households	24	27	21
	% of CFLs	8	24	18
6 to 15	% of households	22	11	10
	% of CFLs	34	40	34
16 to 25	% of households	8	0	2
	% of CFLs	24	0	15
More than 25	% of households	6	2	2
	% of CFLs	34	36	33
Total CFLs Purchased		1,290	247	239
Mean		6.5	2.5	2.4
Sample Size		200	100	100

Comparing the results from Table 37 and Table 38, households in NYS were less likely to buy CFLs in 2009 than before 2009, with the percentage indicating "zero" purchases increasing. Again this represents the possibility that the CFL market in NYS is the most mature; households purchased more CFLs before 2009 and did not have to buy them again in 2009. Overall, at least 52% of households across all three areas did not purchase CFLs in 2009. Those that did purchase CFLs were more likely to purchase between one and five CFLs, followed by six to fifteen CFLs. NYC exhibited a large percentage of households purchasing between six to fifteen CFLs in 2009. This may help explain the boost in the mean number of CFLs purchased in NYC in 2009, which rose from 2.5 in the prior period to 4.4 on average in 2009. Purchases in Houston remained stable prior to 2009 and in 2009.

Comparing the results to those collected in the 2009 survey for "the past year," the evaluators find that the average number of CFLs purchased in the past year increased from 2008 to 2009 in all three areas. NYS saw a modest increase of about 0.4 CFLs purchased in the past year, while NYC experienced an increase of 1.4 CFLs purchased. Purchases in Houston increased by about one CFL per household.

Table 38: CFLs Purchased in 2009 by Comparison Area

(Based on 2010 onsite respondents)

Number of CFLs	Category	NYS	NYC	Houston
Zero	% of households	52%	61%	66%
	% of CFLs	0%	0%	0%
1 to 5	% of households	22	12	21
	% of CFLs	14	7	24
6 to 15	% of households	18	21	8
	% of CFLs	38	41	31
16 to 25	% of households	5	3	3
	% of CFLs	21	12	22
More than 25	% of households	4	4	2
	% of CFLs	27	41	22
Total CFLs Purchased		865	435	236
Mean		4.3	4.4	2.4
Sample Size		200	100	100
Comparison to 2009 Survey				
Mean CFL purchased “in the last year"		3.9	3.0	1.4
Sample Size		203	100	99

Table 39 shows a continued trend of many respondents in NYS and NYC not purchasing CFLs in the first half of 2010, which is, admittedly, only a six-month period rather than the 12-month period of 2009 or the even longer period of all years prior to 2009. Sixty-five percent of respondents in NYC and 62% in NYS did not purchase any CFLs in the first half of 2010. Those NYS and NYC respondents who did purchase CFLs were most likely to buy between one and five CFLs. In contrast, only 52% of Houston respondents did not purchase CFLs in 2010. Unlike Table 37 and Table 38, where the mean number of CFLs purchased by Houston were the lowest by comparison area, the data in Table 39 show that Houston's mean CFL purchase per household rose to 5.8 compared to 1.9 for NYC and 2.5 for NYS in the first half of 2010. These results suggest that the CFL market in NYS and NYC is more mature than in Houston. Households in the NYSERDA area bought large numbers of CFLs in the past, but their purchase rates have slowed. In contrast, the CFL market appears to have recently taken off in Houston, and a greater number of households are buying CFLs in increasing numbers in that comparison area.

Table 39: CFLs Purchased in first half 2010 by Comparison Area

(Based on 2010 onsite respondents)

Number of CFLs	Category	NYS	NYC	Houston
Zero	% of households	62%	65%	52%
	% of CFLs	0%	0%	0%
1 to 5	% of households	22	22	20
	% of CFLs	21	24	10
6 to 15	% of households	11	11	17
	% of CFLs	38	46	28
16 to 25	% of households	4	3	4
	% of CFLs	31	30	13
More than 25	% of households	1	0	7
	% of CFLs	10	0	48
Total CFLs Purchased		506	188	575
Mean		2.5	1.9	5.8
Sample Size		200	100	100

5.2 ESTIMATING PURCHASES FROM REVISIT SAMPLE

In an effort to pinpoint the change in the number of CFLs purchased by revisit households between the first and second onsite surveys in their homes, the evaluation team counted the difference in CFLs in use or in storage from the first visit in 2009 to the second visit in 2010. As Table 40 shows, the 2010 visit households added a total of 331 CFLs for NYS, 163 for NYC and 157 for Houston to their homes between the first and second visits. The average number of CFLs gained per household may be understood as the best estimate of the number of CFL purchases made by these revisit households; the increase in CFL numbers is similar across the three areas, with NYS at 2.9 CFLs, NYC at 2.4 CFLs, and Houston at 3.1 CFLs.

Table 40: CFLs installed and stored, 2009 to 2010 by comparison area
(Based on onsite revisit respondents)

	NYS		NYC		Houston	
	2009 Visit	2010 Visit	2009 Visit	2010 Visit	2009 Visit	2010 Visit
CFLs installed (weighted)*	902	1,182	380	501	293	431
Stored CFLs (weighted)*	69	120	51	93	3	22
Overall change in CFLs 2009 to 2010[1]	331		163		157	
Average number of CFLs gained per household (weighted)	2.9		2.4		3.1	
Weighted Number of Households[2]	114	114	67	67	50	50
Sample size	94	94	59	59	45	45

1 Net increase of CFLs installed minus stored CFLs that were taken out of storage for 2010 plus those gained in storage for 2010

2 The evaluators report the weighted number of households because the weighting scheme is based on the combined revisit and new visit samples. Looking at just a portion of this sample means that the weighted number of *revisit* households differs from the unweighted number of revisit households.

*Analysis based on adjusted 2010 onsite revisits taking into account data collection measurement error.

The average number of CFLs gained between 2009 and 2010 (Table 40) differs greatly from the self-reported differences presented in Table 38 and Table 39. The first two tables present *self-reported* CFL

purchases from 2009 to the first-half of 2010 and do so for *all onsite participants*—new visits and revisits. The data in Table 40, in contrast, derive from the *observations* of onsite technician in *revisit homes only*. Ideally these figures should not differ, yet self reports suffered from lack of accurate recall of when CFLs were obtained, and the technician observations exhibited measurement error.

To verify the accuracy of the revisit purchase estimate further, the evaluators also examined the *unweighted* change in CFLs in use and storage in the revisit sample from 2009 to 2010 with their *self-reported* purchases in the second half of 2009 and the first half of 2010 for the same revisit households. The team compared the unweighted numbers because the weighting scheme has a differential impact on individual households, and the raw comparison offers the more appropriate check on accuracy (Table 41). The results indicate relatively little agreement between the self-reported estimates of CFL purchases and estimated purchases resulting from the comparison of CFLs found in homes in 2009 and 2010. Agreement was closest for CFLs installed in NYS and stored CFLs in NYC and Houston. As indicated earlier, the evaluators have previously documented that self-reported purchases are subject to self-report error; moreover, the overall bulb counts from 2009 to 2010 in revisit homes suffered from measurement error—meaning that some technicians were not able to access all rooms or sockets in the home in one or the other year leading to difficulties in determining the actual change from 2009 to 2010. The data in Table 40 are based on our cleaned and adjusted counts, however, which should have limited these issues. In conclusion, both estimates suffered from some sort of error, and the "truth" regarding the number of purchases remains uncertain.

Table 41: Accuracy Check on Revisit Purchase Analysis

	NYS		NYC		Houston	
	Installed CFLs	Stored CFLs	Installed CFLs	Stored CFLs	Installed CFLs	Stored CFLs
Difference 2009 to 2010 (unweighted)	243	74	73	35	107	10
Self-Reported Purchases 2nd Half 2009 to 1st Half 2010	228	29	184	48	299	10

*Analysis based on adjusted 2010 onsite revisits taking into account data collection measurement error

5.3 RETAILERS WHERE LIGHT BULBS WERE PURCHASED

In the 2009 RDD survey, the evaluators asked respondents where they had purchased their incandescent bulbs and CFLs that they recalled purchasing in 2009. However, as explained in detail in the 2009 report, the evaluators concluded that RDD survey self-reports of purchases were not very reliable, and did not include questions about specific CFL purchases in 2010. Therefore, in the 2010 RDD survey, the evaluators asked respondents to name the types of stores at which they most frequently shop for CFLs and incandescent bulbs rather than tying their responses to the purchase of specific bulbs. Their responses are summarized in Table 42 for CFLs and Table 43 for incandescent bulbs.

Most respondents reported that they often shop for CFLs at home improvement stores, which is also the same type of store at which 2009 RDD respondents most often recalled purchasing CFLs (Table 42). Specifically, more than one-half of the households in both 2009 and 2010 from all three comparison areas indicated buying CFLs from home improvement stores. Mass merchandise / discount stores (*e.g.,* Wal-Mart and Target) were the next most common type of retailer at which respondents in all three areas purchased CFLs. Across NYS, NYC, and Houston there was an increase in respondents reporting their CFL purchases from mass merchandise / discount department stores from 2009 to 2010; 36% to 39% for NYS, 19% to 33% in NYC, and 39% to 51% in Houston.

Table 42: Type of Store where CFL bulbs were purchased by Comparison Area

(Based on RDD survey CFL purchasers, multiple response) 2009 and 2010

Store Type	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Home improvement	54%	56%	55%	65%	60%	59%
Mass merchandise/discount department	36	39	19	33	39	51
Grocery	16	12	12	10	14	8
Warehouse	12	7	14	18	12	27
Hardware	14	9	12	26	7	12
Bargain	5	2	9	4	7	3
Drugstore	4	3	15	2	7	1
Convenience	1	1	1	3	1	0
Electrical/Specialty lighting	2	2	3	2	2	1
Home furnishing	1	1	6	2	1	0
Office supply	0	0	1	1	1	0
Internet	0	0	0	1	0	0
Mail order	0	0	0	0	0	1
Other	1	0	2	0	2	1
Sample size	603	235	250	93	265	106

The stores at which respondents purchased incandescent bulbs were more varied than for CFLs, although home improvement, mass merchandise / discount department, and grocery stores were the most common places to buy incandescent bulbs as well as CFLs in all three comparison areas (Table 43). The somewhat greater variability in the type of stores where respondents buy incandescent bulbs likely reflects the fact that incandescent bulbs are still the dominant residential lighting technology and available in a greater variety of retail stores than CFLs.

Table 43: Type of Store where Incandescent bulbs were purchased by Comparison Area

(Based on all RDD survey respondents, multiple response) 2009 and 2010

Store Type	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Mass merchandise/discount department	56%	42%	30%	22%	67%	53%
Home improvement	50	45	46	43	58	45
Grocery	40	25	34	35	45	22
Hardware	25	12	28	18	15	9
Bargain	21	6	27	12	32	15
Drugstore	13	5	33	8	23	3
Warehouse	12	6	21	13	16	18
Electrical/Specialty lighting	6	2	14	1	4	0
Convenience	3	1	5	1	2	0
Home furnishing	3	0	6	2	3	0
Office supply	2	0	8	0	2	0
Internet	1	0	2	0	1	0
Mail order	0	0	0	0	0	0
Other	1	0	2	0	1	0
Sample size	700	341	357	174	360	180

Additionally, the 2010 onsite participants were also asked to identify the types of stores where they

obtained the installed and stored CFLs found in their homes (Table 44).[12] This question differs from that in the 2010 RDD survey in that it asks about the purchase of *individual* CFLs found in the onsite home, whereas the 2009 RDD survey asked about where respondents *typically* purchase CFLs. Respondents in NYS and NYC exhibit many similarities in their CFL purchasing habits. For both NYS and NYC 2010 respondents, approximately one-half of all CFLs found onsite in NYS were purchased from a home improvement store and two out of five in NYC. Smaller percentages of CFLs in both areas were also purchased at hardware stores, grocery / supermarket, and home furnishing stores. Respondents in NYC, however, offered more varied responses than their counterparts in NYS regarding where they obtained CFLs. Some respondents in NYC had CFLs come with their house (4%) and a significant number indicated that they were given CFLs by a utility (15%) program. Houston respondents indicated that more than four out of five CFL purchases were bought at a home improvement type of store. This may reflect that home improvement stores in the Houston area are the primary retailers of CFLs as opposed to other store types.

[12] The team does not compare these results to 2009 because of a change in the data collection method. In 2009, respondents were asked to name the specific store (*e.g.,* Home Depot, Target, or Ace Hardware) where they purchased the CFLs found in their homes. These results were found to lack validity, with respondents sometimes stating they bought a CFL at a store that did not carry that model. In response, in 2010, the survey simply asked respondents to name the type of store at which they purchased a particular CFLs using similar categories to those included on the RDD survey. The change was great enough, though, to limit the comparability of results between the two years, so the team shows only the 2010 results here.

Table 44: Store Type by Percent of CFLs Purchased

(Based on all 2010 CFLs found onsite)

Store Name	NYS	NYC	Houston
Home improvement	47%	40%	81%
Mass merchandise/discount department	20	2	7
Warehouse store	6	10	3
Hardware store	5	5	0
Grocery/supermarket	5	2	1
Home furnishing	1	3	0
Specialty lighting/electrical	1	2	0
Drugstore	0	2	0
Convenience store	0	0	0
Mail order catalog	1	1	0
Came with house	0	4	0
Internet	0	2	<1
Bargain store	0	3	0
Office supply store	0	0	0
Given by utility	2	15a	0
Given	1	1	0
Other [Specify]	1	2	1
Don't know	9	6	8
Total CFLs purchased	2,767	913	1,108
Total number of households with CFLs	188	81	79
Sample size	200	100	100

[a] One individual in NYC had several bulbs replaced by a ConEdison program; when data are weighted, this exemplifies a small sample bias creating large differences in the reporting.

Largely in support of the multistate modeling effort, RDD survey respondents in 2010 were also asked the average time they must travel to get to the nearest home improvement and mass merchandise / discount department store (Table 45). The team highlighted the distance to these types of stores because they sell the largest number of CFLs nationally, and distance to them could have an impact on CFL purchases for individual households in terms of how easy it is for them to access CFLs. Table 45 shows that it takes less than 15 minutes for about one-half of respondents in NYS to get to a home improvement or discount store. However, the same is true for only 39% of NYC residents, which likely reflects both the smaller concentration of such stores in the City and the greater length of time it takes to travel from place to place due to the high population density in NYC.

Table 45: Average Time to Nearest Discount or Home Improvement Store 2010
(Based on all 2010 RDD survey respondents)

Time	NYS	NYC
Less than 15 minutes	49%	39%a
15-29 minutes	36	31
30-59 minutes	13	19a
60-89 minutes	0	6ab
90 or more minutes	0	1
Don't Know/Refused	2	4
Sample size	341	174

a Statistically significant at 90% confidence level. NYS compared to and NYC.

b Statistical power exceeds 80% for one-tailed hypothesis testing, NYC is compared to NYS.

* Houston is dropped from the comparison tables and associated text unless it was found to provide insightful or significant comparisons

5.4 FEDERAL LIGHTING POLICY

In December 2007, the United States passed EISA to promote energy security and energy savings nationwide.[13] As part of the Act, a 25% increase in light bulb efficiency will take place between 2012 and 2014. While certain specialty bulbs are exempt from this increase (*e.g.,* appliance bulbs, three-way bulbs, etc.), EISA essentially bans the sale of most incandescent light bulbs due to their inefficiency after 2012.

The evaluators asked about respondents' awareness of the standard and if they would stock pile incandescent light bulbs for use after the Act goes into effect starting in 2012. No more than one fifth of respondents in any area were aware of EISA (Table 46). In addition, while most respondents are not likely to stockpile incandescent light bulbs to be used after the federal standard goes into effect, the percentage of all respondents that are somewhat or very likely to do so (34% in NYS and 37% in NYC) could result in substantial hoarding of incandescent bulbs if consumers acted on this stated likelihood (

Table 47). Looking only at those previously aware of the federal standard, the results indicate that 40% of NYS respondents and 70% of NYC respondents indicate that they would be somewhat or very likely to hoard CFLs.

Table 46: Awareness of Federal Standard for Lighting by Comparison Area 2010

(Based on All RDD Respondents)

Familiarity with EISA 2007	NYS	NYC	Houston
Yes	20%	15%	13%
No	79	84	86
Don't know / refused	1	2	1
Sample size	341	174	180

[13]The Act may be accessed here:
http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_bills&docid=f:h6enr.txt.pdf

Table 47: How Likely to Purchase Additional Incandescent Bulbs by Comparison Area 2010

(Based on All RDD Respondents)

Purchase Incandescents	**NYS**		**NYC**		**Houston**	
	All Respondents	Aware of EISA	All Respondents	Aware of EISA	All Respondents	Aware of EISA
Very likely to buy and save incandescent light bulbs for use after 2012	14%	19%	17%	50%ab	16%	19%
Somewhat likely	20	21	20	20	28	20
Somewhat Unlikely	16	15	18	11	23	7
Very unlikely to buy and save incandescent light bulbs for use after 2012	44	44	34ab	19a	29	40
Don't know / refused	6	1	11ab	0	5	13
Sample size	341	62	174	27	180	24

a Statistically significant at the 90% confidence level. NYS is compared to NYC. NYC is compared to Houston.

b Statistical power exceeds 80% for one-tailed hypothesis testing. NYC is compared to NYS, and Houston is compared to NYC.

Section 6

LIGHT EMITTING DIODES

Light emitting diodes (LEDs) are an emerging technology with the potential to save even more electricity than what is now achieved by CFLs. LEDs have high lumen output at very low wattages and have many advantages compared to CFLs (*e.g.,* LEDs do not contain mercury, can be cycled on and off without degradation, turn on to full brightness quickly, and are not as fragile as CFLs and incandescent bulbs). LEDs also have the potential for a much longer lifetime when compared to CFLs (*i.e.,* LED failure is rarely sudden; rather than burning out, the light output fades over time). However, LED products are not always directly comparable to traditional forms of lighting, and while a few LED products are currently available for general lighting applications, the technology is still in development and high cost continues to be a barrier for purchases. The national ENERGY STAR program, under the guidance of the Department of Energy has developed specifications for several LED product categories and continues to facilitate the development of LED quality testing procedures to assess product reliability. As the market for CFLs becomes increasingly transformed and as the federal Energy Independence and Security Act of 2007 (EISA 2007) increases standards for lighting technology, many energy efficiency program sponsors are looking to LEDs as a potential new source of electricity and demand savings. The evaluation team included several questions about familiarity with and use of LEDs in the RDD survey.

Approximately one half of respondents in NYS (52% in 2009 and 51% in 2010) and Houston were familiar with LEDs (48% in 2009 and 47% in 2010); NYC respondents were less familiar with LEDs (34% in 2009 and 39% in 2010) with NYS respondents were least familiar (Table 48). However, familiarity with LEDs declined marginally between 2009 and 2010 in both NYS (52% vs. 51%) and Houston (48% vs. 47%); while a slight increase was seen in NYC (34% vs. 39%).

Table 48: Familiarity with LEDs by Comparison Area

(Based on all RDD respondents)

Level of Familiarity	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Familiar with LEDs	52%	51%	34%ab	39%ab	48%	47%
Sample size (all RDD respondents)	1001	341	502	174	503	180

a Statistically significant at the 90% confidence level. NYS is compared to NYC.

b Statistical power exceeds 80% for one-tailed hypothesis testing. NYC is compared to NYS for a given year.

The evaluators explored familiarity with several types of LED applications among 2010 RDD survey respondents familiar with LEDs. Respondents were most familiar with LED holiday lights, with familiarity ranging from 22% in NYS to 40% in Houston (Table 49). Respondents also voiced awareness with screw-in LED light bulbs, flashlights and night lights with somewhat high frequency across all three comparison areas.

Table 49: Familiarity with Type of Various LED Applications by Comparison Area 2010
(Based on RDD Respondents Familiar with LEDs)

Application	NYS	NYC	Houston
Flashlights	29	23	28
Holiday lights	22%	30%	40%
Night lights	15	21	14
Light bulbs/screw in bulbs	14	12	21
Task/Desk lamps	9	17	8
Under cabinet lighting	9	9	4
Novelty fixtures	8	4	7
Recessed can lighting	1	0	3
None	14	16	7ab
Other	0	0	0
Sample size	173	67	84

a Statistically significant at the 90% confidence level. NYS is compared to NYC.

b Statistical power exceeds 80% for one-tailed hypothesis testing. NYC is compared to NYS.

Respondents familiar with LEDs were also asked to name other LED applications that they were currently using (Table 50). Flashlights, holiday lights, light bulbs, and task / desk lamps were among the most frequently identified applications used among those familiar with LEDs. It should be noted that some applications identified, such as flashlights, may rely on batteries or non-electrical-grid related power.

Table 50: Type of Various LED Applications Owned in Household by Comparison Area 2010

(Based on RDD Respondents Familiar with LEDs)

Application	NYS	NYC	Houston
Flashlights	30%	24%	23%
Holiday lights	16	34ab	21
Task/Desk lamps	11	12	7
Night lights	6	21ab	6
Light bulbs/screw in bulbs	6	10	13
Novelty fixtures	6	0ab	3
Under cabinet lighting	6	8	3
Recessed can lighting	1	1	3
None	31	28	41
Other	0	0	3
Sample size	118	44	61

a Significantly significant at 90% confidence level. NYS compared to and NYC. NYC compared to and Houston.
b Statistical power exceeds 80% for one-tailed hypothesis testing. NYC is compared to NYS, and Houston is compared to NYC.

The potential for replacement and substitution of incandescent and halogen bulbs with various LED technologies is great once the technology matures and price points decrease. In particular task / desk lamps, various screw-in bulbs, under cabinet lighting and recessed can lighting currently utilizing a non LED could potentially be replaced with an appropriate LED bulb.

Section 7

CLIMATE CHANGE ATTITUDES

In 2010, the evaluators asked a series of questions about attitudes and opinions regarding climate change and the environment, again in support of the multistate modeling effort. These questions were intended to capture additional factors that may influence a household's CFL purchase and use behaviors. Data was collected through surveys administered by random digit dial (RDD) survey to the 2010 sample in NYS, NYC, and Houston. A positive attitude towards environmental protection is apparent in the survey results.

When asked about rising temperatures, between 72% (NYS) and 85% (NYC) of all 2010 RDD respondents had some belief in the anthropogenic causes of climate change (Table 51). Differentiating the "definitely yes" responses from the "probably yes" responses, NYC (49%) had the greatest amount of respondents that had a definite belief in anthropogenic causes of climate change when compared to NYS (31%) and Houston (33%). In contrast, one-fifth of all NYS (21%) respondents believed that anthropogenic causes were "probably/definitely not" related to climate change.

Table 51: Belief in Anthropogenic Causes of Climate Change by Comparison Area 2010
(Based on all 2010 RDD respondents)

Climate Change	NYS	NYC	Houston
TEMPERATURE RISING			
Definitely yes	31%	49%	33%
Probably yes	41	36	47
Probably no	15	6	7
Definitely no	6	3	4
Don't know / refused	8	6	9
Sample size	341	174	180

The protection of the environment at the cost of economic growth is the central question being addressed by the results presented in Table 52. At least two-thirds of all respondents in all three areas voiced agreement with the statement that "Protection of the environment should be given priority, even at the risk of curbing economic growth." These percentages are higher than those reported for the nation by Gallup, from whom the evaluators drew this question. The percentage of Americans arguing that the environment should be given priority has not exceeded 60% since April 2000; the percentage was as low as 38% in March 2010, but jumped to 50% in May 2010 after the April Deepwater Horizon oil spill.[14] The nature of this study may have biased respondents toward providing a more environmentally-focused answer than they would otherwise have given.

Table 52: Attitude toward Environmental Protection and Economic Growth by Comparison Area 2010

(Based on all 2010 RDD respondents)

Environmental Protection	NYS	NYC	Houston
"Protection of the environment should be given priority, even at the risk of curbing economic growth"	67%	78%	77%
"Economic growth should be given priority, even if the environment suffers to some extent?"	25	19	20
Refused	9	3	3
Sample size	341	174	180

[14] Jones, J. and L. Saad. 2010. Energy_Environment_May_27_2010.pdf. Wave 1 of a survey performed by USA Today and Gallup in May 2010. Report found at http://www.gallup.com/poll/137888/Energy-Environment.aspx on November 23, 2010.

The results for questions asking RDD respondents about their concerns on global warming, running out of fossil fuels, and depending on foreign oil are shown in Table 53. NYC respondents voiced the greatest concern for all three issues compared to NYS and Houston respondents. Seventy-four percent of all NYC respondents' care a "great deal/fair amount" about global warming compared to only 58% of NYS respondents.

Table 53: Energy-Related Concerns by Comparison Area 2009

(Based on All RDD Respondents)

Energy Related Concerns	NYS	NYC	Houston
GLOBAL WARMING			
A great deal	24%	42%	29%
A fair amount	34	32	30
Only a little	25	16	26
Not at all	17	10	15
Don't know / refused	0	1	0
Sample size	341	174	180
RUNNING OUT OF FOSSIL FUELS			
A great deal	21%	38%	33%
A fair amount	32	27	22
Only a little	28	17	25
Not at all	19	17	20
Don't know / refused	0	2	0
Sample size	341	174	180
DEPENDENCE ON FOREIGN OIL			
A great deal	43%	48%	36%
A fair amount	24	28	26
Only a little	21	8	25
Not at all	11	15	12
Don't know / refused	1	0	0
Sample size	341	174	180

Table 54 shows responses to a series of questions about the respondents' perceived ability to reduce energy use, the cost to do so, and the effect of their actions on climate change. Between 73% (NYS, NYC) and 79% (Houston) respondents either "strongly agree" or "agree" that they will reduce their energy use in the next few months.

Respondents in all areas are more evenly split on whether they agree or disagree with the statement that they cannot do much more to reduce their household energy use, with 51% (in Houston) to 58% (in NYC) strongly agreeing or agreeing with the statement and between 40% (in NYC) to 48% (in Houston) strongly disagreeing or disagreeing with the statement.

About one-quarter of all respondents agree that it is "Too Expensive to Reduce Energy Use". NYC respondents (49%) were the most likely to "disagree" with the statement, followed by NYS (44%) and Houston (35%). However, one-quarter of all RDD respondents "disagree/strongly disagree" that their actions have an influence on climate change.

Table 54: Energy Use and Climate Change Beliefs by Comparison Area 2010

(Based on All RDD Respondents)

Beliefs	NYS	NYC	Houston
WILL REDUCE ENERGY USE			
Strongly Agree	20%	24%	28%
Agree	53	49	51
Disagree	17	21	13
Strongly Disagree	7	3	5
Don't know/refused	3	3	3
Sample Size	341	174	180
CAN'T DO MUCH MORE			
Strongly Agree	15%	16%	17%
Agree	38	42	34
Disagree	37	28	36
Strongly Disagree	8	12	12
Don't know/refused	3	2	1
Sample Size	341	174	180

TOO EXPENSIVE TO REDUCE ENERGY USE			
Strongly Agree	8%	9%	15%
Agree	27	25	25
Disagree	44	49	35
Strongly Disagree	16	14	20
Don't know/refused	5	2	5
Sample Size	341	174	180
BELIEVE MY ACTIONS HAVE INFLUENCE ON CLIMATE CHANGE			
Strongly Agree	16%	24%	15%
Agree	53	50	57
Disagree	19	18	18
Strongly Disagree	8	3	9
Don't know/refused	4	6	2
Sample Size	341	174	180

Early adopter behavior with new technology and respondents' adaptability to it are explored in Table 55. Between 87% and 89% of all respondents are comfortable with new technology, yet between 57% and 70% tend to not like new technology and 66% to 80% tend to be skeptical of it, indicating an aversion to change yet comfortable with it once accepted. Further analysis of the results illustrates that NYC (80%) respondents are more skeptical of technology than NYS (70%) and Houston (66%) respondents. In contrast to the 70% of NYC participants that "strongly disagree" or "disagree" that they like to have new technology, 43% of all respondents in Houston either "strongly agree" or "agree" that they like new technology.

Table 55: Early Adopter Behavior by Comparison Area 2010

(Based on All RDD Respondents)

Beliefs	NYS	NYC	Houston
SKEPTICAL OF TECHNOLOGY			
Strongly Agree	20%	26%	26%
Agree	50	54	40
Disagree	25	18	29
Strongly Disagree	4	3	5
Don't know/refused	1	0	0
Sample Size	341	174	180
LIKE TO HAVE NEW TECHNOLOGY			
Strongly Agree	9%	7%	14%
Agree	23	23%	29
Disagree	46	52	38
Strongly Disagree	22	18	19
Don't know/refused	0	0	1
Sample Size	341	174	180
COMFORTABLE WITH NEW TECHNOLOGY			
Strongly Agree	28%	29%	34%
Agree	61	59	53
Disagree	9	7	10
Strongly Disagree	1	4	1
Don't know/refused	1	2	3
Sample Size	341	174	180

Section 8

CONCLUSIONS

This report summarizes the 2010 results of the random digit dial (RDD) and onsite surveys conducted in New York State (hereafter NYS, excluding New York City (NYC) and Nassau and Suffolk Counties) with Houston, Texas, as a comparison area. This task was completed as part of an impact evaluation of the Compact Fluorescent Lamp (CFL) Expansion Fast Track Program, which is a part of the Energy Efficiency Portfolio Standard Program offering. The surveys were conducted under the direction of NMR Group, Inc. (NMR), part of the Market Characterization and Assessment team led by Navigant Consulting. APPRISE Incorporated managed the data collection efforts. The 2010 RDD survey and onsite saturation study addressed the following issues:

- Awareness of and familiarity with CFLs
- Use and satisfaction with CFLs
- Light bulb purchasing behavior
- CFL use – onsite saturation study
- Light emitting diodes
- Climate change attitudes

The 2010 RDD survey, where applicable, was compared to the 2009 RDD survey results. The onsite saturation studies are also compared between all 2009 onsite participants, the subset of 2009 onsite participants who were "revisited" as part of the 2010 effort, and households visited for the first time in 2010. These two onsite samples have been combined into one onsite sample for most of the analyses in this report, save the few analyses limited only to the revisited households.

The RDD and onsite survey results suggest that the market for CFLs—including CFL awareness, familiarity, and use—is more developed in 2010 than 2009 in all three areas. Purchase of CFLs in NYS and, to a lesser extent, NYC has stabilized over time as the program has matured, while purchases in the non-program area of Houston have increased dramatically over the same time period. Both the RDD and onsite surveys find that the CFL market in NYS was generally more developed than that in NYC.

8.1 CFL AWARENESS AND FAMILIARITY

The evaluation team asked the RDD and onsite survey respondents about their awareness and familiarity with CFLs. The findings indicate that respondents from NYS were more likely to be aware of CFLs compared to the NYC and Houston respondents. Likewise, NYS respondents were also more likely than NYC and Houston respondents to rate themselves as "very familiar" with CFLs, and NYC respondents

were more likely to rate themselves as "very family" with CFLs than Houston respondents. The 2010 RDD sample also asked specific questions regarding familiarity with different types of specialty CFL bulbs. The results suggest that respondents, generally, were not familiar with specialty CFLs of any type, but were most familiar with globe CFLs.

8.2 USEAND SATISFACTION WITH CFLS

Prior experience with CFLs likely affects current use and purchase of the products. In order to explore prior experience with CFLs, the team asked RDD survey respondents if they ever purchased or received a CFL, if they have ever used CFLs, and, if so, when they first used CFLs. Current users of CFLs were then asked how satisfied they were with CFLs.

Most RDD survey respondents from NYS and from NYC had used, purchased, or received CFLs for free at some point prior to the implementation of the RDD and onsite surveys. NYS respondents were more likely to have used or purchased CFLs in the past than were NYC and Houston respondents. Most 2010 NYS respondents had first used CFLs more than three years ago, while most NYC respondents had first used CFLs between one and three years ago.

The onsite saturation study explored how respondents currently use CFLs and provided information to determine socket saturation. Based on data collected during the onsite saturation visits, the study revealed that the current number of CFLs in use at the respondents' homes is greater in NYS than in NYC, a finding likely driven by the small size of homes in NYC that have relatively fewer sockets. Saturation, however, is higher in NYC, where just a few CFLs can boost saturation because the homes have so few sockets. Specifically, the team estimates that about one in four sockets in NYS and about three in ten sockets in NYC contain a CFL. Very few households have specialty CFLs installed. The study finds that, in the best case scenario, about 60% of all sockets in NYS and NYC could still be filled with CFLs, most of which have medium screw bases and adhere to the standard A-shape profile. However, fixture shape, application needs, and the preferences of householders mean that only some of these sockets will actually be converted to CFLs, but the data do not allow us to estimate how many. Bedrooms, bathrooms, kitchens and living rooms have the most CFLs installed and continue to offer some of the largest absolute potential for CFL penetration. Exterior lighting offers a unique opportunity for CFL potential; NYS and NYC exterior fixtures for both samples have between 19% to 35% halogens installed which may be easily replaced with CFLs. The average wattage of an installed CFL in NYS and NYC is similar at 16 and 15 watts, respectively.

The vast majority of RDD survey respondents who self-identified as CFL users in NYS and NYC were "satisfied" or "very satisfied" with the CFLs that were currently installed in their homes. The small number of respondents who rated themselves as dissatisfied generally cited the following reasons: bulb brightness, bulb burn out, light delays, questionable savings, mercury disposal hazard, and unsatisfactory light color.

A majority of respondents in each onsite comparison area reported that they did not store CFLs at the time of the survey. However CFL storage has increased over time from 2009 to 2010. NYC reported storing the greatest number of CFLs on average per household.

8.3 LIGHT BULB PURCHASING BEHAVIOR

The evaluation team assessed respondents' light bulb purchasing behavior for both RDD survey respondents and onsite saturation study participants. The team limited the 2010 RDD survey to questions about where respondents shop for lighting products and how far away respondents live from a discount or home improvement store. The onsite saturation survey asked respondents to state in which time period they purchased the CFLs installed or stored in their homes; the time periods included prior to 2009, 2009, and the first half of 2010.

The onsite results indicated that the number of purchases has stabilized in NYS and NYC at the same time that purchases in Houston appear to have risen dramatically. Respondents to the RDD surveys reported typically buying CFLs and incandescent bulbs from home improvement, mass merchandise / discount department, and grocery stores. Onsite respondents stated that they bought CFLs from home improvement and mass merchandise / discount department stores mostly. Respondents in NYS and NYC typically are within 30 minutes of a home improvement or discount score.

No more than one-fifth of RDD respondents in any area were aware of the Energy Independence and Security Act (EISA) of 2007. More than one-third of total respondents (34% in NYS and 37% in NYC) said they were very or somewhat likely to stockpile incandescent light bulbs after EISA provisions were briefly explained to them. Of those respondents aware of the federal standard, one-half in NYC were significantly very likely to stockpile CFLs.

8.4 LIGHT EMITTING DIODES

The evaluation team included a handful of RDD questions about familiarity with and use of light emitting diodes (LEDs) in the 2010 consumer survey.

About one-half of NYS and Houston respondents were familiar with LEDs. LED awareness in NYC stood at approximately at two in five respondents, significantly lower than in NYS and Houston. Respondents were most familiar with LED flashlights (which do not typically draw power from the grid) and holiday lights. In addition to holiday lights and flashlights, light bulbs, and task/desk lamps were the LED types respondents most frequently reported using.

8.5 CLIMATE CHANGE ATTITUDES

2010 RDD respondents were asked a series of questions exploring their attitudes toward global warming, environmental protection, economic growth, use of fossil fuels, energy use and climate change. Most respondents were found to believe in man-made causes of climate change. In addition, over one-half of all respondents felt that protecting the environment should be made a priority even if economic growth was at risk. Of the RDD respondents asked if they will reduce their energy use, more than seven out of ten respondents agree they will.

2010 RDD respondents were also asked a series of questions relating to early adopter behavior. A large majority of respondents are comfortable with new technology. However, NYC responders are the most skeptical of technology.

8.6 RECOMMENDATIONS

Based on the findings from the RDD and onsite surveys summarized above, the following conclusions and recommendations emerge. Additional conclusions and recommendations are being developed from the multi-state modeling effort, which will be presented under separate cover. Furthermore some of the following recommendations from 2009 are reconfirmed in this year's analysis, suggesting that NYSERDA should continue its efforts in order to move the market for energy-efficient lighting forward.

Conclusion: Until the CFL Expansion Fast Track program started, most of NYSERDA's resources for CFLs had gone toward retailer support and consumer education rather than incentives. In the NYSERDA territory, the vast majority of consumers have known that CFLs exist; consumer awareness as measured in the RDD surveys was over 90% in NYS and 70% in NYC in both 2009 to 2010. There was, however, an increase in the much smaller numbers of consumers who said they were very familiar with CFLs (from 31% in 2009 to 38% in 2010 in NYS; from 28% in 2009 to 32% in 2010 in NYC). Over the same time, the percentage of Houston respondents who said they are very familiar remained constant at 21%. This increase in NYS and NYC may be considered as evidence of the CFL Expansion Program's effectiveness. Moreover, CFL saturation stands at 24% in NYS and 31% in NYC, but ample potential still exists for converting sockets to CFLs and LEDS even in homes that currently use CFLs.

Recommendation: Continue outreach messaging to CFL users encouraging additional purchases of CFLs, rather than focusing on improving consumer awareness. Future marketing campaigns may want to educate committed current CFL users on the benefits of further increasing the number of sockets where they install CFLs.

Conclusion: Of those in NYS and NYC purchasing CFLs in 2010, most purchased between one and fifteen CFLs. NYS and NYC respondents purchased the majority of their CFLs from home improvement stores and mass merchandise / discount department stores, indicating that CFLs move in large numbers from these stores even though they are not program partners.

Recommendation: Continue to incentivize the bulk purchase of CFLs as there is a small but committed group that still purchases more than 25 CFLs per household. However, the successful, non-incented sales of CFLs at home improvement and discount stores suggests that NYSERDA may want to continue its program focus on smaller retailers rather than allocating limited program resources to retailers who will likely still sell large amounts of CFLs without NYSERDA support. If NYSERDA decides to target specialty CFLs, however, they may wish to pursue agreements with these large retailers, who nationally have shown a greater propensity to carry specialty products when incented by CFL programs.

Conclusion: Less than one-fifth of 2010 RDD respondents in the NYSERDA service area are familiar with EISA. In addition, while most respondents are not likely to stockpile incandescent light bulbs to be used after the federal standard goes into effect, the percentage who said they were somewhat or very likely to do so (34% in NYS and 37% in NYC) could indicate the possibility of hoarding of incandescent bulbs, although self-reported intentions of future behavior are generally not reliable. Of respondents who were aware of the federal standard, one-half of those surveyed in NYC said they were very likely to stockpile incandescent bulbs. This could result in the decreased use and flat future purchases of CFLs until the supply of incandescent bulbs is used up—but again, stated intentions are not a reliable measure of future behavior.

Recommendations: Continue outreach messaging to CFL users focusing on the energy savings benefits and comparable quality of light to incandescent bulbs which may discourage stockpiling the bulbs as the federal standard goes into effect. Also, track actual incandescent bulb storage behavior and its relationship to those aware of EISA and intend to hoard.

Conclusion: Many NYSERDA territory households continue to use CFLs, but not in nearly as many sockets as could take a CFL or an LED. The 2010 onsite survey found that 89% of NYS households and 87% of NYC households used CFLs. One in four sockets in NYS (24%) and almost one in three sockets in NYC (31%) contain CFLs. Yet, the highest remaining potential for CFLs or LEDs in NYS and NYC is between 58% to 63% of all sockets. Most sockets have screw-in bases in which A-shaped or spiral-shaped CFLs or screw-in LEDs could be installed. However, the unique characteristics of individual fixtures and applications as well as customer preferences means the achievable potential for CFLs and LEDs is likely lower, but the data do not allow us to estimate how much lower. Exterior lighting offers a unique opportunity for CFL installation, since NYS and NYC exteriors have between 19% to 35% halogens installed which could be replaced by CFLs.

Recommendation: Continue to incentivize products to encourage consumers to purchase CFLs. Specifically target replacement of exterior lighting with CFLs to increase penetration of CFLs in this segment.

Conclusion: Storage of CFLs by the onsite survey participants has increased slightly over time. Most 2010 households in NYS (65%) and NYC (64%) did not have any CFLs in storage. On average, households in

NYC and NYS increased storage of CFLs from less than one in 2009 to between one and two bulbs in 2010.

Recommendation: Continue incentives for multipacks of CFLs so that households can easily have extra CFLs available. Because most consumers prefer to keep bulbs on hand, if they can reach for a CFL without making a special trip to a retailer, they will be more likely to use one the next time a bulb burns out.

Recommendation: To capture program savings from CFLs in multipacks immediately, consumer outreach can also educate consumers about the value of replacing incandescent bulbs with CFLs right away, rather than waiting for them to burn out.

Conclusion: Specialty bulbs comprise a small but important portion of the remaining CFL potential in households in NYS and NYC. Moreover, A-shaped specialty CFLs could fit in most of the sockets currently filled with A-shaped incandescent bulbs.

Recommendation: Consider increasing support for selected specialty bulbs, while maintaining support for standard CFLs. Substantial potential could be reached with A-shaped specialty CFLs in those sockets that at least some households find unattractive when filled with a standard spiral CFLs.

Conclusion: As LED technology progresses and prices decrease, there will likely be increased energy savings potential that exceeds that currently available for CFLs. Roughly one-half of NYS respondents and more than one-third of NYC respondents are familiar with LEDs. Most LED use is for holiday lights, flashlights and nightlights, with a large remaining potential for LEDs in common lighting applications. LEDs offer a potential area for future program focus after the implementation of new lighting efficiency standards resulting from EISA, and with continuing increase in LEDs' lighting efficacy.

Recommendation: Consider increasing the support for common LED lighting applications in tandem with consumer outreach to educate consumers about the value of this emerging lighting technology.

Conclusion: Environmental awareness and positive attitudes toward environmental protection are expressed by most NYSERDA territory respondents. Between 72% (NYS) and 85% (NYC) of all 2010 RDD respondents had some degree of belief in the anthropogenic causes of climate change. At that at least two-thirds of all respondents agreed that the "Protection of the environment should be given priority, even at the risk of curbing economic growth." Climate change is a powerful motivator toward reducing energy use.

Recommendation: Promote the environmental or 'green' benefits of CFL adoption in the continued outreach to consumers.

APPENDIX A

DEMOGRAPHICS

This appendix summarizes the housing, demographic, and socioeconomic characteristics of respondents. While the information is largely presented for review, the analyses discussed in the main document have at times referenced the results presented below, as they may help to explain compact fluorescent lamp (CFL) use and purchasing habits.

HOUSING CHARACTERISTICS

Most survey respondents in New York State (NYS) (75%) and Houston, Texas (67%) owned their homes and lived in single-family attached homes (Table 56). In contrast, less than one-half of New York City (NYC) respondents in 2009 and 2010 (43% and 34%, respectively) owned their homes and only about one-fourth of respondents (22% and 28%, respectively) lived in single-family detached homes. Respondents in NYC were more likely to dwell in single-family attached homes and apartment buildings of all sizes—but especially those with five or more units—when compared to respondents from the other areas.

Table 56: Homeownership Status and Type of Home by Comparison Area

(Based on All RDD respondents)

Home Type	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Own/buying home[1]	75%	68%	43%	34%	67%	58%
TYPE OF HOME						
Single-family detached home	69%	63%	22%	28%	67%	57%
Single-family attached home (duplex, row home)	10	5	17	17	10	17
Apartment building with 2-4 units	8	15	16	14	5	10
Apartment building with 5 or more units	7	10	39	38	14	11
Mobile home	5	7	3	0	4	4
Other	0	0	1	0	0	0
Don't know/refused	0	0	2	3	1	0
Sample size	1001	341	502	174	503	180

[1] Buying refers to respondents who were in the process of buying a home at the time of the survey.

Within the 2010 onsite samples, more than two-thirds of NYS participants owned or were buying their homes; more than one-half of Houston participants and about one-third of NYC participants owned or were buying their own homes (Table 57). Single family detached homes ranged from close to two-thirds of the NYS and Houston onsite visits to lows of approximately one in five of NYC, where most households lived in buildings with five or more units.

Table 57: Onsite Homeownership Status and Type of Home by Comparison Area

(Based on 2010 onsite respondents)

Home Type	NYS	NYC	Houston
Own/buying home[1]	68%	34%	55%
TYPE OF HOME			
Single-family detached home	63%	18%	66%
Single-family attached home (duplex, row home)	7	16	9
Apartment building with 2-4 units	14	16	6
Apartment building with 5 or more units	10	47	16
Mobile home	7	0	3
Other	0	2	0
Don't know/refused	1	1	0
Sample size	200	100	100

Table 58 summarizes the year in which 2009 and 2010 RDD survey respondents' homes were built, but the analysis is limited to only single-family detached or attached homes because these respondents would be the most likely to have accurate information on the age of their homes. In NYS and NYC, the largest percentage of homes was built in the 1930s or earlier. In, Houston homes were newer, with the largest percentage of homes built in 2000 or later (21% for 2009 respondents and 20% for 2010 respondents).

Table 58: Decade Home was built by Comparison Area

(Based on respondents living in Single Family Homes)

Decade	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
1930s or earlier	25%	18%	25%	13%	4%	3%
1940s	5	9	6	1	6	1
1950s	14	9	16	13	8	8
1960s	11	7	9	11	14	7
1970s	11	13	4	16	14	17
1980s	9	17	4	11	16	24
1990s	7	10	2	16	6	13
2000 or later	6	10	2	7	21	20
Don't know/refused	13	4	31	11	12	9
Sample size	851	232	223	78	413	135

Respondents from the NYC RDD samples were more likely (53% and 48%) to live in small homes (less than 1,400 square feet) relative to the other comparison areas (32% and 23% in Houston to 31% and 32% in NYS) (Table 59). Few respondents from any of the areas lived in homes 3,500 square feet or larger.

Table 59: Size of Home by Comparison Area

(Based on all RDD respondents)

Square Feet	NYS		NYC		Houston	
SQUARE FEET						
	2009	2010	2009	2010	2009	2010
Less than 1,400	31%	32%	53%	48%	32%	23%
1,400-1,999	31	32	25	23	31	36
2,000-2,499	18	18	10	15	16	18
2,500-3,499	14	11	6	9	12	16
3,500-3,999	1	3	1	3	3	4
4,000-4,999	2	1	1	1	1	2
5,000 or more	1	3	2	1	2	1
Don't know/Refused	2	<1	3	<1	3	<1
Sample size	1001	341	502	174	503	180

DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS

Table 60 shows that there were only slight differences in the educational background of RDD respondents in NYS compared with NYC. Most respondents had at least some college level education in NYS (56% in 2009 and 59% in 2010), NYC (53% in 2009 and 57% in 2010) and Houston (55% in 2009 and 58% in 2010). Respondents in NYS and Houston exhibit the highest amount of educational disparity, with 19% of 2010 NYC and 20% of 2010 Houston respondents not attaining a high school diploma while 14% and 13% of the same sample earned a graduate or professional degree, respectively.

Table 60: Highest Level of Education by Comparison Area

(Based on All RDD Respondents)

Education	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Less than ninth grade	1%	2%	3%	2%	4%	4%
Ninth to twelfth grade no diploma	4	9	6	17	8	16
High school graduate (includes GED)	35	29	33	24	31	22
Some college, no degree	17	21	11	13	19	18
Associates degree	10	8	8	8	7	10
Bachelors degree	15	19	16	22	17	17
Graduate or professional degree	14	11	18	14	12	13
Don't know/refused	4	1	4	2	2	0
Sample size	1001	341	502	174	503	180

The education level of 2010 onsite participants (Table 61) is very similar to that of the respondents from the RDD survey. In general, most participants had at least an associate's degree at 43% in NYS, 46% in NYC, and 47% in Houston. The NYC sample had the highest overall education attainment with 22% of the sample having earned a graduate or professional degree while the Houston sample had the largest percentage without a high school diploma (15%).

Table 61: Highest Level of Education by Comparison Area

(Based on 2010 onsite respondents)

Education	NYS	NYC	Houston
Ninth to twelfth grade no diploma	7%	12%	15%
High school graduate (includes GED)	30	28	24
Some college, no degree	18	12	14
Associates degree	9	5	10
Bachelors degree	15	19	20
Graduate or professional degree	19	22	17
Don't know/refused	1	2	0
Sample size	200	100	100

Table 62 shows slight differences in household income in the comparison areas among those who were willing to disclose that information in the RDD survey from 2009 to 2010.[15] A noteworthy number in each comparison area show total household incomes below $15,000. The sample in NYC below $15,000 increased from 13% to 17% from 2009 to 2010. Both NYS and Houston saw slight decreases at this minimum level and slight gains in the income categories just above. Interestingly, respondents in all areas from 2009 to 2010 were fairly evenly spread throughout the various income categories above $15,000, although the demographic and socioeconomic weighting scheme may be equalizing the distribution somewhat.

Table 62: Household Income by Comparison Area

(Based on All RDD Respondents)

Response	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
HOUSEHOLD INCOME						
$14,999 or less	13%	8%	13%	17%	14%	11%
$15,000 to $19,999	4	9	4	9	7	12
$20,000 to $29,999	9	15	6	14	9	13
$30,000 to $39,999	7	10	7	14	8	12
$40,000 to $49,999	8	12	8	6	5	10
$50,000 to $74,999	12	12	9	6	8	8
$75,000 to $99,999	9	6	6	7	11	8
$100,000 to $149,999	7	6	6	6	7	7
$150,000 or more	3	4	6	4	5	4
Refused	22	15	27	15	17	13
Don't know	5	3	10	3	8	4
Sample size	1001	341	502	174	503	180

[15] The categories are based on those used and reported by the US Census Bureau.

Table 63 shows that household income for onsite respondents is spread across all income ranges in NYS, NYC, and Houston similar to the results of the RDD survey. Again NYC has the highest number of households having less than $15,000 in annual income.

Table 63: Household Income by Comparison Area

(Based on onsite respondents)

Response	NYS	NYC	Houston
HOUSEHOLD INCOME			
$14,999 or less	11%	15%	13%
$15,000 to $19,999	7	10	8
$20,000 to $29,999	14	11	8
$30,000 to $39,999	12	11	11
$40,000 to $49,999	14	13	12
$50,000 to $74,999	14	8	7
$75,000 to $99,999	8	9	11
$100,000 to $149,999	10	9	6
$150,000 or more	5	3	1
Refused	5	6	15
Don't know	<1	3	7
Sample size	200	100	100

The race and ethnic mix of RDD respondents in NYS was similar from 2009 to 2010, with a large majority of respondents identifying themselves as white, 85% and 88%, respectively (Table 64). In contrast, 59% of 2009 NYC respondents and 50% of 2010 NYC respondents identified themselves as white. Houston respondents, similar to NYC, identified as 56% white in 2009 and 65% in 2010. Houston and NYC respondents in both years were more likely to identify themselves as Hispanic than NYS respondents, reflecting both the demographics of the areas as well as the fact that the team fielded the survey in Spanish in those two cities but nowhere else.

Table 64: Race and Ethnicity by Comparison Area

(Based on All RDD Respondents)

Race and Ethnicity	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
RACE OF RESPONDENT						
White	85%	88%	59%	50%	56%	65%
Black or African-American	7	5	19	35	24	18
American Indian, Native Hawaiian, or Alaska Native	1	2	1	1	1	2
Other	2	3	7	10	2	12
Don't know/refused	5	1	14	4	3	3
HISPANIC IN HOUSEHOLD						
Yes	4%	8%	10%	23%	12%	27%
Sample size	1001	341	502	174	503	180

While the majority of 2010 onsite respondents identified their race and ethnicity as being white (Table 65), a high percentage of respondents living in NYC identified themselves as being Black or African-American (34%). This self identification is higher than NYS where only 10% identified as being Black or African American. That said NYC when compared to Houston and NYS had the lowest percentage of respondents identify as being white (50%).

Table 65: Race and Ethnicity by Comparison Area

(Based on 2010 onsite respondents)

Race and Ethnicity	NYS	NYC	Houston
RACE OF RESPONDENT			
White	87%	50%	63%
Black or African-American	10	34	22
American Indian, Native Hawaiian, or Alaska Native	1	1	2
Other	2	11	7
Don't know/refused	<1	3	8
No Answer	0	2	0
Sample size	200	100	100

Table 66 summarizes the primary language RDD respondents claimed to speak at home. Prior to discussing the results, it is important to recall that the survey was conducted only in English in NYS, and in English and Spanish in NYC and Houston. Those with limited English or Spanish skills may not have been able to answer the survey if they could not communicate effectively with the interviewer.

With this caveat in mind, Table 66 shows that English was the primary language spoken at home across all comparison areas, ranging from 83% in Houston in 2010 to 97% in NYS in 2009. NYC and Houston respondents from 2010 identified Spanish as their primary language in large numbers, 13% and 17%, respectively. This represents an increase from 2009 of 4% and 7%, respectively. Within NYS, English was the primary language spoken in 93% or more of the respondents' households.

Table 66: Primary Language Spoken in the Home by Comparison Area

(Based on All RDD Respondents)

Language	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
English	97%	93%	85%	86%	89%	83%
Other (Specify)	1	0	2	1	1	1
Spanish	0	6	9	13	10	17
Mandarin	0	1	0	0	0	0
Russian	0	0	1	0	0	0
Don't know/refused	1	0	2	0	1	0
Sample size	1001	341	502	174	503	180

Compared to the RDD survey respondents, onsite respondents in all areas were far more likely to speak English primarily at home. This may reflect the fact that the onsite technicians most often spoke English as their first language, making some non-English speakers hesitant to take part in the onsite.

Table 67: Primary Language Spoken in the Home by Comparison Area

(Based on 2010 onsite respondents)

Language	NYS	NYC	Houston
English	95%	94%	93%
Spanish	4	3	7
Other	1	0	0
Refused	0	1	0
No Answer	0	2	0
Sample size	200	100	100

Table 68 shows that across comparison areas, more RDD respondents were females than males (53% or more). NYC and Houston respondents in 2010 were more likely to be female than in 2009 (62% vs. 55% and 63% vs. 58%, respectively).

Table 68: Gender by Comparison Area

(Based on All RDD Respondents)

Gender	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Female	57%	53%	55%	62%	58%	63%
Male	43	47	45	38	42	37
Sample size	1001	341	502	174	503	180

On average, the RDD survey households in all three areas had fewer than one child under 17 years old; 2010 NYS and NYC households had the smallest number of children (0.5) on average and 2009 Houston had the highest (0.9) (Table 69). The average number of household residents age 65 or older in 2009 and 2010 was also less than one, varying from 0.1 in Houston to 0.4 in NYS. Overall average household size varied from 2.5 individuals in the 2010 NYS sample to 3.0 individuals in the 2009 Houston sample.

Table 69: Number and Age Group of Persons Living in the Home by Comparison Area

(Based on RDD respondents providing usable answers on household composition)

Number of People by Age Group	NYS		NYC		Houston	
	2009	2010	2009	2010	2009	2010
Mean number of under 17 in home	0.6	0.5	0.6	0.5	0.9	0.7
Mean number of over 65 in home	0.4	0.1	0.3	0.1	0.2	0.1
Mean household size	2.6	2.5	2.6	2.7	3.0	2.9
Sample size	963	339	478	173	491	138

In Table 70, 2010 RDD respondents in all three comparison areas exhibit high satisfaction with their standard of living, with at least three out of four respondents reporting they were very or somewhat satisfied. NYS respondents were the most dissatisfied, with 13% reporting being somewhat or very dissatisfied with their standard of living.

Table 70: Satisfaction with Standard of Living by Comparison Area 2010

(Based on 2010 RDD respondents)

Satisfaction	NYS	NYC	Houston
Very satisfied	39%	34%	24%
Somewhat satisfied	40	42	53
Neither satisfied nor dissatisfied	7	14	12
Somewhat dissatisfied	9	4	6
Very dissatisfied	4	2	5
Don't know/ refused	2	4	0
Sample Size	341	174	180

2010 RDD respondents were also asked to identify the method by which they pay their electric bills. Almost all respondents in NYS and Houston pay their bills directly to the electric company (Table 71). Only 79% of NYC respondents pay directly to the electric company while 19% pay the bill as part of their rent or via a condominium maintenance payment.

Table 71: Method of Electric Bill Payment by Comparison Area 2010

(Based on 2010 RDD respondents)

Satisfaction	NYS	NYC	Houston
Direct to electric company	94%	79%	98%
Part of rent/condo fee	5	19	1
Other	1	0	1
Don’t know / refused	0	2	0
Sample Size	341	174	180

The 2010 onsites reported a similar pattern to the RDD sample with respect to the method of paying the electric bill (Table 72). The majority of NYS and Houston participants paid their bill directly to the electric

company while a sizable percentage of NYC participants (23%) pay as part of the rent or via a condominium maintenance payment.

Table 72: Method of Electric Bill Payment by Comparison Area

(Based on 2010 onsite respondents)

Satisfaction	NYS	NYC	Houston
Direct to electric company	89%	71%	94%
Part of rent/condo fee	7	23	7
Other	3	0	0
Don't know / refused	2	6	0
Sample Size	200	100	100

APPENDIX B

COMPARISON OF REVISIT AND NEW VISIT HOUSEHOLDS

The analyses presented in the full report combine the revisit onsite sample and the first visit onsite sample into one combined onsite sample. As discussed more fully in the report, the revisit sample was comprised of households that took part in both the 2009 and 2010 onsite lighting saturation surveys. The purpose of performing the "revisits" in 2010 was to see how lighting usage and storage had changed over time, thereby providing an alternative method to estimate CFL purchases and gauge how CFL saturation and storage had changed over time. The "first visit" onsite sample included households identified in the 2010 Random Digit Dial (RDD) telephone survey who then were sampled to take part in the 2010 onsite survey.

On the advice of a consultant to the New York State Public Service Commission, the evaluators combined the revisit and first samples into one collective onsite sample for two primary reasons. First, combining the two samples allowed for easier identification of patterns over time within areas and within a time period across areas. Second, the sample sizes for the first visit were small, limiting any conclusions that could be drawn by examining the first visit sample in isolation. The evaluators, however, believe it is important to compare the revisit and first sample samples on a few key CFL-related and demographic characteristics. This appendix provides such a comparison.

Turning first to New York State (less New York City and Nassau and Suffolk Counties, hereafter NYS), the comparison of the revisit and first visit samples shows similar rates of CFL awareness, saturation, and purchases in 2009, but the two samples diverge on levels of familiarity, the percentage of the homes using at least one CFL, the mean numbers of CFLs in use, and the mean number of CFLs purchased in 2010 (Table 73). In particular, the revisit sample is more likely to use CFLs, but they use and purchase them in smaller numbers than the first visit sample. Table 74 may provide some explanation for these results. The revisit sample is slightly more likely to live in a large apartment building, to have less than a college degree, to self-identify as non-white, and to have an income of less than $75,000. Such demographic groups are less likely to use CFLs in large numbers, largely because they live in smaller homes that do not have as many sockets. In other words, they simply need fewer light bulbs than respondents living in larger homes.

Table 73: Comparison of New York State Revisit and First Visit Onsite Samples – CFL Related Factors

Characteristic	Revisit	First Visit
Sample Size	*132*	*68*
Aware of CFLs	91%	91%
Somewhat or very familiar with CFLs	75%	80%
Use at least one CFL	91%	84%
CFL socket saturation	22%	21%
Mean number of CFLs in use	11.5	14.2
Mean number of CFLs purchased in 2009	4.2	4.6
Mean number of CFLs purchased in 2010	2.1	3.7

Table 74: Comparison of New York State Revisit and First Visit Onsite Samples – Demographic Factors

Characteristic	Revisit	First Visit
Sample Size	*132*	*68*
Rent Home	68%	68%
Single-family detached home	63%	62%
Apartment with five or more units	10%	8%
Less than a college degree	66%	61%
Racial identification as non-white	14%	8%
Income less than $75,000	75%	68%

Comparisons between the revisit and first visit samples in New York City (NYC) and Houston exhibit greater differences than in NYS on both the CFL-related and demographic factors. The driving force behind these differences are small sample sizes for both the revisit (65 in NYC and 64 in Houston) and first visit (35 in NYC and 36 in Houston) samples. Small samples are more prone to wide variation in estimation because each individual has a greater impact on the average results presented.

With this important explanation in mind, the data for NYC reveal that the revisit sample is more aware of CFLs, more likely to use them, but users and purchases fewer CFLs than the first visit sample (Table 75). This may again be driven by the characteristics of the sample, with the revisit sample being less educated

and having a smaller income than the first visit sample, although it is also the case that the first visit sample is more likely to live in large apartment buildings, which are usually smaller units (Table 76).

Table 75: Comparison of New York City Revisit and First Visit Onsite Samples – CFL Related Factors

Characteristic	Revisit	First Visit
Sample Size	*65*	*35*
Aware of CFLs	85%	73%
Somewhat or very familiar with CFLs	58%	64%
Use at least one CFL	77%	73%
CFL socket saturation	29%	30%
Mean number of CFLs in use	6.5	10.4
Mean number of CFLs purchased in 2009	3.9	5.6
Mean number of CFLs purchased in 2010	1.5	3.0

Table 76: Comparison of New York City Revisit and First Visit Onsite Samples – Demographic Factors

Characteristic	Revisit	First Visit
Sample Size	*65*	*35*
Rent Home	35%	31%
Single-family detached home	15%	27%
Apartment with five or more units	48%	54%
Less than a college degree	64%	39%
Racial identification as non-white	43%	54%
Income less than $75,000	74%	56%

Finally, the Houston samples diverge to an even greater degree, with the revisit sample being more aware and familiar with CFLs, more likely to use at least one CFL, and to have used or purchased CFLs in greater numbers (Table 77). The revisit sample is more likely than the first visit one to rent their homes, to live in either a single-family home or a large apartment building (but not small apartment buildings or mobile homes), but the revisit sample is less likely to have a college degree, to self-identify as white, and to have an income greater than $75,000.

Table 77: Comparison of Houston Revisit and First Visit Onsite Samples – CFL Related Factors

Characteristic	Revisit	First Visit
Sample Size	*64*	*36*
Aware of CFLs	84%	62%
Somewhat or very familiar with CFLs	70%	50%
Use at least one CFL	90%	61%
CFL socket saturation	21%	23%
Mean number of CFLs in use	11.5	8.6
Mean number of CFLs purchased in 2009	2.5	2.1
Mean number of CFLs purchased in 2010	6.8	3.3

Table 78: Comparison of Houston Revisit and First Visit Onsite Samples – Demographic Factors

Characteristic	Revisit	First Visit
Sample Size	*64*	*36*
Rent Home	57%	49%
Single-family detached home	72%	51%
Apartment with five or more units	19%	9%
Less than a college degree	51%	69%
Racial identification as non-white	31%	42%
Income less than $75,000	52%	79%

One pattern of note is the fact that the revisit sample in the relatively more mature CFL markets of NYS and NYC bought fewer CFLs in 2009 and 2010 than did the first visit sample, while in the growing CFL market of Houston, the revisit sample purchased more CFLs than the first visit sample. Interestingly, data from Massachusetts confirm a similar pattern—in that state with a mature CFL market, the revisit sample also reported purchasing fewer CFLs than the first visit sample. The evaluators are not certain why this pattern exists, but they theorize that the revisit respondents are "reacting" to the initial visit in 2009 differently in the mature and growing CFL markets. In NYS, NYC, and Massachusetts, the revisit sample already have a relatively high number of CFLs installed; the initial visit did not pique their interest in buying new CFLs but did make them more attentive to when they bought the products and to provide more

conservative estimates when questioned in 2010 than did the first visit sample. In contrast, in Houston, the initial visit sparked a flurry of purchases among the revisit sample, such that they purchased in greater numbers than their first visit counterparts who did not have the initial visit to spark their interest in CFLs. Unfortunately, the evaluators do not have revisit information from other comparison areas so they cannot test this theory more fully.

APPENDIX C

NMR FIRST DRAFT OF LIGHTING CONSUMER SURVEY

Hello, my name is _____ and I am calling from Braun Research on behalf of the New York State Energy Research and Development Authority or NYSERDA. We are conducting a survey about household lighting. I just want to ask you questions about lighting in your home. I'm not selling anything.

[IF NECESSARY, OFFER THE CONTACT NAME FROM BELOW AS THE PERSON TO CONTACT WITH ANY QUESTIONS ABOUT THE VALIDITY OF THE RESEARCH.]

Contact: Victoria Engel-Fowles, NYSERDA, (866) 697-3732 ext 3207

Introduction

I1. May I please speak with an adult in the household who is responsible for purchasing the light bulbs for your household?

1. YES, I PURCHASE LIGHTS
2. SOMEONE ELSE DOES IT **[ASK TO SPEAK WITH PERSON, REPEAT INTRODUCTION THEN GO TO S1]**
3. NO **[TRY TO RESCHEDULE AND THEN TERMINATE]**

AWARENESS OF ENERGY-SAVING LIGHT BULBS

S1. I'd like to ask you a few questions about your awareness of different types of light bulbs. Before this call today, had you ever heard of compact fluorescent light bulbs, or CFLs?

1	YES	**[SKIP TO S3]**
2	NO	

96 REFUSED

97 DON'T KNOW

S2. Compact fluorescent light bulbs – also known as CFLs – usually do not look like regular incandescent bulbs. The most common type of compact fluorescent bulb is made with a glass tube bent into a spiral, resembling soft-serve ice cream, and it fits in a regular light bulb socket. Before today, were you familiar with CFLs?

1 YES

2 NO **[SKIP TO BUY1]**

96 REFUSED **[SKIP TO BUY1]**

97 DON'T KNOW **[SKIP TO BUY1]**

S3. Would you say that you are very familiar, somewhat familiar, not too familiar, or not at all familiar with CFLs?

1 VERY FAMILIAR

2 SOMEWHAT FAMILIAR

3 NOT TOO FAMILIAR

4 NOT AT ALL FAMILIAR

96 REFUSED

97 DON'T KNOW

Q1. Have you or anyone else in your household ever purchased or been given any compact fluorescent light bulbs or CFLs to use in a home?

1 YES, I HAVE **[SKIP TO S4]**

2 YES, SOMEONE ELSE HAS

3 NO **[SKIP TO S4]**

96 REFUSED **[SKIP TO USE1]**

97 DON'T KNOW **[SKIP TO USE1]**

Q1a. Is that person who had purchased or received the compact fluorescent light bulb an adult?

1 YES **[ASK TO SPEAK TO PERSON AND RESTART AT INTRO, BUT SKIP I1 AND GO TO S1]**
2 YES, NOT AVAILABLE **[TRY TO RESCHEDULE THEN TERMINATE]**
3 NO
96 REFUSED
97 DON'T KNOW

S4. While most CFLs are spiral shaped, CFLs also come in other shapes and some have special features. I'm going to read you a list of different types of CFLs. For each type, please tell me if you are very familiar, somewhat familiar, not too familiar, or not at all familiar with that type of CFLs. [RANDOMIZE ORDER OF A THROUGH F]

[READ IF NECESSARY WITH EACH ITEM] Are you very familiar, somewhat familiar, not too familiar, or not at all familiar with this type of CFLs?

a. Dimmable CFLs. This refers to a CFL that can be used with a dimmer switch to adjust the level of brightness
b. 3-way CFLs. This refers to a CFL that has the ability to shine at 3 different levels of brightness in a 3-way lamp
c. Flood or recessed lighting CFLs
d. Candelabra CFLs. This refers to a CFL with a small base for use in a decorative fixture, such as a chandelier.
e. Globe CFLs. This refers to a CFL that has a round shape and might be used in a fixture, such as a vanity light
f. A-shaped CFLs. This refers to a covered CFL that is made to look and feel like a traditional incandescent or regular light bulb.

1 VERY FAMILIAR

2 SOMEWHAT FAMILIAR

3 NOT TOO FAMILIAR

4 NOT AT ALL FAMILIAR

96 REFUSED

97 DON'T KNOW

CFL USE AND SATISFACTION

USE1. Have you EVER used a compact fluorescent light bulb, or CFL, on the interior or exterior of your home?

1 YES

2 NO **[SKIP TO BUY1]**

96 REFUSED **[SKIP TO BUY1]**

97 DON'T KNOW **[SKIP TO BUY1]**

USE2. Do you currently have CFLs installed on the interior or exterior of your home?

1 YES

2 NO

96 REFUSED

97 DON'T KNOW

USE3. Approximately how long ago did you FIRST use a compact fluorescent light bulb?

[RECORD NUMBER OF YEARS OR MONTHS, NOT A RANGE. IF LESS THAN ONE YEAR, RECORD MONTHS.

IF "DON'T KNOW," PROBE: Is it less than or more than five years ago? WORK FROM THERE TO GET AN ESTIMATE.

ENTER 97 FOR MONTHS AND YEARS IF STILL "DON'T KNOW."

ENTER 96 FOR MONTHS AND YEARS IF REFUSED.]

1 MONTHS _____

2 YEARS _____

USE5. How satisfied are you with the compact fluorescent light bulbs currently in your home or, if you have no CFLs installed right now, the ones you have used in the past? Would you say….?

1 Very satisfied **[SKIP TO BUY1]**

2 Somewhat satisfied **[SKIP TO BUY1]**

3 Neither satisfied nor dissatisfied

4 Somewhat dissatisfied

5 Very dissatisfied

96 REFUSED **[SKIP TO BUY1]**

97 DON'T KNOW **[SKIP TO BUY1]**

USE6. Why are you not satisfied? [DO NOT READ, ALLOW MULTIPLE RESPONSE] [IF RESPONDENT SAYS "BRIGHTNESS" ASK TO CLARIFY IF TOO BRIGHT OR NOT BRIGHT ENOUGH; IF RESPONDENT SAYS "DID NOT LIKE" ASK WHAT ABOUT THE CFL THEY DIDN'T LIKE]

1 BURNED OUT
2 BROKE/STOPPED WORKING
3 NOT BRIGHT ENOUGH
4 TOO BRIGHT
5 DELAY IN LIGHT COMING IN
6 LIGHT COLOR
7 FLICKERING
8 FIT IN FIXTURE
9 APPEARANCE
10 MERCURY/DISPOSAL HAZARD
11 OTHER OR NON SPECIFIC HEALTH CONCERNS
12 SAVINGS LESS THAN EXPECTED
13 OTHER [SPECIFY]

96 REFUSED

97 DON'T KNOW

PURCHASES OF LIGHTING PRODUCTS

Now I have a few questions about where you buy your light bulbs.

BUY1. Where do you buy **incandescent, or regular** light bulbs? [DO NOT READ CHOICES,RECORD UP TO THREE RESPONSES, PROBE TO TRY TO GET MORE RESPONSES IF NECESSARY.]

1. GROCERY STORE OR SUPERMARKET, SUCH AS STOP & SHOP OR WHOLE FOODS
2. WAREHOUSE STORE, SUCH AS BJ'S, COSTCO,OR SAM'S CLUB
3. HOME IMPROVEMENT STORE, SUCH AS HOME DEPOT OR LOWE'S
4. HARDWARE STORE, SUCH AS TRUVALUE, ACE HARDWARE, OR AUBUCHON
5. MASS MERCHANDISE OR DISCOUNT DEPARTMENT STORE, SUCH AS A WAL-MART, K-MART, OR TARGET
6. DRUGSTORE, SUCH AS WALGREEN'S RITE AID, OR CVS
7. CONVENIENCE STORE, SUCH AS 7-ELEVEN
8. SPECIALTY LIGHTING OR ELECTRICAL STORE
9. HOME FURNISHING STORE, SUCH AS A BED, BATH, AND BEYOND, LINENS AND THINGS, OR POTTERY BARN
10. MAIL ORDER CATALOGS
11. THROUGH THE INTERNET
12. BARGAIN STORE, SUCH AS THE DOLLAR STORE OR FAMILY DOLLAR
13. OFFICE SUPPLY STORE, SUCH AS OFFICE DEPOT OR STAPLES
14. OTHER, SPECIFY

96. REFUSED

97. DON'T KNOW

[IF Q1 = 03, 96, 97, SKIP TO BUY3]

BUY2. Where do you buy **CFLs**? [DO NOT READ CHOICES, RECORD UP TO THREE RESPONSES, PROBE TO TRY TO GET MORE RESPONSES IF NECESSARY.]

1. GROCERY STORE OR SUPERMARKET, SUCH AS STOP & SHOP OR WHOLE FOODS
2. WAREHOUSE STORE, SUCH AS BJ'S, COSTCO,OR SAM'S CLUB
3. HOME IMPROVEMENT STORE, SUCH AS HOME DEPOT OR LOWE'S
4. HARDWARE STORE, SUCH AS TRUVALUE, ACE HARDWARE, OR AUBUCHON
5. MASS MERCHANDISE OR DISCOUNT DEPARTMENT STORE, SUCH AS A WAL-MART, K-MART, OR TARGET
6. DRUGSTORE, SUCH AS WALGREEN'S RITE AID, OR CVS
7. CONVENIENCE STORE, SUCH AS 7-ELEVEN
8. SPECIALTY LIGHTING OR ELECTRICAL STORE
9. HOME FURNISHING STORE, SUCH AS A BED, BATH, AND BEYOND, LINENS AND THINGS, OR POTTERY BARN
10. MAIL ORDER CATALOGS
11. THROUGH THE INTERNET
12. BARGAIN STORE, SUCH AS THE DOLLAR STORE OR FAMILY DOLLAR
13. OFFICE SUPPLY STORE, SUCH AS OFFICE DEPOT OR STAPLES
14. OTHER, SPECIFY

96. REFUSED

97. DON'T KNOW

BUY3. Approximately how many minutes, on average, does it take you get to the nearest large discount store or home improvement store such as Wal-Mart, Home Depot, or Lowes? Is it….[IF RESPONDENT SAYS THEY DO NOT SHOP AT THAT THOSE STORES, SAY, "That's okay. But if you did, about how long would it take you to get there?"]

1 Less than 15 minutes

2 15-29 minutes

3 30-59 minutes
4 60-89 minutes
5 90 minutes or more.

96. REFUSED

97. DON'T KNOW

CLIMATE CHANGE ATTITUDES/EFFICACY

I am now going to ask you some questions about global warming, climate change, and the environment.

GW1. Based on your understanding of the facts, is the earth's average temperature currently rising as a result of human activity?

1 Definitely yes

2 Probably yes

3 Probably no

4 Definitely no

96 REFUSED

97 DON'T KNOW

GW2. Which one of these two statements about the environment and the economy do you most agree with—[RANDOMIZE AND READ]

1. Protection of the environment should be given priority, even at the risk of curbing economic growth OR
2. Economic growth should be given priority, even if the environment suffers to some extent?

96 REFUSED

GW3. I'm going to read you a list of energy-related concerns. As I read each one, please tell me if you personally worry about this problem a great deal, a fair amount, only a little, or not at all. First, how much do you personally worry about – [READ AND RANDOMIZE]

1 A great deal

2 A fair amount

3 Only a little

4 Not at all

96 REFUSED

97 DON'T KNOW

a. Global warming
b. Running out of fossil fuels such as coal, oil, and natural gas
c. Dependence on other countries for oil

GW4. Please tell me if you strongly agree, agree, disagree, or strongly disagree with each of the following statements? [RANDOMIZE AND READ]

1 Strongly agree

2 Agree

3 Disagree

4 Strongly Disagree

96 REFUSED

97 DON'T KNOW

a. Over the next few months I expect to take measures to reduce how much energy my household uses.
b. I can't do much more than I'm already doing to reduce the amount of energy my household uses.
c. It is too expensive for me to reduce my household energy use.
d. I believe my actions have an influence on global warming and climate change.

EARLY ADOPTER BEHAVIOR

EA1. Please tell me if you strongly agree, agree, disagree, or strongly disagree with each of the following statements? [RANDOMIZE AND READ]

1 Strongly agree

2 Agree

3 Disagree

4 Strongly Disagree

96 REFUSED

97 DON'T KNOW

a. I am skeptical of new technology. I like to wait until a new technology Is proven before I buy it.
b. I always like to have the latest gadget.
c. I am comfortable learning about how new technologies work.

CUSTOMER DEMOGRAPHICS

Now I have a few questions for statistical purposes only.

DEM1. What type of home do you live in? Is it a . . .?

1 Single-family detached house

2 Single-family attached house (townhouse, row house, or duplex)

3 Apartment building with 2-4 units **[SKIP TO DEM3]**

4 Apartment building with 5 or more units **[SKIP TO DEM3]**

5 Mobile home or house trailer **[SKIP TO DEM3]**

6 Other (Specify): _____ **[SKIP TO DEM3]**

96 REFUSED **[SKIP TO DEM3]**

97 DON'T KNOW **[SKIP TO DEM3]**

DEM2. When was your home built? Please stop me when I get to the appropriate category.

1 1930s or earlier

2 1940s

3 1950s

4 1960s

5 1970s

6 1980s

7 1990s

8 2000 or later

96 REFUSED

97 DON'T KNOW

DEM3. Do you or members of your household own this home or do you rent?

1 OWN/BUYING

2 RENT/LEASE

3 OCCUPIED WITHOUT PAYMENT OF RENT

4 OTHER (SPECIFY): _____

96 REFUSED

97 DON'T KNOW

DEM4. Approximately how large is your home? [READ CHOICES]

1 Less than 1,400 square feet

2 1,400 – 1,999 square feet

3 2,000 – 2,499 square feet

4 2,500 – 3,499 square feet

5 3,500 – 3,999 square feet

6 4,000 – 4,999 square feet

7 5,000 square feet or more

96 REFUSED

97 DON'T KNOW

DEM5. How many rooms are in your home, not counting bathrooms? [DO NOT READ CHOICES]

1 1

2 2

3 3

4 4

5 5

6 6

7 7

8 8

9 9

10 10 OR MORE

96 REFUSED

97 DON'T KNOW

DEM6. What is the highest level of education that the head of household has completed so far?

[READ CATEGORIES, IF NECESSARY.]

1 LESS THAN NINTH GRADE

2 NINTH TO TWELFTH GRADE; NO DIPLOMA

3 HIGH SCHOOL GRADUATE (INCLUDES GED)

4 SOME COLLEGE, NO DEGREE

5 ASSOCIATES DEGREE

6 BACHELORS DEGREE

7 GRADUATE OR PROFESSIONAL DEGREE

96 REFUSED

97 DON'T KNOW

DEM7. Counting yourself, how many people normally live in this household on a full time basis? Please include everyone who lives in your home whether or not they are related to you and exclude anyone who is just visiting or children who may be away at college or in the military.

[CATI: INCLUDE RESPONSE OPTION FOR 96 = REFUSED AND 97 = DON'T KNOW]

RECORD NUMBER OF PEOPLE ____

DEM7a: **[IF DEM7 = 1, 96, 97, ASK]** What is your age?

[IF DEM7 NE 1, 96, 97, ASK] What is the age of the head of household?

1. 0-17 years old
2. 18-24 years old
3. 25-34 years old
4. 45-54 years old
5. 55-64 years old
6. 65 or older

96. REFUSED

97. DON'T KNOW

[IF DEM7 = 1, 96, or 97, SKIP TO DEM8]

DEM7b: Excluding the head of household, how many people in your household are…

[CATI: ALLOW ENTRY OF NUMBER FOR EACH OF a – g. INCLUDE RESPONSE OPTION FOR 96 = REFUSED AND 97 = DON'T KNOW FOR EACH AGE GROUP.]

a. 0 to 17 years old
b. 18 to 24 years old
c. 25 to 34 years old
d. 35 to 44 years old
e. 45 to 54 years old
f. 55 to 64 years old
g. 65 or older

DEM8. Are you satisfied or dissatisfied with your standard of living, that is, all the things you can buy or do? Would you say that you are…?

1 Very satisfied
2 Somewhat satisfied
3 Neither satisfied nor dissatisfied
4 Somewhat dissatisfied
5 Very dissatisfied
96 REFUSED
97 DON'T KNOW

DEM9. Do you pay your electric bill directly to your electric company, or is your electricity included in your rent or condo fee?

1 PAY DIRECTLY TO ELECTRIC COMPANY
2 ELECTRICITY INCLUDED IN RENT OR CONDO FEE
3 PAID FOR IN SOME OTHER WAY
96 REFUSED
97 DON'T KNOW

DEM10. Please tell me the primary language spoken in your home. [PROMPT IF NECESSARY]

1 ENGLISH

2 SPANISH

3 MANDARIN

4 CANTONESE

5 TAGALOG

6 KOREAN

7 VIETNAMESE

8 RUSSIAN

9 JAPANESE

10 OTHER (SPECIFY): _____

96 REFUSED

97 DON'T KNOW

DEM11. Do you consider yourself to be Spanish, Hispanic, or Latino?

1 YES

2 NO

96 REFUSED

97 DON'T KNOW

DEM12. Do you consider yourself to be . . .?

[SELECT ONE RESPONSE ONLY. IF MIXED RACE OR MULTIPLE RACES, RECORD IN 'OTHER']

1 White

2 Black or African-American

3 American Indian, Native Hawaiian, Pacific Islander, or Alaska Native

4 Asian

9 Other (Specify): _____

96 REFUSED

97 DON'T KNOW

DEM13. Which category best describes your total household income in 2009 before taxes? Please stop me when I get to the appropriate category.

1 $14,999 or less

2 $15,000 to $19,999

3 $20,000 to $29,999

4 $30,000 to $39,999

5 $40,000 to $49,999

6 $50,000 to $74,999

7 $75,000 to $99,999

8 $100,000 to $149,999

9 $150,000 or more

96 REFUSED

97 DON'T KNOW

DEM14. [INTERVIEWER: DO NOT READ.]

Sex:

1 FEMALE

2 MALE

Recruit for On-Site Survey

R1. On behalf of NYSERDA we are offering people in your area [IF NYS OR HOUSTON: $100, IF NYC: $150] to allow a trained technician to visit their home to gather more detailed information about the lighting products used. The visit should take about an hour. BY SAYING YES, YOU ARE SIMPLY AGREEING TO BE RE-CONTACTED TO SET UP AN APPOINTMENT. DURING THE VISIT, THERE WILL BE NO ATTEMPT TO SELL YOU ANYTHING. The information gathered will be used to evaluate and improve NYSERDA programs.

Would you be interested in being a part of this type of visit?

1. YES **[SKIP TO R2]**
2. NO **[SKIP TO LED1]**

96 REFUSED

97 DON'T KNOW

R1a. That is OK, you do not have to decide now. Would it be OK if I take your name and have someone call you when we are scheduling these visits?

1. YES
2. NO **[SKIP TO LED1]**

96 REFUSED **[SKIP TO LED1]**

97 DON'T KNOW **[SKIP TO LED1]**

R2. What town do you live in? [RECORD]_____

R3. And your name? [RECORD]_____

R4. And what is the best number to call you about a visit? [RECORD]_____

Thank you very much. As I said, we will be scheduling these visits in the next few weeks and will call you then.

Now I just have a few more questions to ask you.

LEDs

LED1. Are you familiar with light emitting diodes, or L-E-D lights?

1 YES

2 NO **[SKIP TO PO1]**

96 REFUSED **[SKIP TO PO1]**

97 DON'T KNOW **[SKIP TO PO1]**

LED2. What types of L-E-D lamps, fixtures, or bulbs have you heard of?

[DO NOT READ. SELECT ALL THAT APPLY. PROBE ONCE FOR ADDITIONAL RESPONSES]

1 HOLIDAY LIGHTS

2 TASK/DESK LAMPS

3 UNDERCABINET LIGHTING

4 LIGHT BULBS/SCREW IN BULBS/GU-TYPE BULBS

5 RECESSED/CAN LIGHTING

6 NIGHT LIGHTS

7 FLASHLIGHTS

8 NOVELTY FIXTURES

9 OTHER (SPECIFY): _____

10 NONE

96 REFUSED

97 DON'T KNOW

LED3. What types of L-E-D lamps, fixtures, or bulbs do you currently HAVE in your household, even if you are not currently using them? [DO NOT READ. ALLOW MULTIPLE RESPONSES]

1 HOLIDAY LIGHTS

2 TASK/DESK LAMPS

3 UNDERCABINET LIGHTING

4 LIGHT BULBS/SCREW IN BULBS/GU-TYPE BULBS

5 RECESSED/CAN LIGHTING

6 NIGHT LIGHTS

7 FLASHLIGHTS

8 NOVELTY FIXTURES

9 OTHER (SPECIFY): _____

10 NONE

96 REFUSED

97 DON'T KNOW

POLICY

PO1. The Energy Independence and Security Act of 2007 sets new federal efficiency standards for lighting that will be phased in beginning in 2012. The standards will require that regular or traditional incandescent light bulbs improve their efficiency by about 25% over current levels. This standard will ban the sales of most traditional incandescent light bulbs not meeting the efficiency standard. Before this call today, had you ever heard of this new federal standard for lighting?

1 YES

2 NO

96 REFUSED

97 DON'T KNOW

PO2. Given that most inefficient incandescent light bulbs will be phased out beginning in 2012, how likely are you to buy extra incandescent light bulbs before 2012 and save them for use after the standards go into effect? Would you say you are:

1. Very likely to buy and save incandescent light bulbs for use after 2012
2. Somewhat likely
3. Somewhat unlikely, or
4. Very unlikely to buy and save incandescent light bulbs for use after 2012

96 REFUSED

97 DON'T KNOW

CFL REFERENCE FOR QS4 TO GIVE TO INTERVIEWERS

(source: http://www.energystar.gov/index.cfm?c=cfls.pr_cfls_shapes):

Bulb Image	Type of Bulb
	Spirals
	A-shaped bulbs: Made to look and feel like traditional incandescents.
	Globe: This refers to a CFL that has a round shape and might be used in a fixture, such as a vanity light.
	Tubed
	Candelabra: Small bulbs for use in decorative fixtures where you can see the light bulb. Often used in chandeliers
	Posts: Covered post bulbs for outdoor fixtures; there are also yellow "bug light" covered posts, designed to keep away insects.

	Indoor Reflectors: Provide directional light; recessed ceiling lights or ceiling fans.