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June 4, 2009

Via E-Mail and Overnight Delivery
Honorable Jaclyn A. Brilling
Secretary
New York State Department
of Public Service
Three Empire State Plaza
Albany, NY 12223

Case 07-E-0523
Targeted DSM Errata Filing

Dear Secretary Brilling:

On May 8, 2009, Consolidated Edison Company of New York, Inc. ("Con Edison") filed the independent evaluation of the Company's existing Targeted Demand Side Management programs as required by the Public Service Commission's *Order Establishing Rates for Electric Service*, issued and effective March 25, 2008 in the above referenced proceeding.

The consultant that performed the evaluation recently advised Con Edison of certain minor errors in the initial evaluation. Enclosed for filing are an original and five copies of the Errata Memo provided to Con Edison and an original and five copies of the revised evaluation dated May 30, 2009 and updated to include the corrections identified in the Errata Memo.

Please let us know if you have any questions. Thank you for your assistance.

Sincerely,

Encl:
cc: Michael Townsley, Staff (*via E-mail)*
William Saxonis, Staff (*via E-mail*)
Cary Pshena, Con Edison (*via E-mail*)
Active Parties List (*via E-mail*)

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Memorandum

To: **Cary Pshena, Consolidated Edison Company of New York, Inc.**

From: **Gene Shlatz**

cc: **Armen Nishanian; Craig McDonald**

Date: **May 30, 2009**

Re: **Errata Report for the Targeted DSM Evaluation Final Report**

Specific errors in Fact that have been corrected in the Final Report are listed below by page number:

1. Page 4 (Executive Summary), Paragraph 3, Line 3 – Percentage changed from 84 to 88 percent.
2. Page 117 (2nd bullet), Line 4 – "2)" changed to "3)"
3. Page 122 (1st complete bullet) – Reference to Appendix E deleted. Appendix E does not exist.
4. Page 123 (2nd to last paragraph) – Reference to Appendix E deleted. Appendix E does not exist.
5. Page 125 (2nd to last paragraph) – Reference to Appendix E deleted. Appendix E does not exist.

Evaluation of

TARGETED DEMAND SIDE MANAGEMENT PROGRAM

Presented to

Consolidated Edison Company of New York, Inc.
4 Irving Place
New York, New York

MAY 30, 2009

(INCLUDES ERRATA UPDATES)

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CONTENTS

LIST OF TABLES ALIGNMENT OF

LIST OF FIGURES

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EXECUTIVE SUMMARY

Overview

The evaluation presented herein responds to the New York Public Service Commission's (NYSPSC) March 2008 Rate Order that adopted Staff's recommendation to conduct an independent evaluation of Con Edison's Targeted DSM program. The evaluation includes findings and recommendations derived from an impact analysis and process evaluation of existing and proposed load reductions.

This evaluation focuses on Phases II through IV[1] of Con Edison's Targeted DSM program. These phases targeted the delivery of 148 MW of DSM to defer 15 T&D projects with a total investment cost of $274 million. The maximum number of years of T&D deferral is limited to five.

Con Edison's Targeted DSM program differs from most DSM programs in that it is designed to reduce peak demand via firm load reduction within specific geographic areas. The program is specifically targeted to load areas where transmission and distribution (T&D) upgrades are proposed and can be deferred through firm load reductions.[2] The emphasis on individual *network* peak demand reduction contrasts with DSM programs designed to reduce total *system* coincident peak demand.

Targeted load reductions are set to defer near-term T&D capacity investments. A premium is paid to vendors to ensure installed measures are firm and delivered when needed. Candidate T&D deferrals include new or upgraded substations, transmission lines and network load transfers. The cost of T&D upgrades range from under $1 million to over $100 million. Although *specific* distribution lines and secondary network projects are not targeted for deferral, program savings include credits for deferral of primary distribution facilities.

The Targeted DSM program is unique and path breaking. While several utilities have had limited pilots to use DSM or distributed generation (DG) to defer T&D upgrades, the Con Edison program is the first large-scale program to defer T&D investments through targeted and permanent load reductions. Uniquely, Con Edison now includes targeted DSM as a standard option in their T&D planning. Further, Con Edison uses T&D deferral to create added value for DSM load reduction. This is the first, full scale evaluation of the Targeted program. As with first time evaluation of a new program, there are opportunities for refinement.

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[1] Phase 1 of the Targeted DSM program was a pilot program and is not included in this evaluation.

[2] Load areas include one or more networks where T&D investments may be deferred by targeted DSM.

Impact Evaluation

The impact evaluation for the Targeted DSM program indicates that it is cost effective for the program portfolio based on adjusted program savings and current avoided costs. However, commercial measures are cost-effective while the residential measures are not. Based on Total Resource Costs (TRC), the Targeted DSM program as of early 2009 has achieved a composite benefit-to-cost (B/C) ratio of 1.14. The program is expected to achieve a benefit-to-cost ratio of 1.45 when fully implemented. Program results, summarized in Table ES - 1, indicate daytime peaking load areas yield significantly higher ratios. Virtually all measures installed in evening peaking load areas are residential lighting; daytime peaking load areas are mostly commercial lighting. Of the 15 load area projects targeted for deferral, eight have B/C ratios above 1.0; seven have ratios that are below 1.0. Most of the projects below 1.0 are located in residential load areas.

Table ES - 1: Program Economic Benefits[3]

Load Area Type	Actual Load Reduction Achieved	Actual Benefit to Cost Achieved	Total Contracted Load Reduction	Total Program Benefit to Cost
Evening Peaking	15 MW	0.79	40 MW	0.61
Daytime Peaking	15 MW	1.40	108 MW	1.71
Total	**30 MW**	**1.14**	**148 MW**	**1.45**

The TRC approach used to derive the ratios is based on the premise that benefits for T&D project deferrals should be based on project need dates established at the time requests for proposals were issued for each of the program phases. This assumption is important, as economic conditions have shifted the need dates for certain T&D deferrals. Further, avoided production demand and energy costs have declined. The avoided costs used in this evaluation are from the NYSPSC's January 2009 EEPS order, which caused the benefit-to-cost ratio cited in Table ES - 1 to decline by about 3 percent (1.50 versus the 1.45 ratio cited in Table ES - 1).[4]

The primary reasons the benefit-to-cost ratio is lower for residential measures includes; use of lower peak coincidence factors, higher free ridership and fewer hours of usage than the values used for commercial measures. Notably, several of the values used in this evaluation are lower than those applied at the time that the program was developed. For example, the coincidence

[3] The actual capacity reduction achieved includes about 8 MW of DSM that has been installed since December 2008, or that is in the pipeline with a very high likelihood of meeting delivery targets.

[4] A value of $746/kW plus up to $150 for avoided distribution capacity deferral is used to establish an avoided cost ceiling for vendor payments and represents the Company's cost of DSM acquisition, exclusive of deferred T&D projects. The avoided costs used in this evaluation to derive TRC are based on demand and energy cost projections included in the NYSPSC's January 2009 Order.

factor is 0.19 for evening peaking residential load areas, which is far lower than the values – approximately 80 percent - assigned to commercial areas that peak during daytime hours.

The Targeted DSM program has produced value to Con Edison customers, as it has deferred T&D projects that otherwise would have been constructed in the absence of DSM. On a forward-looking basis, the need date for several T&D projects has been extended beyond the original five-year deferral window due to reduced growth caused by recent economic conditions. When these projects are excluded from the benefit analysis, the benefit-to-cost ratio declines about 14 percent to 1.2. Nevertheless, the program continues to be cost-effective when measured by TRC on a portfolio basis, even when T&D benefits are extended or excluded.

Notably, were it not for the Targeted DSM program, several of these T&D projects would have been built, or at least started, before the recession caused slowdown in demand growth. Thus, although T&D deferral benefits appear to be reduced because of the later need dates, the Targeted program actually produces greater benefits than anticipated. Absent the Targeted DSM program, these T&D projects would have been built, though not needed for a greater number of years than originally planned due to the recent decline in load area forecasts.

The net present value (NPV) of program cost and benefit components are summarized in Table ES - 2 for residential and commercial programs combined.

Table ES - 2: Benefit-Cost Detail for Targeted DSM Program

Program Costs and Benefits	Total NPV to Date (000s)	Total Program NPV (000s)	Percent (Total Program)
Program Benefits:			
Demand Savings	$4,508	$30,247	14.0%
Energy Savings	$24,794	$111,989	52.0%
Environmental	$2,322	$10,589	4.9%
Loss Savings	$2,277	$11,003	5.1%
Distribution Benefits	$1,466	$15,120	7.0%
Transmission & Substation	$8,440	$36,415	16.9%
Total Benefits	**$43,807**	**$215,364**	**100.0%**
Program Costs:			
Vendor Payments	$28,577	$119,987	81.0%
Utility Incentives	$3,936	$7,446	5.0%
Customer Costs	$1,035	$6,676	4.5%
Program Planning & Administration	$292	$1,289	0.9%
Measurement & Verification	$2,156	$9,504	6.4%
Evaluation & Market Research	$752	$3,316	2.2%
Total Cost	**$36,748**	**$148,218**	**100.0%**

Despite a program design that emphasizes firm demand reduction, energy savings dominate program benefits. Benefits achieved by T&D deferrals are approximately 17 percent of total

savings; non-targeted distribution deferrals add about seven percent savings. The majority of savings, 67 percent, are avoided capacity and energy costs. Over 80 percent of program costs are vendor payments.

The best opportunities for cost-effective T&D deferrals are when the cost of the upgrade is high compared to the amount of firm reduction needed to enable the deferral. Similarly, load areas with low growth forecasts tend to produce higher benefit-to-cost ratios. In virtually all instances, program value is higher in daytime peaking loads areas than evening, largely because measures in evening peaking areas are targeted to residential customers.

Table ES - 3 lists predicted DSM deliveries by project phase. The values in this table are contracted totals, and exclude net-to-gross adjustments and coincidence factor. The probability that vendors will meet Phase II targets, net of free ridership, is 88 percent. Good progress has been made in meeting contract reductions, as 20 MW of the 46 MW Phase II target has been delivered as of December 2008. The level of delivery risk associated with residential load areas is lower than commercial areas. The latter observation is derived from vendor interviews and customer surveys, which indicate residential participation is high, largely because most measures – lighting – are delivered free-of-charge. However the higher free ridership for residential customers (11 percent versus 3 percent for commercial) increases delivery risk for Phase II, as these reductions have already been accounted for in the Company's load forecasts; and therefore, cannot be claimed as firm load reductions.

Table ES - 3: Predicted DSM Penetration and Probabilities

Program Phase	Total Load Area Peak (MW)	Contracted Load Reduction (MW)	Load Reduction Achieved (12/08)	Probability of Achieving Targets	Expected Load Reduction (MW)
Phase 2	1,273	46	19.9	88%	40.8
Phase 3	1,859	33	2.4	86%	28.4
Phase 4	1,389	69	0.3	81%	55.7
Totals	**4,521**	**148**	**22.6**	**84%**	**124.8**

The probability that vendors will meet load reduction targets drops to 86 percent for Phase III, as the higher number of commercial load areas coupled with greater uncertainty of vendor performance causes a modest increase in the uncertainty of meeting delivery dates. Further, the introduction of residential and small commercial "Fast Track" programs under the Energy Efficiency Portfolio Standard (EEPS) will begin to erode savings. Vendors are likely to find better opportunities under the EEPS for some customers. The percentage drops further for Phase IV, largely due to the higher uncertainty of meeting load reduction targets in networks served by East 13th Street. However, the projected level of load reduction that will not be met is tempered by the Company's liquidated damages clause, which provides a strong incentive to vendors to deliver DSM on schedule and for the full contracted amount. Absent this clause,

deliveries likely would be lower. Further, load forecasts for most load areas have declined sufficiently to avoid capacity deficits on the T&D system.

Other key findings of the impact evaluation include:

- The program, to date, has provided net economic benefits of approximately $7 million to Con Edison's ratepayers through the deferral of T&D projects. Scaling back the residential contracts and/or the targeted quantities in networks where the need date has been extended due to the recession, to the extent feasible and allowed by contract, could enhance the economic value of the program.

- The Targeted DSM program provides the Company greater flexibility in the T&D planning process and a hedge to changes in forecasts or system upgrade need dates. This flexibility has provided added value, as some T&D upgrades were deferred due to anticipated DSM load reductions and not built. This means that the Targeted program actually allowed the project (and costs to the ratepayers) to be deferred for much longer than anticipated. For example, some of the T&D projects now will not be needed for up to ten years or beyond due to recent economic conditions. The Targeted DSM program provides the ability to: (1) buy a couple of years of time to see how forecast uncertainty is resolved and/or implement other network adjustments; and (2) "ramp up" or "ramp down" the program quickly, a positive feature that can be used to proactively respond to changes in load forecasts or network adjustments.

- The vast number of measures installed to date are lighting, primarily CFL for both residential and commercial participants. Almost 100 percent of residential lighting is CFL. Over 90 percent of the savings achieved to date for commercial participants has been CFL and about five percent savings for florescent lighting. The percentage of lighting measures is expected to continue to be high in networks where contracted load reductions have not yet been delivered.

- The avoided cost of certain T&D projects does not appear to justify the additional incentives paid to support the deferral. For example, the cost of substation transformer cooling, typically $0.5 million, is too low to justify Targeted DSM.

- The ability of vendors to meet program targets may be impacted by competing programs, both internal and external. Recently approved residential and small commercial programs in the Company's Energy Efficiency Portfolio Standard (EEPS) and cost-competitive NYSERDA programs will likely erode Targeted program participation.

- The primary risk associated with the Targeted program is the likelihood that actual firm load reduction in residential load areas will be lower than the original assumptions used as

a basis for deferring T&D investments. Market research and industry data indicate firm network capacity savings for residential load areas ranges from 15 to 25 percent compared to 60 to 90 percent for commercial networks.[5]

- Program risk is partly mitigated by contributions from external DSM programs offered by the New York State Energy Research and Development Agency (NYSERDA) and New York Power Authority (NYPA), demand response and back-up distributed generators owned or leased by Con Edison. Savings from external programs are deemed to be non-firm, but nonetheless produce demand and energy savings. Opportunities exist to improve DSM program marketing and efficiency via joint marketing and program planning. Further, the amount of firm DSM needed to defer T&D investments usually is very small compared to the network peak – often less than 2 to 3 percent. The very small amount of DSM needed, coupled with the mitigation options described above, causes program risk to be relatively small and does not materially increase risk exposure.

Process Evaluation

An intensive measurement and verification (M&V) process has helped ensure that actual DSM installed is commensurate with vendor commitments. It has also contributed to DSM sustainability. However, the process is viewed as burdensome by vendors – Con Edison may be able to streamline the process without compromising vendor commitments or program results. For example, given that most measures installed are lighting, it may be appropriate to scale back the level of M&V for measures with minimum downside delivery risk. It also may be more cost-effective to reduce M&V, but increase contracted DSM to offset any deterioration in firm savings resulting from reduced M&V.

Vendors have successfully promoted and delivered lighting measures to achieve demand reduction targets, citing ease of marketing, installation and low cost as the primary reasons why lighting is preferred. Non-lighting measures such as HVAC and Distributed Generation, while possibly cost-effective, require specialized expertise (e.g., licensed electricians), greater investment risk, and longer lead-times. The use of DG to offset networks peak load has not been pursued due to "physical assurance" obligations, a contractual requirement vendors are unwilling to pursue due to added cost and potential for customer load disruption.[6] Physical

[5] The coincidence factors cited herein refer to the level of firm DSM achieved at the time of the load area or network peak. The system peak coincidence factor, used to derive avoided costs for production demand, is assumed to occur during the summer daytime peak interval of 12:00 noon to 6:00 pm.

[6] Physical assurance involves use of communication and control systems that would interrupt customer load in amounts equal to contracted firm DG delivery if the generator was unavailable when needed to reduce load. This approach, approved and adopted elsewhere in the U.S., is needed to assure certainty of load reduction at the time of the load area peak.

assurance is needed in load areas where the number and diversity of DG units would otherwise have to be very high to achieve the same level of reliability as conventional T&D lines and substations.

Incentives paid to vendors for Phases II through IV range from about $900/kW to $1900/kW[7]; the difference due solely to the value assigned to T&D deferrals. Successful bidders are those which submit bids that are below a maximum threshold established by Con Edison prior to issuance of Requests for Proposals (RFPs). To date, four vendors have been awarded contracts. Con Edison's bidders list exceeds 100, but many potential vendors have not submitted bids due to extensive contractual requirements, project scope or other business reasons.

The 100 percent pre- and post-inspection process is rigorous but time-consuming and expensive. Con Edison's ability to reduce the number of inspections (providing time and cost savings to both vendors and Con Edison) has been hampered by the level of inaccuracies in reports submitted by participating vendors. Options for maintaining M&V rigor while lowering the cost, inconvenience and time delays associated with 100 percent inspections include (1) having a lower percentage of pre-inspections performed, with vendors absorbing the cost for additional inspections required if pre-specified levels of accuracy in implementation reports are not achieved, or (2) applying the level of accuracy found in a random sample of inspected projects to all projects for that vendor. Both options should result in a de-rating of all load reductions for vendors not providing accurate information to the M&V contractor. In turn, this should provide a strong incentive for the vendors to have projected load reductions from each project, as represented on their implementation reports, be as accurate as possible. While this is primarily an issue with commercial sector projects, these approaches may also work with some residential vendors.

The evaluation examined three primary issues related to the interaction of the Targeted program with other efficiency programs (e.g., NYSERDA) operating in the targeted areas:

- Are customers or vendors taking advantage of multiple incentives for making the same efficiency improvement (double-dipping), i.e., are customers participating in two programs at the same time for the same measure? To date, Con Edison has identified only one instance where a customer was going to be reimbursed for participation in

[7] Con Edison's Phase I pilot included higher average incentives, with awarded contracts approaching a maximum of $2000/kW. The total amount that will be paid to vendors for Phases II through IV, assuming full delivery of the entire 148 MW awarded, is approximately $150 million or slightly above $1000/MW.

both the NYSERDA program and the Con Edison program. That customer was asked to choose between the two programs.

- Are customers confused by having two programs in the market (primarily NYSERDA's and Con Edison's) at the same time? Customers report little awareness of other programs and report no confusion regarding them, although some contractors/vendors appear to have strong opinions regarding the value of one or the other program.
- Is there a way to further integrate the two programs to address each customer's efficiency opportunities more comprehensively? While there may be ways to better integrate the NYSERDA and Con Edison programs, there is no simple way to do so that would (1) result in significantly broader coverage of efficiency opportunities at customer facilities and (2) not jeopardize participating vendors' ability to achieve their load reduction commitments.

Market Research

A review of program documents, customer surveys, and in-depth interviews with stakeholders served as the primary data sources for ensuring that expected impacts from the program are obtained and that ways to improve the effectiveness of the program are identified. Market research included in-depth interviews with 65 individuals representing seven stakeholder groups.

Telephone surveys were conducted with customers, and these were designed to provide statistical precision levels of +/- 10 percent at the 90 percent confidence level. Telephone surveys with 421 residential customers were performed, including samples of participating customers served by each of the two primary residential vendors and customers residing in single-family, two- to four-family and more than four-family dwellings. Telephone surveys with 283 commercial customers were also performed, including samples of customers located in and outside of Manhattan, customers in offices/small retail establishments, as well as those in other types of facilities. Both participating and non-participating customers were surveyed. Details of the market research appear in Appendix D, and results are discussed in the Conclusions and Recommendations section that follows.

Conclusions and Recommendations

Con Edison's Targeted program is a progressive DSM initiative that is one of the few domestic programs designed to defer T&D upgrades, accomplished via firm and permanent load reduction. The other examples are either limited pilots or rely on distributed generation

(usually back-up and/or mobile generation units) and demand response to meet the peak loads of a local T&D area. The program has, and is expected to continue to produce value to Con Edison's customers. It also provides Con Edison another option and greater flexibility in the T&D capacity planning process. Program value can be enhanced via refinement of assumptions, and adjustments to program structure and delivery methods as described in this evaluation.

From the evaluation findings contained herein, the following conclusions and recommendations are offered:

Program Design

1. For load areas where the need dates for T&D projects have been extended or eliminated, Con Edison should renegotiate vendor contracts to reduce DSM deliveries.

2. Vendor contracts should explicitly note the possibility and likelihood that the level of contracted load reduction may change over the course of the contract period.

3. The Company should monitor residential load areas currently designated as evening peaking to determine whether load patterns or customer demographics have caused the peak to shift to daytime hours. The Company also should reconcile differences in the day time versus evening peaking hours used by DSM and Planning personnel

4. The program could be made more cost effective by lowering payments made for residential compact fluorescent lamp (CFL) installations, due to their low coincidence with network peak periods. Con Edison should apply a load area or network coincidence factor for each type of DSM measure in order to reflect the firm network-specific capacity that will be realized.

5. Participating customers should be required to confirm that the measures installed in their homes/facilities through the program are on for at least two hours during the peak period.

6. The Company should incorporate the impact adjustment factors (coincidence, free ridership, hours of use, rebound, spillover, and measure retention) derived from this evaluation into either the load reduction needs established in program RFPs or the value assigned to different types of load reduction measures.

7. Measures having lower diversity factors (e.g., occupancy sensors, day-lighting and other controls) and demand response measures should be included as eligible measures to facilitate greater savings penetration per customer, perhaps by supplying a discounted on-peak or diversity factor.

8. The Company should investigate the feasibility and customer acceptance of demand response (DR) that can be dispatched for both system capacity and network/load area requirements. This could include distributed generation, provided that Con Edison would have direct control of the device or equivalent load to ensure capacity is available when needed.

9. The Company should include quality criteria for measures installed through the program, (meeting state code, where applicable, meeting Energy Star requirements, etc.), and explicitly disallow measures in certain room types (e.g., CFLs in closets).

10. Evaluate whether to include rewards in addition to the existing penalties for vendor performance in the program, as well as bands of achieved load reduction within which penalties are reduced for almost achieving goals. These characteristics are common in similar outsourced DSM contracts.

11. Provide training for vendors in the various practical aspects of participating in the program (especially administrative issues), so that time is not wasted in climbing a learning curve on how to efficiently participate.

Request for Proposal Process

1. The RFP process is fair and reasonable. Con Edison should implement this report's recommendations regarding communications with vendors regarding program RFPs, to increase the number of likely bidders, and minimize the vendor learning curve regarding the practical aspects of participation.

Program Satisfaction

1. Customers report very high satisfaction with the program, most likely driven by the favorable economics of participation. However, they have a number of suggestions for how the program could be improved.

Measurement & Verification

1. Due to the wide prevalence of lighting, M&V protocols employed in the program have been straightforward and consistent with standard industry practice. As the program evolves, non-lighting measures will be included and Con Edison will need to ensure that protocols continue to reflect standard industry practice.

2. Vendors have raised a few administrative issues regarding the Targeted program, and Con Edison should seek to address them or educate new vendors on how to deal with these issues up front.

3. M&V costs on the part of Con Edison and vendors for commercial installations should be reduced by scaling back the current 100 percent inspection requirement, especially for sites with smaller load reductions, without compromising certainty regarding load reductions achieved. This recommendation may be more practical to implement in future RFPs, where vendors have not designed their approach based on a 100 percent inspection regimen.

4. Improve required data collection to collect additional data on operating hours and use coincidence while the M&V inspectors are on-site.

Program Marketing

1. Marketing and sales processes used by the program appear to be sophisticated and effective, including advanced scheduling, lead tracking and other practices.

2. The Company should assist vendors in meeting goals faster and more easily by providing more support to them, including limited, controlled use of the utility logo, general program marketing, a simpler method for qualifying customer locations, and ensuring that Con Edison employees and customer service staff are properly informed about the program.

3. The Company should implement mechanisms to encourage program vendors to market and implement a broader range of efficiency measures in targeted areas. To date, program vendors have focused on a narrow set of lighting measures, but customers believe additional efficiency opportunities exist at their facilities.

4. Targeted program marketing and implementation efforts have influenced customers to make additional efficiency improvements to their homes/facilities on their own.

Interactions with Other Efficiency Programs

1. While there appears to be no significant confusion among customers due to the existence of multiple efficiency programs sponsored by different organizations, this may be due to a lack of awareness of such programs. Con Edison should monitor this potential issue in the future.

2. The current system in place to ensure that customers participate in only one program for a given efficiency improvement appears to be effective in routing out program overlap.

3. Successful integration of the Targeted program with NYSERDA programs and future Con Edison non-targeted programs could yield a deeper penetration of the market. However, vendor incentives for the programs need to be better aligned. Con Edison and NYSERDA should work together more closely to find ways to bring about this alignment.

BACKGROUND & SCOPE

Scope

This report summarizes Navigant Consulting Inc.'s (NCI) evaluation of Consolidated Edison Company of New York Inc.'s (hereafter "Con Edison" or "the Company") Targeted Demand Side Management (DSM) program. Two other firms – RLW Analytics[8] and L&S Energy Services – assisted in the evaluation. The report includes both an impact analysis and a process evaluation, built upon a foundation of market research and program data. The Targeted program is being implemented over five phases. Phase I, commonly referred to as the program pilot, has been successfully completed, and vendor bids for Phase V are now under evaluation. Accordingly, results and findings presented herein apply solely to program Phases II through IV. Further, our findings and results are based primarily on data collected and market research performed for these phases.

Program History

In 2003, Con Edison initiated a pilot program designed to defer the need date for transmission and distribution (T&D) capacity via permanent and firm energy efficiency measures. Con Edison issued an RFP to solicit bids from vendors for energy efficiency to defer additions and upgrades outlined in Con Edison's ten year load relief plan. Con Edison subsequently executed contracts with vendors who successfully responded to Con Edison's solicitation for 47 MW of firm demand reduction.

In its filing for cost recovery with the New York State Public Service Commission (NYSPSC), Con Edison indicated that the Targeted program would promote independent investment in energy-efficient equipment and clean distributed generation, as well as increased energy awareness of its customers. It also would facilitate and promote transition to a fully-functional competitive market.[9] Con Edison's customers also would realize the following benefits:

- Direct cost avoidance by load reductions,
- Mitigation of peak period energy prices,

[8] Now part of KEMA Consulting

[9] Cases 96-E-0897 and 00-M-0095, Petition Regarding Ratemaking Treatment Applicable To Procurement of Electric Load Reduction, (Sept. 18, 2003). The NYSPSC approved the cost recovery on April 2, 2006. Case 03-E-1332, Order On Cost Recovery Of Demand Management Program (April 21, 2006).

- Reduction of Con Edison's capacity requirements, and/or
- Deferral of T&D infrastructure investments.

Subsequently, as a condition of NYSPSC approval of its 2005 rate case filing (resulting in the Company's 2005-08 Electric Rate Plan), Con Edison agreed to implement a program for an additional 150 MW of firm DSM reductions. Anticipated benefits include reduced energy consumption and air pollution, avoidance of the environmental impacts associated with construction of generation, transmission, and distribution facilities, increased supply diversity, and increased economic growth.[10] The NYSPSC later ordered the Company to apply and meet the total resource cost test (TRC) for cost-effectiveness for the program.[11] The approach used in this evaluation also meets the NYSPSC's program cost-effectiveness test requirements.

In 2008, the NYSPSC authorized continuation for an additional 30 MW of contracts (Phase V) under the same terms and conditions as in the 2005-08 Electric Rate Plan.[12] The NYSPSC also adopted a recommendation by Staff that requires Con Edison to conduct an independent evaluation of the Targeted program. Results of the Targeted program evaluation are presented in this report.

Approach

A high-level description of NCI's evaluation approach is outlined below, listing the four key task and analytical focus areas for this evaluation of the Targeted DSM program.

1. Assess the actual and likely impacts of the program on deferring T&D investments, including:
    - Reliability and persistence of savings
    - Net savings impacts
    - Impacts upon T&D investments (offsetting factors, impact of partial deferrals, and net-to-gross).
    - Value relative to alternative options

[10] Case 04-E-0572, Order Adopting Three-Year Rate Plan, at 85 (March 24, 2005).

[11] Case 04-E-0572, Order On Demand Management Action Plan, at 30 (March 16, 2006).

[12] Case 07-E-0523, Order Establishing Rates For Electric Service, at 158 (March 25, 2008).

2. Evaluate the effectiveness of the current program and identify opportunities for improvements, especially focused upon:
    - RFP and contracts
    - Measurement and Verification (M&V)
    - Marketing and communications
    - Program processes
3. Develop data from stakeholders and participants to support impact and process evaluations
4. Provide a detailed summary of all research, analyses and conclusions

Impact Evaluation Methodology

Figure 1 illustrates the primary tasks undertaken to perform the impact evaluation. The process quantifies the value of the Targeted program, with net present values (NPV) derived for each primary benefit and cost category over the life of each measure.

The process presented in Figure 1 and described below applies to residential and commercial customers participating in the Targeted program. Three benefit categories are illustrated: (1) The process for deriving demand-related savings are outlined in the left-hand column; (2) Energy-related savings in the center; and (3) T&D savings to the right. Project costs are presented at the bottom of the illustration. Probability and risk analyses are used to assess program risk. Additional details are presented in the Impact Evaluation section of this report.

1. *Determine Net Load Reduction by Load Area* - The Targeted program is structured to defer T&D projects in sections of Con Edison's electric power delivery system described as "load areas." These load areas include segments of one or more networks served by the Company's transmission and distribution substations. Vendors that submit successful bids are obligated to deliver firm DSM load reductions in an amount sufficient to defer T&D upgrades for up to five years. Once the load reduction targets are determined, the contracted load reductions are adjusted downward for persistence (e.g., turnover/retention), free ridership; and then upward for spillover.

2. *Calculate Firm Demand Reduction* – Coincidence factors are developed for each load area, and applied to the net load reductions to determine the expected amount of net firm demand reduction for each load area. The difference between contracted load reductions and net firm load reductions represents the amount of capacity that must otherwise be met by targeted DSM. If the net load reduction is less than the capacity

deficit, then other mitigation options would have to be pursued by the Company to avoid capacity shortfalls.

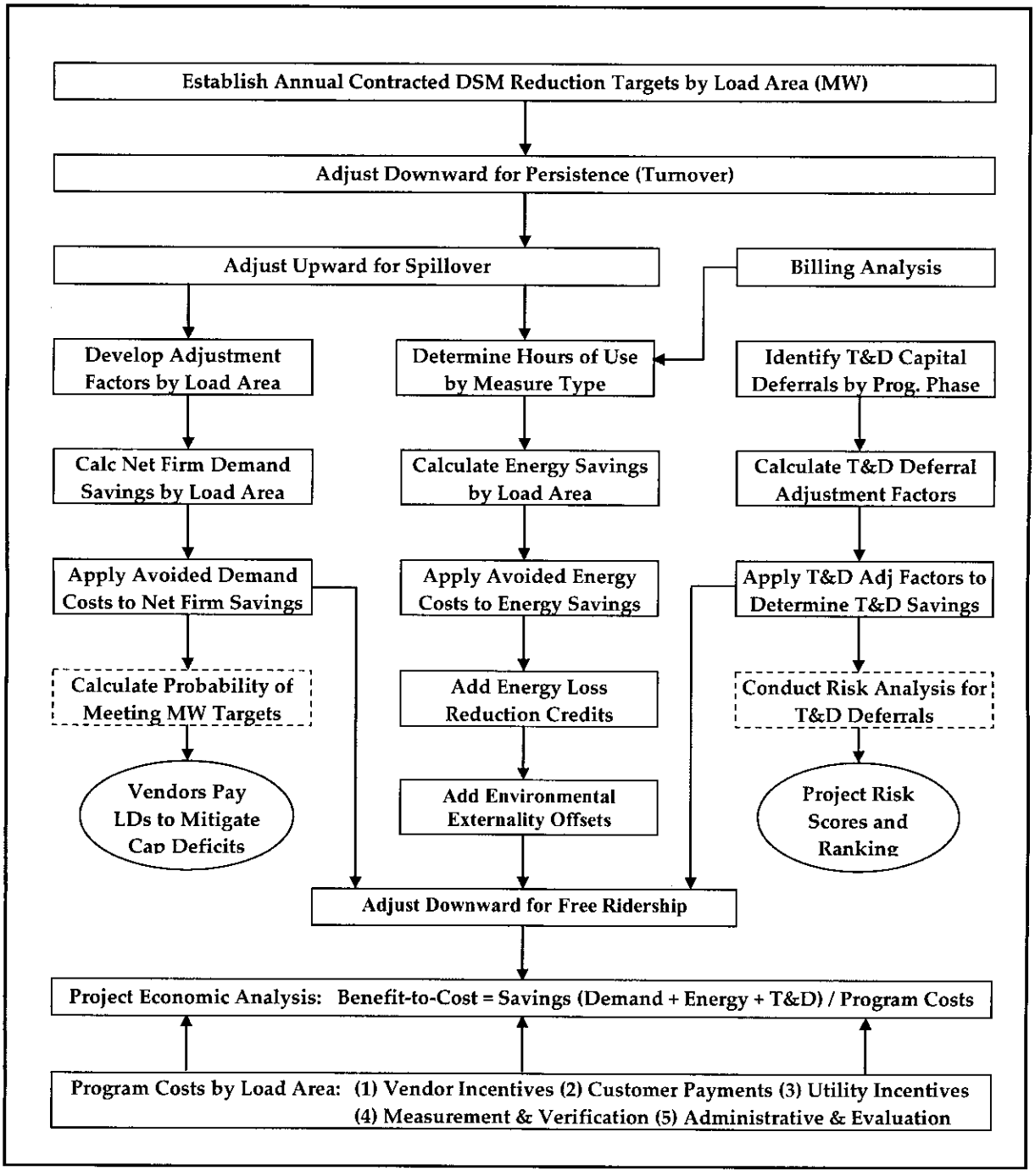
3. *Calculate Energy Savings* – Within each load area, the annual hours of use are estimated for each measure. Results of a survey of participating and non-participating customers, and those of evaluations of similar programs completed in the Northeast, are used to derive hours of use. A billing analysis also is performed to confirm these estimates. The hours of use by customer type is applied to the annual net load reduction to determine energy savings by load area. The savings are adjusted upward for losses.

4. *Determine T&D Capital Deferral Adjustment Factors* – The economic value of T&D deferrals is determined by calculating the difference between the net present value (NPV) of the cost of the investment absent deferral and the NPV of the cost of the T&D investment following the deferral. This is the approach Con Edison now uses to set a price ceiling for the T&D component of the maximum payment the Company awards to vendors bidding on the Company's Targeted DSM RFP. A "declining balance, revenue requirements" approach is applied to determine the total NPV of the T&D investment, before and after the T&D deferral. The difference in net present values of these two cost streams represents the savings achieved by the T&D deferral. However, the cost of the deferred T&D investment is adjusted upward to reflect real escalation.

5. *Conduct Economic Analysis* – The methodology used to test for cost effectiveness is similar to methods applied by the Company in prior and current program filings before the NYSPSC. The combined savings in demand, energy and deferred T&D is compared to program costs, by load area, to determine economic value. A benefit-to-cost metric is used to assess total program value. Demand savings are derived by applying avoided capacity costs to the annual net firm demand savings for each load area. Energy savings are derived by applying current avoided energy costs to the reduction in energy use by load area. Methods used to derive T&D deferral savings are described above. Program costs include vendor payments, participant costs, measurement and verification, evaluation, Company earning incentives and administrative costs.

6. *Risk Assessment* – Qualitative and quantitative methods are applied to determine the likelihood vendors will achieve load reduction targets for each load area. Probabilistic methods are used to predict the likelihood that vendors will meet these targets and, if not, the magnitudes of the capacity deficit for each load area. The risk analysis is not included in the economic assessment, under the assumption that liquidated damages paid by vendors will be used by Con Edison to mitigate capacity shortfalls.

Figure 1: Impact Methodology Flow Chart



IMPACT EVALUATION

Program Objectives

Over the past five years (2003 – 2008), Con Edison has issued bid requests for a total of 515 MW of demand reduction via RFP solicitations in 44 (of 78) networks in the Con Edison system targeted for firm load reduction. It has entered into 13 contracts with six vendors for a total of 193 MW of firm demand reduction between 2005 through 2012.[13] The amount of contracted targeted load reduction for Phases II through IV is 148 MW delivered in 28 networks. Most DSM measures for these three phases have or will be installed between 2007 and 2012.

Targeted networks are designated as either daytime or evening peaking. Daytime peak hours are defined as 12:00 noon through 6:00 pm. Evening peaks are assumed to occur in the summer during the hours of 6:00 pm through 10:00 pm. Potential bidders are notified via RFP documents of the peak interval that applies to each network, and the level of firm load reductions targeted for each network. The RFPs also list the number of customers in each network, by rate class, to assist vendors in crafting responses to bid solicitations.

Many Con Edison networks peak during summer late afternoon or early evening hours

Targeted Transmission and Distribution Projects

It is important to differentiate targeted network load areas from the T&D lines and substations that deliver power and energy to customers located within these networks. Candidate T&D project deferrals include new or upgraded transmission lines (New York City only) or substations, each of which may serve one or more networks (typically between 69 kV and 230 kV).[14] Upgrades to the lower voltage primary distribution system are not targeted for deferral; however, program incentives are structured under the assumption that some primary distribution facilities are also deferred.

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[13] Approximately 16,000 customers (commercial, industrial and residential) participated in the Phase I program, resulting in an installed demand reduction of 45 MW. The success of the Phase I pilot led to subsequent approval by the NYSPSC for Phases II through V. Phase V bids are currently under evaluation.

[14] Transmission upgrades exclude high voltage bulk transmission assets and tie lines outside of New York City.

To avoid confusion, the term "load area" has been ascribed by Con Edison and used in this report to collectively define the one or more networks where capital investments are targeted for deferral.

Hereafter, the analysis focuses on load areas, as T&D project deferrals are accomplished by collectively reducing firm demand by load area. Most load areas in Manhattan include more than one network; whereas those in Staten Island and Westchester typically include a single network.[15] One load area in Manhattan, the East 13th Street Station, includes ten networks.

T&D Planning and DSM Selection Process

Commensurate with the adoption of the Targeted program, DSM has been integrated into the Company's T&D planning process. Targeted firm DSM is now considered a potentially viable alternative to traditional capacity investments in the preparation of the Ten Year Transmission and Substation Plan. This plan compares annual projected peak demand versus T&D substation or transmission capacity for each load area, whichever is applicable from a supply perspective. Both traditional T&D and DSM are considered viable options for meeting the capacity deficit. The evaluation process for comparing and selecting DSM as an alternative to traditional T&D capacity upgrades is described below.

First, Con Edison develops an annual baseline peak load forecast. This forecast is adjusted downward on the assumption that previously committed DSM is firm, and will be delivered in an amount equal to contracted load reductions. Firm capacity is subtracted from the adjusted load forecast for each load area to identify capacity deficits for substations and transmission feeders; the latter typically are rated 138kV and 69kV. If a load area is identified as requiring reinforcement to meet capacity shortfalls, capital infrastructure projects are developed as a solution. As an alternative to these investments, Con Edison evaluates DSM solutions utilizing a targeted approach to reduce peak demand in an amount equal to the capacity deficit. To date, 148 MW of firm DSM has been committed to targeted areas in Phases II through IV.

Next, the timing and cost of the T&D load relief options are compared to DSM. This is accomplished by identifying the savings that could be achieved if sufficient DSM were

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[15] To avoid confusion, the reader is advised that the term "network" is often used to describe a wide range of electric system configuration or geographic areas. The term network in this report generally refers to one or more geographic areas served by Con Edison substations. In contrast, urban utilities like Con Edison often construct complex and highly reliable systems in densely populated downtown areas, sometimes described as secondary "spot" or "grid" networks. Underground networks are configured to operate as a single highly reliable, integrated grid. Most rural and suburban lines, including many in Con Edison's system outside of Manhattan, operate radially. The use of the term network in this report refers to both grid and radial distribution systems.

installed to reduce load in an amount equal to the annual capacity deficit up a maximum of five years. The savings from T&D deferrals is divided by the capacity deficit, and this value is added to the $746/kW baseline and avoided distribution costs to establish an incentive ceiling for evaluating and accepting bids. Bid documents are prepared and issued to vendors on Con Edison's qualified bidders list. Where contracts are awarded, the committed DSM is included in the Company's Ten Year Transmission and Substation Plan. The process begins anew when the Company institutes the next phase of the program. Phase V of the program is currently under review for implementation.

The 148 MW of targeted DSM, as structured, will defer T&D projects in 15 load areas. These 15 load areas include 28 individual networks, some of which are assigned to more than one load area (e.g., Cooper Square).[16] Table 1 presents each of the 15 load areas and the networks targeted for DSM within each load area. The non-coincident 2008 network peak is also listed. Notably, East 13th Street serves ten networks with a combined peak of over 1200 MW.

Table 1: Targeted Loads Areas and Networks

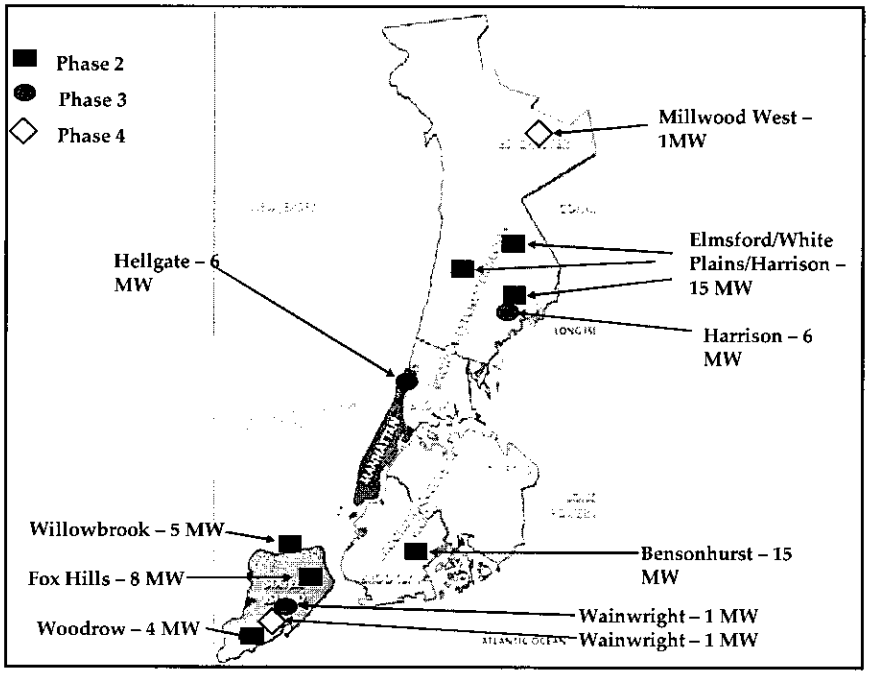
Load Area Description	Network	2008 Peak (MW)	Load Area Description	Network	2008 Peak (MW)
White Plains/Elmsford 2/Harrison	Elmsford No.2	164	**Willowbrook**	Willowbrook	94
	White Plains	230	**Woodrow**	Woodrow	116
	Harrison	246	**Bensonhurst No. 2**	Flatbush	232
Avenue A	Cooper Square	250	**Hellgate**	Yorkville	304
E. 40th St No. 1/2/Murray	Grand Central	173	**Wainwright**	Wainwright	90
	Beekman	137	**East 13th St**	Cooper Square	250
	Empire	64		City Hall	164
	Fashion	62		Chelsea	186
E. 63rd No. 1	Hunter	79		Madison Square	239
	Sutton	148		Greeley Square	52
E. 29th St.	Madison Square	239		Kips Bay	106
E. 63rd No. 2	Turtle Bay	137		Greenwich	62
	Roosevelt	80		Sheridan Square	167
Harrison	Harrison	246		Canal	92
Millwood West	Millwood West	85		Park Place	74
Fox Hills	Fox Hills	191		East 13th St Total[17]	1,214

Figure 2, Figure 3 and Table 2 present each of these load areas and the amount of firm DSM needed to defer T&D investments for up to five years.

[16] Typically, a single substation will serve one or more networks. A load area may include one or more substations.

[17] The coincident peak demand of the East 13th Street load area is less than the sum of individual network peaks as the hour of individual network peaks vary. Also, some of the networks are day time peaking.

Figure 2: Load Areas Targeted for T&D Deferral (Non-Manhattan)



All load areas and substations displayed in Figure 2, except for Harrison, Elmsford and White Plains, are evening peaking. All loads areas in Figure 3 are daytime peaking.

Figure 3: Load Areas Targeted for T&D Deferral (Manhattan)

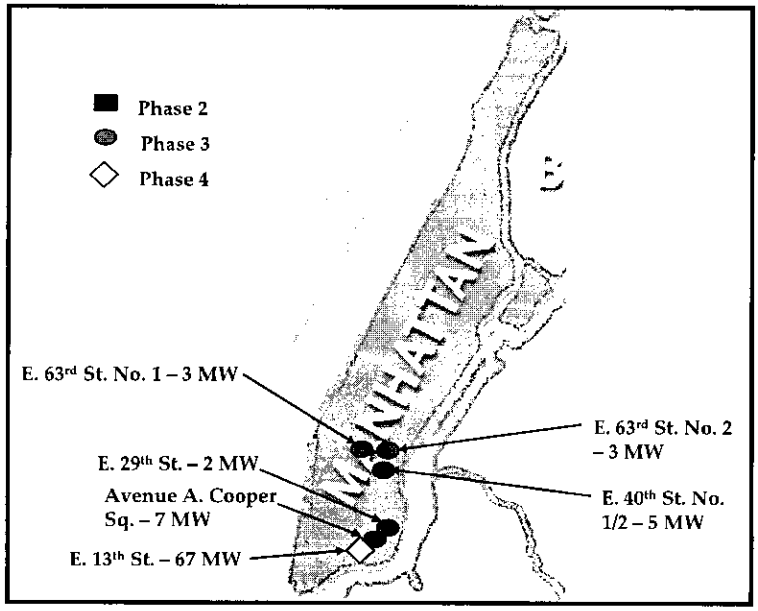


Table 2 includes a description of the T&D project to be deferred, its cost, and the network peak interval – daytime or evening.[18] In addition to projects listed in Table 2, other projects were included in Con Edison's RFP (mostly Phase II), but not undertaken due to insufficient vendor responses, quotes above bid ceilings, changes in T&D need dates, or size of capacity deficits.[19]

Table 2: T&D Capital Projects Targeted for Deferral

Load Area	T&D Project Deferral Description	Peak Interval	Orig. Cost (000's)	DSM (MW)
White Plains/Elmsford. No. 2/Harrison	Transfer 30MW - White Plains to Rockview	Day	$10,600	15
Avenue A	Increase 69kV Supply Rating	Day	$15,000	7
E. 40th Street No. 1/2: Murray Hill	Install 20MVAR Capacitor Bank	Day	$1,500	5
E. 63rd No. 1	Transfer Hunter to East 75th Street	Day	$15,000	3
E. 29th St.	Transfer 30MW - Madison Square to E. 36th	Day	$6,000	2
E. 63rd No. 2	Transfer 30MW - Roosevelt to E. 63rd St	Day	$1,000	3
Harrison	Install Permanent Transformer Cooling	Day	$500	6
East 13th St	Extend Transmission Lines to Astoria East	Day	$180,000	67
Millwood West	Replace 13kV bus & Add Transformer Cooling	Evening	$500	1
Fox Hills	Install Permanent Transformer Cooling	Evening	$500	8
Willowbrook	Transfer 6 MW - Willowbrook to Fresh Kills	Evening	$1,000	5
Woodrow	Install 3rd Transformer & 138kV Supply	Evening	$29,000	4
Bensonhurst No. 2	Install 5th Substation Transformer	Evening	$7,000	14
Hellgate	Transfer Randal/Wards Isle - 42MW to Bruckner	Evening	$5,500	6
Wainwright	Transfer 6 MW to Woodrow Substation	Evening	$1,200	2
		Totals	**$274,300**	**148**

The total cost for the T&D upgrades identified for deferral is about $274 million, and about half is for the deferral of transmission lines to Astoria East - the project is needed to meet projected capacity deficits upon the retirement of a major generating unit in 2010 (900 MW Poletti unit).[20] As noted later, the Astoria project has been deferred beyond the five-year deferral window due to load transfers among networks and reduced load growth.[21] The effect of the Astoria deferral is to reduce, by about 50 percent, the total value of potential T&D deferrals.

The need dates for several upgrades have been changed - many have been extended by one to ten or more years; a few have been accelerated (changes in need dates are presented in the Sensitivity Analysis section). One project in Staten Island, Willowbrook network load

[18] The phases annotated in the diagrams include projects and load areas in the most recent phase of the RFP process.

[19] Examples include the 65th Street Station in Manhattan and the Fresh Kills network upgrades in Staten Island.

[20] All costs are based on estimates included in the Company's most recent Ten-Year Transmission and Substation Plan. Some costs have changed from values that may have appeared in prior Company plans or forecasts.

[21] Although DSM is not needed for East 13th Street, approximately 30 MW of DSM may be needed for projects at East 29th Street and Avenue A, as two networks (Cooper Square and Madison Square) are also served by East 13th Street.

transfers, has been accelerated by one year and will be constructed in 2009; however, DSM measures continue to be installed in the Willowbrook load area. The extension in need dates is due to several reasons, most notably a decline in peak load forecasts caused by recent economic conditions. Also, reconfiguration in the form of load transfers among networks is common, and these also have caused need dates to shift as well.

Vendor Commitments

Table 3 presents Phase II through IV annual load reductions under contract for the Targeted program, listed by vendor.[22] It includes both installed DSM and committed load reductions that vendors are obligated to meet. All but 2 MW of the 150 MW of load reduction proposed is under contract. Bids from four vendors have been accepted via the RFP process. For most networks within load areas, only one vendor was selected, in large part because only one provided bids below the Company's payment ceiling. Further, most measures in evening peaking load areas are targeted to residential customers; commercial customers are targeted to those that peak during day time hours.

Table 3: Program Load Reduction Targets

Load Area	Phase	Peak Interval	Vendor	Contracted DSM (kW)	2008 (kW)	2009 (kW)	2010 (kW)	2011 (kW)	2012 (kW)
Fox Hills	2	Evening	FLC	8,000		4,000	2,000	2,000	
Willowbrook	2	Evening	FLC	5,000	2,000	1,000	1,000	1,000	
Woodrow	2	Evening	FLC	4,000	4,000				
W Plains/Elmsford 2./Harrison	2	Day	PES	15,000	2,000	6,000	4,000	3,000	
Bensonhurst No. 2	2	Evening	QCS	14,000	3,000	4,000	4,000	3,000	
Avenue A	3	Day	CPL	7,000		4,000	2,000	1,000	
E. 40th St No. 1/2: Murray Hill	3	Day	CPL	5,000				5,000	
E. 63rd No. 1	3	Day	CPL	3,000			1,000	2,000	
E. 29th St.	3	Day	CPL	2,000				2,000	
E. 63rd No. 2	3	Day	CPL	3,000				3,000	
Wainwright	3	Evening	FLC	1,000			1,000		
Harrison	3	Day	PES	6,000	1,000	2,000	2,000	1,000	
Hellgate	3	Evening	QCS	6,000			4,000	2,000	
Wainwright	4	Evening	FLC	1,000					1,000
E. 13th St	4	Day	PES	67,000			46,000	10,000	11,000
Millwood West	4	Evening	QCS	1,000				1,000	
			Totals	**148,000**	**12,000**	**21,000**	**67,000**	**36,000**	**12,000**

[22] Vendors for Phases II through IV include Public Energy Solutions (PES), Quality Conservation Services, Inc. (QCS), Free Lighting Corporation (FLC), and Consumer Powerline (CPL).

As of December 31, 2008 approximately 22 MW of the 150MW of DSM targeted for T&D deferrals under program phases have been installed. Over 90 percent of measures delivered as of December 2008 is compact fluorescent lighting, with the remainder being other types of commercial lighting. Each measure is summarized in Table 4. The type of lighting measures installed in most residential areas is compact fluorescent lighting (equipped with special restraint disks, called socket modifiers that remain in the lamp socket to increase the chance that CFLs are installed when the bulb needs to be replaced). The commercial and industrial measures are predominantly CFLs; the remainder are fluorescent fixtures, high efficiency lamps and replacement ballasts.

Table 4: Load Reductions Achieved as of December 2008

Phase	Vendor	Total Load Reduction	Com Load Reduction	Res Load Reduction	HID Replace with CFL	HID Replace with LF	High Eff. Fluorescent Lamps	High Eff. Lamp and Ballast	LED Exit Sign	Low Watt Fluorescent Fixture	Screw-in CFL with Restraint
2	FLC	2,200	1	2,199	0	0	0	0	0	0	2,200
2	FLC	4,428	17	4,411	0	0	0	0	0	0	4,428
2	FLC	3,124	14	3,110	0	0	0	0	0	0	3,124
2	FLC	631	2	629	0	0	0	0	0	0	631
2	PES	2,168	2,168	0	31	54	238	278	21	566	975
2	QCS	3,399	0	3,399	0	0	0	0	0	0	3,399
2	QCS	3,955	0	3,955	0	0	0	0	0	0	3,955
3	PES	1,831	1,831	0	4	89	150	262	15	460	857
3	QCS	605	0	605	0	0	0	0	0	0	605
4	PES	262	262	0	0	0	0	28	0.5	86	148
Totals		**22,602**	**4,293**	**18,309**	**35**	**143**	**388**	**568**	**36**	**1,112**	**20,322**

Most participants located in evening peaking networks are residential, as their highest electricity consumption is during evening hours. Most day time peaking participants are commercial, as they use the largest amount of electricity during daytime hours; particularly smaller retail stores and businesses with heavy daytime lighting load.

Results achieved to date suggest the program is on target to meet near-term load reduction goals. However, vendor ability to meet long-term targets is questionable, as the program is still in the early stages from a delivery standpoint - significant progress is needed over the long-term to achieve 150 MWs of load reduction. In particular, in 2010 another 67 MW of DSM is scheduled for installation, more than tripling 2009 efforts. Feedback from vendors indicates lighting opportunities in some areas may be reaching saturation, and a shift to non-lighting measures such as heating, ventilation and cooling (HVAC) and refrigeration may be needed to reach delivery targets. Vendors also noted that the economic recession has significantly reduced commercial customers' interest in the program (commercial customers typically pay for a portion of lighting measures, whereas most residential customers do not).

Adjustment Factors

The preceding section presented program DSM targets based on contracted load reductions. Estimates for the amount of load reduction that these contracts will *actually* produce, net to gross, must include adjustments to account for measures that are not operating at the time of the area peak,[23] measure life and retention, spillover, free ridership, and turnover.

The derivation of these adjustment factors for the Targeted program is based largely on the results of market research conducted for this study. Where applicable, results from studies with comparable demographics and measures were considered in the development of these factors, including recommendations outlined in the NYSPSC's draft for residential and small commercial programs.[24]

Surveys of participating and non-participating customers provided data to support the refinement of the program's savings estimates. The sample design for the survey research is summarized in Appendix A. Several parameters used in engineering algorithms to estimate savings were addressed in these surveys:

- Hours of use of installed high-efficiency equipment
- Coincidence of load reductions with network peaks
- Persistence (Retention/Turnover) including:
  - (a) efficiency measure retention; and
  - (b) household and business turnover
- Rebound
- Spillover
- Free ridership

The approach and assumptions used to derive each of these parameters is discussed in detail in Appendix B and summarized below. Participants were asked about the following parameters:

- *Coincidence Factor, Retention & Turnover* – Participants were asked to estimate the number of CFLs or percentage of installed lighting that typically is operating during each of the daytime or evening peak hour intervals. As summarized in Table 6, composite network coincidence factors of 19 and 67 percent are recommended for the

[23] Coincidence factors cited herein refer to the level of firm DSM achieved at the time of the load area peak.

[24] "New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs" for Selected Residential and Small Commercial Measures.

evening peaking (residential) and day-time peaking (commercial) networks. These are very significant adjustments from the 100 percent factors that are currently assumed and used. Recommended changes in the coincidence factors are discussed below. Participants also were asked about the number or percentage of program-installed lighting that had been removed and, if removed, the efficiency of the replacement lighting. Participants were asked about plans to move within four years.

- *Hours of operation* – Participants were asked about the hours of use by lamp type and location. These results were found to be consistent with data from studies cited in Appendix B where hours of use were metered (meters were not used in the Targeted program evaluation). The average daily and annual hours of use, by segment, are summarized in Table 5. The derivation of these hours also appears in Appendix B.

Table 5: Average Hours of Use

Customer Segment	Daily Hours of Use Per Lighting Measure	Annual Hours of Use Per Lighting Measure
Residential		
Single Family	2.7	986
2 to 4 Family	2.7	986
More Than 4 Family	3.8	1,387
Total Population	**2.8**	**1,022**
Commercial		
Manhattan	10.7	3,908
Non-Manhattan	9.0	3,258
Office/Small Retail	8.6	3,134
Non-Office/Small Retail	9.2	3,352
Total Population	**9.1**	**3,302**

- *Rebound* – Residential participants were asked how many CFLs installed *through the program* are used more or fewer hours per day than prior lighting, including estimates of the number of hours greater (or fewer) that the new lighting is used.

- *Spillover* – Residential participants were asked whether the program had influenced them to purchase additional CFLs. Those responding affirmatively were then asked how many additional CFLs were purchased. Residential and commercial participants also were asked whether the program influenced them to make additional efficiency improvements. A spillover factor of 1 percent was estimated for residential customers. Survey data for commercial customers indicated 12 percent were likely to install additional DSM. Since data on the quantity of DSM they may install was not provided, a conservative estimate of 4 percent spillover was assumed based on customer survey responses and professional judgment.

- *Free Ridership* – Participants were asked a battery of questions to ascertain the extent to which targeted DSM measures obtained through the program would have installed in the absence of the program.

Table 6 lists the adjustment factors used to derive network firm demand reductions and energy savings. These differ significantly from assumptions used by the Company's, which assumes 100 percent coincidence for all measures and no adjustments for the other factors listed.

Table 6: Adjustment Factors

Adjustment Factors[25]	Residential	Commercial
Coincidence Factor	19%	67%
Retention/Turnover	1%	1%
Rebound/Snapback	7%	0%
Spillover	1%	4%
Free Ridership	11%	3%

The coincidence factors are summarized, by segment, in Table 7. The residential factor (24 percent) is higher as the value is adjusted downward to 19 percent reflect the likelihood that respondents over-estimated summer lighting use hours.

Table 7: Coincidence Factors by Segment

Residential Segment	Summer Average CF	Commercial Segment	Summer Average CF
Single Family	24%	Manhattan	91%
2 to 4 Family	22%	Non-Manhattan	66%
More Than 4 Family	34%	Office/Small Retail	82%
		Non-Office/Small Retail	63%
Total Population	**24%**	**Average**	**67%**

A net-to-gross ratio is often used to summarize the total impact of the retention/turnover, rebound, spillover and free ridership factors. The derived net-to-gross ratios (excluding coincidence) are 83% for the residential measures and 99.8 percent for the commercial measures. The net-to-gross ratio of 83 percent means that for every 100 kW of DSM installed, the program actually saves 83 kW (exclusive of coincidence factor adjustments).

[25] Rebound impacts are excluded from the economic analyses due to the low impact and uncertainty of these impacts. Coincidence factor applies only to demand, while the remaining factors apply to both energy and demand.

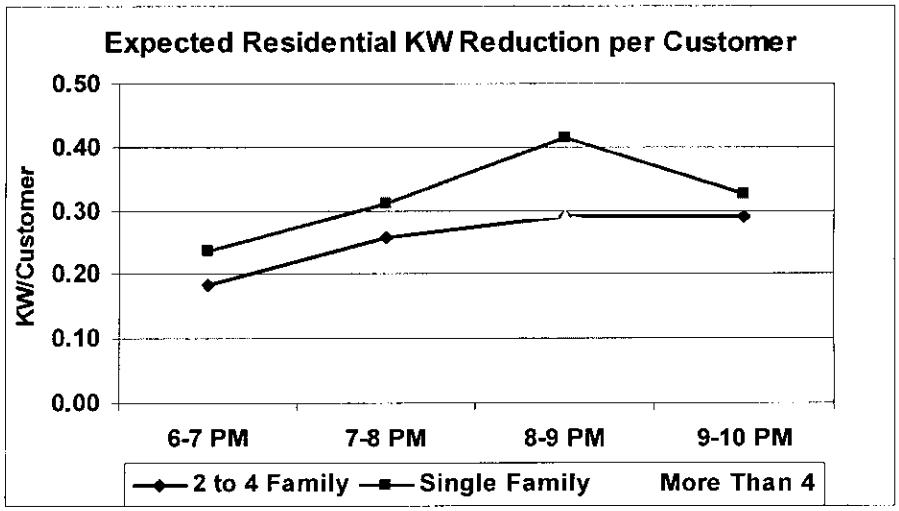
Network Analysis and Firm Load Reduction

The results of the market research analysis, planning studies and evaluation of network load characteristics were evaluated to predict the level of firm load reduction and energy savings for each load area targeted for T&D deferral under program phases II through IV. Billing data and recorded hourly load data were analyzed to support load reduction estimates.

Load Research and DSM Load Profiles

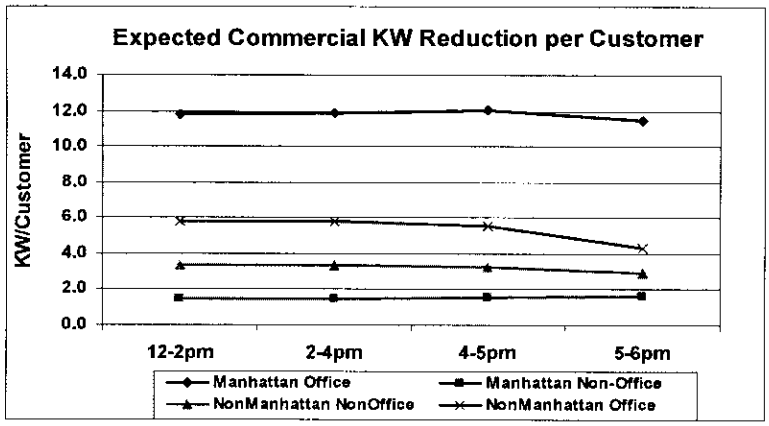
Market research and survey results for participating residential customers indicate hourly net DSM savings range between 0.2 kW to 0.4kW during the evening peak hours of 6:00pm to 10:00pm. These patterns are displayed in Figure 4.

Figure 4: Residential DSM Load Profiles



The expected hourly net DSM savings for commercial customers during the daytime peak interval of 12:00 noon to 6:00pm is between 2 kW to 12kW. These patterns are displayed Figure 5. The hourly load reductions displayed in each of these charts are net, and reflect the coincidence factors derived from the results of the market research.

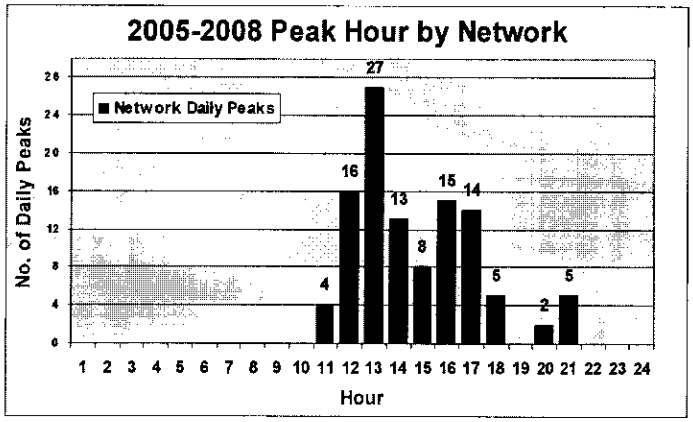
Figure 5: Commercial DSM Load Profiles



Load Research and Network Load Profiles

To date, virtually all networks designated as evening peaking have experienced daytime peaks, but this finding may be due, in part, to moderate weather and because T&D planning uses a 5:00 pm start hour for the evening peak interval rather than the 6:00 pm start hour used in the Targeted program. Figure 6 illustrates the hour of the day when individual networks experienced annual peaks. One would expect an evening peak to occur on these networks on an extreme weather day, the approach used by Con Edison for planning network upgrades[26]

Figure 6: Hour of Network Peak (2005 – 2008)



[26] The process Con Edison applies to predict extreme system and network peak loads is based on a weather normalization process that weights temperature and humidity.

Table 8 presents hourly network peak hours for the last four years. The data in Table 8 was used to derive the peak hour distribution profile illustrated in Figure 6.

Table 8: Hour of Network Peak (2005 – 2008)

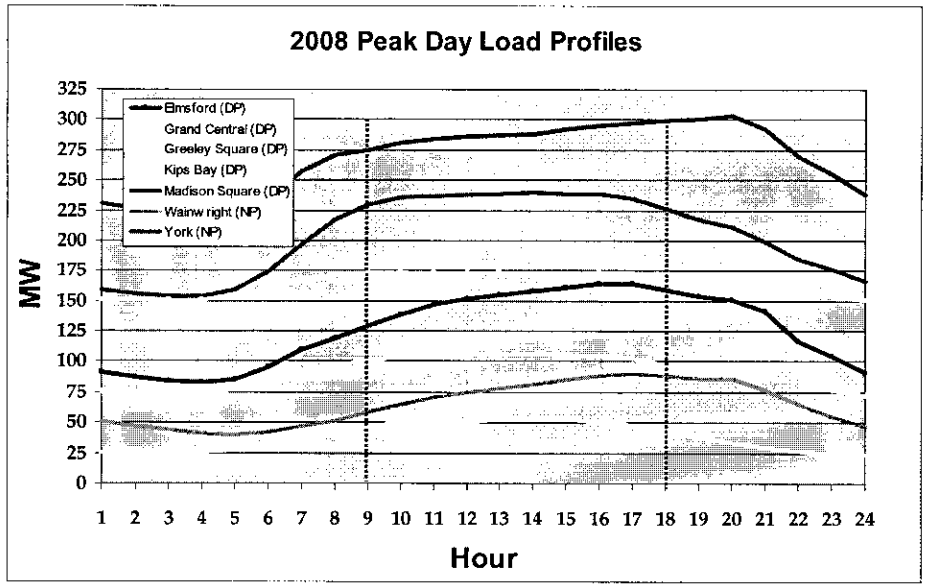
Network	Network Peak	2005 Peak Hour	2006 Peak Hour	2007 Peak Hour	2008 Peak Hour
Beekman	Day	12	13	13	13
Brighton Beach	Night	21	15	21	13
Canal	Day	13	11	14	13
Chelsea	Day	12	13	15	13
City Hall	Day	13	11	12	13
Elmsford	Day	16	16	15	16
Empire	Day	0	0	14	13
Fashion	Day	14	14	13	15
Flatbush	Night	13	21	21	17
Fox Hills	Night	17	17	18	17
Grand Central	Day	12	11	12	13
Greeley Square	Day	13	12	14	13
Greenwich	Day	12	13	17	17
Harrison	Day	16	16	16	16
Hunter	Day	14	13	14	15
Kips Bay	Day	12	12	12	14
Madison Square	Day	13	12	12	14
Millwood West	Night	16	15	15	16
Park Place	Day	14	17	12	13
Roosevelt	Day	14	13	12	16
Sheridan Square	Day	14	12	13	15
Sutton	Day	17	11	13	13
Turtle Bay	Day	14	12	13	13
Wainwright	Night	16	17	18	17
White Plains	Day	16	16	16	16
Willowbrook	Night	18	18	18	17
Woodrow	Night	0	17	17	17

Network load data indicate daily profiles for daytime peaking networks are flat for up to nine hours. If these same patterns were to occur on future extreme peak days, commercial measures would have to operate continuously for up to nine hours to achieve maximum savings; whereas residential measures need to operate continuously for about four hours.

In addition, there are differences in the day time versus evening peaking hours used by Company DSM and Planning personnel. The Planning group assumes the evening peak begins after 5:00pm; whereas DSM assumes 6:00pm. This potentially could shift some evening peaking networks to day time (or vice versa).

Figure 7 presents peak day hourly profiles for 2008 for representative residential and commercial load area networks.

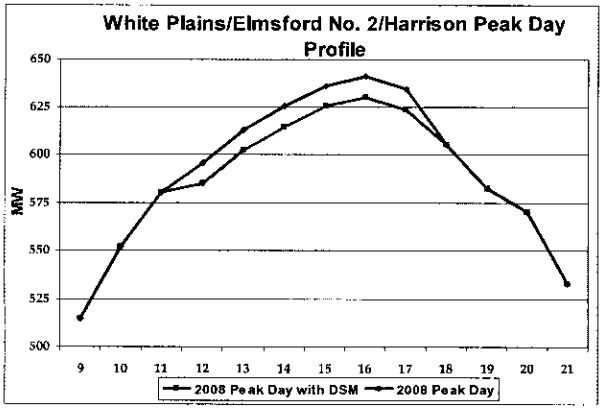
Figure 7: Daily Load Profiles

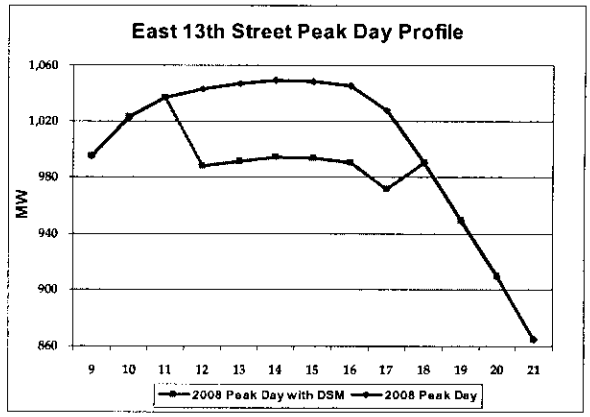


The impact of demand reduction on shoulder hours, specifically whether secondary peaks could be created also was analyzed for each load area. The analysis indicates targeted load reductions will not create secondary peaks, either for evening and daytime peaking load areas, as the amount of load reduction typically is a small percentage of the area peak.

Figure 8 present hourly reductions for two load areas. The first is in White Plains, where a T&D project has successfully been deferred. The second illustrates the impact of load reductions on the area with the largest amount of load reduction, East 13th Street. In Figure 8 Elmsford No. 2

Figure 8: Net Hourly Peak Day Profiles





The diagrams Figure 8 are representative of other load areas, where hourly profiles are flat. Most residential load areas show virtually no shift in hourly profiles due to the very small penetration of DSM relative to the area peak. For most load areas, firm DSM is less than five percent of the area peak.

Billing Analysis

Where available, pre- and post-participation billing data for program participants were collected and analyzed to determine the level of correlation between actual and predictive reduction of energy consumption. Because most participants are residential and small commercial billed under non-demand service codes (mostly SC 1 and 2), the billing analysis was used to confirm energy savings as opposed to coincidence factors or peak demand reduction. The billing analysis only analyzed participating customers prior to the installation of the energy efficiency measures to their bills post-installation. It also excludes use of customer data, data on changes in operation or occupancy, or detailed weather data.

Typically, billing analyses can be used when the amount of energy savings is more than five percent of total energy consumption. Table 9 confirms this threshold is achieved for participants: for commercial participants, the savings 10 percent and 20 percent of pre-program energy for office and non-office buildings, respectively; and for residential customers, the average savings range from 3.5 percent to 10 percent of the pre- program energy use.

Table 9: Percent Energy Reduction for Targeted Program Participants

Customer Type	KWh Reduction	KWh Total	% of Total
Single Family	8,225	81,914	10.0%
2 to 4 Family	9,549	269,152	3.5%
More Than 4 Family	106,116	1,484,068	7.2%
Total	**123,890**	**1,835,134**	**6.8%**
Non Manhattan Office	5,958	28,908	20.6%
Non Manhattan Non-Office	721,515	7,262,603	9.9%
Total	**727,473**	**7,291,511**	**10.0%**

The amount of billing data available via electronic records is limited to three years. Hence, there is limited data for participants prior to the installation of Phase II measures under Phase II of the program. (Phase III and IV are not applicable since vendors have only recently begun to install measures, and therefore, insufficient post-DSM data are available.)

For Phase II, pre- and post-billing data were available for 457 residential participating customers; however, data for only one commercial customer was available. Accordingly, for commercial customers, Phase I participant pre- and post-DSM billing data were used. Table 10

summarizes billing analysis results for residential and commercial participants, including a comparison of actual annual energy savings to predicted, based on the kW reduction from the program data and the hours of usage from the market research, as summarized above.

Table 10: Comparison of Billing Analysis and Market Research-Based Predicted Savings

Customer Type	Actual Savings (kWh/Cust)	Predicted Savings (kWh/Cust)	Difference (Actual Less Predicted)	Actual as a Percent of Predicted
Residential				
Single Family	914	1,856	942	49%
2 to 4 Family	184	886	702	21%
More Than 4 Family	268	717	449	37%
Commercial				
Office	5,958	3,846	-2,112	155%
Non-Office	10,768	8,929	-1,839	121%

The results for the residential sector indicate actual energy savings as a percent of predicted savings ranges from 21 percent for 2 to 4 unit complexes to 49 percent for single family homes. The higher actual savings for single family homes could be partially due to mild weather, other uncontrolled factors, and the small number (nine) of single homes in the analysis. Overall, the observed energy reductions (approximately seven percent of total use in Table 9) from the residential billing analysis are generally too low to confirm the hours of use derived from the market research. However, the lower actual versus predicted savings suggest lower use hours may be warranted.

For commercial buildings, the actual savings is 21 to 55 percent higher than predicted values. While some of this reduced usage also could be due to weather and changes in occupancy, the results indicate that the adjustment factors and hours of use derived from the market research are reasonable and can be used to predict hours of use and energy savings for this program.

Program Persistence and Measure Life

Market research indicates the sustainability of measures installed to date has been robust - very few customers surveyed reported measures removed or discarded. Those that have been removed have generally been replaced with equally efficient measures. The use of restraints in sockets designed solely for CFLs and vendor practices of leaving behind spare bulbs has helped ensure customers continue to use efficient lighting. Also, the quality of lighting measures, particularly for commercial has been reported as good and has not deterred customers from using the lighting measures as intended.

Measure life for lighting is expected to be equal to or greater than the five-year maximum deferral period for T&D deferrals. The results of market research suggest measure life for

residential lighting is at least five years, and three years for commercial lighting. These results compare to the five- to seven-year lives for CFLs in the NYSPSC's November 2008 draft *Standard Approach*[27] and several related studies in the northeast cited in Appendix B. For the Targeted program, a seven-year life is used for residential lighting; five for commercial lighting.[28]

Load Reduction Projections and Probabilities

The likelihood vendors will be able to deliver targeted load reductions consistent with contractual obligations is dependent on several factors, including marketing and delivery mechanisms, vendor track records of successfully delivering DSM in targeted networks, impact of competing programs (internal and external), and measure saturation. Existing performance statistics, vendor interviews and customer survey results were used to estimate probabilities for each of these factors. A probability analysis of these factors, weighted by likely impact, was conducted for each program phase, by vendor, by network. The results of the probability analysis are presented in Table 11.

The methodology used to derive the composite "Probability of Meeting Targets" column in Table 11 assumes six factors contribute to the likelihood that vendors will meet delivery targets. These six factors are assigned probabilities and weighted according to their contribution to meeting reduction targets. The probabilities assigned to each of the factors are multiplied by their corresponding weighting, and then added to derive composite probabilities for each load area. Each of these factors is described below:

- *Ability to Meet End-of-Year 2008 Targets* – Vendors that have demonstrated an ability to deliver DSM on schedule are assigned a higher likelihood of delivery for subsequent program phases. Probabilities range from 90 to 100 percent, as most vendors have achieved year-end targets for DSM deliveries as of December 2008. This factor is assigned a 30 percent weighting.

- *Load Reduction as a Percent of Peak* – Load areas with a higher penetration of load reduction are assigned lower probabilities, as vendors are likely to encounter greater delivery

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[27] "New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs" for Selected Residential and Small Commercial Measures.

[28] The hours of use for commercial customers, predicted at 3000 or more hours annually, would limit measure life for CFLs to about three years. For this evaluation, a five-year average life is assumed for CFLs installed for commercial customers under the assumption that socket restraints and reduced electric bills would incent customers to replace CFLs in kind. Further, vendors are obligated to ensure savings are sustained for the entire T&D deferral window of up to five years. Some vendors have supplied replacement bulbs to comply with the sustainability obligation.

challenges (e.g., measure saturation) in these areas. The load areas are grouped into three categories: (1) Load reduction is less than one percent of the peak; (2) Load reduction is less than one and five percent of the peak; and (3) Load reduction is greater than five percent of the peak. Probabilities range from 75 percent (East 13th) to 95 percent (areas where the majority of DSM has already been installed). This factor is assigned a 20 percent weighting.

- *Commercial Measure Adjustment* – Load areas that are predominantly commercial are assigned a 90 percent probability to reflect the greater uncertainty of customer participation, many of whom must contribute financially to measure installation(s). Residential areas are assigned probabilities near 100 percent as lighting measures (CFLs) are provided free-of-charge. This factor is assigned a 20 percent weighting.

- *Vendor Interviews and Survey Responses* – Information provided during the interview process provided additional insight regarding vendor ability to meet targets. Those who raised concerns about their ability to achieve targets were assigned probability of delivery percentages of between 80 and 90 percent. This factor is assigned a 10 percent weighting.

- *Energy Efficiency Portfolio Standard (EEPS) Impacts* – Load areas where most DSM has yet to be delivered were assigned lower probabilities to reflect the likelihood EEPS programs would erode savings derived from the targeted program. Probabilities ranged from 80 to 95 percent. This factor is assigned a 20 percent weighting.

- *Free Ridership-* The above five factors are then adjusted downward to reflect the 11 percent free ridership assigned to residential measures and three percent assigned to commercial measures.

Load projections and probabilities presented in Table 11 indicate that the likelihood of meeting Phase II targets is reasonably high – the probability that vendors will meet targets, net of free ridership is 88 percent. The higher probabilities associated with Phase II load areas is reflects the progress that vendors have made as of December 2008 in meeting delivery targets. Almost 20 MW of the 46MW target has already been delivered. Further, the level of delivery risk associated with the large number of residential areas is lower than commercial areas. The latter observation is derived from vendor interviews and customer surveys, which indicate residential participation is high as most measures – lighting – are delivered free-of-charge. However the higher free ridership for residential customers (11 percent versus 3 percent for commercial) increases delivery risk for Phase II.

Table 11: Load Reduction Projections

Load Area	Phase	Peak Interval	Vendor	Load Area Peak (MW)	Contracted Reduction (MW)	Contracted DSM as a % of Peak	Load Reduction Achieved (12/08)	Probability of Achieving Target	Expected Load Reduction (MW)
Fox Hills	2	Evening	FLC	191	8	4%	3.1	87%	6.9
Willowbrook	2	Evening	FLC	94	5	5%	2.8	87%	4.3
Woodrow	2	Evening	FLC	116	4	3%	4.4	87%	3.5
White Plains Area	2	Day	PES	640	15	2%	2.2	92%	13.8
Bensonhurst No. 2	2	Evening	QCS	232	14	6%	7.4	87%	12.2
Phase 2 Totals				**1,273**	**46**	**4%**	**19.9**	**88%**	**40.8**
Avenue A	3	Day	CPL	100	7	7%	-	87%	6.1
E. 40th 1/2: Murray	3	Day	CPL	436	5	1%	-	88%	4.4
E. 63rd No. 1	3	Day	CPL	227	3	1%	-	87%	2.6
E. 29th St.	3	Day	CPL	239	2	1%	-	87%	1.7
E. 63rd No.2	3	Day	CPL	217	3	1%	-	87%	2.6
Wainwright	3	Evening	FLC	90	1	1%	-	84%	0.8
Harrison	3	Day	PES	246	6	2%	1.8	83%	5.0
Hellgate	3	Evening	QCS	304	6	2%	0.6	85%	5.1
Phase 3 Totals				**1,859**	**33**	**2%**	**2.4**	**86%**	**28.4**
Wainwright	4	Evening	FLC	90	1	1%	-	83%	0.8
E. 13th St	4	Day	PES	1,214	67	6%	0.3	81%	53.9
Millwood West	4	Evening	QCS	85	1	1%	-	93%	0.9
Phase 4 Totals				**1,389**	**69**	**5%**	**0.3**	**81%**	**55.7**

The probability of meeting targeted reduction drops to 86 percent for Phase III, as the higher number of commercial networks coupled with the uncertainty of vendor performance causes uncertainty to increase modestly. Notably, the introduction of residential and small commercial Fast Track programs recently approved by the NSYPSC in the Energy Efficiency Portfolio Standard (EEPS) proceeding may begin to erode savings. Contractors are likely to find better opportunities under the EEPS for some customers. The percentage drops further for Phase IV, largely due to the higher uncertainty of meeting load reduction targets in networks served by East 13th Street.

One vendor indicated in interviews that meeting targets in these networks will become very challenging given the rapid ramp-up in their contracted deliveries, the saturation of efficient lighting, competition from NYSERDA programs, and the economic recession. The transition to other more sophisticated measures also increases the risk of non-delivery.

The estimated amount of load reductions not met is tempered by liquidated damages that vendors must pay if targets are not met. The expected load reductions likely would be lower than those cited in Table 11 if this clause was not included in vendor contracts.

Firm DSM Load Reduction for Residential and Commercial Measures

The results of market research indicates firm capacity reductions achieved by targeted DSM is expected to be lower than the 100 percent assumption currently used to defer T&D investments. Table 12 presents contracted and net firm load reduction for residential and commercial load areas.[29] Notably, the level of firm DSM for residential measures installed in evening peaking areas is significantly below levels predicted for daytime peaking areas, where mostly commercial measures are installed.

On a total portfolio basis, the level of firm DSM, net of adjustments, is expected to be approximately 60 percent of contracted amounts. However, load forecasts for most load areas have declined sufficiently to avoid capacity deficits. As a result, the lower than contracted load reductions will not accelerate the need date (or cause overloads) for most T&D projects.

Table 12: Contracted Versus Firm DSM Load Reduction

Network Description and Peak Interval	Contracted Load Reduction (MW)	Net Firm Load Reduction (MW)	Percent Firm Reduction
Residential Networks (Evening Peaking)	40	6	14%
Commercial Networks (Daytime Peaking)	108	83	77%
Total	**148**	**88**	**60%**

The primary reason for the lower percentage of firm DSM in residential and commercial networks is the use of lower coincidence factors – 19 percent for residential areas and between 74 and 84 percent for commercial load areas.

Table 13 presents adjusted firm DSM by load area. All residential load areas, except for a portion of Hellgate, are located outside of Manhattan, so the coincidence factor is the same in all residential load areas. The other adjustments account for about four percent of the total reduction of 40 percent. Other adjustments include about a one percent turnover rate for commercial and residential customers, and an upward adjustment factor of one to four percent

[29] The load reductions that appear in Table 12 are independent of the predicted DSM deliveries cited in Table 11 of the prior section. The values cited in Table 12 assume liquidated damage payments from vendors would be used to make up the shortfall or to pursue mitigation options such as use of mobile generators to remedy capacity deficits caused by vendor non-performance.

for spillover. Results for individual commercial load areas vary due to differences in coincident factors in Manhattan (74 to 84 percent) versus those applied in residential areas (19 percent).

Table 13: Firm DSM by Load Area

Load Area	Peak Interval	Net-to-Gross Ratio	Coincidence Factor	Free Ridership	Net Firm DSM (kW)
Fox Hills	Evening	83.0%	19.0%	11.0%	1,123
Willowbrook	Evening	83.0%	19.0%	11.0%	702
Woodrow	Evening	83.0%	19.0%	11.0%	561
W. Plains/Elmsford No. 2./Harrison	Day	99.8%	75.0%	3.0%	10,894
Bensonhurst No. 2	Evening	83.0%	19.0%	11.0%	1,965
Avenue A	Day	99.8%	82.3%	3.0%	5,580
E. 40th St No. 1/2: Murray Hill	Day	99.8%	82.3%	3.0%	3,986
E. 63rd No. 1	Day	99.8%	82.3%	3.0%	2,391
E. 29th St.	Day	99.8%	83.9%	3.0%	1,624
E. 63rd No. 2	Day	99.8%	82.4%	3.0%	2,393
Wainwright	Evening	83.0%	19.0%	11.0%	140
Harrison	Day	99.8%	73.8%	3.0%	4,289
Hellgate	Evening	83.0%	19.0%	11.0%	842
Wainwright	Evening	83.0%	19.0%	11.0%	140
E. 13th St	Day	99.8%	79.7%	3.0%	51,699
Millwood West	Evening	83.0%	19.0%	3.0%	153
	Total	**95.3%**	**59.8%**	**3.5%**	**88,483**

Energy Savings

The market research completed for residential and commercial networks produced expected hours of use, and these data were used to derive DSM energy savings by load area. Since the hours of use for specific measures vary by customer type (e.g., office versus non-office building), energy savings achieved by the Targeted program differs slightly among networks. Demand and energy savings, and average hours of use for residential and commercial load areas (networks) are presented in Table 14.

Table 14: Targeted DSM Hours of Use and Energy Savings

Customer Description	Contracted Demand Reduction (MW)	Average Hours of Use	Energy Savings (MWh)
Residential Energy Savings	40	1,022	40,880
Commercial Energy Savings	108	3,575	386,074
Total	**148**	**N/A**	**426,954**

The hours of usage used to derive energy savings are far larger for commercial participants than residential. These hours are generally consistent, or in some cases slightly higher, than values derived for other northeast utilities. Also, the hours for commercial areas are heavily weighted to use hours derived from survey results for Manhattan, the location of most commercial participants.

External Program Impacts

NYSERDA

Some of NYSERDA's Energy $mart programs parallel the Targeted program, although none are designed to reduce firm peak loads to defer T&D investments. Many of these programs are delivered in the targeted areas analyzed in this evaluation. Measures include system peak load and energy reduction programs, including system peak reduction, which about 5 percent of the load reduction achieved in targeted networks. Table 16 presents NYSERDA existing and committed DSM programs, measured by total kW savings, for all networks in Con Edison's service territory, and for each network that is part of the targeted program.[30]

Table 15: NYSERDA DSM Programs in Con Edison Networks

NYSERDA DSM Program	All Networks (MW)	Targeted Networks (MW)
Existing	72	29
Committed	109	38
Total	**181**	**66**

For this evaluation, no firm capacity credit is applied to NYSERDA DSM programs delivered to Con Edison customers, full service or delivery only, to relieve projected capacity deficits. The NYSERDA programs are non-firm, particularly when viewed in the context of *network* peaks, which may occur at a different time than the *system* peak (NYSERDA's peak reduction programs are designed to reduce the system peak).

Any firm reductions achieved from NYSERDA programs that occur at the time of the network peak would reduce capacity deficits and further mitigate program risk.[31] For example, if a 20 percent coincidence factor is assigned to committed NYSERDA measures – a conservative estimate - there would be 15 MW of additional firm load reduction in the targeted areas (10

[30] Demand reduction estimates provided by NYSERDA.

[31] About 50 percent of NYSERDA programs in Con Edison's are peak load reduction, many of which are only called upon to operate during a statewide emergency or to reduce *system* peak demand. The likelihood the load read peak is coincident with the system peak demand is greater in commercial load areas. However, the low hours of operation of NYSERDA peak load reduction programs suggest a low coincidence factor is appropriate.

percent of program targets for Phases II through IV). These measures serve to reduce the level of risk of non-delivery from vendors, but are excluded in firm demand reduction calculations.

Table 16: NYSERDA DSM Measures in Targeted Load Areas

Load Area	Existing DSM (MW	Committed DSM (MW)
White Plains /Elmsford No. 2/ Harrison	2.6	4.7
Avenue A	1.5	1.2
E. 40th Street No. 1/2: Murray Hill	2.1	4.4
E. 63rd No. 1	3.2	4.5
E. 29th St.	1.3	3.6
E. 63rd No. 2	2.9	2.4
Harrison	0.7	0.0
Millwood West	0.0	0.1
Fox Hills	0.8	0.1
Willowbrook	0.1	0.2
Woodrow	0.0	0.0
Bensonhurst No. 2	0.6	1.2
Hellgate	0.0	0.0
Wainwright	0.0	0.0
East 13th St	12.5	15.5
Total:	**29**	**38**

Program and Market Risks

In addition to the probability analysis used to predict vendor DSM deliveries in the prior section, program risk also was assessed using qualitative and quantitative methods. Both qualitative and quantitative data are used as inputs to the risk profile for each load area (i.e., T&D project deferred by DSM). First, overall risk associated with capacity deficits is assessed.

Capacity Deficits and Mitigation Options

Table 17 presents the hours of exposure associated with DSM capacity deficits. The relatively small deficit compared to peak demands for each load area results in few hours of exposure - it is during these hours that mitigation would be needed to ensure sufficient capacity is available to avoid degradation of transmission and substation reliability in targeted load areas.[32]

[32] The actual hours of exposure typically are higher than the absolute value presented in the table. First, there can be multiple days when load exceeds firm capacity. Further, the time needed to install mitigation options such as DG likely will be more than the few hours listed. Further, due to uncertainty in peak load duration the number of hours back-up generators would operate would be greater than the few hours listed in the table.

Table 17: Hours of Exposure for DSM Capacity Deficits

Load Area	Contracted DSM (kW)	Firm DSM (kW)	Capacity Deficit (kW)	Network Load (MW)	Exposure (Hrs)
Fox Hills	8,000	1,858	6,142	193	5
Willowbrook	5,000	1,154	3,846	90	11
Woodrow	4,000	916	3,084	113	6
W. Plains/Elmsford 2/Harrison	15,000	10,883	4,117	637	3
Bensonhurst No. 2	14,000	3,866	10,134	232	4
Avenue A *	7,000	69	6,931	250	3
E. 40th Street No. 1/2	5,000	4,133	867	467	2
E. 63rd No. 1	3,000	2,480	520	227	2
E. 29th St.	2,000	1,682	318	239	-
E. 63rd No. 2	3,000	2,481	519	216	2
Wainwright	1,000	231	769	90	3
Harrison	6,000	4,291	1,709	228	3
Hellgate	6,000	2,004	3,996	87	3
Wainwright	1,000	231	769	303	2
E. 13th St	67,000	55,369	11,631	1,214	4
Millwood West	1,000	231	769	84	2

The most significant program risk is the likelihood that actual network coincidence factors will be less than unity, particularly in residential areas where market research predicts actual network coincidence factors of about 20 percent. The next area of risk is the inability of contractors to meet delivery targets; either due to market saturation, contractor shortfalls, competition from other programs or economic conditions that make it increasingly challenging to motivate customers to participate (this is mostly a concern for commercial customers who must contribute financially – most residential customers are provided lighting free-of-charge).

Although the program contracted deliveries are on schedule as of year-end 2008, there have been some interim shortfalls, and liquidated damages have been paid by some vendors. Further, vendors serving areas with larger loads reductions (e.g., 67MW for the 13th Street load area) may have difficulty reaching their targets. Reasons for the potential delays include need to shift from lighting to other measures and the decline in participation by commercial customers impacted by the economic decline. However, the economic decline also has caused loads to decline, which may offset the drop off in participation.

The risk of not having sufficient DSM load reduction is mitigated by several initiatives designed to enhance network reliability, most of which have been implemented independent of the Targeted program. Risk mitigation includes voluntary load curtailment, direct load control programs, emergency demand reduction, and if necessary, installation of temporary generators at network substations (that would be paid by liquidated damages paid by vendors who fail to

meet their load reduction commitments). The backup distributed generation (DG) can be installed in the secondary network system in some instances rather than primary lines or substations, which offers greater flexibility and less risk than if installed adjacent to substations.

Overall program risk also is mitigated by Con Edison's robust planning criteria.[33] Transmission feeders and substations that supply Manhattan are designed to meet n-2 contingency criteria (n-1 outside Manhattan). Since Con Edison applies deterministic criterion for planning purposes, the system is designed to meet deficiencies for the highest load hours. The likelihood of a multiple contingency event at the time of the network peak is very low. For most networks, the targeted DSM load reduction is a small percentage of the load area peak; usually less than 5 percent. Hence, the increased risk of not meeting reduction targets is lower for networks where DSM penetration is low as a percentage of total area load, particularly when mitigation options outlined above are applicable for use at each network and readily available.

Lastly, risk is further mitigated when loss reductions are added to the contracted load reductions achieved. At peak, incremental demand losses on the T&D system can reach or exceed ten percent. For example, a 2MW deficit for 10MWs of contracted DSM delivery results in an actual reduction of 8 MW. However, if incremental losses are 10 percent, then total load reduction is 8.8 MW, which yields a net 1.2 MW deficit instead of 2 MW. In this example, incremental peak loss credits would reduce the deficit by 40 percent. Con Edison does not apply demand loss credits when specifying the level of DSM needed to meet annual capacity deficits and the same assumption is applied in this evaluation; however, loss benefits are accounted for in the economic analyses where a 7.2 percent credit is applied to energy savings.

Qualitative Methodology

The risk analysis includes a qualitative assessment of key DSM parameters and assumptions. Using the qualitative approach, each of the key risk factors is assigned a rating of one through five: one is assigned to factors with the lowest risk, five the highest. Table 18 presents the scoring criteria used for each load area T&D project scheduled for deferral. The scores should be viewed qualitatively, as they represent relative risk of each project versus others scheduled for deferral as a result of the Targeted program.

[33] The report does not opine on Con Edison planning methods or criteria, established in the early 1960's by Commission directive. The risk analysis solely addresses the increase in risk, if any, from key drivers, assumptions and delivery methods for the Targeted DSM program.

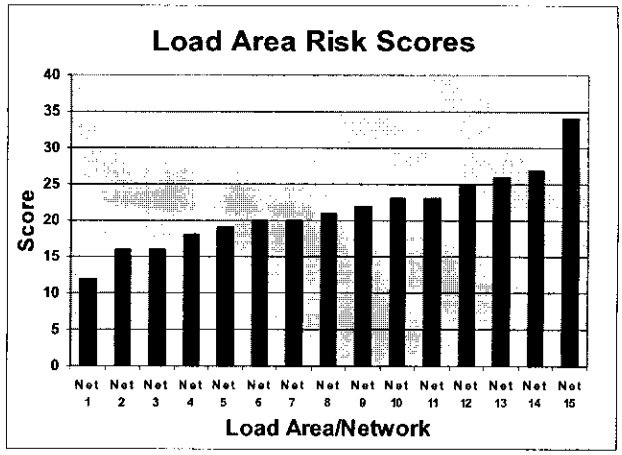
Table 18: Risk Score Assignments

Category	Low Risk (1-2)	Medium Risk (3-4)	High Risk (5)
Vendor Ability to Deliver/Meet Target	Less than 5 MWs Contracted	Between 5 and 10 MWs Contracted	Greater than 10 MWs Contracted
Time Required to Install Backup DG	Less than 8 Hours (Non-Man/Res)	Between 8 and 24 Hours (Non-Man/Com)	Greater than 24 hours (Manhattan)
Firm DSM as a Percent of Load	Less than 1 Percent	Between 1 and 5 Percent	Greater than 5 Percent
Load Forecast Variability (98 Percent Peak Load)	Less than 0.5%	Between 0.5% & 1.5%	Greater than 1.5%
Construction/Equipment Lead Time	Less than 6 Months	Between 6 Months & 2 Years	Greater than 2 Years
Years Deferred	Less than 3 Years	Three or Four Years	Five years
T&D Project Cost	Less than $1 million	Between $1 million & $10 million	Greater than $10 million
Contributions from External EE Programs	Greater than 10 Percent of Firm DSM	Between 1 and 10 Percent Firm DSM	Less than 1 Percent of Firm DSM

Overall project risk scores, ranked low to high, are presented in Figure 9. Results indicate most of the residential load areas have relatively low risk, both from a delivery standpoint and potential for network overload. This finding also reflects the lower than anticipated load growth caused by the recent economic decline.

Figure 9: Targeted T&D Risk Scores

Key	Load Area Description
Net 1	Millwood West
Net 2	Willowbrook
Net 3	Wainwright
Net 4	Harrison
Net 5	Hellgate
Net 6	E. 40th Street No. 1/2 - Murray Hill
Net 7	Fox Hills
Net 8	E. 63rd No. 2 - Turtle Bay/Roosevelt
Net 9	Woodrow
Net 10	E. 63rd No. 1 - Hunter/Sutton
Net 11	E. 29th St. - Madison Square
Net 12	Avenue A - Cooper Square
Net 13	Bensonhurst No. 2
Net 14	White Plains/Elmsford No. 2/Harrison
Net 15	East 13th St/East River Switching Station



The low risk scores for residential load areas are partly offset by low coincidence factor, which reduces the level of firm reduction achieved at peak. Daytime peaking areas appear to be at greater risk than residential areas. Notably, the East 13th Street project (Extend transmission to Astoria East) has higher overall risk than projects in other load areas, but been deferred due to lower load growth and network transfers.

Quantitative Evaluation

In addition to the probability analysis used to predict contracted load reduction targets achieved by vendors, probability analyses were performed to identify the likelihood of capacity deficits or surpluses for load areas where T&D upgrades have not yet been deferred.[34] A confidence interval of 95 percent was selected as the end points for the lower and upper distributions. Where possible, actual data were used to derive a probability distribution for each independent variable. Independent variables (input parameters) include weather normalized peak load forecast (i.e., extreme peak), contractor performance (ability to delivery contracted DSM on schedule) and peak coincidence factor. A description of the methodology employed to derive state and cumulative probabilities is provided in Appendix C.

Results for each of the other load areas also show capacity deficits for the mean or most likely outcome. It is important to note capacity deficits are based on normalized peak forecasts, which are higher than historical load area peaks over the past four years.

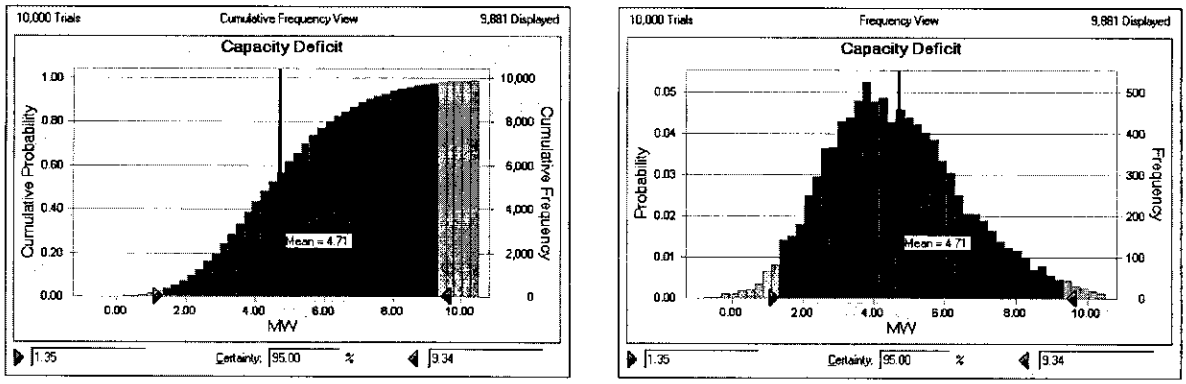
Figure 10 illustrates the results of the probability analysis for the Willowbrook load area. Results indicate capacity deficits can range from 2.3 MW to a 7.4 MW with a deficit of 4.5 MW at the 50 percent cumulative probability level. (Note that the 50 percent likelihood differs slightly from the predicted mean value of 4.71.) Results for each of the other load areas also show capacity deficits for the mean or most likely outcome. It is important to note capacity deficits are based on normalized peak forecasts, which are higher than historical load area peaks over the past four years.

Table 19 presents the likelihood of capacity shortfalls or surpluses by load area. Results indicate the amount of capacity deficit (positive values) or surpluses (negative values) at the 10, 50 and 90 percent cumulative probability levels. The 50 percent value is the mean value, whereas the 10 percent level indicates there is a 10 percent likelihood the capacity deficit will be at lower than the corresponding value on the chart. At 90 percent, there is a 10 percent likelihood

[34] The East 13th Street project also does not appear as the T&D upgrade (Extend transmission to Astoria East) has been permanently deferred.

capacity deficits will be greater than the corresponding value that appears on the chart (capacity deficits appears on the Y – Axis). Discrete probabilities for specific capacity deficit levels also appear in Figure 10.

Figure 10: Capacity Deficit Probability Distributions



The probability studies reveal that load growth variability has the greatest contribution to uncertainty in meeting load reduction targets – over 80 percent of the uncertainty in the risk analysis is load growth variability, the remainder is related to coincidence factor and contractor delivery targets. To date, actual loads generally have been below forecasts, which has mitigated the risk of capacity deficits and offset coincidence factors that are expected to be below 100 percent, particularly in residential load areas.

Table 19: Probability of Capacity Deficits

Load Area	2009 Peak (MW)	Low (10% Probability)	Base (50% Probability)	High (90% Probability)
E. 40th Street No. 1/2: Murray Hill	505	-4.3	9.5	23.6
E. 63rd No. 1	245	1.7	8.3	14.9
E. 29th St.	267	-7.4	0.5	8.8
E. 63rd No. 2	231	0.5	6.8	13.2
Millwood West	85	0.9	2.8	5.4
Fox Hills	211	5.9	11.1	18
Willowbrook	93	2.3	4.5	7.4
Hellgate	315	0.3	7.2	17.0
Wainwright	95	2.7	4.8	7.7

An unexpected upward or downward shift in growth could cause higher deficits or surpluses, and program design adjustments may be needed to provide greater contract flexibility. However, risk mitigation measures, described in the prior section, temper the impact of

unexpected load increases, and should be considered if changes in contracted demand reduction are pursued.

The primary conclusion drawn from the probability analysis is that DSM should be considered less "firm" than traditional T&D investments, but has equal or less variability than other factors such as load forecasts. Further, mitigation measures outlined above may be needed in some load areas to ensure the program does not increase the overall risk of capacity shortages. The primary driver of the level of "firmness" of DSM is the difference between the evaluated coincidence factors and those that were used in the planning. If the evaluated coincidence factors are used, then DSM becomes a reliable, firm resource, comparable to traditional T&D investments.

Economic Analysis and Program Cost-Effectiveness

The approach used to derive the Total Resource Cost (TRC) test ratios is based on the premise that benefits for T&D project deferrals should be based on project need dates established at the time that Requests for Proposals were issued for Phases II through IV. This assumption is important, as economic conditions have shifted the need dates for certain T&D deferrals.

Total Resource Cost Test

The Targeted DSM economic evaluation applies the total resource cost (TRC) test methodology similar to the test applied in prior Con Edison filings before the NSYPSC. The methodology employed includes many of data and assumptions used by Con Edison to evaluate specific T&D deferrals. However, findings and results presented in this evaluation are updated based on the findings from market research, and vendor and stakeholder interviews.

Evaluation Assumptions

Key assumptions and methods used to derive TRC benefit-to-cost ratios include:

- Average measure life of 7 and 5 years, respectively, for residential and commercial lighting. Program savings are projected over these measure lives; no credit is assigned for market transformation.[35]

[35] As noted previously, the life of some commercial lighting measures may be below five years. The provision of replacement lights by vendors and use of restraints for CFLs suggest a minimum life of five years is warranted.

- Use of coincidence factors, turnover, and free ridership derived via market research results and industry data derived from recent studies of Northeast utilities for residential and commercial customers, by load area, as summarized in Table 6.

- A 7.82 percent discount rate (versus 7.2 percent in the September EEPS filing) – the increase causes a modest decline in program value as many benefits are long-term whereas costs are incurred in the first 5 years.

- Use of the avoided costs in the NYSPSC's January 16, 2009 Order for the New York State Fast Track residential and small commercial programs. (The September EEPS filing used slightly higher values for demand and energy.) Avoided costs from the January 2009 Commission order appear in Table 20.

Table 20: Avoided Costs - Demand and Energy

Year	Demand ($/kW-Yr)	Energy ($/MWHr)	Year	Demand ($/kW-Yr)	Energy ($/MWHr)
2008	$ 55.2	$ 81.1	2018	$ 137.2	$ 78.3
2009	$ 55.5	$ 83.2	2019	$ 138.1	$ 78.5
2010	$ 120.2	$ 81.5	2020	$ 139.8	$ 78.6
2011	$ 119.7	$ 80.0	2021	$ 139.8	$ 78.8
2012	$ 119.2	$ 78.6	2022	$ 139.8	$ 79.0
2013	$ 125.1	$ 78.3	2023	$ 139.8	$ 79.2
2014	$ 121.0	$ 78.0	2024	$ 139.8	$ 79.4
2015	$ 113.4	$ 77.7	2025	$ 139.8	$ 79.4
2016	$ 122.3	$ 77.9	2026	$ 139.8	$ 79.4
2017	$ 136.1	$ 78.1	2027	$ 139.8	$ 79.4

Program Benefits

Program benefits are based on the avoided costs are based on firm demand and energy reductions achieved by the Targeted program. Avoided production demand and energy savings are derived using values in Table 20. Other program benefits include,

- A 15 percent reserve margin credit applied to the demand component of the system avoided costs presented in Table 20.

- A loss credit of 7.2 percent (same as the September EEPS filing). The 7.2 percent credit applies equally to both demand and energy savings.

- An externality adder of $15/ton for avoided CO2 (at 0.5 tons per avoided MWh (same as the September EEPS filing).

- Avoided primary distribution costs of $50/kW-yr., applied annually to the amount of firm DSM achieved, net of adjustments. In the September 2008 filing for Phase V, a credit of $100/kW-yr. was applied. However, the January NSYPSC Order clearly indicates the avoided distribution credit of $100/kW-yr. includes substations and lower voltage transmission. The applied value therefore was lowered by $50/kW-Yr to avoid double counting of substation and transmission benefits, and to be consistent with T&D cost allocation methods used by Con Edison. No credits are applied for low voltage secondary networks.

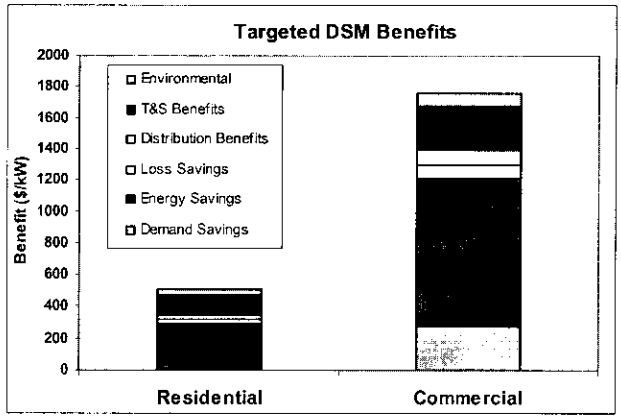
Total T&D deferral savings (over a maximum of five years) are derived using a methodology similar to the approach applied by Con Edison to derive a T&D incentive ceiling for vendor bids. These savings are derived by multiplying the T&D savings factors presented Table 21 by the total T&D investment cost. For example, a $1 million T&D project, deferred for a period of five years, would achieve a total NPV savings of $137,000.

Table 21: T&D Deferral Factors

Deferral Years	T&D Savings Factor
1-Year Deferral	0.029
2-Year Deferral	0.057
3-Year Deferral	0.084
4-Year Deferral	0.111
5-Year Deferral	0.137

Total program benefits for residential and commercial load areas are illustrated in Figure 11. The majority of benefits are energy savings. Total program benefits for commercial load areas collectively are about $1,750/kW. Program benefits for the combined residential load areas are about $500/kW, less than one-third of the value of commercial programs.

Figure 11: Program Benefits

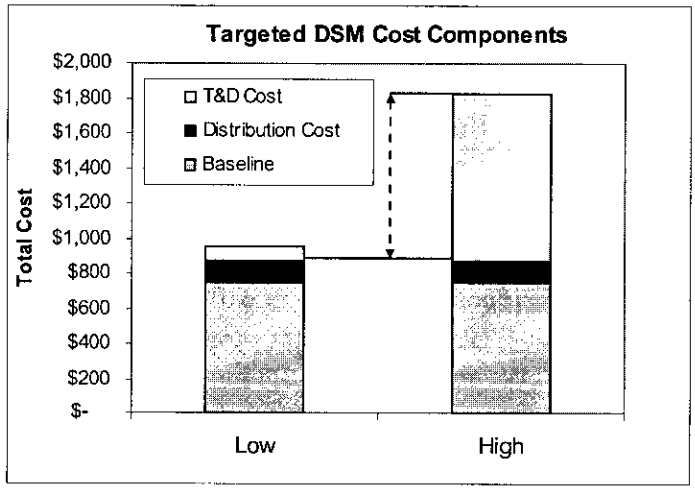


Program Costs

The primary program cost is payments made to vendors for delivery of DSM measures. These costs vary as vendor submitted a range of bids depending on load area. The maximum amounts paid by Con Edison to vendors (on a $/kW basis) are capped according to a bid ceiling. The bid ceiling used by the Company to evaluate bids (and the maximum amount paid to vendors) for T&D deferrals ranges between $900/kW and $1900/kW; specific cost components are displayed in Figure 12.

In Figure 12, the baseline value ($746/kW), and distribution capacity ($100/kW to 150/kW) is fixed.[36] The cost of the T&D deferral used to establish the bid ceiling varies by load area, and is determined by multiplying the factors that appear in Table 21 by the amount of the T&D investment.

Figure 12: Targeted Network Costs



Notably, the baseline value of $746/kW accounts for approximately 50 to 90 percent of the total amounts paid to vendors for the Targeted DSM program. These cost ceilings were used by the Company to evaluate vendor bids. The benefit-cost analysis, below, compares actual vendor costs obtained from bid documents (and Con Edison program costs) to program benefits.

For the program costs, the vendor specific bids were used. The vendor bids were compared with the baseline (energy and capacity), distribution and T&D deferral cost, as summarized in Figure 11. For the TRC analysis program costs include,

[36] The distribution component is included in the above table and used for vendor bid evaluation . In Phase II, Con Edison used program guidelines, Phases III and IV a value of $150/kW was used, and Phase 5 is $100/kW.

- Direct program costs based on accruals as of March 2009. Direct program costs include measurement and verification, monitoring and evaluation, Company labor and other administrative costs. Projected costs for targeted DSM not yet delivered are assumed to follow the same trend, and are derived using the $/kW values incurred as of March 2009 for each of these cost categories.

- An average customer cost of $79/kW for commercial participants. Costs for residential customers were determined to be zero as all measures delivered are lighting, offered free-of-charge by vendors. The commercial estimate is based on survey responses.

- A utility earnings incentive of approximately $22/MWh applied once to first-year energy savings, to contracted DSM deliveries. The approach is consistent with the Company's September 2008 EEPS filing for Phase V of the Targeted program.

To derive benefit-to-cost (B/C) ratios, actual amounts paid or scheduled to be paid to vendors (displayed in Figure 12) are added to the costs described in each of the bulleted items above. These costs are summarized by load area and used in the denominator of the economic analysis equations to determine B/C ratios.

Program Cost-Effectiveness

The impact evaluation for the Targeted DSM program indicates it is cost effective on a total portfolio basis. However, commercial measures are more cost-effective than residential measures, which are not cost effective. Based on TRC results, the program achieves a composite B/C ratio of 1.5. Program results, summarized in Table 22, indicate daytime peaking load areas yield significantly higher B/C ratios. Of the 15 load area projects targeted for deferral, eight have ratios above 1.0; seven have ratios that are below 1.0. Most below 1.0 are located in evening peaking, residential areas

Table 22: Base Case Economic Analysis

Load Area Type	Actual Load Reduction Achieved	Actual Benefit to Cost Achieved	Total Contracted Load Reduction	Total Program Benefit to Cost
Evening Peaking	15 MW	0.79	40 MW	0.61
Daytime Peaking	15 MW	1.40	108 MW	1.71
Total	**30 MW**	**1.14**	**148 MW**	**1.45**

The primary reasons the benefit-to-cost ratio is lower for residential measures include use of lower peak coincidence factors, higher free ridership and fewer hours of usage than the values used for commercial measures. Also, the several of the values used in this evaluation are lower than those applied by the Company at the time that the program was developed. Also, the

system (as opposed to load area) peak coincidence factor is 0.10 for evening peaking residential load areas, which is far lower than the 0.80 value assigned to measures in commercial areas.

Program net present value costs and benefits are presented in Table 23 for residential and commercial programs, and on a total portfolio basis. Benefits achieved by T&D deferral are approximately 17 percent of total program savings; non-targeted distribution deferrals are about seven percent of total program savings.

Notably, the majority of savings, over 66 percent, are avoided capacity and energy costs. Despite a program design that emphasizes firm network demand reduction, energy savings dominate program benefits.

Table 23: Economic Analysis (Total Program)

Program Costs and Benefits	Commercial (000s)	Residential (000s)	Total NPV (000s)	Percent (Total Program)
Program Benefits:				
Demand Savings	$29,911	$336	$30,247	14.1%
Energy Savings	$100,706	$11,284	$111,989	52.1%
Environmental	$9,525	$1,063	$10,589	4.9%
Loss Savings	$10,090	$913	$11,003	5.1%
Distribution Benefits	$13,803	$1,318	$15,120	7.0%
Transmission & Substation Benefits	$30,412	$5,457	$35,868	16.7%
Total Benefits	**$194,446**	**$20,371**	**$214,817**	**100.0%**
Program Costs:				
Vendor Payments	$90,112	$29,875	$119,987	81.0%
Utility Incentives	$6,758	$688	$7,446	5.0%
Customer Costs	$6,676	$0	$6,676	4.5%
Program Planning and Administration	$933	$356	$1,289	0.9%
Measurement & Verification	$6,881	$2,623	$9,504	6.4%
Evaluation and Market Research	$2,401	$915	$3,316	2.2%
Total Cost	**$113,762**	**$34,456**	**$148,218**	**100.0%**

The Targeted program has produced value to Con Edison customers, as it has deferred T&D projects that otherwise would have been constructed in the absence of DSM. Table 24 presents five committed projects that have been deferred one or more years by the program. The total cost of these five projects is $62.1 million, approximately 20 percent of the total cost of proposed T&D deferrals of $274 million. The benefit-to-cost ratio achieved by these deferrals is 1.1, approximately 20 percent below the composite ratio of 1.45 estimated for the program portfolio.

Table 24: T&D Projects Deferred by Targeted Program

Load Area	T&D Project Deferral Description	Peak Interval	Cost (000's)
White Plains/Elmsford No. 2/Harrison	Transfer 30MW-White Plains to Rockview	Day	$10,600
Avenue A	Increase 69kV Supply Rating	Day	$15,000
Harrison	Install Permanent Transformer Cooling	Day	$500
Woodrow	Install 3rd Transformer & 138kV Supply	Evening	$29,000
Bensonhurst No. 2	Install 5th Substation Transformer	Evening	$7,000
		Total	**$62,100**

On a forward-looking basis, the need date for several T&D projects has been extended beyond the original five-year deferral window. Nevertheless, the program continues to be cost-effective when measured by TRC, even when T&D benefits are reduced. Con Edison could reduce vendor load reduction targets in other load areas where DSM has not yet been delivered – almost 75 percent of the Targeted program has not yet been installed or in the delivery queue. However, there may be added costs to reduce the target levels or modify vendor contracts.

The best opportunities for cost-effective T&D deferrals is when the cost of the upgrade is high compared to the amount of firm reduction needed to enable the deferral. Similarly, areas with low load growth forecasts tend to produce superior results. Table 25 present results for T&D project deferrals, by load area.

Table 25: Benefit-to-Cost Ratios by Load Area

Load Area	T&D Project Deferral Description	Peak Interval	Original Cost (000's)	DSM (MW)	Benefit to Cost Ratio
White Plains/Elmsford No. 2/Harrison	Transfer 30MW - White Plains to Rockview	Day	$10,600	15	1.4
Avenue A	Increase 69kV Supply Rating	Day	$15,000	7	1.8
E. 40th St. No. 1/2: Murray	Install 20MVAR Capacitor Bank	Day	$1,500	5	1.7
E. 63rd No. 1	Transfer Hunter to East 75th Street	Day	$15,000	3	2.1
E. 29th St.	Transfer 30MW - Madison Square to E. 36th	Day	$6,000	2	2.1
E. 63rd No. 2	Transfer 30MW - Roosevelt to E. 63rd St	Day	$1,000	3	1.1
Harrison	Install Permanent Transformer Cooling	Day	$500	6	0.9
East 13th St	Extend Transmission Lines to Astoria East	Day	$180,000	67	1.9
Millwood West	Replace 13kV bus & Add Transformer Cooling	Evening	$500	1	0.5
Fox Hills	Install Permanent Transformer Cooling	Evening	$500	8	0.5
Willowbrook	Transfer 6 MW - Willowbrook to Fresh Kills	Evening	$1,000	5	0.5
Woodrow	Install 3rd Transformer & 138kV Supply	Evening	$29,000	4	1.4
Bensonhurst No. 2	Install 5th Substation Transformer	Evening	$7,000	14	0.5
Hellgate	Transfer Randalls/Wards Isle-42 MW to Bruckner	Evening	$5,500	6	0.6
Wainwright	Transfer 6 MW to Woodrow Substation	Evening	$1,200	2	0.6

Table 26 presents the 15 load areas, with costs and need dates established at the time of issuance of Phase IV bids. It also includes project need dates as of December 2008, which includes the impact of DSM added after Phase IV. Those highlighted in light yellow represent projects where need dates have been extended – many of these projects now are needed well beyond the 10-year planning horizon – and contracted DSM is in the early stage of delivery. The level of contracted DSM in these load areas possibly could be adjusted downward with attendant T&D deferral savings.

Notably, the largest project in terms of cost, East 13th Street, also has the highest risk of non-delivery, and now represents an opportunity for contract re-negotiation. In contrast, two projects, highlighted in light blue, have been advanced by one or more years; one project at Willowbrook is under construction. Projects left unshaded are those already deferred or whose need date has not materially changed.

Table 26: Sensitivity Analysis

Load Area	T&D Project Deferral Description	Peak Interval	Cost (000's)	Original Need Date	Current Need Date
White Plains/Elmsford 2/Harrison	Transfer 30MW - White Plains to Rockview	Day	$10,600	2008	> 2018
Avenue A	Increase 69kV Supply Rating	Day	$15,000	2009	> 2018
E. 40th Street No. 1/2: Murray Hill	Install 20MVAR Capacitor Bank	Day	$1,500	2011	2017
E. 63rd No. 1	Transfer Hunter to East 75th Street	Day	$15,000	2010	> 2018
E. 29th St.	Transfer 30MW-Madison Sq to E. 36th	Day	$6,000	2011	2018
E. 63rd No.2	Transfer 30MW - Roosevelt to E. 63rd	Day	$1,000	2011	> 2018
Harrison	Install Permanent Transformer Cooling	Day	$500	2008	> 2018
East 13th St	Extend Transmission Lines to Astoria East	Day	$180,000	2010	> 2018
Millwood West	Replace 13kV Bus & Add Transf. Cooling	Evening	$500	2012	> 2018
Fox Hills	Install Permanent Transformer Cooling	Evening	$500	2009	> 2018
Willowbrook	Transfer 6 MW - Willowbrook to Fresh Kills	Evening	$1,000	2010	2009
Woodrow	Install 3rd Transformer & 138kV Supply	Evening	$29,000	2008	2010
Bensonhurst No. 2	Install 5th Substation Transformer	Evening	$7,000	2008	> 2018
Hellgate	Transfer Randal/Wards Isle-42 MW to Bruckner	Evening	$5,500	2010	2009
Wainwright	Transfer 6 MW to Woodrow Substation	Evening	$1,200	2012	> 2018

Results indicate the extension of T&D need dates and associated reduction of T&D capital deferral savings causes total program cost-effectiveness to decline by about 14 percent; a reduction in the benefit-to-cost ratio from 1.45 to 1.25. The other sensitivity analysis, using original avoided costs as filed for Phase V, increases program cost-effectiveness by about four percent. Sensitivity results are summarized in Table 27.

Table 27: Sensitivity – Economic Analysis

Load Area	Total Contracted Load Reduction	Current Avoided Costs	Original Avoided Costs	Current T&D Deferral Schedule
Evening Peaking	40 MW	0.59	0.62	0.50
Daytime Peaking	108 MW	1.71	1.77	1.48
Total	**148 MW**	**1.45**	**1.50**	**1.25**

Customer Payback

The length of the customer payback period can significantly impact participation rates, as long paybacks discourage many customers from purchasing energy efficiency measures. Customer payback is not relevant for residential customers, as vendors have provided lighting measures (CFLs) free-of-charge. Vendor success achieved thus far for meeting residential network load reduction targets has been favorably influenced by this approach.

At an average cost of $79/kW per measure installed, average payback for commercial customers typically is less than one year. Table 28 presents payback intervals for a hypothetical 10 kW customer located in Manhattan and outside of Manhattan. The short payback interval suggests participation rates for most commercial customers should not be influenced by measure cost. The payback interval may become more significant for networks where non-lighting measures are needed to achieve targets. For example, customer payback for HVAC installations likely is longer than lighting, and will result in lower participation rates.

Table 28: Commercial Customer Payback Interval

Customer Location	Savings per kW	Electric Bill Savings	Customer Cost	Payback
Manhattan	$ 3,908	$5,862	$ 790	< 1 Year
Non-Manhattan	$ 3,258	$4,887	$ 790	< 1 Year

PROCESS EVALUATION

The process evaluation focuses upon the following aspects of the program to identify areas that are working well and opportunities to improve the program effectiveness:

- Request for proposals (RFP)s
- Program design
- Program satisfaction
- Measurement & verification (M&V)
- Program marketing
- Market analysis
- Interactions with other energy efficiency programs

A review of program documents, customer surveys, and in-depth interviews with stakeholders served as the primary data sources for the process evaluation effort. Details on the market research sample design appear in Appendix A. Detailed findings from stakeholder interviews and customer surveys appear in Appendix D. Specific process evaluation findings and recommendations are summarized below.

Request for Proposal (RFP)

The RFP process is fair and reasonable -- the accepted vendors had few recommendations on how the RFPs process could be improved. Con Edison received good quality proposals from multiple, qualified firms. The proposals provided sufficient information to support evaluation and selection of vendors. These vendors' view is that Con Edison's RFP process is fair, and that the company's modifications to the RFPs and accompanying DSM Agreements in subsequent phases have improved the RFP process. However, it may be possible to increase the number of vendors bidding in the program.

Similarly, vendors felt that the contract was reasonable, albeit with very stringent requirements. They question some specific requirements and desire more flexibility, as discussed in the next section. The key program modification has been the change in the liquidated damages provision with regard to the amount of penalties levied. Originally set to cover the cost of the T&D upgrade avoided or deferred, Con Edison has since lowered the penalty to cover the cost of installing and operating a temporary generator until the T&D upgrade is completed.

Most stakeholders and accepted vendors agreed that Con Edison has been quite responsive with respect to the program. Several issues were raised and are summarized below.

Payment Ceilings

The Phase II RFP provided a maximum per-kW reduced payment the company would make to the winning bidder(s), based on requests from vendors. However, once implemented, the vendors found such a ceiling less useful. Con Edison responded by eliminating this payment ceiling in subsequent RFPs.

Updating Bidder Lists and Publicizing RFPs

One suggested area for improvement is to continually update the list of potential bidders, which could be completed with relatively small effort. Many names and email addresses listed on the bidders list are individuals who no longer work for these firms. Further, no one (at the vendor) had been assigned to deal with opportunities arriving via email addressed to individuals no longer with the firm. Once notified of the program, a number of those interviewed indicated they would be interested in bidding – or at least exploring doing so – but had not been aware of the program. This is an issue throughout the industry, and such firms should establish generic inboxes. However, Con Edison could make a series of telephone calls to update the list, especially with respect to firms that are clearly qualified to bid. It should also attempt to address the problem of individuals leaving firms by continuing to publicize the RFPs more broadly (e.g., via the Association of Energy Services Professionals and similar organizations and their websites).

Barriers to Bidding, for a Broader Group of Vendors

Although the following concerns were not sufficient to prevent the current set of accepted vendors from bidding in Phases II-IV of the program, they were concerns raised by some vendors that declined to bid. Most of these concerns also are common when energy firms bid on similar 100% pay-for-performance in other jurisdictions.

- Liquidated damages and measure sustainability clauses (to ensure that capacity reduction obligations are met) discourage some potential bidders, though some may be unaware that the liquidated damages provision has been reduced somewhat relative to Phase I requirements.

- Con Edison competes with other areas of the country for the services of energy services companies (ESCOs). The fact that the work in other areas typically does not include the same level of risk for ESCOs – e.g., stiff penalties for under-performance and payments

based only upon verified measure installation – makes such work more attractive to many ESCOs, and this serves as a barrier to greater participation among potential bidders in the Con Edison program. To the extent that the market for ESCOs remains strong, this competition will continue to dampen participation in the Targeted program.

- High insurance requirements, although these are not unusual for an ESCO contract.
- Loss of demand response credits -- Some non-participating vendors felt that Con Edison's contractual rights to demand response (DR) was a barrier to their bidding. In some cases, allowing the customer (and/or the vendor) to use the measures for both Con Edison's Targeted DSM program and for NYISO programs may support the adoption of more energy measures. Multiple issues include "double dipping," and who gets the benefits of the DR capacity, and the incremental benefit of relaxing this contractual requirement need to be analyzed before changing the contracts. There was not any evidence that changing this contractual clause would increase the number of bidders or the bid prices.
- The magnitude and timing of program load reduction targets has discouraged smaller vendors from bidding.

These barriers may keep some firms from participating, but are not onerous requirements given the nature of this program.

Communications

Clarity of RFP. Several vendors felt that the Con Edison RFP could have been clearer regarding how a project's kW reduction would be counted. Specifically, certain types of retrofits may not actually reduce kW load by an amount calculated by subtracting the new nameplate kW load from the existing nameplate kW load (the method specified in the RFP and DSM Agreement). For example, this may be the case when existing equipment is not currently being used. Or the current equipment might be failing and cannot be replaced with equipment of the same efficiency as that which is currently installed due to an increase in minimum allowable efficiency levels of new equipment in the market. In these cases, the existing nameplate kW load may not be a reasonable base case against which to compare the new kW load obtained through the efficient retrofit, and the computed savings needs to be based on a different baseline value. This suggests that the company may want to provide examples of possible exceptions to the calculation method in the RFP and during bidders' meetings/conference calls.

As discussed elsewhere in this evaluation, there is a need to apply a load area or network coincidence factor for each type of DSM measure in order to reflect the firm network specific capacity that will be realized. Future RFPs should specify a calculation method that includes the

use of network and measure specific coincidence factors and include coincidence factors where they are known and a process for Con Edison and the vendor to agree to factors for new measures.

Modifications to Basic RFPs. Some vendors who had received RFPs from early Phases of the program reported that they had assumed that the liquidated damages and other contract terms were the same and were unaware that certain RFP modifications had been made to make the program more favorable to vendors. Con Edison should consider including a brief summary of key RFP provisions such as liquidated damages within a cover sheet for future RFPs, so that these vendors may be more likely to consider bidding.

Program Design

As a program that explicitly requires firm load reduction in targeted areas by a fixed date, the Targeted program has been effective in getting a large number of measures implemented in a short-time within the targeted areas. The requirements are very strict and that helps to ensure that load reductions are delivered in full and on time, and that they last long enough to truly defer T&D project upgrades. As noted above, in the impact evaluation section, one area of improvement needed most is to include network and measure specific coincidence factors, especially for the residential CFLs. Adjustments of coincidence factors are also appropriate for non-residential measures, though to a much lesser extent. Accordingly, measure specific coincidence factors and net-to-gross factors (including spillover, free-riders, and rebound) should be incorporated into any future RFP plans.

Two other areas where improvements could be made to the program design include modifications to the list of qualifying measures and explicitly building in enhanced flexibility to accelerate or scale back the DSM delivery quantities.

Qualifying Measures

Con Edison requires full assurance that demand savings will be realized during the peak hours when needed. To that end, there is currently no mechanism for providing partial demand savings credit for a group of measures that may have, for example, 50% coincident demand savings. This prevents vendors from implementing a fairly broad class of measures that lower demand and save energy. Examples include occupancy sensors, day lighting controls, and energy management systems, to name a few. Con Edison could supply a coincidence factor that

represents a discounted on-peak or diversity factor (e.g., 25% for occupancy sensors)[37]. This factor would be applied to the connected kW reduction to represent the aggregated savings coming from multiple installations of this type of measure. This diversified coincidence factor should be conservative enough such that Con Edison has assurance that the minimum demand savings will be realized when needed.

Currently, Con Edison does not require that the installed measures meet New York State code or be ENERGY STAR-qualified. The company should include such requirements, to ensure longer-term customer satisfaction, as other utility programs across the country do.

Currently, demand response (DR) measures are not eligible for the program. However, these represent a substantial potential resource that could be of value at least to some extent in addressing network/load area peaks lasting a minimal number of hours, provided that Con Edison has the rights to call upon the DR based upon network or load area needs. Con Edison should investigate the feasibility and customer acceptance of having DR that can be dispatched for both system capacity and network/load area requirements. If such dual function DR is acceptable, then Con Edison should consider including such measures in the list of eligible measures.

One additional measure-related issue is the location and coincidence of residential CFLs. While few were noted by participating customers as being located in closets, some were. Con Edison should specifically prohibit CFL installations in closets. Also, program measures have to be operating at least at some point during the peak period defined for the relevant network. Con Edison should tighten up this requirement so that the customer must confirm that the location specific measure is on for at least one or two hours during the peak period. This may decrease number of CFLs installation per household, but would increase the coincidence of their use within the peak period.

Flexibility in Contract Modifications

Con Edison has the right to terminate contracts with its vendors at its convenience. Additional flexibility is needed. A compelling example of this need for flexibility is the 67MW of targeted load reductions for East 13th Street load area, originally designed to remediate the planned retirement of the Poletti Plant in 2010 and to delay the implementation of extending transmission lines Q35 L and M to Astoria East. The project has been deferred to beyond five years due to lower than expected growth and load transfers that have taken place independent of the program. Importantly, DSM delivery is in the early stages for the East 13th Street

[37] Note: these factors may differ by network/load area.

network, and opportunities exist to reduce contracted load reductions in certain networks among the East 13th Street networks. Furthermore, the primary vendor has indicated there is uncertainty in their ability to meet the contracted load reductions.

In other cases, the need date has been accelerated and more DSM sooner is needed to achieve the deferral. Another case is a project will be constructed in 2009, obviating the need for DSM to defer the investment. The shift in need dates suggest contract instruments (e.g., early termination clauses, bonuses for acceleration) should be designed to enable the Company to easily adopt and incorporate adjustments – both upward or downward – in the level of DSM to be delivered by vendors, and that they should explicitly note the very real possibility that such flexibility will be exercised. Contract terms should clearly specify that vendors should submit bids with the knowledge and *expectation* that such terms likely will be invoked.

Flexibility will come at a cost, because there is a very real cost to vendors to gear up their infrastructure to achieve targeted reductions within the time frames to which they have committed. One practice potentially useful in addressing this situation is to have a payment when load reductions are modified downward. One could set this payment at something like the expected profits from the reduced contract purchases. For a typical DSM contract, the net profit may typically by in the range of 3-5 percent. Thus, the payment for early termination may be 3- 5 percent of the remaining contract amount. Of course, upward modifications would not require a payment but would require the consent of the vendor that such increases and the time frames associated with them are reasonable and possible.

Another approach is to ask the vendor to supply the maximum increase or decrease that they will accept at the bid price. For example the California utilities ask for bid prices if the bid quantity is scaled up or down by 10 percent and 20 percent.

Program Satisfaction

According to participating vendors, Con Edison has generally been responsive to vendor needs for Phases II-IV of the Targeted program. Customer satisfaction with the program is very high. Further, most participants feel strongly that the program has benefited them in ways other than savings energy, and that they did not experience any additional costs due to the program (outside of whatever they paid to have the measures installed). The high satisfaction ratings, however, do not mean that they believe the program could not be improved.

Satisfaction and Non-energy Benefits

Both residential and commercial participants were very satisfied with the program. When asked to rate their satisfaction with the program on a 10-point scale, with "1" meaning "not at

all satisfied" and "10" meaning "extremely satisfied," the average rating for participants in both sectors was 8.5. The median rating for residential participants was 10.0 and for commercial participants 9.0. These are very high ratings, especially considering that only 5-6% of participants in the two sectors gave negative ratings (rating of less than "5"). More than 90% of residential participants said they would recommend participating in the program to other Con Edison customers, and three fourths said they would recommend purchasing CFLs to other customers even if they had to pay full price for them.

At least two thirds of residential participants believe their CFL installations are saving them money and energy, and are helping to improve the environment (rating of "4" or "5" on a 5-point scale – where "1" means "strongly disagree" and "5" means "strongly agree"). Most commercial participants believe that, due to the measures installed through the program, maintenance costs have either remained the same or decreased, and that the quality and attractiveness of the lighting has either stayed the same or increased.

Participant Recommendations for Improving the Program

While program satisfaction was high, about two thirds of the participants had suggestions for improvements to the program. Although the range of comments was diverse, most types of comments were made by 15% or less of participants, the most frequent comments had to do with the following:

- Increasing Con Edison's involvement and marketing the program better
- Reducing the amount of time taken to participate in the program and number of visits made by contractors/inspectors
- Improving the performance, knowledge level and truthfulness of the contractors (truthfulness regarding coming back to fix problems or make additional lighting change outs, or about how long lights would last)
- Installing either more lighting measures or including other, non-lighting measures.

Measurement & Verification

The M&V process provides sufficient information to ensure that Con Edison is kept aware of how vendor performance is tracking to vendor goals. The M&V contractor provides weekly summary reports that allow Con Edison to understand deliveries to date and projects in progress. Due to the wide prevalence of lighting, M&V protocols employed in the program have been straightforward and consistent with standard industry practice. As the mix of measures changes from lighting, the M&V contractor may have to do more than just verify the nameplate ratings of the installed equipment, to ensure that they continue to be consistent with standard industry practice.

Vendors have focused heavily on promoting lighting measures to achieve demand reduction targets, citing ease of marketing and installation, low cost, and short decision-making cycle, as the primary reasons why lighting is preferred. Non-lighting measures such as HVAC and refrigeration, while possibly cost-effective, require specialized expertise, greater investment risk, and longer lead-times. The use of DG as peak load offset has not been pursued due to "physical assurance" of load reduction, a contract requirement vendors are unwilling to pursue due to cost and customer load disruption.[38]

The vendors expect to shift from the reliance solely on lighting to including HVAC, refrigeration and other measures to meet their contract obligations. This shift is in its nascent stage and Con Edison should be especially vigilant in monitoring progress made.

While there have been issues with the process, as both vendors and the M&V contractor have learned how to work with each other and had to ramp up staffing, accepted vendors report that the M&V process is basically sound and the M&V contractor and Con Edison are responsive. As noted below, there are options for reducing the number of inspections being performed while maintaining a high level of certainty regarding load reductions being obtained.

M&V Inspection Process

The M&V process being practiced by Con Edison's M&V contractor (ICF) in performing the Monitoring & Verification (M&V) function varies for residential versus commercial installations. The commercial M&V process includes pre-inspection visits to 100% of customer

[38] Physical assurance involves use of communication and control systems that would interrupt customer load in amounts equal to contracted firm DG delivery if the generator was unavailable when needed to reduce network load. This approach, approved for use in California, is used to assure certainty of load reduction at the time of the network peak.

sites, attended by the M&V contractor and a representative of the participating vendor, during which a 100% count is performed of all installations reported by the vendor. In addition, 10% of the fixtures are opened to ensure that ballasts have been correctly reported. This process is repeated, once the measures have been installed, during the post-installation inspection. The process is quite rigorous and is consistent with the most rigorous industry practice.

The residential process includes two options, both of which are designed to address the pre-inspection condition and post-inspection condition of each site while minimizing the intrusion to the customer:

- Vendor "ride-alongs," during which the M&V contractor accompanies the participating vendor to the residential site and examines what is being removed and what is being installed, as it is happening. These are not very frequent.
- "Tag-and-bags," consisting of M&V contractor review of the contents of bags which have been sealed by the vendor and include the light bulbs that have been removed, the packaging of the efficient bulbs installed, and an inspection report signed by the customer indicating what was installed and what was removed.

As with the commercial M&V process, the residential M&V process is used to verify 100% of residential installations.

In addition, annual inspections are made to a sample of sites to ensure that measures found during the post-inspection are still in place. These examine customer sites accounting for approximately 10% of load reduction in each load area for which there is a contracted target reduction.

M&V Issues

A number of issues with the M&V process were raised by some of the vendors interviewed, including the following:

- The spreadsheets vendors must complete for each measure installed are cumbersome.
- Performance penalties are due even before Con Edison's review of an issue has been completed. According to some participating vendors, this results in penalties being levied even though the end result may be that no penalties are due.
- Con Edison has, on occasion, withheld the entire savings on vendor claim report submissions, particularly for minor errors (e.g., one or two incorrect entries or

misspelling), is unreasonable and has a serious effect on vendor cash flows. It is not clear how often this problem has occurred. It is not clear that how often this problem has occurred.

Con Edison should evaluate whether changes to the M&V process can be made to address these issues. To the extent that they cannot be addressed through making changes to the program processes, they should at least become part of the educational process for participating vendors.

Commercial-specific M&V Issues

- Interview responses from participating vendors indicate interactions with the M&V contractor (ICF) have been reasonable. However, some view the M&V process as too stringent and costly, since every site must have a pre- and a post- installation inspection. These require attendance by representatives of both the vendor and M&V contractor.
- The time between application and pre-inspection is too long (an issue during the pilot phase, according to at least one vendor, and still an issue, according to both vendors and customers.

Residential M&V Issues

No residential-specific M&V issues were identified. Vendors and the M&V contractor appear to be working well together and the advent of the tag-and-bag method has ensured minimal disruption to residential customers.

M&V Cost Effectiveness

The current M&V process is extensive, expensive and time-consuming. To ensure load reductions are firm and sustained, Con Edison requires 100 percent inspection of measures.

Commercial M&V Cost Effectiveness

According to the M&V contractor, the original intent was to reduce the high level of inspection (100% inspections of sites, 100% inspection of measures) as program experience and comfort with vendor measure counts, identification and reporting were gained. However, this comfort level was never established, due to continued under- or over-statement (mostly over-statement) of measure counts and types, and a plethora of mistakes made by the vendors and their subcontractors. Con Edison is in no position to allow gross errors in reporting, again due to what is at stake with the program. Further, reducing the number of measures to be inspected at

each customer facility will not likely reduce the cost of inspections by much, because much of that cost is due to traveling to the facility.

One potential approach is to reduce the number of required pre-inspections at customer facilities responsible for lower levels of load reduction (e.g., 50% of facilities inspected if reported load reduction is less than 2 kW), with inspections performed randomly. Results from the reduced number of inspections could be applied to all of the vendor's remaining customer facilities within that load reduction category. Further, results varying more than 15% from reported load reductions could trigger 100% inspections, with the vendor responsible for the added inspection costs. This could serve to ensure vendor accuracy while reducing vendor cost associated with inspections[39] and at the same time ensure a higher degree of accuracy in reporting of final load reductions.

Other solutions could involve de-rating all load reduction claims made by specific vendors whose reported load reductions differ by more than a set percentage from what they report. Either type of solution may not be practical to implement within the context of existing agreements, which were signed under the assumption of 100% inspections, unless both parties can come to agreement on the issue. However, future DSM Agreements could include such inspection requirements.

Residential M&V Cost Effectiveness

Inspections of residential measures occur primarily through the tag-and-bag approach. There are very limited opportunities to reduce these costs (essentially to review fewer bags), so that any reductions in cost through reviewing fewer bags do not compensate for the reduction in rigor obtained by reviewing 100% of the bags. No changes in the number or content of residential inspections are recommended.

Annual Follow-up Inspections

The annual follow-up inspections for Phase II-IV installations had only recently been initiated at the time of the evaluation. These inspections are conducted at least one year after the post-inspection has occurred, and most measures in Phases II-IV had only been installed in late 2007/2008.

[39] The vendor must accompany the M&V contractor at each inspection. One vendor estimated that meeting current load reduction commitments would require the vendor to accompany the M&V inspector on as many as 39,000 on-site inspection visits.

At the time of the evaluation, early annual inspection results were available for only one of four load areas being addressed by one Phase I vendor. These inspections (performed for less than 25 commercial customers) had found a decrease in load reduction of approximately 21%. Primary reasons for the decrease in load reduction were bulbs burning out, bulbs having been removed for unknown reasons, and customers going out of business. However, these results were: (1) for a vendor not participating in Phases II-IV of the program; (2) for a small number of sites and the efficiency improvements that had been implemented; and (3) under the pilot phase (Phase I) of the program. For these reasons, the initial results should not be viewed as indicative of the program.

Con Edison has a protocol in place for remedying discrepancies between load reductions calculated during post-installation inspections and load reductions calculated during later follow-up inspections. The M&V contractor notifies both Con Edison and the affected vendor of any discrepancies, and the vendor has a period of time to remedy the situation. In the absence of such remedy, the vendor must pay a financial penalty.

Because the earliest that Phase II and III measures could have been installed is 2007, it is appropriate that follow-up visits have begun to occur in early 2009. Con Edison reserves the right to make such visits annually (more so if needed) throughout the five-year period of required performance. While Con Edison, has the right to conduct annual re-inspections, bi-annual re-inspections would halve the cost of re-inspections while having minimal impact upon the reliability of the load reduction.

Con Edison has modified its annual follow-up inspection protocol so that it focuses on customers whose accounts have been flagged for some reason (e.g., the account number has changed or been finalized). As a result, while the results will not be representative of the entire population, the results should identify a higher number of deficient sites than would be the case using a random sampling approach. Consequently, the opportunity to address deficiencies will be enhanced, allowing more certainty that the system experiences the expected load reductions.

Program Marketing

Vendors with winning bids employ sophisticated marketing approaches, consistent with an earlier finding that only experienced vendors with strong financial backing were willing and able to respond to RFPs. Residential participants report that vendor first contacts are being made mostly through telephone calls (45%) and to a lesser extent cold-call visits (18%) or direct mail (12%). Commercial participants are being reached by a combination of direct mail, door-to-door visits, and network marketing. Most commercial customers use simple payback as their

primary decision-making criteria regarding whether to invest in energy efficiency improvements, with the average acceptable payback period being two years.

Marketing Program Best Practices

Best practice marketing of DSM programs includes a number of practices that these vendors appear to be employing. They also recommend activities that, in the case of the targeted Program, suggest a greater involvement of Con Edison in program marketing. Table 29 presents a list of DSM program marketing best practices derived from NCI's experience in developing, implementing and evaluating such programs, and a review of reported best practices, and compares these practices with how vendors said they market the program.

Table 29: Best Practices in DSM Program Marketing vs. Practices Employed by Program Vendors

Best Practice	Practices Employed by Program Vendors
Do not pay 100% of the measure. Target about 50% of the measure being paid for out of utility incentive programs.	Not being practiced by program vendors
Develop long-term market strategies and continuous feedback to end customers and program management personnel. Communicate to customers that programs are part of a threat of ongoing initiatives that customers should also continue taking advantage of.	Not being practiced by program vendors
Complete co-branding of utility, state government and other sponsor brands.	Strongly desired by program vendors
Use multiple marketing methods that take into account channel delivery, key buying influences and whether or not the measures are simple or more complicated. Higher penetration rates are tied to well-thought-out marketing.	Use of multiple marketing methods
Provide highly transparent feedback on program performance and cost effectiveness to key stakeholders.	At least one vendor (commercial sector) initiating customer satisfaction surveys
Provide bonuses and incentives for superior performance.	Practiced by program vendors
Link efficiency programs to broader altruistic causes like sustainability, greenhouse gas reduction	Limited use by commercial vendor

Best Practice	Practices Employed by Program Vendors
and green/clean energy initiatives that also save money.	
Use the internet to broadcast significant program results.	Not being practiced by program vendors
Consider a consistent, credible spokesperson who can speak plainly and clearly to target customer markets.	Not being practiced by program vendors, but vendors desire promotional support from Con Edison which is credible
Consider advanced market entry into a community with network marketing in order to build up a back log of early orders.	Being practiced by program vendors
Use cross-selling, because up to 50% of new program participants are likely to have contact with and have participated in prior programs.	Not being practiced by program vendors
Leverage interrelationships of complimentary organizations including civic groups, trade allies, and jointly sponsor initiatives.	Use of channel partners for marketing, to publicize and market offerings (e.g., community groups, other vendors)
Consider vertical segments and target marketing using key account representatives who can talk the experience and lingo of those who are being targeted in the marketing message, and value proposition.	Commercial vendor strongly desires such support from Con Edison
Establish a baseline through M&V, and encourage customers to use the baseline for measuring continuous improvement.	Not being practiced by program vendors
Automate customer registration, feedback and fulfillment and management processes for mass marketing programs. Offer customers self help tools using the internet.	Not being practiced by program vendors
Create and report on sales metrics -- contacts, signups, drop outs, participation, kW/kWh impacts, cost per acquisition, cost per transaction, and post cost-benefit results.	Use of sales and prospect tracking, customer lists and databases, monthly quotas (other aspects considered confidential information not shared with evaluation team)

Vendors addressing each major sector employ a range of marketing and sales approaches to achieve load reduction goals.

Commercial Marketing Processes

Specific findings on the sales and marketing process for the commercial market include:

- Firms marketing to commercial customers (and residential, for that matter) have a formal sales and marketing process, including "pipelines", and advanced prospect development before neighborhood or block campaigns occur.
- Both base and variable incentives are used for field crews.
- Neighborhood direct marketing, including door-to-door marketing, and direct installation methods are used.
- Commercial vendors also rely on some channel partner incentives for sales and leads – payment on a $/kW basis.
- Direct sales have been more effective and more controllable than channel partner sales, according to one vendor. The former is also a faster sales cycle.
- Vendors use sales tracking tools – one reported an Excel-based sales tracking system.
- Energy cost savings then energy and carbon savings and payback are stressed to customers as benefits for participating. (Often stress less than one-year payback).
- Contractors value using Con Edison brand equity even without using the Con Edison logo directly, and wish that Con Edison would allow more collaborative marketing.

Residential Marketing Processes

Specific marketing insights gained from vendors marketing to the residential market include:

- Community-based, network marketing used – use community groups, local civic and police precinct contacts
- 99.9% of measures are CFL lamps; some commercial lamp/ballast changeouts occur but not frequently.
- Areas are sometimes approached using local media, contacts with elected officials, flyers and door hangers, public events, and church group presentations. Other times, direct mail campaigns with telemarketing follow-up are used.

- Multi-stage sweeps or rounds are employed – one to three rounds in a neighborhood.
- One vendor does not feel the need to do cold calling. One uses this method.
- Vans with program marketing logos also help with marketing in a neighborhood.
- Value proposition centers on the fact that the measures are free and they are "green."
- One vendor stresses that electric bill savings can be $10-15/month.
- Vendors sometimes have a central office taking calls and organizing neighborhood visits.
- One vendor reports that they create demand in neighborhoods by getting the word out of a planned visit over a two-week period. While their van is in the neighborhood, this creates additional calls and referrals.
- Vendors may do neighborhood calling and scheduling up to two months out for two good weeks of field direct installation.
- Some vendors have weekly and monthly job quotas established and track quotas closely.
- Customer response varies somewhat by season, monthly bill cost, and daily weather, according to one vendor.
- Vendors leave extra lamps for customers in case of breakage or faulty product.

Commercial Customer Decision-making Regarding Energy Efficiency Investments

Vendors report payback or a combination of payback and another criterion as the primary decision-making criterion they use in making energy efficiency investments. This is especially true among program participants (73%) relative to non-participants (49%). As noted previously, very few participants reported that they had had existing plans to install the efficiency measures that were installed through the program, and free ridership rates calculated for the program were quite low.

Need for Monitoring as Vendors Introduce Non-Lighting Measures

Vendors report that meeting future load reduction goals is likely to require moving substantially beyond installation of lighting equipment, especially those serving the non-residential market. The marketing and sales approaches may need to be modified to address non-lighting measures. Further, the recent economic downturn has severely hampered the ability of vendors, especially in the non-residential sector, to persuade customers to participate

in the program. Con Edison would be wise to closely monitor how well accepted vendors make this transition, and to provide assistance in making it, as noted below.

Vendor Value Propositions for Customers

The vendor value proposition for residential customers has clearly been "free light efficient bulbs." The primary vendor serving the commercial market has emphasized annual bill savings and low cost measures (and, to a lesser extent, environmental improvement), and commercial participants report that these two main propositions were influential arguments in their decision to participate in the program.

Involvement of Con Edison in Marketing

Vendors emphasized that authorized use of Con Edison's brand or label has considerable value, even when the Con Edison logo cannot be used. Expanded or direct partnership with the company could yield greater, faster and more cost-effective participation via a market approach that includes one or more of the following:

- Allows use of the Con Edison logo on marketing materials approved by Con Edison
- Publicizes the program, its contractors and subcontractors on the Con Edison website, both to aid in marketing outreach and for customers to use in confirming the existence of the program and specific vendors' participation in it
- Provides more expedited assistance to vendors regarding identifying which customers are in and out of the targeted areas. Vendor experience has been that sometimes customers in the same neighborhood as qualifying customers may not qualify, so that knowing which customers qualify is not always straightforward. This is not an issue that energy service companies typically face elsewhere. Con Edison currently offers participating vendors a service whereby they can submit a spreadsheet with the names and addresses of specific customers (prior to submitting an Implementation report that includes these customers), and the company will let them know within five business days whether each customer is in or outside of the targeted area. However, this process could be made more proactive or at least streamlined. The costs and time required to confirm customer eligibility is factored into vendor bid prices. Additional assistance that Con Edison might provide could be limited to providing a detailed map of the targeted areas, as suggested by one vendor. Further, if the company were to have a web portal whereby a vendor could enter an address from the field and get a yes or no response from a field inquiry, determining eligibility could be done more at the convenience of the vendor and according to the vendor's schedule. Con Edison could have a list of eligible addresses loaded behind the portal and

not need to provide a list of addresses to the vendor. Con Edison should explore ways to assist the vendors in identifying qualified customers – something in which Con Edison has expertise – so that the vendors could spend their time doing what they do best – marketing and installing measures. If this is done, the company may see slightly lower bids from vendors in future phases of the program, and higher vendor satisfaction with the program.

- Provides for collaborative marketing and sales with Con Edison – e.g., working closely with large customer account managers for joint marketing/sales.
- Better informs Con Edison employees about program so that, when queried, they can assure customers of the program (offer) validity and to confirm benefits.

Such practices are consistent with best practices used in other jurisdictions for DSM programs and offer the potential for enhanced program productivity as well as image benefits for Con Edison. The potential risk due to customers' problems with vendors in the program (and, by association, poor reflection on Con Edison), however, would need to be addressed through greater involvement with vendors and protocols for marketing and installation processes.

Market Analysis

In the residential sector, the program appears to be targeting those who are less likely to have CFLs installed in their homes already. Commercial sector customer recent experience with making lighting efficiency improvements has been minimal, regardless of participation status. The very favorable economic value of the installation has been the main force driving participation – residential CFLs generally have been installed free of charge to customers, and commercial lighting has been installed at steep discounts. Similarly, the primary barrier to replacing the current CFLs with new ones when they burn out or with making additional lighting improvements is the cost involved, although about half of residential customers with CFLs see no barriers to replacing CFLs with new CFLs. Most participation to date is happening outside of Manhattan (primarily driven by the due dates for the program's load reduction needs).

- Previous activity. More residential non-participants (70%) than participants (40%) already have CFLs in their homes[40], and tend to have more CFLs in their homes (average of 7.0 for non-participants vs. 4.5 for participants). In the commercial sector, less than 20% of both participants and non-participants already had made lighting efficiency improvements to their facilities in the previous three years, chief among them being CFLs and efficient linear fluorescent lights.

- Reasons for making improvements. Lower electric bills and energy savings were the most frequently reported reasons for installing CFLs through the program/this year among participants and non-participants in both sectors, though the fact that they were approached by the program vendor and the low cost of the project were also important reasons among commercial participants. Residential participants and commercial non-participants reported learning of the advantages of CFLs primarily through word of mouth (commercial participants were not asked this question).

- Remaining efficiency opportunities. About 18% of residential participants said that at the time of their participation in the program, there were additional efficiency actions they wanted to take, but only 1% reported that their vendor made additional efficiency improvement recommendations to them. Vendors were clearly focused on CFL installations, and reported that they were. However, 4% of residential participants said the program influenced them to buy additional CFLs, averaging 3 additional CFLs per repeat buyer, and about 13% said they were influenced to make other efficiency improvements (a wide range).

  About half of commercial participants believe there are additional efficiency improvements that should be made to their facilities, but only 2% reported that their program vendor made additional recommendations. Again, program vendors were focused on specific lighting installations. As with residential participants, about 13% said their experience with the program had influenced them to make additional efficiency improvements.

  It appears that there are additional energy savings opportunities at customer facilities that are not being pursued by the vendors. At least one vendor cited that the decision makers and decision cycles are different for based on type of measure. Customers will

[40] However, there may be a time dimension to this difference. Participants were asked how many they had prior to participating in the program, while non-participants were asked how many they currently have in their home.

retrofit lighting. HVAC, is more typically a replacement decision, and may require budgeting and inclusion in the facilities capital project planning cycle. Most of the vendors to date, however, are focused on the lighting projects. One vendor does plan to mine their previous customers to develop additional DSM projects.

Program participants are satisfied with their experience and inclined to implement additional opportunities. Strategies to increase the depth of savings of savings could include: (1) improving coordination with other (e.g. NYSERDA and Con Edison programs that promote energy efficiency rather than demand savings); (2) allowing or encouraging higher incentive levels for higher savings percentages; (3) targeting participants for follow-up sales calls; and (4) developing a multi-year commitment and energy efficiency improvement strategy (this would developing a program to allow the vendors to benefit from marketing and enrolment actions that allow Con Edison to produce greater depth of savings.

- Demographics. The demographics of residential participants generally match those of non-participants with some notable exceptions. Chief among these are the higher prevalence of retired persons among participants (48%) than among non-participants (35%)[41]. This may be due to the use of telephone recruitment by program vendors and the likely greater availability of retired persons during working hours. Participants also tended to be less likely to be college graduates and more likely to have a larger number of individuals living in the household. Participants of Free Lighting were more likely to own their homes (85%) versus participants of QCS (54%), the other residential load area program vendor. Commercial participant demographic characteristics generally match those of non-participants, except that they are slightly more likely to own their facilities, be in business and at the same address for more than ten years, and be less likely to have annual revenues of less than $500,000[42]. As noted above, most participation to date has occurred outside of Manhattan.

Interactions with Other Efficiency Programs

Some of NYSERDA's Energy $mart programs parallel the Targeted program and are being marketed in the same areas and networks as those that are the focus of the Targeted program, although it is not clear how aggressively this is occurring. Of concern are the possibilities that:

[41] One would expect the relative number of retired persons to be somewhat elevated due to the fact that such respondents are typically easier to reach by telephone, the method used to survey participants and non-participants. However, the percentage of such persons among participants was particularly high.

[42] Regarding annual revenues, a small but important percentage of respondents (24% for participants and 13% for non-participants) either refused to respond or said they did not know their annual revenues.

- Customers may be faced with confusing or conflicting information on available DSM measures, customers may be trying to participate in both programs at the same time (double-dipping into incentive dollars)[43];
- Opportunities for broader coverage of efficiency measures may be overlooked due to a lack of cooperation or integration between the programs.

Some of the vendors interviewed reported that it can be difficult to determine which program (Con Edison's or NYSERDA's) is best for a customer, and impractical to promote both programs to the customer (due to multiple sets of inspections and reporting). However, customers expressed little awareness of the NYSERDA programs, and none expressed confusion resulting from having more than one program available. Con Edison should monitor customer and vendor perceptions regarding this issue, to ensure that it does not become detrimental in the future.

The three primary program interaction issues are discussed in more detail below.

- ***Broader Coverage of Efficiency Opportunities***

  Several stakeholders interviewed expressed strong support for expanding the range of efficiency measures that are addressed as Con Edison uses its program to meet T&D needs. They fear that savings opportunities for participating customers are being left on the table, especially for non-residential customers. In fact, some stakeholders are concerned that the program creates "lost-opportunities." Once, the customer installs the lighting measures, the total remaining energy savings may be too small to justify the cost of sales of recruiting that customer implement subsequent energy efficiency projects. The cost of sales is significant. As discussed in the "Remaining Efficiency Opportunities" above, there are opportunities to leverage the good will and satisfaction of the participants to develop additional savings in the future.

  The survey data indicates that there are additional opportunities: participating customers believe they have additional savings opportunities. The commercial vendors do plan to revisit past participant to help them meet their future goals. They believe that customers are not generally inclined to buy into a comprehensive program.

  As noted above, Con Edison should consider taking certain steps to expand the types of measures that qualify for the program; facilitate joint program delivery; and consider mechanisms to increase the depth of savings, e.g. increasing incentive levels, and

[43] See discussion below regarding existing process in place to prevent double dipping

gaining multi-year commitments). Since the program is focused on avoiding or deferring the need for transmission and substation upgrades, a focus solely on measures that directly achieve demand reductions is required, but encouraging synergies with the other complimentary energy efficiency programs could extend the benefits of the Targeted DSM program.

Perhaps the most effective way to achieve both broader coverage of efficiency opportunities and meet the needs of the program is to integrate it with other programs. One accepted vendor, asked about the potential for using its entrée with a commercial customer to market both NYSERDA (or other) efficiency programs along with the Targeted program, saying that a major barrier to such integration is each program's need for its own inspections and reporting, noting that even the number and timing of inspections for only the Targeted program can be disruptive to customers. An unprecedented level of cooperation would be required to integrate the inspections and reporting needs of both organizations into a single set of activities, but such integration could yield additional savings and potentially improve long-term customer satisfaction.

Another option mentioned by some stakeholders would be merely to add the T&D deferral portion of the incentive onto whatever incentive NYSERDA is offering and let NYSERDA contractors obtain the savings wherever possible. This would likely require some level of additional paperwork on the part of the NYSERDA contractors and probably time to identify whether specific customers are in targeted areas. This would obviate the need for the highly demanding contracts Con Edison now completes with accepted vendors and reduce the pressure on the vendors to perform. However, without the performance pressure, there is no guarantee that vendors would achieve the same level of load reduction on the same schedule as they do under the Targeted program, and the timing of these load reductions is central to the concept of deferring T&D upgrades. Indeed, one of the stakeholders said that a benefit of merely adding Con Edison T&D incentives onto NYSERDA rebates would be that of relaxing the schedule from the vendor's viewpoint.

A third option is to expand its DSM offerings to include programs that are not constrained by the need to meet T&D deferral requirements. Inspection and reporting needs could be integrated more easily. Schedule requirements and performance pressures would remain, but implementation of a broader range of efficiency measures would be facilitated.

There are no simple answers to these problems. Con Edison vendors have made commitments to achieve specific load reduction targets within pre-specified time frames and they will suffer financial penalties if they do not succeed in doing so. Their interest

in promoting non-qualifying measures to the customers they approach may take a back seat to ensuring that they reach their contractual load reduction goals. Expanding the range of measures that qualify under the program, as recommended above, should help to broaden the measures addressed somewhat. However, efforts to broaden the range of efficiency opportunities addressed will need to take into account the need to maintain vendor motivation for intensive marketing to achieve load reduction commitments.

- *Avoiding Overlap in Participation*

Provision by NYSERDA of data on participation in its programs in the Con Edison territory, while not comprehensive, appears to have prevented overlap in participation between the two organizations. Only one case of overlap has been identified, in which the customer was receiving incentives for the same measure from both programs. The customer was then asked to choose one or the other program and the issue was resolved.

- *Cooperation between Programs*

Reports from stakeholders and vendors suggest that efforts to date to integrate the NYSERDA programs and the Con Edison Targeted program could be improved. It appears that some vendors have strong preferences for one or the other program, and tend to view the programs as in competition with each other. Also, as noted above, they feel that implementing both programs at a single customer site is not currently practical. Vendor cooperation is likely to be improved if vendors can be provided with a clear, practical method for integrating the efforts of both programs.

Likely components of an integrated offering would include: (1) common application form; (2) integrated inspections and acceptance process; (3) verification process that supports measures implemented under all applicable programs (i.e. acceptance of each entity's inspections and approvals); and (4) unified marketing This would need to be worked out by management at Con Edison, NYSERDA and NYPA. To date, this issue has not been one that appears to have prevented accepted vendors from reaching their goals, though as they expand their offerings beyond lighting, it could become more important. Con Edison should consider some of the recommendations noted above for addressing the comprehensiveness of load reduction opportunities at each customer site, which also offer possibilities for enhanced cooperation between the programs.

CONCLUSIONS, RECOMMENDATIONS AND MARKET STRATEGIES

Con Edison's Targeted program is a progressive DSM initiative that is one of the few domestic programs designed to defer T&D upgrades, accomplished via firm and permanent load reduction. The other examples are either limited pilots or rely on distributed generation (usually back-up and/or mobile generation units) and demand response to meet the peak loads of a local T&D area. The program has, and is expected to continue to produce value to Con Edison's customers. It also provides Con Edison another option and greater flexibility in the T&D capacity planning process. Program value can be enhanced via refinement of assumptions, and adjustments to program structures and delivery methods as described in this evaluation.

From the evaluation findings contained herein, the following conclusions and recommendations are offered:

Program Impacts and Achievement of Load Reduction Goals

- The Targeted program has produced value to Con Edison customers, as it has deferred T&D projects that otherwise would have been constructed in the absence of DSM. Six projects have been deferred by one or more years by the program. The total cost of the projects is approximately $62 million, or 20 percent of the total cost of proposed T&D deferrals. Without the Targeted DSM program, Con Edison would have built or initiated several other projects, which in light of the recession will be deferred. Of these, several now have need dates beyond the 10-year planning horizon, which underscores the value of capital investment deferrals achieved thus far.

- The program, to date, has provided net economic benefits of approximately $7 million to Con Edison's ratepayers through the deferral of T&D projects. Scaling back the residential contracts and/or the targeted quantities in networks where the need date has been extended due to the recession, to the extent feasible, under the contracts could enhance the economic value of the program.

- The Targeted DSM program provides the Company greater flexibility in the T&D planning process and a hedge to changes in forecasts or need dates for system upgrades. This flexibility has provided additional value, as some T&D upgrades were deferred due to the anticipated DSM and were not built. This means that the Targeted DSM actually allowed the project (and costs to the ratepayers) to be deferred for much longer than

anticipated. For example, some of the T&D projects now will not have not for up to ten years or beyond due recent economic conditions. The Targeted DSM program provides the ability to both: (1) buy a couple of years of time to see how forecast uncertainty is resolved and/or implement other network adjustments; and (2) "ramp up" or "ramp down" the program quickly is a positive feature that can be used to proactively respond to changes in load forecasts or network adjustments.

- As of December 2008, the program has achieved 15 percent of the load reductions projected to be needed for T&D system deferrals (22 MW) based on capacity deficit projections at the time when the Requests for Proposals for Phases II through IV were issued.

- The results of market research indicates firm capacity reductions achieved by targeted DSM is expected to be only 60% of the amount currently assumed as installed to defer T&D investments. The evaluation developed load reduction adjustment factors to apply to the residential and commercial load reductions reported through the M&V process. These factors take into account the coincidence of reported load reductions with the summer network peaks they are meant to reduce, as well as free ridership, spillover, rebound, and measure retention/persistence. These factors are currently not being taken into account when Con Edison planners adjust their planning estimates based on DSM results, resulting in an over-estimation of the impacts of the Targeted program. They should be incorporated, to give the company a more accurate assessment of achieved load reductions.

- The impact evaluation for the Targeted DSM program indicates it is cost effective on a total program basis but, due to lower coincidence factors than assumed for evening peaking networks, residential activities are not cost effective. Such activities account for about 27% of the needed load reductions. Improvement to cost effectiveness could be obtained by lowering payments made for residential CFL installations. However, vendors have undoubtedly depended on CFL installations to meet their load reduction commitments, so that this recommendation may only be possible to implement in future RFPs.

- The program is not expected to meet all of its near-term (2009-2012) targets. However, the load reduction need for a number of these targets is being reduced, due to reduced consumption by customers and significant modifications made to planning estimates.

Program Design

As a program that explicitly requires firm load reduction in targeted areas by a fixed date, the Targeted program has been effective in getting a large number of measures implemented in a short-time within the targeted areas.

Key recommendations regarding the design of the targeted Program include the following:

- For load areas where the need dates for T&D projects have been extended or eliminated, Con Edison should renegotiate vendor contracts to reduce DSM deliveries, preferably via mutual agreement between the Company and vendors. The greatest opportunity is the 13th Street load area, where far less DSM is needed than originally forecast, the potential for T&D savings is now very small, and the vendor reports achieving its load reduction commitments may be difficult to achieve.

- Vendor contracts should explicitly note the possibility and likelihood that the level of contracted load reduction may change over the course of the contract period.

- Monitor residential load areas currently designated as evening peaking to determine if load patterns or customer demographics have caused the peak to shift to daytime hours. The Company also should reconcile differences in the day time versus evening peaking hours used by DSM and Planning personnel. The Planning group assumes the evening peak begins after 5:00pm; whereas DSM assumes 6:00pm. This also could cause some evening peaking load areas to shift to day time peaking.

- The program could be made more cost effective by lowering payments made for residential CFL installations, due to their low coincidence with network peak periods and the high incentives being paid to program vendors serving residential customers. Con Edison should apply a load area or network coincidence factor for each type of DSM measure in order to reflect the firm network-specific capacity that will be realized.

- The Company should tighten up the existing requirement that measures be operating at least for some portion of the peak period defined for the load area. The customer should confirm that the location-specific measure is on for at least one or two hours during the peak period. This may decrease number of CFLs installation per household, but would increase the coincidence of their use within the peak period.

- The Company should incorporate the impact adjustment factors (coincidence, free ridership, hours of use, rebound, spillover, and measure retention) derived from this evaluation into either the load reduction needs established in program RFPs or the value

assigned to different types of load reduction measures. One particular concern is the coincidence associated with residential CFLs.

- Measures having lower diversity factors (e.g., occupancy sensors, day-lighting and other controls) and demand response measures should be included as eligible measures in future RFPs, as a means for facilitating greater savings penetration per customer and achievement of existing load reduction commitments in the commercial sector. Con Edison could supply a coincidence factor that represents a discounted on-peak or diversity factor. This factor would be applied to the connected kW reduction to represent the aggregated savings coming from multiple installations of this type of measure.

- The Company should investigate the feasibility and customer acceptance of demand response (DR) that can be dispatched for both system capacity and network/load area requirements. If such dual function DR is acceptable, then Con Edison should consider including such measures in the list of eligible measures. This could include distributed generation, provided that Con Edison would have direct control of the device or equivalent load to ensure capacity is available when needed.

- Include quality criteria for measures installed through the program, (meeting state code, where applicable, meeting Energy Star requirements, etc.), and explicitly disallow measures in certain room types (e.g., closets).

- Evaluate whether to include rewards in addition to the existing penalties for vendor performance in the program, as well as bands of achieved load reduction within which penalties are reduced for almost achieving goals. These characteristics are common in similar outsourced DSM contracts.

- Provide training for vendors in the various practical aspects of participating in the program (especially administrative issues), so that time is not wasted in climbing a learning curve on how to efficiently participate.

Request for Proposals Process

- The RFP process is fair and reasonable -- the accepted vendors had few recommendations on how the RFPs process could be improved. However, it may be possible to increase the number of vendors bidding in the program, through updating the bidders list, better publicizing the RFPs, and ensuring that those who received

previous RFPs are aware of changes that have been made to make the current RFPs more favorable toward bidders. Specifically, Con Edison should:

  - Update the RFP mailing list, to obtain a larger pool of bidders.
  - Explain in the email transmitting RFPs how the current RFP has been modified from previous RFPs, to encourage participation by those who rejected providing a proposal for previous RFPs.

- Emphasize in RFPs Con Edison's right to modify load reduction targets prior to the completion of the contract, as well as its strong likelihood of doing so, to allow the needed flexibility to make such modifications while preparing vendors for their possibility.

Program Satisfaction

- Con Edison has generally been responsive to vendor needs for the Phases II-IV of the targeted Program.
- Survey results indicate that participating customers are very satisfied with their program experience, but that there is room for program improvement. Some commercial customers recommend more involvement in the program by Con Edison and more extensive marketing. Chief among complaints by customers are the amount of time it takes for installation to occur after initial walk through, the number of inspections and visits by individuals required by the program, and vendor responsiveness to their calls.

Measurement & Verification

- The M&V process is effective in providing notice of how well program participation is tracking to program goals. Due to the wide prevalence of lighting, M&V protocols employed in the program have been straightforward and consistent with standard industry practice. As the program evolves, non-lighting measures will be included. As discussed, below, the 100% inspection of lighting measures could be relaxed without jeopardizing ratepayers. The current policy of 100% installation verification would be consistent with industry practice for most non-lighting measures.
- While there have been issues with the process, as both vendors and the M&V contractor have learned how to work with each other and have ramped up staffing to meet the program requirements and activity levels. The accepted vendors report that the M&V

process is basically sound and that the M&V contractor responsive. Vendors have raised a few administrative issues (around the process for addressing minor errors in reports, invoices and reports) and Con Edison should seek to address them or educate new vendors on how to deal with these issues up front.

- Current M&V issues relate to the burdensomeness and cost of the process, rather than its accuracy. Specifically, Con Edison may want to relax its current practice of requiring data for all projects on a vendor report to be accurate before processing any of them. For example, the company might require corrections to the entire submission only when errors are found with more than a pre-specified number of projects or pre-specified percentage of load reduction being reported. Otherwise, correct projects could be approved and those with errors could be sent back for correction.

- The current M&V process is extensive, expensive and time-consuming. M&V costs on the part of Con Edison and vendors should be reduced by scaling back the current 100% inspection requirements, especially for pre-inspections. Sampling in combination with strategies that ensure vendor self interest in implementation and post-installation report accuracy should be effective in delivering a high degree of certainty regarding load reductions achieved without the need for 100% inspections, especially for smaller load reduction sites. Con Edison's original intention was to reduce the percentage of projects inspected, as comfort was gained that vendors were reporting accurately. However, this level of accuracy has not materialized, at least for commercial sector projects. Still, the 100% inspection requirement is time-consuming and expensive, especially for commercial projects, which require on-site visits.

  Two options for reducing the number of inspections while maintaining the rigor of the M&V process would be as follows:

  (1) Have a lower percentage of pre-inspections performed and have vendors absorb the cost for additional inspections required if pre-specified levels of accuracy in implementation reports are not achieved; or

  (2) Apply the level of accuracy found in a random sample of inspected projects to all projects for that vendor. Both options should result in a de-rating of all load reductions for vendors over-estimating load reductions in their reports to Con Edison and the M&V contractor. In turn, this should provide a strong incentive for the vendors to have projected load reductions from each project, as represented on their implementation reports, be as accurate as possible. The potential for reduced inspections is limited to commercial installations.

Residential inspections – largely done through the tag-and-bag method – are relatively efficient and offer very limited cost savings if done on a sampling basis.

- Little information regarding hours of use and coincidence of hours of use with network peaks has been available to the program, other than assumptions that could be made based on other sources. While such data are optimally obtained via metering, especially (for coincidence values) during summer months, Con Edison could gain important knowledge regarding these impact parameters by collecting estimates during M&V visits. These estimates could then be compared to estimates from other sources that recommend reference values (e.g., pre-specified hours of use by building type), or to results from other studies, to determine whether specific metering studies may be warranted to understand significant discrepancies. At the least, Con Edison should enhance its current M&V data collection efforts by including collection of additional data on operating hours and use coincidence while the M&V inspectors are on-site.

Program Marketing

- Vendors selected by Con Edison have implemented relatively sophisticated marketing strategies and employed some DSM marketing best practices as they have sought to achieve their goals. Additional aspects of best practice marketing will require greater involvement on the part of the company with individual vendors, and this closer involvement may also be needed in order for commercial vendors to meet their load reduction commitments as implementation shifts to measures beyond lighting. Con Edison should evaluate whether advantages of greater involvement outweigh the potential disadvantages. Greater involvement of value to the program would be based on the following:
    - Allowing use of the Con Edison logo under closely controlled conditions
    - Publicizing the program and its vendors on the Con Edison web site, and educating Con Edison employees and especially customer service staff regarding the program and its vendors
    - More expeditiously assisting vendors in identifying whether customers are within or outside of areas targeted by the program

- Most commercial customers use simple payback as their primary decision-making criteria regarding whether to invest in energy efficiency improvements, with the average acceptable payback period being two years.

- The vendor value proposition for residential customers has clearly been "free light efficient bulbs." The primary vendor serving the commercial market has emphasized annual bill savings and low cost measures (and, to a lesser extent, environmental improvement), and participants report that these were influential arguments in their decision to participate in the program.

- Vendors are not typically trying to address a wide range of measures with customers. Rather, they focus on CFLs for residential customers and a limited set of lighting measures for commercial customers. However, vendors serving the commercial market admit that they will need to go beyond lighting to meet their load reduction commitments. Only some vendors have the capability to address non-lighting opportunities. Vendors with the capabilities of addressing non-lighting measures should be encouraged to seek deeper energy efficiency savings from each participant through such mechanisms as coordinated/program process, and tiered incentives. Single end-use focused vendors should be encouraged to cross market. It should be noted that the Targeted program is still quite early in its implementation and the vendors may indeed develop successful strategies on their own to pursue a wider range of measures to implement, especially through repeat visits.

  There are barriers to broadening measure coverage. It can require dealing with different decision-makers at the customer site. Decisions regarding other measures also may have different time frames than those of the lighting measures that have been the focus of the program so far. Further, customers may not be willing to undertake more comprehensive improvements all at once, given the much higher price tag for the bundle of improvements. As noted below, a key to enabling broader measure coverage will be a clear, practical method for integrating the efforts of multiple types of programs (i.e., including those that target energy savings rather than solely load reductions). Con Edison should explore how the program design, cost effectiveness, and success in achieving timely load reductions would be affected by modifying the program to better encourage implementation of a broader range of efficiency measures. See discussion below, under "Interactions with Other Energy Efficiency Programs," regarding achieving this objective.

- The Company should also evaluate ways in which it could work with vendors to address the efficiency needs of large customer accounts (perhaps through cooperation

with Con Edison large customer account managers), which could result in significant load reductions through the program.

Market Analysis

- In the residential sector, the program appears to be targeting those who are less likely to have CFLs installed in their homes already. Commercial customer recent experience with making lighting efficiency improvements has been minimal regardless of participation status. The program therefore appears to be broadening the customer base that has experience with implementing DSM. This helps to set the stage for deeper penetration of the customer base with additional measures in the future.

- Customers generally have heard about the advantages of CFLs through word of mouth, suggesting that the network marketing approach being employed by the vendors is on target.

- About half of commercial participants report that there are additional energy efficiency improvements that should be made to their facilities, and about 13% of both residential and commercial participants said that their participation in the program has influenced them to make additional efficiency improvements. Con Edison should take steps to broaden the range of measures addressed by the program, especially among commercial customers. This can be achieved in part by broadening the measures that qualify for the program and taking a more active role in facilitating vendor marketing, as noted above.

- Residential marketing efforts are reaching retired persons disproportionately, most likely due to the use of telephone marketing and the fact that retired persons may be more likely to be at home.

- Compared to non-participants, residential program participants are more likely to be retired persons, less likely to be college graduates and more likely to have larger households, on average. Compared to non-participants, commercial program participants are more likely to own their facilities, have been in business longer, have been located at their current address for more than ten years, and less likely to have annual revenues of less than $500,000.

- Most participation to date has occurred outside of the Manhattan area, driven primarily by the timing of Con Edison's need for load reduction in specific load areas.

Interactions with Other Energy Efficiency Programs

The evaluation looked at three primary issues related to the interaction of the Targeted program with other efficiency programs (especially NYSERDA programs) operating in the targeted areas:

- The process in place to prevent participation by customers in both the NYSERDA program and the Con Edison program (and the related double-dipping into program incentives for the same measure) appears to be working well. To date, Con Edison has identified only one instance where a customer was going to be reimbursed for participation in both the NYSERDA program and the Con Edison program. That customer was asked to choose between the two programs.

- Concerns about market confusion due to having both the Con Edison Targeted program and also NYSERDA programs serving the same market do not appear justified with respect to customers' experience, though some contractors/vendors appear to have strong opinions regarding the value of one or the other program. Most program participants are not aware of the NYSERDA programs, and most non-participants are not aware of either program.

- More work needs to be done to find ways to address a fuller array of efficiency measures at each customer site. Con Edison vendors, due to their contractual commitments to achieve specific levels of load reduction at specific times, have little motivation to promote measures that do not help to meet those commitments even if they are desired by customers and would result in cost effective energy savings. However, as noted above, there are a number of measures that could be included in the program that are aligned with vendors' needs to meet their load reduction commitments.

- Similarly, more work needs to be done to integrate the Con Edison program with the NYSERDA programs (or future non-targeted Con Edison programs, especially the EEPS initiatives). Cross-selling is a best practice marketing approach not being employed currently. But program delivery and marketing best practices are rapidly moving to include:

  (1) integrated program offerings (including EE and DR);

  (2) over-arching value proposition;

  (3) single application form;

  (4) customer transparent review, approval and inspections; and

(5) tiered incentives based upon cumulative savings and organizational commitments to a multi-year program of efficiency upgrades

Vendors either tend to think of programs as being in competition with one another or as impractical to implement simultaneously, or both. The coordination opportunities will increase as Con Edison rolls out its EEPS programs. Similarly, without a proactive strategy, vendors will view Con Edison's EEPS offerings as new competition. Successful integration could yield a deeper penetration of the market, but vendor incentives for the two program need to be better aligned. Vendor cooperation is likely to be improved if vendors can be provided with a clear, practical method for integrating the efforts of both programs, and such direction will only be possible if promoted by management of both organizations. Con Edison and NYSERDA should work together more closely to find ways to bring about this alignment.

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APPENDIX A: MARKET RESEARCH – SAMPLE DESIGN METHODOLOGY

Background and Approach

The approach applied to develop a sample design for residential and commercial participants and non-participants for the survey instrument is described below.

Sample Design

The sample design for surveying participants and non-participants is part of the evaluation of the Targeted DSM program by the Navigant Consulting, Inc. team. The results of these surveys were used to support the impact and process evaluation. Participant data indicate that there is very little difference between the smallest and largest program participant in terms of estimated demand savings. This eliminated use of estimated demand savings as a stratification variable. The dimensions applied in the development of the sample design included:

- Program participation – including study participants and non-participants
- Customer class – residential versus non-residential customers, and possibly further differentiation by facility type
- Program year – the 2008 program year has been closed out but the 2009 and 2010 program years are open and active
- Vendors
- Contract network – There were five contract networks impacted in 2008, an additional three networks impacted in 2009, etc.

Judicious application of the assumptions outlined above ensures good statistical precision for selected dimensions. For dichotomous variables, a sample size of 68 completes was used to estimate the proportion to within ±10 percentage points. The next step focuses on development of a preferred allocation of the fixed sample.

Sample Allocation

The following sections present a summary of current program activity broken down by phase, contractor, class, and network. An examination of Table 30 show that the reported current load reduction for 2008 was dominated by the residential class, which accounts for more than 80 percent of the total load reduction.

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Table 30: Load Reduction Achieved Through December 2008 and Contracted Load Reduction

Phase	Contractor	LRCD	LRED	Contract Load Area	Contract Network	Total Contracted Load Reduction (kW)	2008 Load Reduction (kW)	2009 Load Reduction (kW)	2010 Load Reduction (kW)	2011 Load Reduction (kW)	2012 Load Reduction (kW)
2	Free Lighting	5/1/2008	4/30/2011	Willowbrook	Willowbrook	2,000	2,000	2,000	2,000	2,000	
2	Free Lighting	5/1/2008	4/30/2011	Woodrow	Woodrow	4,000	4,000	4,000	4,000	4,000	
2	Free Lighting	5/1/2009	4/30/2011	Fox Hills	Fox Hills	4,000		4,000	4,000	4,000	
2	Free Lighting	5/1/2010	4/30/2011	Fox Hills	Fox Hills	2,000			2,000	2,000	
2	Free Lighting	5/1/2011	4/30/2012	Fox Hills	Fox Hills	2,000				2,000	2,000
2	Free Lighting	5/1/2009	4/30/2011	Willowbrook	Willowbrook	1,000		1,000	1,000	1,000	
2	Free Lighting	5/1/2010	4/30/2011	Willowbrook	Willowbrook	1,000			1,000	1,000	
2	Free Lighting	5/1/2011	4/30/2012	Willowbrook	Willowbrook	1,000				1,000	1,000
2	PES	5/1/2008	4/30/2011	White Plains/Elmsford No. 2/Ha	White Plains/Elmsford No. 2/Harrison	2,000	2,000	2,000	2,000	2,000	
2	PES	5/1/2009	4/30/2011	White Plains/Elmsford No. 2/Ha	White Plains/Elmsford No. 2/Harrison	6,000		6,000	6,000	6,000	
2	PES	5/1/2010	4/30/2011	White Plains/Elmsford No. 2/Ha	White Plains/Elmsford No. 2/Harrison	4,000			4,000	4,000	
2	PES	5/1/2011	4/30/2012	White Plains/Elmsford No. 2/Ha	White Plains/Elmsford No. 2/Harrison	3,000				3,000	3,000
2	QCS	5/1/2008	4/30/2011	Bensonhurst #2	Flatbush	3,000	3,000	3,000	3,000	3,000	
2	QCS	5/1/2009	4/30/2011	Bensonhurst #2	Flatbush	4,000		4,000	4,000	4,000	
2	QCS	5/1/2010	4/30/2011	Bensonhurst #2	Flatbush	4,000			4,000	4,000	
2	QCS	5/1/2011	4/30/2012	Bensonhurst #2	Flatbush	3,000				3,000	3,000
3	CPL	5/1/2009	4/30/2011	Avenue A	Cooper Square	4,000		4,000	4,000	4,000	
3	CPL	5/1/2010	4/30/2011	Avenue A	Cooper Square	2,000			2,000	2,000	
3	CPL	5/1/2011	4/30/2012	Avenue A	Cooper Square	1,000				1,000	1,000
3	CPL	5/1/2010	4/30/2011	East 63rd Street No. 1	Hunter/Sutton	1,000			1,000	1,000	
3	CPL	5/1/2011	4/30/2012	East 63rd Street No. 1	Hunter/Sutton	2,000				2,000	2,000
3	CPL	5/1/2011	4/30/2012	East 63rd Street No. 2	Turtle Bay/Roosevelt	3,000				3,000	3,000
3	CPL	5/1/2011	4/30/2012	East 29th Street	Madison Square	2,000				2,000	2,000
3	CPL	5/1/2011	4/30/2012	East 40th St No. 1/East 40th St	Grand Central/Beekman/Fashion/Empire	5,000				5,000	5,000
3	FLC	5/1/2010	4/30/2011	Wainwright	Wainwright	1,000			1,000	1,000	
3	PES	5/1/2008	4/30/2011	Harrison	Harrison	1,000	1,000	1,000	1,000	1,000	
3	PES	5/1/2009	4/30/2011	Harrison	Harrison	2,000		2,000	2,000	2,000	
3	PES	5/1/2010	4/30/2011	Harrison	Harrison	2,000			2,000	2,000	
3	PES	5/1/2011	4/30/2012	Harrison	Harrison	1,000				1,000	1,000
3	QCS	5/1/2010	4/30/2011	Heligate	Yorkville/Randalls Island/Wards Island	4,000			4,000	4,000	
3	QCS	5/1/2011	4/30/2012	Heligate	Yorkville/Randalls Island/Wards Island	2,000				2,000	2,000
4	PES	3/1/2010	2/28/2012	East 13th Street/East River Sw	Cooper Square/City Hall/Chelsea/Madison Square/G	46,000			46,000	46,000	46,000
4	PES	3/1/2011	2/28/2012	East 13th Street/East River Sw	Cooper Square/City Hall/Chelsea/Madison Square/G	10,000				10,000	10,000
4	PES	3/1/2012	2/28/2013	East 13th Street/East River Sw	Cooper Square/City Hall/Chelsea/Madison Square/G	11,000					11,000
4	FLC	3/1/2012	2/28/2013	Wainwright	Wainwright	1,000					1,000
4	QCS	3/1/2011	2/28/2012	Millwood West	Millwood West	1,000				1,000	1,000
						148,000	**12,000**	**33,000**	**100,000**	**136,000**	**94,000**

In addition, the contracted load reduction does not become more balanced until 2011. Given this result, Con Edison should allocate a higher proportion of the sample to the residential class than to the non-residential class.

Non-Residential

A total of 280 sample points were assigned to the non-residential sector, allocated equally between participants and non-participants. Because the non-residential class is being implemented by a single vendor, it therefore is not a variable that can be used to differentiate the sample. Hence, the non-residential samples were divided by geographic network area; due to limited commercial measures installed to date, it was important to maximize the number of Manhattan network participants included in the sample. It included an examination of the facility types with the most participants and that contributed the most savings. Table 31 lists the number of participants and estimated savings by facility type. Because office buildings and small retail is expected to be a significant participant group (approximately 40 percent of the participation and savings), one-half of the samples were allocated to this combined group.

Table 31: Non-Residential Participants and Savings by Facility Type

Facility Type	Participant Count	Percent of Participants	Savings (kW)	Percent of Savings
Office Building	110	11.7%	1,192	27.0%
Small Retail	287	30.6%	485	11.0%
Apartment Building	40	4.3%	405	9.2%
Educational Institution	19	2.0%	370	8.4%
Church	54	5.8%	358	8.1%
Other	11	1.2%	268	6.1%
Non-Profit Organization	23	2.4%	211	4.8%
Restaurant	103	11.0%	175	4.0%
Lodging	8	0.9%	154	3.5%
Auto Industry	35	3.7%	90	2.0%
Clothing Industry	21	2.2%	83	1.9%
Deli/Grocery Store	36	3.8%	82	1.9%
Medical Institution	44	4.7%	76	1.7%
Food Industry	14	1.5%	66	1.5%
Specialty	10	1.1%	63	1.4%
Furniture Store	12	1.3%	54	1.2%
Beauty Salon/Barbershop	41	4.4%	41	0.9%
Senior Housing	5	0.5%	41	0.9%
Manufacturing	8	0.9%	39	0.9%
Country Club	2	0.2%	36	0.8%
Dry Cleaner/Laundromat	19	2.0%	19	0.4%
Warehouse	2	0.2%	18	0.4%
Construction	12	1.3%	14	0.3%
Supermarket	1	0.1%	13	0.3%
Wholesale	4	0.4%	12	0.3%
Theater	1	0.1%	11	0.2%
Studio Space	1	0.1%	8	0.2%
Real Estate	2	0.2%	6	0.1%
Club	1	0.1%	5	0.1%
Professional Building	5	0.5%	4	0.1%
Outdoor	1	0.1%	3	0.1%
Dance Studio	1	0.1%	3	0.1%
Large Retail	3	0.3%	3	0.1%
Funeral Home	1	0.1%	2	0.0%
Café	1	0.1%	2	0.0%
Government Institution	1	0.1%	1	0.0%
Totals	939	100.0%	4,417	100.0%

It would have been preferable to divide the sample equally; however, the Manhattan network only has 110 participants, making it unlikely that 70 non-residential customer surveys from this limited population frame could be successfully completed. The non-residential sample design is presented in Table 32.

Table 32: Non-Residential Sample Design and Allocation

Class	Vendor	Type	Network	Facility Type	Sample
Non-Residential	PES	Participant	"Non-Manhattan"	Office/Retail	35
Non-Residential	PES	Participant	"Non-Manhattan"	Non-Office/Retail	35
Non-Residential	PES	Participant	"Manhattan"	Office/Retail	35
Non-Residential	PES	Participant	"Manhattan"	Non-Office/Retail	35
				Non-Residential PES Participant Totals	140
Non-Residential		Non-Participant	"Non-Manhattan"	Office/Retail	35
Non-Residential		Non-Participant	"Non-Manhattan"	Non-Office/Retail	35
Non-Residential		Non-Participant	"Manhattan"	Office/Retail	35
Non-Residential		Non-Participant	"Manhattan"	Non-Office/Retail	35
				Non-Residential PES Non-Participant Totals	140
				Non-Residential Totals	280

Since there was an insufficient number of Manhattan participants from which to draw a sample, the remainder of the participants were drawn from Non-Manhattan networks; specifically Westchester County. Further, the Office/Retail designation could not be determined for the non-participants; hence, only the Manhattan and Non-Manhattan dimension was used.

Residential

The Residential sample design and allocation proved more challenging than commercial as it was necessary to address several additional dimensions; particularly, dwelling type and vendor. Table 33 presents a summary of the estimated 2008 savings and participants by dwelling type. From this table, the residential participants clustered among three dwelling types, i.e., single family, 2 to 4 family, and all others. Accordingly, this dimension was used in the sampling plan.

Table 33: Savings by Dwelling Type

Dwelling Type	Savings (kW)	Percent of Savings	Participant Count	Percent of Total
Single Family	7,464	.40.9%	5,043	29.5%
2 to 4 Family	6,907	37.9%	6,428	37.6%
Large Multi-Family	2,513	13.8%	3,440	20.1%
5 to 25 Family	1,360	7.5%	2,203	12.9%
Totals	18,244	100.0%	17,114	100.0%

In addition, there were only two vendors with installations during the 2008 period, Free Lighting and QCS, and which serve six of the targeted networks. However, decision-making is more likely to vary based on the dwelling type and vendor rather than the network serving the customer. As a result, the dwelling type and vendor dimensions were included in the final sample design, presented in Table 34.

Table 34: Residential Sample Design and Allocation

Class	Vendor	Type	Dwelling Type	Sample
Residential	Free Lighting	Participant	Single Family	35
Residential	Free Lighting	Participant	2 to 4 Family	35
Residential	Free Lighting	Participant	Other	35
Residential	QCS	Participant	Single Family	35
Residential	QCS	Participant	2 to 4 Family	35
Residential	QCS	Participant	Other	35
			Residential Participant Totals	210
Residential		Non-Participant	Single Family	70
Residential		Non-Participant	2 to 4 Family	70
Residential		Non-Participant	Other	70
			Residential Non-Participant Totals	210
			Residential Totals	420

Non-Participant Samples

The non-participant samples closely map the participant samples. Accordingly, a very large non-participant pool was requested from each affected network area, including:

- Residential:
    - Willowbrook
    - Woodrow
    - Fox Hills
    - Flatbush
    - Yorkville/Randalls Island/Wards Island
    - Millwood West
- Non-residential:
    - White Plains/Elmsford No. 2/Harrison
    - Harrison
    - Cooper Square/City Hall/Chelsea/Madison Square, Greeley Square, Kips Bay, Greenwich, Sheridan Square, Canal, and Park Place

Data for each customer listing included the following fields:

a. Customer name
b. Contact name (if available)
c. Consuming facility street address

d. Consuming facility city and state
e. Consuming facility zip code
f. Account Number
g. Permanent premise identifier
h. Load Area
i. Network Area
j. Rate code
k. Facility type (if available)
l. All electronic current and historical consumption data including:
   - Consumption
   - Bill code (i.e., actual or estimated read)
   - Beginning read data (i.e., start of the cycle)
   - Ending read data (i.e., end of the billing cycle)
   - Number of days in the cycle

Surveys Completed

Table 35 summaries the number of surveys completed by each of the sample segments.

Table 35: Residential Survey Participants

Class	Vendor	Type	Dwelling Type	Number of Completes
Residential	Free Lighting	Participant	Single Family	35
Residential	Free Lighting	Participant	2- to 4- Family	35
Residential	Free Lighting	Participant	Other	33
Residential	QCS	Participant	Single Family	35
Residential	QCS	Participant	2- to 4- Family	36
Residential	QCS	Participant	Other	37
			Residential Participant Total	**211**
Residential		Non-Participant	Single Family	71
Residential		Non-Participant	2- to 4- Family	70
Residential		Non-Participant	Other	69
		Residential Non-Participant Total		**210**
			Residential Totals	**421**

Table 36 summarizes the number of surveys completed by sample segment. Table 37 presents the same information but by facility location. Table 38 presents the same information by facility type.

Table 36: Commercial Survey Participants, by Sample Segment

Class	Vendor	Type	Network	Facility Type	Number of Completes
Non-Residential	PES	Participant	Non-Manhattan	Office/Small Retail	44
Non-Residential	PES	Participant	Non-Manhattan	Non-Office/ Small Retail	42
Non-Residential	PES	Participant	Manhattan	Office/Small Retail	26
Non-Residential	PES	Participant	Manhattan	Non-Office/ Small Retail	28
				Non-Residential Participant Total	**140**
Non-Residential		Non-Participant	Non-Manhattan	Office/Small Retail	35
Non-Residential		Non-Participant	Non-Manhattan	Non-Office/ Small Retail	38
Non-Residential		Non-Participant	Manhattan	Office/Small Retail	35
Non-Residential		Non-Participant	Manhattan	Non-Office/ Small Retail	35
				Non-Residential Non-Participant Total	**143**
				Non-Residential Totals	**283**

Table 37: Commercial Survey Participants, by Facility Location

Class	Vendor	Type	Network	Facility Type	Number of Completes
Non-Residential	PES	Participant	Non-Manhattan		86
Non-Residential	PES	Participant	Manhattan		54
				Non-Residential Participant Total	**140**
Non-Residential	PES	Non-Participant	Non-Manhattan		73
Non-Residential	PES	Non-Participant	Manhattan		70
				Non-Residential Non-Participant Total	**143**
				Non-Residential Totals	**283**

Table 38: Commercial Survey Participants, by Facility Type

Class	Vendor	Type	Network	Facility Type	Number of Completes
Non-Residential	PES	Participant		Office/Small Retail	70
Non-Residential	PES	Participant		Non-Office/Small Retail	70
				Non-Residential Participant Total	**140**
Non-Residential	PES	Non-Participant		Office/Small Retail	70
Non-Residential	PES	Non-Participant		Non-Office/Small Retail	73
				Non-Residential Non-Participant Total	**143**
				Non-Residential Totals	**283**

APPENDIX B: DEVELOPMENT OF PROGRAM ADJUSTMENT FACTORS

The derivation of the adjustment factors cited above for the Targeted program is based largely on the results of the market research. Where applicable, results from studies with comparable demographics and measures are considered in the development of these factors, including recommendations outlined in the NYSPSC's draft for residential and small commercial programs.

Surveys of participating and non-participating customers provided data to support the refinement of the program's savings estimates. Several parameters used in engineering algorithms to estimate savings were addressed in these surveys:

- Coincidence of load reductions with network peaks
- Hours of use of installed high-efficiency equipment
- Free ridership
- Spillover and rebound
- Efficiency measure retention

The approach and assumptions used to derive each of these parameters is discussed below.

Residential Impact Adjustment Factors[44]

Network Coincidence Factors. A 19 percent coincidence factor was derived for residential networks, far lower than the 100 percent factor used by Con Edison to evaluate the deferral of T&D investments for evening peaking networks. Survey participants were asked how many program CFLs were installed in each room and of these, how many were on during each of four one-hour periods in the summer evening (the period defining the evening network peak period for the program). Non-participants were asked the same question about all lights in each room. Coincidence factors derived from participants survey results ranged from 0.2 to 0.4 (average of 0.24), when weighted by the number of CFLs installed in each room.

The coincidence factor is consistent with the value derived from the non-participant surveys (24 percent), when weighted by the number of CFLs installed in each room by participants. It is

[44] Participant survey results were weighted by the number of CFLs installed and by population (the ratio of the number of participants in each sample segment to the total number of program participants in that segment). Non-participant survey results were weighted by population (the ratio of the number of customers in the sample segment to the total number of customers in that segment in the customer population).

also consistent with the winter evening coincidence values produced by other studies. However, a very recent study – a 2009 evaluation of a CFL markdown (CFL supplier price-reduction) program in New England for nine entities (8 utilities and the Vermont Public Service Commission) – found a 24 percent winter evening coincidence factor and a 13 percent summer evening average coincidence factor. The surveys in targeted evaluation were conducted in the winter and although respondents were asked about summer evening CFL usage, they may have been influenced by their current winter use. For this reason and because the New England study was based on metered data, estimates used herein are based on the average of the New England study and survey results, resulting in a 19 percent coincidence factor. Targeted program survey and external study results are presented in Table 39, Table 40 and Table 41.

Table 39: Percentage of Program CFLs in Use during Evening Peak Hours – Participants

Residence Description	Summer Evening Hour				
	6-7	7-8	8-9	9-10	Average
Total Population (n = 211)	18%	24%	28%	25%	24%
Single Family (n = 70)	17%	24%	27%	27%	24%
2 to 4 Family (n = 71)	16%	21%	28%	22%	22%
More Than 4 Family (n = 70)	29%	38%	39%	32%	34%

Table 40: Percentage of Lights in Use during Evening Peak Hours – Non-participants

Residence Description	Summer Evening Hour				
	6-7	7-8	8-9	9-10	Average
Total Population (n = 210)	13%	20%	30%	33%	24%
Single Family (n = 71)	11%	18%	33%	35%	24%
2 to 4 Family (n = 70)	15%	19%	28%	31%	23%
More Than 4 Family (n = 69)	16%	25%	30%	34%	26%

Table 41: Percentage of Residential CFLs in Use during Evening Peak Hours (Other Studies)

2008 New England Markdown Study[45]			*Evening Hour*					
	Loggers	**On-Site**	**5-6**	**6-7**	**7-8**	**8-9**	**9-10**	**Average**
Summer	493	106	11%	11%	12%	15%	16%	13%
Winter	164	51	21%	24%	24%	24%	24%	24%
2007 Coincidence Factor Study and NY PSC Draft Energy Savings Estimation Document (Nov 2008)[46]								
	Loggers	**On-Site**	**Winter Hours 5-7**					
December	282	N/A	28%					
January	264	N/A	32%					
Ave Winter	264	N/A	30%					
2007 Maine Residential Lighting Impact Study[47]								
	Loggers	**On-Site**	**Winter Hours 5-7**					
Winter	153	25	34%					
2005 New England Utilities Residential Lighting Extended Metering Study[48]								
	Loggers	**On-Site**	**Winter Hours 5-7**					
Winter	92	44	15%					
2004 VT Technical Reference Manual[49]								
	Loggers	**On-Site**	**Winter Hours 5-7**					
Winter	N/A	N/A	23%					
2003 New England Utilities Residential Lighting Impact Study[50]								
	Loggers	**On-Site**	**Winter Hours 5-7**					
Winter	233	128	25%					

[45] "Residential Lighting Markdown Impact Evaluation," submitted to Markdown and Buydown Program Sponsors in Connecticut, Massachusetts, Rhode Island, and Vermont, January 20, 2009, pp. 6 (Figures 1-3 and 1-4), 26 (Table 4-2), and 27 (Table 4-4). (www.ctsavesenergy.org/files/FINAL%20Residential%20Lighting%20Markdown%20Full%20Report%2001-20-09.doc)

[46] "Coincidence Factor Study: Residential and Commercial Industrial Lighting Measures," prepared for New England State Program Working Group (SPWG) For use as an Energy Efficiency Measures/Programs Reference Document for the ISO Forward Capacity Market (FCM), Spring 2007, pg. III, Table i-2. (http://www.ctsavesenergy.org/files/CT%20Lighting%20Coincidence%20Factor%20Report%20Mar%202007.pdf)

[47] "Process and Impact Evaluation of the Efficiency Maine Lighting Program," submitted to Efficiency Maine, April 10, 2007, pp. 11 and 26. (http://www.efficiencymaine.com/orders-documents/EMResidentialLightingEvaluation.pdf)

[48] "Extended Residential Logging Results" memorandum, submitted to National Grid, May 2, 2005, pg. 1. (http://publicservice.vermont.gov/energy/ee_files/efficiency/eval/marivtfinalresultsmemodelivered.pdf)

[49] "Efficiency Vermont Technical Reference User Manual (TRM) No. 2004-31, pg. 125. (http://www.state.vt.us/psb/eeurfp2005/trmusermanualno2004-31.doc#_Toc93807418)

[50] "Impact Evaluation of the Massachusetts, Rhode Island, and Vermont 2003 Residential Lighting Programs," submitted to The Cape Light Compact, State of Vermont Public Service Department for Efficiency Vermont, National Grid (Massachusetts Electric, Nantucket Electric, and Narragansett Electric), Northeast Utilities (Western Massachusetts Electric), NSTAR Electric, and Unitil Energy Systems, Inc. (Fitchburg Gas and Electric), October 1, 2004, pp. 28 and 45. (http://www.cee1.org/eval/db_pdf/485.pdf)

Hours of Use. Hours of use for residential CFLs are estimated at 2.8 hours/day, or 1,022 hours annually. Participants were asked how many hours per day the program CFLs in each room were on each day, differentiating portable lamps from permanent fixtures. According to participant survey results, summarized in Table 42, average hours of use ranged from 3.2 to 4.5 hours per day (average of 3.3 hours per day). However, self-reports of hours of use by survey respondents may be overstated. Two New England studies calculated correction factors used to adjust customer survey results regarding CFL hours of use; the following adjustment factors are based on light logger data collection for subsets of these customers: 81 percent from a 2004 New England (Vermont and Massachusetts) study, 97 percent from a 2007 study in Maine, and 78 percent from a 2009 New England (Vermont, Massachusetts, Connecticut and Rhode Island) study. Averaging the three results yields an 85 percent correction factor, which when applied to the 3.3 hours/day estimate from the current study, yields an adjusted average of 2.8 hours per day, or 1,022 hours/year. Notably, averaging the final hours-of-use estimates from these three studies (2.6, 2.6 and 3.2) also yields an average of 2.8 hours/day.

Table 42: Residential Hours of Use per CFL Installed

Customer Residence Description	Daily Hours of Use Per CFL	Annual Hours of Use Per CFL
Total Population (n = 211)	2.8	1,022
Single Family (n = 70)	2.7	986
2 to 4 Family (n = 71)	2.7	986
More Than 4 Family (n = 70)	3.8	1,387

Note: Results Adjusted by Self-Reporting Correction Factor

Free Ridership. Free ridership is approximately 11 percent for residential (evening peaking network) participants. This value is derived by averaging the 7 percent free ridership estimate from the participant survey and the 15 percent free ridership estimate from non-participant survey results. The participant estimate is based on an analysis of survey participant responses to a series of questions about their plans to purchase CFLs, their reasons for participating and the likelihood of their doing so in the absence of the Targeted DSM program.

The following questions and topics were used to assess free ridership:

- Did you already have plans to buy CFLs: *Were you already planning to buy any CFLs that month, or in the three months following that day? (IF SO): How many were you already planning to buy?*
- Why did you have CFLs installed that day: *What were the reasons you chose to have these CFLs installed that day, when you hadn't had CFLs installed in those fixtures in those locations before?*

- Would you have bought CFLs at full price: *If [read name of installing vendor] had not given you the CFLs, and CFLs cost between 2 and 5 dollars per light bulb, do you think you would have bought any CFLs yourself at that time or over the 3 months that followed?*

- What would you have done if no program: *If [read name of installing vendor] had not been offering CFLs that day, which of the following best describes what you probably would have done over the 3 months around that time? Would you have . . .* ***READ LIST.***
  - *Bought the same [# of CFLs actually installed] CFLs yourself during that period*
  - *Bought fewer CFLs during that period, or*
  - *Taken no action with regard to CFLs during that period?*

- *(If would have bought fewer CFLs):* How many fewer would you have bought if no program: *How many CFLs do you think you would have bought yourself, at 2 to 5 dollars per bulb, during that period?*

Table 43 presents customer responses and demonstrates how data were used to derive a free ridership percentage for each respondent. The "Count" column is the unweighted number of respondents whose responses meet descriptions that appear in the "Free Rider Criteria" column.

Table 43: Derivation of Residential Free Ridership Percentage Estimates

Free Rider Criteria	Free Rider %	Count
• Did not plan to buy CFLs	0%	140
• Wouldn't have paid full price to buy CFLs	0%	8
• Would've taken no action re: CFLs if no program	0%	6
• Planned to buy CFLs • Would've paid full price • Would've bought fewer CFLs • Don't know how many planned to buy/would've bought	25%	2
• Participation reasons include program (free CFLs, wide variety of lamps, etc.)	50% Maximum	9
• Planned to buy CFLs • Would've paid full price • Indicate would've bought fewer CFLs	Lesser of number planned to buy or number would've bought, divided by number installed	44
• Planned to buy CFLs • Would've paid full price • Would've taken same action if no program • Don't know how many planned to buy	75%	2

Non-participant survey results also were used to estimate free ridership, accomplished by dividing the average number of CFLs installed in 2008 per household (3.6) into the average number of CFLs installed in participant homes through the program (23). This approach yielded a non-participant estimate of free ridership of 15 percent. Averaging this value with the participant free ridership estimate of 7 percent results in a net 11 percent free ridership estimate.

Spillover. Spillover for residential participants is estimated at 0.1 CFLs or 1 percent per participant (see Table 44). Participants were asked whether the free CFLs received through the Targeted DSM program influenced them to independently purchase additional CFLs and, if so, the number of bulbs purchased. On average, 4.5 percent of respondents indicated the program influenced them to purchase, on average, 3.1 additional CFLs per home. Further, as Table 45 indicates, 13 percent of residential survey respondents indicated other efficiency measures have been implemented as a result of their participation in the program (Energy Star appliance purchases, programmable thermostat installations, etc.). However, absent significant additional research, savings from these additional measures is difficult to quantify, and therefore, is excluded from energy and demand reduction estimates. However, any incremental savings achieved reduces program risk.

Table 44: Spillover Estimate for Residential Participants

Customer Residence Description	Percent Who Bought More CFLs Due To Program	Average Number of Additional CFLs Bought	Overall Spillover Per Program Participant (= of CFLs)
Total Population (n = 210)	4%	3.1	0.1
Single Family (n = 70)	5%	2.0	0.1
2 to 4 Family (n = 71)	3%	7.5	0.2
More Than 4 Family (n = 70)	4%	1.3	0.1

Table 45: Additional Potential Spillover Savings Not Able to be Quantified

Customer Residence Description	Program Influenced You To Take Other Efficiency Actions
Total Population (n = 210)	13%
Single Family (n = 70)	11%
2 to 4 Family (n = 71)	17%
More Than 4 Family (n = 70)	8%

Rebound/Snapback. Rebound, or, in this case, the phenomenon of program participants increasing the number of hours they are using their CFLs, is estimated to be 7 percent. Participants were asked whether they used any of the lights in which the program CFLs were installed more or less than they did prior to their installation. For lights whose usage changed, respondents were asked how many more or fewer hours these lights were used each day. The mix of lights used more hours and lights used fewer hours resulted in a net increase in the number of hours lights are used. This number of hours was then subtracted from the total number of hours reported for all CFLs installed through the program, to estimate the total original number of hours the lights had been in use prior to the CFLs being installed. Finally, the number of additional hours was divided by the original total number of hours of use, to estimate the rebound effect, i.e., the percentage increase in the hours of use on average. Table 46 presents the derivation of the rebound estimate.

Table 46: Derivation of Rebound Estimate

Rebound Calculation Variable	Calculated Value*
Total CFL hours of use in all participant homes (n = 210)	1,133,170
Total additional CFL hours of use, compared to prior to program	74,455
Total fewer CFL hours of use, compared to prior to program	1,691
Net additional CFL hours of use (rebound)	72,764
Total CFL hours of use for all participant homes, minus net additional CFL hours of use	1,060,406
Percentage of total CFL hours of use for all participant homes represented by net additional CFL hours of use	7%

*All values are weighted by population

Measure Retention. The short-term retention rate for residential measures is virtually 100 percent (99.6 percent), with little variance by type of residence. Participants were asked whether they had removed any of the CFLs that had been installed and, if so, how many and the type of replacement. While some CFLs are being removed (e.g., due to burning out or otherwise malfunctioning), this constitutes about two percent of CFLs installed, and of these, almost all were replaced with extra "replacement" CFLs that program vendors had left behind. The use of socket modifiers that made it difficult to replace CFLs with incandescent bulbs also keeps retention rates high – it appears few customers have attempted to remove the modifiers.

Long-term CFL retention degradation due to customer moves is estimated at two percent. Residential survey participants were asked whether they planned to move within the next four years. Approximately 13 percent of residential survey participants (unweighted) responded affirmatively. However, only CFLs installed in lamps (rather than fixtures) are likely to be removed when the customer moves. Therefore, the total number of lamp CFLs installed and owned by respondents with plans to move within the next four years was calculated and weighted by population. This value was then divided by the total number of CFL lamps and fixtures, also weighted by population. Results indicate that, at most, a net total of two percent of residential CFLs installed in homes where owners expect to move are likely to be removed.

Commercial Impact Adjustment Factors[51]

Network Coincidence Factors. Coincidence factors derived from participants survey results range from 0.6 to 0.9 (average of 0.67). Table 47 presents these values, weighted by population and by the amount of kW reduction achieved. Survey results are similar to those identified in a recent commercial and industrial lighting coincidence factor study performed for the New England State Program Working Group in Spring 2007[52], which produced coincidence factors of 0.75 for offices, 0.82 for retail, and 0.75 across all building types. However, customer demographics in the Con Edison service territory may differ from those of utilities throughout New England. Therefore, factors derived from survey results are recommended and used in this evaluation, though they may be viewed as conservative estimates.

Table 47: Percentage of Program Commercial Lighting in Use during Daytime Peak Hours (Participants, Weighted by Population and kW Reduction Achieved)

Customer Location and Type	12-2	2-4	4-5	5-6	Average
Total (n = 140)	72%	69%	69%	60%	67%
Manhattan (n = 54)	89%	90%	92%	93%	91%
Non-Manhattan (n = 86)	70%	68%	67%	57%	66%
Office/Small Retail (n = 70)	85%	86%	85%	71%	82%
Non-Office/Small Retail (n = 70)	68%	64%	64%	56%	63%

Coincidence factors for Manhattan participants are higher than those for non-Manhattan participants. Notably, all daytime peaking (commercial) networks targeted by the program are located in Manhattan, except for one area in Westchester. Coincidence is somewhat lower when individual participant kW reductions and population are used to weight results presented in Table 48, compared to weighting results by population alone. Table 49 and Table 50 confirm that participant and non-participant coincidence values are similar when kW reduction is not considered. These values also are similar to those derived in the New England Working Group study. However, weighting by kW reduction is deemed appropriate, because the intent is to estimate firm load reduction for daytime peaking networks.

[51] Participant survey results were weighted by kW reduction (the amount of kW reduction contributed by the respondent) and also by population (the ratio of the number of participants in each sample segment to the total number of program participants in that segment). Non-participant survey results were weighted by population (the ratio of the number of customers in the sample segment to the total number of customers in that segment in the customer population).

[52] *Coincidence Factor Study: Residential and Commercial Industrial Lighting Measures . . . for Use as an Energy Efficiency Measures/Programs Reference Document for the ISO Forward Capacity Market (FCM)*, Spring 2007.

Table 48: Percentage of Program Commercial Lighting in Use during Daytime Peak Hours (Participants, Weighted by Population Only)

Customer Location and Type	12-2	2-4	4-5	5-6	Average
Total (n = 140)	81%	82%	80%	69%	78%
Manhattan (n = 54)	87%	88%	91%	90%	89%
Non-Manhattan (n = 86)	80%	81%	78%	66%	76%
Office/Small Retail (n = 70)	84%	85%	81%	65%	79%
Non-Office/Small Retail (n = 70)	79%	80%	79%	71%	77%

Table 49: Percentage of Commercial Lighting in Use during Daytime Peak Hours (Non-Participants, Weighted by Population Only)

Customer Location and Type	12-2	2-4	4-5	5-6	Average
Total (n = 143)	81%	81%	79%	72%	78%
Manhattan (n = 70)	81%	81%	80%	75%	79%
Non-Manhattan (n = 73)	81%	81%	79%	68%	77%
Office/Small Retail (n = 70)	81%	81%	81%	75%	79%
Non-Office/Small Retail (n = 73)	81%	81%	78%	71%	78%

Hours of Use. Commercial hours-of-use estimates were derived from telephone survey responses, which yielded an average commercial participant usage estimate of 64 hours/week, or 3,300 hours per year. This value is similar to the 2002 DOE National Lighting Study[53] value of 3,541 for the commercial sector. It is also somewhat similar to the value used by the New York NYSPSC's November 2008 draft *Standard Approach*[54] and Pennsylvania Technical Reference Manual[55] for offices (3,435 hours per year). As the table below shows, the survey-based estimate is considerably affected by the prevalence of non-office/small retail facilities which, among those who chose to participate in the program, had a somewhat higher value than that of offices/small retail.

Table 50 presents survey results, weighted by kW reduction.

[53] "U.S. Lighting Market Characterization, Volume 1: National Lighting Inventory and Energy Consumption Estimate," prepared for U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy Building Technologies Program, September 2002.

[54] "New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs" for Selected Residential and Small Commercial Measures.

[55] "Proposed Revision of the Pennsylvania Alternative Energy Portfolio Standard, Technical Reference Manual (Revisions to September 2005 TRM)", January 2009.

Table 50: Commercial Hours of Use for Program Lighting Measures – Participants

Customer Location and Type	Total Weekly Hours of Use	Annual Hours of Use
Total (n = 140)	63.51	3,302
Manhattan (n = 54)	75.15	3,908
Non-Manhattan (n = 86)	62.66	3,258
Office/Small Retail (n = 70)	60.28	3,134
Non-Office/Small Retail (n = 70)	64.46	3,352

These estimates may overstate use hours if the effect of occupancy sensors is not included in estimates provided by survey respondents. However, these values are somewhat lower than those of non-participants, presented in Table 51, who reported 3,747 annual hours of use, which provides additional assurance that participant estimates are not overstated. The more general group of non-participants also exhibited higher hours of use in offices/small retail, relative to non-offices/small retail facilities.

Table 51: Commercial Hours of Use for Lighting Equipment – Non-Participants

Customer Location and Type	Total Weekly Hours of Use	Annual Hours of Use
Total (n = 143)	72.05	3,747
Manhattan (n = 70)	75.94	3,949
Non-Manhattan (n = 73)	64.24	3,340
Office/Small Retail (n = 70)	79.67	4,143
Non-Office/Small Retail (n = 73)	67.52	3,511

Free Ridership. Commercial free ridership is estimated at 3 percent. The estimate is based on an analysis of participant survey responses to questions about their plans to purchase efficiency lighting equipment, their reasons for participating and the likelihood of doing so in the absence of the targeted program.

The following question and topics were used to assess commercial free ridership:

- Did you already have plans to make efficiency upgrades: *Please try to remember back to [date of installation from sample list], when your lighting equipment was installed by [installing vendor]. At that time, did you already have specific plans to make any of the same lighting equipment improvements that [installing vendor] made?*
- Was funding in place to make planned upgrades: *Did you already have the funding in place to make this/each of these improvements?* ***(Record in table below for each measure type.)?***

- Would you have paid full price for the upgrades: *If you had had to pay full price for the lighting equipment upgrades you received, how likely would you have been to have the same upgrades made that year? Would you say . . .* ***(Read list)***
  - — *Extremely likely?*
  - — *Very likely?*
  - — *Somewhat likely?*
  - — *Not very likely?*
  - — *Not at all likely?*

- What would you have done if no program: *If [installing vendor] had not offered you discounted lighting equipment upgrades through Con Edison's program, which of the following best describes what you would have done? Would you have . . .* ***(Read list)***
  - — *Paid full price to make exactly the same type and number of lighting equipment upgrades?*
  - — *Paid full price to make some portion of the same lighting equipment upgrades?*
  - — *Taken no action with regard to lighting equipment upgrades during that year?*

- *(If would have made only some portion of efficiency upgrades):* What portion of upgrades would you have made if no program: *What percentage of the same lighting upgrades do you think you would have paid full price to make, even if [read name of installing vendor] had not offered you the discounted lighting equipment through the program?*

Table 52 presents the responses to these questions and how they were used to derive a free ridership percentage for each respondent. The "Count" column is the unweighted number of respondents whose responses meet descriptions that appear in the "Free Rider Criteria" column.

Table 52: Derivation of Commercial Free Ridership Percentage Estimates

Free Rider Criteria	Free Rider %	Count
• Had no existing plans to make same lighting upgrades	0%	119
• Not very/not at likely to have made improvements if had to pay full price	0%	9
• Would've taken no action re: lighting upgrades if no program	0%	2
• Don't know if would've made upgrades if paying full price and don't know action taken if no program	0	1
• Somewhat likely to make improvements if had to pay full price	50% Maximum	1
• Funding no already in place to make improvements	80% maximum	2
• Would've made some portion of same improvements if no program	Percentage would have installed	6

Spillover. About 12 percent of commercial participants reported being sufficiently influenced by their participation experience to take additional efficiency action. A wide variety of measures were reported to have been installed. However, because small and medium commercial respondents in general have limited understanding about lighting equipment and, in light of other data deemed more important to collect through the surveys (e.g., free ridership and coincidence factor data), the surveys did not attempt to quantify the savings associated with these measures. Therefore, a conservative estimate of 4 percent spillover was assumed.

Measure Retention. The short-term retention rate for commercial measures is estimated at 100 percent. Participants were asked what percentage of efficient lighting equipment installed through the program had been removed for any reason and, for equipment removed, whether the replacement equipment was more, less or the same efficiency as the equipment installed via the Targeted program. Results are highlighted in Table 53. The high retention rate is likely due to the fact that commercial measures tend to be installed in or as permanent fixtures. The use of socket modifiers also discourages attempts to replace CFLs with incandescent bulbs, and may contribute to the high retention rate.

Long-term efficiency measure retention degradation, caused by customer relocation or closure, is estimated conservatively at one percent. The estimate is based on commercial survey responses, where participants were asked if a move was planned within the next four years. Approximately one percent responded affirmatively. It is likely that some portion of the load reduction (lighting installations) would be lost concurrent with a move to a new location (e.g., due to the new occupant renovating the space or the old occupant removing and taking

measures to their new space), but the extent of such effect cannot be accurately quantified via the responses. However, it is unlikely that commercial customer relocation or business closure would include removal of efficient lighting equipment, in large part because the new occupants would encounter additional costs in disposing of new efficient lighting and installing the new lighting.

Table 53: Retention Rate of Efficient Lighting Equipment Installed

Customer Location and Type	A*: Percent of kW Reduction Replaced	B*: Percent of Column A Values Replaced with Lower Efficiency	C*: Retention Rate [1-(A*B)]
Total (n = 140)	2%	18%	99.7%
Manhattan (n = 54)	4%	35%	98.7%
Non-Manhattan (n = 86)	1%	15%	99.8%
Office/Small Retail (n = 70)	6%	9%	99.5%
Non-Office/Small Retail (n = 70)	0.5%	51%	99.8%

*Column A and Column B values shown are rounded. Column C value is based on un-rounded values.

APPENDIX C: PROBABILISTIC RISK METHODOLOGY

Risk Analysis

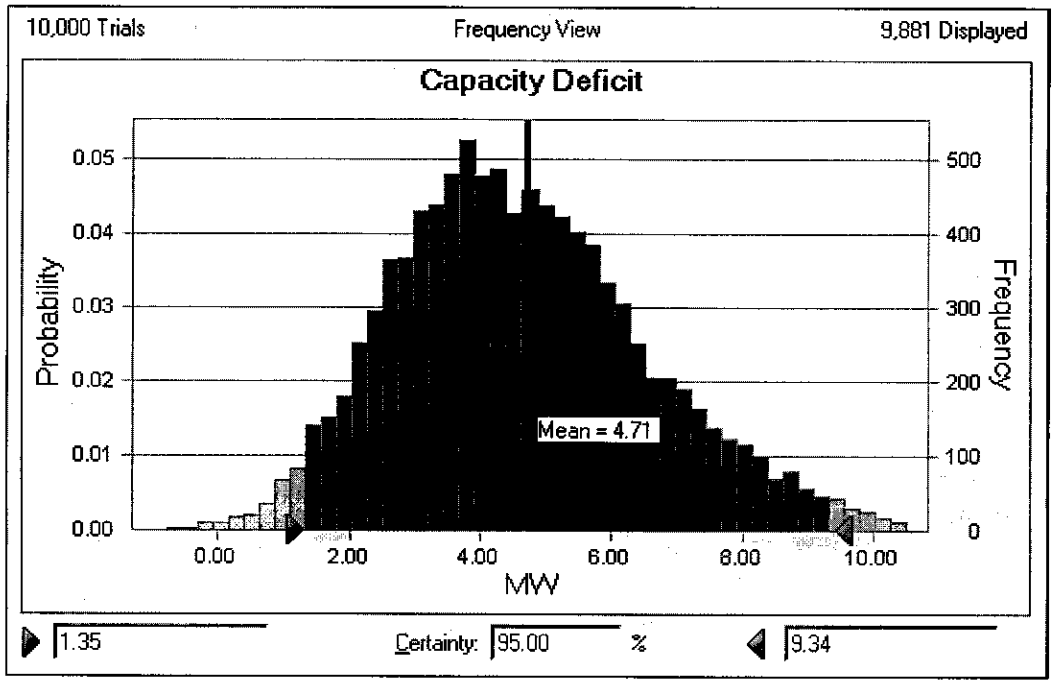
When weighing T&D upgrades versus targeted DSM, it is important to assess the likelihood the Targeted DSM program will achieve the same level of firm capacity as conventional T&D upgrades. The ability of the Targeted DSM program to meet this objective relies on a few key factors: the ability of contractors to meet their stated DSM targets, program participants' use of DSM measures, and network load growth over time. There is a degree of uncertainty associated with each of these factors. The uncertainty model treats these parameters as random variables. Probability distributions were assigned to each of these random variables and Monte Carlo simulation methods were employed to evaluate a range of outcomes: These include the likely amount of DSM delivered in a particular network, as well as likely future load. This technique is used to calculate network capacity surpluses or deficits for each load area. Where there is a strong probability of a capacity excess, the Targeted DSM program is sufficient to meet load growth. In networks with a strong probability of a capacity deficit, mitigation options or installation of the originally planned T&D investment may be necessary.

Monte Carlo Simulation

The Crystal Ball simulation model was employed to conduct the risk analysis, including the computation of a range of likely capacity deficit (or surplus) values for each load area. Monte Carlo Simulation is a modeling technique that applies an algorithm that selects sample values from a given probability distribution. For a random variable with a defined distribution, a Monte Carlo algorithm randomly samples the distribution and selects a value for the variable. Each sample is independent of prior samples, and has an identical distribution. For each random variable in the model, Crystal Ball samples the assigned probability distribution and sets that variable equal to the sampled value. Once all random variables have been assigned a value, the model calculates the load area capacity deficit over a range of possible outcomes.

Monte Carlo Simulation is particularly useful in risk analysis. Because there is much uncertainty surrounding input parameters of the model, sampling likely values of key parameters gives a wider range of results, rather than a single result that relies on static inputs. The Crystal Ball trial sampling algorithm was set to 10,000 sampling values from the assigned distributions for each parameter and producing a capacity deficit value for each run. The results of each of the 10,000 trials are displayed as a probability density function, with capacity deficit on the X axis, and probability of occurrence on the Y axis. An example output for the Willowbrook network is presented in Figure 13.

Figure 13: Willowbrook Capacity Deficit after Five Years



Results indicate that this network, largely residential, is most likely to have a 4.71MW capacity deficit after five years. The 95 percent confidence interval of the deficit is highlighted in pink. With 95% confidence, after five years the network capacity ranges between a deficit of 1.35MW and a deficit of 9.34MW.

Parameters and Assumptions

The risk model evaluates three parameters most likely to result in capacity deficits or surpluses: load growth, coincidence factor, and contractor performance. To assign a probability distribution to the first parameter -- load growth – load areas are first separated into two groups: commercial and residential. Using actual peak data from 2005 to 2008 provided by Con Edison, yearly load growth for each network is determined. Load growth within each group (commercial and residential) is assumed to be identically distributed. Then, using Crystal Ball, a probability distribution is fit into the yearly load growth data for both load area groups. Residential load growth follows a lognormal distribution, where commercial network load growth follows a logistic distribution. The distributions are illustrated in Figure 14 and Figure 15.

Figure 14: Residential Load Growth Distribution

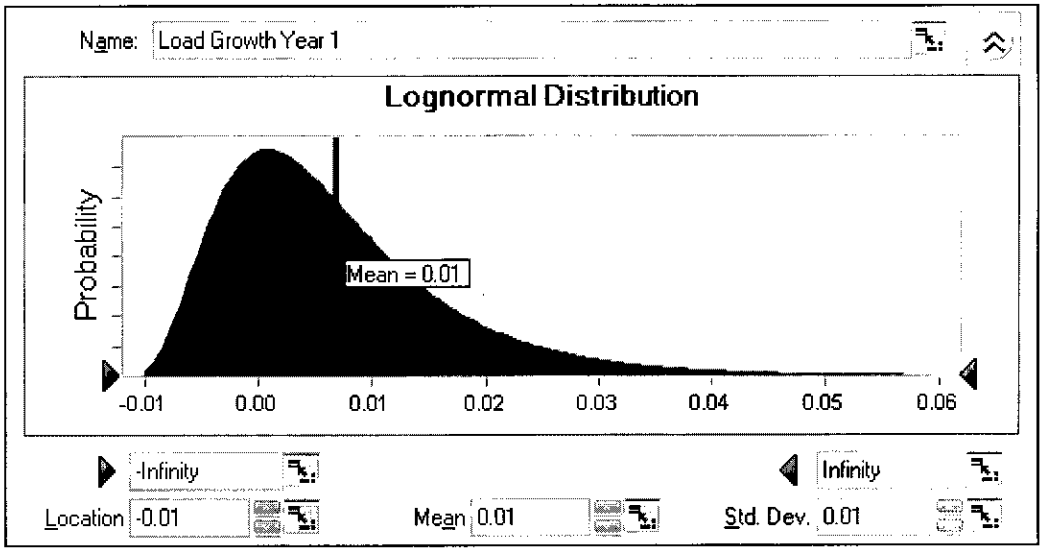
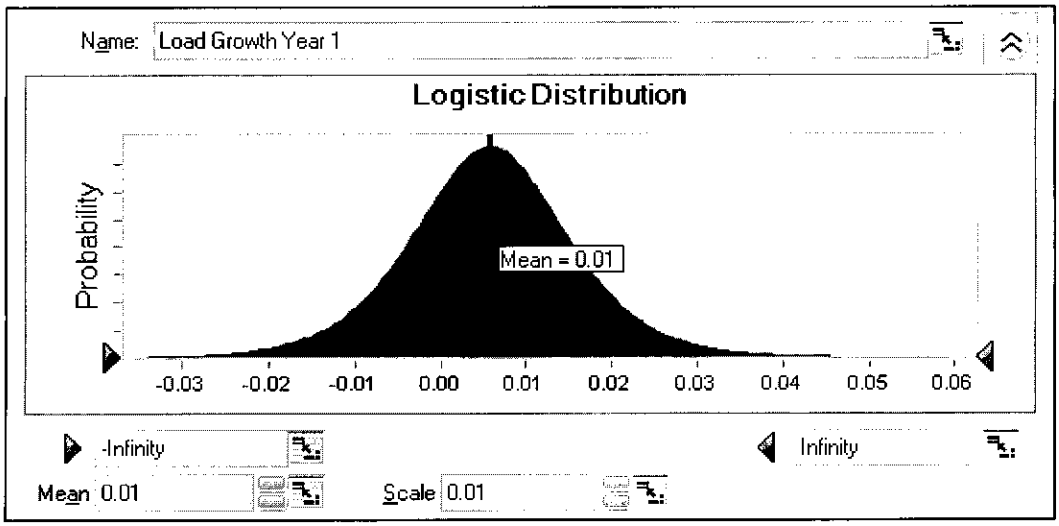


Figure 15 Commercial Load Growth Distribution



Coincidence factor distributions were determined through surveys of residential and commercial participants. Using actual survey data (weighted to reflect the total participant population) to estimate the percentage of lighting used during peak periods, distributions were adopted to correspond to survey responses. Both residential and commercial coincidence factors follow a beta distribution, with varied shape parameters. The beta distribution is extremely flexible and is typically used to represent variability over a fixed range, which in the

case of the coincidence factor, is 0 to 1. The commercial survey data revealed that approximately 70 percent of the participant sample use their lights during the peak period. Based on that information, a beta-PERT distribution is used, which takes one more parameter than the beta: a most likely value – one - is applied. The residential and commercial coincidence factor distributions are presented in Figure 16 and Figure 17.

Figure 16: Residential Coincidence Factor Distribution

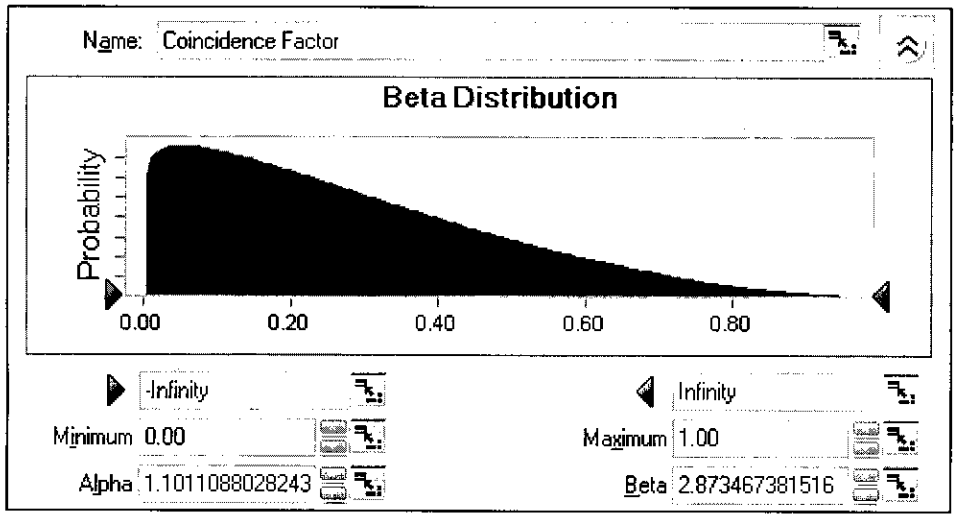
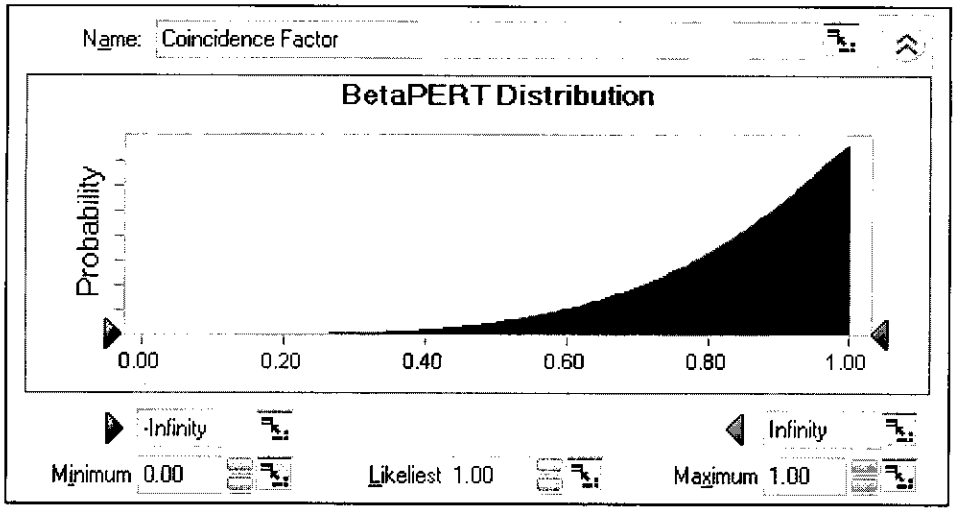


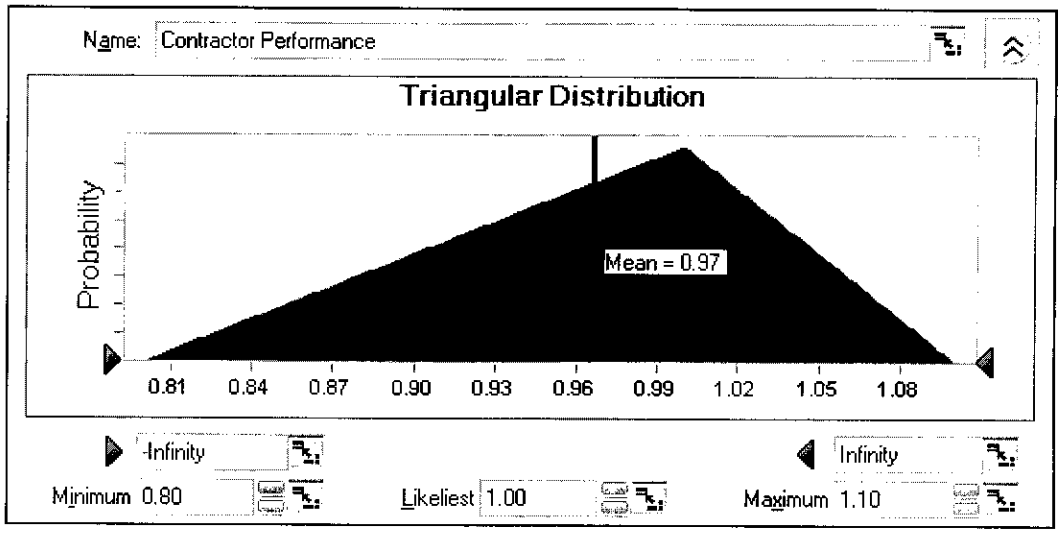
Figure 17: Commercial Coincidence Factor Distribution



Last among these risk factors is the contractor performance parameter, where a more qualitative approach to assigning this distribution was applied; in part because there is little hard data to differentiate contractor performance patterns. Hence, a triangular distribution with a minimum

value of 80%, a likeliest value of 100%, and a maximum value of 110%, instead was applied. This distribution is shown in Figure 18.

Figure 18: Contractor Performance Distribution



The model assembles each of these random variables and uses static inputs (first year load, DSM target, and firm capacity) to calculate the potential capacity deficit. This is accomplished using the following equation:

$$Capacity\ Deficit = (Current\ load + load\ growth) - (firm\ capacity + DSM\ capacity)$$

$$where\ DSM\ capacity = (DSM\ target) * (Coincidence\ Factor) * (Contractor\ Performance)$$

Crystal Ball then selects samples from each of the probability distributions to assign values to the three uncertainty parameters to calculate the capacity deficit and probabilities for each of the 10,000 trial runs. The results of the analysis are presented in Table 19 of the Quantitative Risk Section of the report.

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APPENDIX D: MARKET RESEARCH FINDINGS

A review of program documents, customer surveys, and in-depth interviews with stakeholders served as the primary data sources for the process evaluation effort. This section describes the market research effort and presents the findings from each aspect of the research. These findings serve as the basis for the overall process evaluation findings appearing in other sections of this report.

Market Research Activities

The Phase 2, 3 and 4 Requests for Proposals (RFPs) Con Edison issued for the program were reviewed, as well as associated DSM Agreements. Interviews were conducted with a broad range of stakeholders, vendors, program participants and non-participants. Due to the complexity of the Targeted program and changes that have occurred between program phases – these include changes in forecasts and need dates – the number of interviews with Con Edison staff was much higher than anticipated. Table 54 lists the stakeholders interviewed.

Table 54: Stakeholder Interviews

Stakeholder Group	Original Sample	Interviews Completed
Con Edison Staff	8	24 (approximate)
Collaborative Members	5	5
NYSERDA/NYPA Contractors	7	7
Program Vendors	5	4
Vendors Not Accepted	5	4
Vendors with No Response	20	20
M&V Contractor (ICF)	1	1
Total	**51**	**65**

Surveys were completed with customers who participated in the Phase II-IV programs, and matching sets of non-participants. These survey respondents were selected randomly from within several key segments.

Counts of the residential participant and non-participant survey respondents appear in Table 55, with totals provided for each sample segment they represented. The study sample design targeted 35 respondents for each participant and 70 respondents for each non-participant segment.

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Table 55: Residential Survey Respondents, by Sample Group

Class	Vendor	Type	Dwelling Type	Sample
Residential	Free Lighting	Participant	Single Family	35
Residential	Free Lighting	Participant	2 to 4 Family	35
Residential	Free Lighting	Participant	Other	33
Residential	QCS	Participant	Single Family	35
Residential	QCS	Participant	2 to 4 Family	36
Residential	QCS	Participant	Other	37
			Residential Participant Totals	**211**
Residential		Non-Participant	Single Family	72
Residential		Non-Participant	2 to 4 Family	71
Residential		Non-Participant	Other	67
			Residential Non-Participant Totals	**210**
			Residential Totals	**421**

Counts of the commercial (non-residential) participant and non-participant survey respondents are shown in Table 56, with totals provided for each sample segment they represented. The study sample design targeted 35 respondents for each participant and non-participant segment. However, due to the limited size of the Manhattan participant population, it was assumed that 35 survey completions in each of these segments might not be achieved and would have to be compensated for by non-Manhattan respondents.

Table 56: Commercial Survey Respondents, by Sample Group

Class	Vendor	Type	Network	Facility Type	Sample
Non-Residential	PES	Participant	"Non-Manhattan"	Office/Retail	44
Non-Residential	PES	Participant	"Non-Manhattan"	Non-Office/Retail	42
Non-Residential	PES	Participant	"Manhattan"	Office/Retail	26
Non-Residential	PES	Participant	"Manhattan"	Non-Office/Retail	28
				Non-Residential PES Participant Totals	**140**
Non-Residential		Non-Partic.	"Non-Manhattan"	Office/Retail	35
Non-Residential		Non-Partic.	"Non-Manhattan"	Non-Office/Retail	38
Non-Residential		Non-Partic.	"Manhattan"	Office/Retail	35
Non-Residential		Non-Partic.	"Manhattan"	Non-Office/Retail	35
				Non-Residential PES Non-Participant Totals	**143**
				Non-Residential Totals	**283**

Findings from the interviews with the stakeholder groups and the surveys with customers appear in the Process Evaluation section that follows.

Stakeholder Interview Findings

Listed below are the key findings from interviews with each stakeholder group, by topic area. Comments are not attributed to individuals to ensure confidentiality of the respondent.

Con Edison Staff Interview Findings

Interviews with a variety of Con Edison staff provided a basic understanding of the program from which the evaluation team was able to target its inquiries with various stakeholder groups and identify potential areas for improvement. That program description is presented below.

Description of the Targeted DSM Program

From the interviews and a review of key program documents, the Evaluation Team developed the following description of the Targeted DSM program.

- **Program Objective:** To avoid the need to expend capital funds for selected critical substation and other infrastructure needs through the implementation of targeted demand-side management electric load reduction technologies.
- **Contractor Selection Process:** Con Edison issues request for proposals (RFP). Upon review of proposals submitted, Con Edison selects contractors whose offers 1) meet minimum requirements set by Con Edison, 2) are most cost advantageous to Con Edison and 3) meet load reduction needs.
- **Program Implementation:** Contractors are awarded contracts based on a set fee per kW of load reduction achieved in the targeted area. Contractors guaranty to achieve a specified amount of MW load reduction.

Contractors serve certain defined geographic areas (load areas or load area networks) where Con Edison has critical future infrastructure needs. They develop specific marketing approaches and business models needed to implement demand-side management (DSM) measures. They must achieve set load reduction (MW) targets in each area that they have been awarded a contact.

Contractors must submit DSM Measures Implementation Report(s) to Con Edison. These implementation reports contain customer name/info, description of the existing electric equipment to be replaced, description of the DSM measures to be implanted, and load

reduction to be achieved. The contractors must also submit copies of customer agreements showing the customer has agreed to the installation of the DSM measures.

Con Edison can complete pre-installation site visits to verify the information contained in the implementation report is complete and accurate. These visits may be completed by Con Edison's M&V contractor, ICF. Verification site visits are completed at 100% of all commercial and industrial sites, and for all multifamily common area DSM measures.

After the DSM measures are installed and operational, the contractors submit a post-installation report to Con Edison. Con Edison can then perform a post-installation verification visit. Again, Con Edison completes verification visits at 100% of all commercial and industrial sites, and for all multifamily common area DSM measures.

Con Edison uses a "Tag and Bag" method as verification for most residential lighting DSM measures (incandescent to compact fluorescent lamp retrofit). In this procedure the contractor places the removed light bulbs and places them inside a sealed bag along with the box that contained the installed compact fluorescent lamp and site paperwork signed by the customer.

If a contractor fails to meet the contracted load reduction, they are subject to pay liquidated damages to Con Edison. Contractors have an annual MW load reduction that they must meet. The DSM measures must be in place by May 1 of the contract year for Phases II and III, and by March 1 of the contract year for Phase IV.

Contractors must also pay two security payments, one at the start of the contract and the second at the start of the contract year for which they are obligated to provide MW load reduction.

Liquidated damages are assessed if a contractor fails to meet its contracted load reduction amounts. Liquidated damages total $300 per kW and are paid in a specific schedule set forth in the contract. The amount of the liquidated damages is based on the estimated cost to Con Edison to provide the MW shortfall using portable distributed generation.

Program Phases

- Phase 1 (pilot). Load reduction delivery 2005-2008. Contracts initiated Sep/Nov 2004. Three contracts awarded.
- Phase 2. Load reduction delivery 2008 - 2011. Contracts initiated Oct/Nov 2006. Three contracts awarded.
- Phase 3. Load reduction delivery 2008 - 2011. Contracts initiated May 2007. Four contracts awarded.
- Phase 4. Load reduction delivery 2010 - 2012. Contracts initiated Feb/Mar 2008. Three contracts awarded.
- Phase 5. Pending.

DSM Measures

Eligible measures include lighting, motors, electric air conditioning, gas air conditioning, heat pump or alternative fuel hot water heaters, refrigeration, clean distributed generation (DG), and thermal storage. Custom measures will also be considered by Con Edison.

As of December 2008, all of the reported Phase 2 through 4 DSM measures were lighting. The vast majority of the lighting measures were compact fluorescent lamps, linear fluorescent fixtures, and linear fluorescent T-8 lamps and electronic ballasts. Roughly 95% of the participants were residential, representing roughly 80% of the kW load reduction achieved thus far.

Description of the Contractor RFP Process

- Con Edison develops and issues Requests for Proposals (RFPs).
    - For Phases 2 and later, a Collaborative was developed. The Collaborative currently consists of over 75 members.
    - A bidders list was developed by Con Edison with input from the NYSPSC, the Collaborative, and any vendors requesting to receive the RFP.
    - RFPs are emailed to bidders.
    - Proposals are typically due approximately 45 days after issuance of the RFP.
    - Contractors have the opportunity to submit questions for clarification.
    - The Phase 2 RFP included pricing guideline to help potential bidders price their proposal.
    - The Phase 1 RFP was sent to approximately 40 to 50 potential bidders.
    - The Phase 2 RFP was sent to approximately 160 to 170 potential bidders.
    - By Phase 5, the RFP was sent to approximately 230 potential bidders.

- Proposals are submitted to Con Edison.
    - Con Edison sets up a "proposal receipt" office.
    - Proposals are kept in locked area.
    - Proposal evaluation is completed by a committee made up of program staff. Also involved, albeit to a lesser degree, are representatives from Legal and Purchasing.

- Proposals are reviewed and evaluated by Con Edison.
    - Proposals are reviewed. For each bid, Con Edison determines whether the proposal was acceptable in terms of vendor qualification and vendor price offer. From the RFP:

"The main evaluation criteria for selection of the winning Respondent(s) from the qualified proposals received are favorable pricing and Con Edison's assessment of the likelihood of successful performance based on the Respondent's experience, expertise and proposed implementation program."

- Selections are made to obtain needed MW goal
- Vendors offering to meet all of needed MW reduction in a given area are favorably reviewed.
- Phase 2. Proposals received: 5, Contracts awarded: 3
- Phase 3. Proposals received: 8, Contracts awarded: 4
- Phase 4. Proposals received: 5, Contracts awarded: 3

Description of Contractor Contracts

- A sample DSM Agreement is included in each RFP.
- All contracts in Phases 2 through 4 are substantially the same.
- Con Edison / Contractor Agreements
  - Include specific reporting requirements
    - Contractor to submit Implementation Report
    - Contractor to submit Post-Installation Report
  - Include description of Security Payments
  - Include description of Liquidated Damages
  - Include description eligible DSM measures
  - Include description of M&V procedure Con Edison will use
- The basic DSM Agreement has changed minimally throughout program phases. The most important change has been to reduce the liquidated damages to an amount sufficient to cover Con Edison's cost to provide MW using distributed generation placed within the load area/network, rather than the cost of the T&D project itself.
- Most firms that respond to the RFP already have contracts in prior phases, so they do not tend to ask for changes to the sample agreement.
- No firms have requested changes to the liquidated damages requirement.
- All firms selected to receive awards signed contracts with Con Edison.
- Vendors agree to a specified Contract Load Reduction Guaranty amount.
- Vendors can receive payment for up to 110% of the Contract Load Reduction Guaranty amount.

Description of the Monitoring & Verification Process

- ICF is Con Edison's M&V contractor and was selected by Con Edison through a separate request for proposals process.
- ICF is responsible for site verification visits, review of implementation reports and post-installation reports provided by contractors.

- ICF completes sites visits at 100% of all commercial and industrial sites, and for all multifamily common area DSM measures.
- ICF completes a 100% DSM measure count. For lighting, 10% of all ballasts are verified.
- A "Tag and Bag" method is used most of the time for residential lighting (incandescent to compact fluorescent lamp retrofit).
- Some "ride along" verifications are also completed, where ICF accompanies the contractors as they perform the work.
- ICF provides annual inspections to complete an assessment of persistence by vendor and area.

Collaborative Member Interview Findings

RFP Process

Collaborative members collectively are concerned that there is an insufficient number of competitive vendor responses to the RFPs. One expressed disappointment that there was not a better effort to point out the positive changes made to the program as they occurred. He said he was busy and, seeing another RFP for the same program, he assumed it had the same conditions as previous ones that were not acceptable to him as a potential bidder, making it not a good fit.

Most collaborative members are in agreement that certain contract terms are onerous, and likely discouraged vendors from responding. Since almost all measures have been lighting, one suggested the elaborate RFP and M&V processes were unnecessary and that the program goals could be more easily achieved – and more vendors would participate – if Con Edison were to restructure and portray the Targeted program as focused on lighting, and to offer vendors incentives typically associated with lighting projects.

Contract Terms

- Guidelines for Distributed Generation are too restrictive. No one could adequately satisfy them.
- Distributed Generation (DG) should be looked at again for future phases. Collaborative members have made some suggestions for ways to better incorporate DG into later phases. One such suggestion was that DG load should be aggregated by vendor, so that the vendors could reach their promised load reduction, with a percentage of error available. For example, a vendor could contract for 20 MW; install 30MW of co-generation and, with 75% DG reliability, still have 22.5MW. This load reduction would still be more than their promised 20MW. Realistically, the load reduction might be even higher than 75%. Keeping this de-rating in mind, Con Edison would pay less for the load, but it would make it easier to achieve and open up a lot of load reduction in the city that cannot currently be tapped.

- Vendors can make more money on demand response. They should not be required to turn the demand response rights over to Con Edison.
- Customers should be eligible to receive NYSERDA money for concurrent projects. If the customers were allowed to receive money for concurrent projects, the increased load reduction could be significant. (Customers ARE permitted to receive NYSERDA incentives for concurrent projects, but not for the same projects.)

M&V Process

While members of the collaborative that were interviewed felt that the program's M&V process may be a bit restrictive and onerous, they generally felt that it was necessary to hold vendors accountable. There were no major issues with the current M&V terms.

Program Structure

- Some collaborative members said the program should promote kW reduction through a broader, more comprehensive range of measures. They felt that the program measure requirements and structure need to be revisited, to find further ways to promote kW reduction, regardless of whether Con Edison has deemed specific measures as measurable permanent load reduction. One member suggested that Con Edison promote the benefits of combined heat and power projects to customers and provide incentives for them in some way under the program.

- One member believed that customers should be able to participate in both the Con Edison and NYSERDA programs concurrently and that this is prohibited in some way.

Suggestions for Alternative Approaches

- With one exception, the collaborative members interviewed reported that Con Edison has been very responsive to recommendations for how the program could be improved and has made changes when necessary.
- One idea offered for an alternative approach, based on other utility programs across the U.S., was to simply identify problem areas and use existing or future non-targeted programs (e.g., NYSERDA's) to fix them. For example, incentives already in use could be increased only in those areas in which Con Edison is having T&D constraint issues. Con Edison could promote more intensive marketing in these areas, and build on what they and NYSERDA have already developed. This would eliminate the need for restrictive, time consuming contracts.
- Another idea offered was to simplify the program so that it is "a regular DSM program." If kW reduction from lighting is enough, Con Edison could offer incentives for vendors to market and install lighting projects. The big contracts put too much pressure on vendors and the terms are too onerous. This would also save Con Edison money and time and

perhaps they would see more participation, especially from ESCOs and small lighting companies who would work for less money.

Non-Responsive Vendor Interview Findings

Improving the RFP Bidders List

To date, there have been five "Phases" of the program, implemented through five RFPs for load reduction. Over the course of the non-participating vendor interviews, attempts were made to contact 94 individuals who had been sent the RFP. Companies the evaluation team identified as important players were contacted several times, including both emails and voicemails.

At least 18 contacts were no longer with their respective companies. Many times, this resulted in the company not seeing the RFP. Another problem was finding someone new with whom to speak, even if it was merely to let them know of the Targeted DSM program and to obtain updated information on the company. Most company operators only had directories by name, and could not identify the individuals who would be responsible for receiving or responding to RFPs. Most of the 20 companies interviewed did not recollect the RFP, but some of them did discuss it after a basic explanation of the program. Also, a substantial number of companies who were on the list would not be appropriate to participate as vendors in the Targeted DSM program.

The evaluation team recommends that Con Edison review and update the current vendor list regularly. While there is a large list of contacts on the list, sending RFPs to these contacts is not necessarily resulting in the companies reviewing, or even knowing that the RFPs exist. Companies have been bought out, merged, or changed names. Individuals have left the companies, and often no process has been put into place to deal with emails sent to these individuals.

Barriers to Participation by Potential Bidders

Many potential vendors interviewed were opposed to the contract term stipulating that all demand response (DR) rights must be signed over to Con Edison. A few were providers of demand response services, but others had large clients who currently participate in DR.

Several companies felt that the liquidated damages penalty structure was too high and was too much of a financial risk, citing it as their only reason for not responding.

Some firms felt that the insurance requirements were very large for a small company that may want to participate. Most small companies would not have an insurance umbrella to match what Con Edison was requiring merely to respond to the RFP.

Contract Terms

Some companies found that the redundancy requirement needed for installation of distributed generation made it nearly impossible for a company to get the installation recognized as permitted kW.

Many energy efficiency measures are not recognized by the program, including occupancy sensors and solar projects. This limits the scope of projects being performed and the interest of some of those interviewed.

Some felt that a 500-kW minimum commitment by a vendor is too high for some companies. Small lighting companies could take on a project if the size commitment was smaller.

Current Environment

Many vendors right now are seeing that customers are only interested in a quick lighting retrofit – the low hanging fruit with a very short payback period.

Some of the vendors do not want to do any work at all in NYC, with the economy the way it is, and the expectation of a really short payback period by potential customers.

There are so many projects all over the United States right now, and not enough skilled companies/workers to meet the demand. This allows vendors to be pickier about what projects they bid on, and with whom they decide to work. Interviewees mentioned on multiple occasions that other DSM programs around the country were far simpler in which to participate, and there were not so many onerous terms. They also felt that other utilities offered a friendlier environment to work in, and it was easier to get questions answered.

Competition with NYSERDA

Some of those interviewed expressed a strong preference for NYSERDA's programs. Even when NYSERDA incentives are not as lucrative, they said, there is less risk for all parties involved. The vendor does not have to worry about meeting certain kW reduction goals by a date, nor about avoiding a financial penalty.

One vendor thought Con Edison should consider developing a loan program, if customers cannot use NYSERDA's loan program when participating in the Targeted DSM program. This would allow them to consider doing larger upgrade projects.

NYSERDA/NYPA Contractor Interview Findings

Current Market Trends

Most of the NYSERDA contractor customers are only looking at lighting upgrades, because of their short payback time. The economy has people worried about whether their company will still be in business a few years down the road.

NYPA reports that it is not having a slowdown because of the economy, and is funding large-scale upgrade projects.

Other Programs vs. Targeted DSM

According to NYSERDA contractors, NYSERDA programs are easier for contractors to use, with less risk involved for both the contractor and the customer.

Having two programs (NYSERDA v. Targeted DSM) seems to cause a level of confusion, because selecting a program that is right for the customer is never a cut-and-dried choice.

Inspections

Inspections take too much time and effort to get completed with ICF. Inspection headaches cause contractors to turn back to NYSERDA programs.

Contract Terms

Demand response rights being turned over to Con Edison keeps many possible projects from happening. .

Suggestions

The contractors have suggested that Con Edison turn over the Targeted DSM funds to NYSERDA, so there are not two separate programs. They reason that NYSERDA already has successful programs, and there is no need for Con Edison to try to develop something additional.

Non-Accepted Vendor Interview Findings

Interviews were conducted with four firms whose proposals for the Targeted DSM program had not been accepted by Con Edison. Key findings are presented below.

RFP Process

One vendor who had served as a subcontractor to an accepted vendor noted that there were discrepancies between how Con Edison defined kW load reduction in the RFP and what it was willing to count as qualifying kW load reduction in practice.

Some felt that communication was not sufficient during the bid process. Vendors were not notified of rejected proposals, and there was a significant lag time in answering questions about the RFP. Some found out later that they had not been selected, but it was over a year after the bid date. When one of the vendors tried to get a question about the process answered, he said it took more than a month to hear back from Con Edison. This left a bad impression on the vendor, because they feel communication is extremely important between a vendor and the utility. This makes the vendor less likely to try to participate in the future.

One vendor said that Con Edison's practice of listing load reduction needs in certain load areas even though they could not possibly be met by DSM hurts the company's credibility. The vendors are less willing to participate, knowing that a load reduction that has been listed is completely impossible to achieve and wondering whether those about which the vendor knows less might also be impossible to achieve.

Contract Terms

One vendor felt a higher incentive should be offered per kW reduced. "With all the roadblocks and inspections required, more money would cover the extra time and effort involved." Close to the same level of incentive is available in other programs, but there is no financial risk for the vendor. If there is a higher risk with the Con Edison program, that should translate to a lot higher payment, to make the risk acceptable.

Other vendors felt that the incentive level was fine and was very good for the customer. Many times the projects they have done are completely free to the customer, or close to it. They are getting upgraded equipment, and saving money on their electric bills. A lot of these customers would not have been able to afford the projects on their own.

M&V Process

One vendor who had experience with Phase I of the program believes ICF (the M&V contractor) has too much power in the program and is difficult to work with. This vendor would not want to be involved in the future, due to problems with ICF. He indicated that many of the ICF technicians were previously salespeople, and had never seen a light bulb in a technical setting. Now, these same people were deciding if they were going to give the full watt value of savings to the vendor. There were constant problems on every project, and ICF showed no flexibility

nor would it take the time to review anything when questioned. (Note: This is a very different picture than that painted by accepted vendors, perhaps because this vendor's experience with the program occurred early in the program.) If a 100-watt light bulb is taken out, and replaced with the 23 watt CFL, this vendor said, the savings difference should be 77 watts, according to the contract for the program. In many instances, however, ICF would not give full credit for the light bulb replaced and refused to give an answer as to how they arrived at the new number. In other circumstances, Con Edison would do the same thing with larger projects, and tell the vendors "That's not what really is being used, so we won't pay you for that." The vendor went on, "If that's how they feel, they should have changed the methodology in the contract." The vendor said that when a vendor makes a bid, they base it on using nameplate data for the kW they would be removing and that is a large factor on what they contract to deliver in a targeted area. The vendor gave additional examples of how, while the load reduction being claimed by the vendor might not be what was actually removed from the system, the contract definition of what qualified as load reduction had been satisfied, and yet the vendor was denied full payment.

Program Data Flow

The current format of data submission is very cumbersome and can cause many time delays on projects. When there is a mistake on a submitted sheet, even if it is the only mistake, the whole spreadsheet is kicked back to the vendor to be corrected. This delays all of the projects on the sheet, not merely the one with which Con Edison found a problem. Also, it is extremely hard to track the changes in such a large spreadsheet that could have numerous tabs along the bottom. With all of the scrolling, it takes up a huge amount of time and increases the chances of making a mistake. An example of a data submission error was provided by one of the vendors. This issue was with the customer's billing address. On their Con Edison bill, the street address was spelled incorrectly. When the vendor submitted the company on a spreadsheet, they spelled the street name correctly. Con Edison then returned the entire spreadsheet, and the only error was that the street was spelled differently than on their bill. "Why," wondered the vendor, can't Con Edison change the spelling and just move on? Why are all the projects delayed, because of a spelling mistake Con Edison made to begin with?"

Perception of Con Edison's Progress

Some of these vendors feel that the program is a failure. Many kWs are being left on the table, and current vendors are not on track to meet their commitments.

Contract Issues

Turning over demand response load to Con Edison is a problem for some of the vendors' customers.

One vendor has issues with the contract term that mandates reduction methods must stay in place for a number of years, or the vendor is penalized. He cited as an example a case involving a demolished building whose efficient lighting, of course, was no longer functional but which was still delivering less load to the system.

Accepted Vendor Interview Findings

RFP process

All of the accepted vendors were satisfied with the Con Edison RFP process. All of the accepted vendors reported during the interviews that they felt the RFP was, for the most part, clear in its goals and objectives.

Several of the vendors had submitted proposal responses to one or more of the earlier program phases so they had experience with the RFP format and required response format.

Good communications is highly valued by the accepted vendors.

- One vendor indicated that it may have been beneficial to have had an increased dialog or communication with Con Edison program staff during the RFP phase.
- The vendor felt that they would have benefited by obtaining more details on the load areas included in the RFP. They felt their proposal may have been impacted by such additional information. Although the vendor did note that they could have been more proactive in initiating that communication with Con Edison.
- Another vendor said that in some of the later RFPs, no maps were provided to assist the bidders in better understanding the load areas. This would be helpful in future RFPs.
- According to one vendor, pre-bid meetings/conference calls are important for vendors to be able to better understand the load areas where the load reductions are needed.
- Vendors generally feel that Con Edison staff has responded to any questions submitted in a clear manner and quickly.

One vendor reported that the DSM Agreement's liquidated damages clause caused a lot of potential bidders to drop out at the beginning of the program. As reported elsewhere, it is not clear whether these vendors were aware that positive changes have been made to this clause in later RFPs.

One vendor felt that there has been confusion among vendors regarding the extent to which vendor bids on only a portion of the targeted need in a load area would be accepted or could win. This issue becomes more important the higher the load reduction need is and the more difficult it is for a single vendor to meet it in the required time frame. On the converse side of this issue, a vendor noted that they thought they would be the only vendor retained by Con Edison to obtain demand reduction in the areas they were awarded. Recently, they were disturbed to find out that in later phases Con Edison has other vendors also trying to sell and implement demand reduction in the same area.

From the vendors' point of view, it is unusual that the load reductions being sought by Con Edison do not ramp up but are at significant levels in the first year of need, according to one vendor. This is not typical of other utilities' programs and serves as a barrier to participation by vendors.

Contracting with Con Edison

All vendors reported that while Con Edison was fair throughout the contracting process, the liquidated damages clause included in the contract was troublesome. However, one vendor went on to say that they understood Con Edison's reasons for requiring liquidated damages to be part of the contract.

The vendors did feel that the contract with Con Edison was one-sided, in that it favored Con Edison. For instance, while liquidated damages are required to be included in the contract, there are no bonuses or upside payments to be made to the vendor if they meet or exceed their demand reduction goals. Also, there is no band of tolerance such that if a vendor "substantially" meets their goal the liquidated damages would not be imposed.

One vendor noted that in hindsight they would have liked the contract to be more flexible in light of market changes (referring to the impact of the current economic situation on their ability to obtain demand reduction).

Vendors noted that Con Edison was not willing to negotiate terms and conditions in a substantive manner.

Qualifying Measures

All vendors stated that they focus almost exclusively on promoting, marketing, and installing lighting. One vendor noted that their installations were almost entirely compact fluorescent lamps (CFLs).

Con Edison does not require the use of ENERGY STAR-qualified lamps. When asked whether the program should require that CFLs installed through the program be ENERGY STAR qualified, a vendor suggested this would not be helpful. The vendor noted that ENERGY STAR requirements had changed in recent years such that bulb lifetime has been shortened as manufacturers strove to meet other requirements such as quality of light and lack of harmonic distortion. The vendor felt that it is in the customer's interest, and more energy is saved, if longer-lasting CFLs can be installed.

One vendor considered distributed generation as a potential demand reduction technology. However, they noted that the requirement by Con Edison of 100% physical assurance of the demand reduction was overly harsh. They felt that the likelihood that 100% of distributed generation equipment would not be available during the peak load hours when needed was very small. The requirement for 100% physical assurance that the demand reduction would be realized makes the economics of distributed generation unfavorable.

While other technologies are eligible (air conditioning, motors, etc.), the economics are not as attractive to both the customer and the vendor compared to the economics associated with lighting. In addition, the long sales cycle associated with non-lighting and distributed generation generally preclude the vendors from advocating such technologies. It is most economical for the vendors to reduce the amount of time expended for sales and marketing to a given customer.

Interaction with NYSERDA Programs

Two vendors do not market both Con Edison and NYSERDA programs to the same customer. One of these vendors does participate in the NYSERDA Peak Load Reduction Program with other of its customers. The other vendor has not participated in any NYSERDA programs.

Another vendor indicated that if both the NYSERDA programs and Con Edison programs could be applicable to a given customer's project, they will use the NYSERDA program, because it does not restrict the measures that could be done (i.e., provides incentives for both energy and demand saving measures).

However, according to one vendor, the participation process of Con Edison program is quicker and simpler than that of the NYSERDA program. The NYSERDA programs sometimes require measurement and verification of savings before full payment is made, while the Con Edison program does not. Another vendor said that, while it gives "lip service" to providing assistance to vendors and wanting to integrate its programs with that of Con Edison, NYSERDA has not been especially cooperative in assisting vendors in melding the resources of the two programs together to better address customer energy efficiency needs. Like the other vendor, this vendor

indicated that, relative to the Con Edison program, the NYSERDA process is long and cumbersome for both contractors and customers. He noted that the customer's major concern (especially for larger customers) is the period from initial walk-through to installation, and that the process is three times as long with NYSERDA as it is with Con Edison. He thinks the NYSERDA program also has too many contractors and M&V options. In addition, the vendor felt that NYSERDA's Technical Assistance Contractors (TACs) sometimes push specific manufacturers' products on the vendor and customer, limiting options. Further, sometimes these TACs "talk down" the Con Edison program, which is not particularly helpful in integrating the two programs.

Monitoring & Verification Process

For lighting retrofits in residential applications, Con Edison uses a "Tag and Bag" procedure. Con Edison's M&V contractor at times accompanies the vendors to the sites. One vendor reported that while the tag and bag process is time-consuming, it is easy. Another vendor stated that an ICF M&V staff person is with at least one of their five trucks each day.

One vendor noted that when submitting a "demand savings" report, if there is only one problem or error, the entire report is rejected and has to be corrected and resubmitted. The vendor noted that it would help with cash flow if Con Edison were to give partial credit (hence partial payment). Another vendor echoed this sentiment, reporting that while report approval time frames have significantly improved over time, the vendor had had to spend lots of time following up on the status of inspections, with reports being kicked back to the vendor due to very minor issues such as improper formatting. This was very costly and time-consuming to the vendor. The M&V contractor has 20-30 days to perform inspections once the report is submitted. When a report is kicked back to the vendor, this clock is reset and the 20-30 day period starts all over again, resulting in excessive delays from the vendor's and customer's viewpoint. The vendor speculates that some of this preoccupation with minor details of the reports may have been used as an excuse by the M&V contractor to buy time to staff up to sufficient levels for conducting inspections. One vendor stated that sometimes new staff of the M&V contractor has not received sufficient training. Another reported that the delay between the initial contact or walk-through and installation of the efficiency measures is very important to customers and a source of dissatisfaction (something borne out by the participating customer surveys).

Participating vendors generally believe that the 100% inspection requirement is excessive. One vendor said that the 100% inspection requirement makes it difficult for the vendor to use subcontractors that are not willing or able to wait for each inspection, especially if they have other work they could be pursuing. Another said that if they could free up resources currently

being absorbed by the M&V process, they could bring more load reduction to Con Edison and in a timelier manner.

Another vendor gave an example of just how many resources were spent on the M&V process. To meet their M&V goal, based on the typical project size that they see, it would take over 13,000 pre-inspections, over 13,000 post-inspections, and over 13,000 one-year verification inspections – if Con Edison implemented a 100% inspection rate. This consumes a significant amount of resources from both the vendor and the M&V contractor.

One vendor noted the issue of lag time in processing information. Con Edison gets kW reduction immediately after ECM is installed. However, it takes 30 to 90 days (or more) until Con Edison gives them credit. Conversely, another vendor indicated that this was typical within programs like this and that they expect these types of time frames.

One of the three vendors that have brought projects to the M&V phase noted that Con Edison and ICF have been more than generous to navigate through problems.

Meeting kW Reduction Targets

Most vendors reported at least some uneasiness in answering the questions about likelihood of achieving sales and marketing targets. One member declined to answer this question. Others reported that it was getting more difficult to achieve their sales targets. One was planning to go back into earlier covered neighborhoods and renew their campaigns. One vendor has not brought any projects to the point of M&V. The likelihood of achieving near-term load reduction targets for this vendor is slight at best.

Vendors working primarily in the residential sector reported no issues in meeting their future kW reduction targets. Those in the commercial sector, however, expressed serious concern, primarily due to the impact of the recent downturn in the economy. As one of them put it, "The current economic meltdown has created a very downward trend in market acceptance." This downturn would be expected to have less of an impact on residential program participation because both vendors serving that market offer their CFL installations free of charge to the customer for the most part. While commercial lighting upgrades are significantly discounted, there often still is some type of outlay on the part of the customer. Further, it is likely that uncertainty regarding the ability of the organization to remain in business in the future, restrictions on available capital, and an environment of layoffs and job loss may be placing a serious drag on non-residential customer willingness to participate in what otherwise appears to them to be a very attractive program. However, the economic downturn sometimes can work in the program's favor. As one vendor put it, higher/quicker payback measures may

become accelerated because of the high return on investment – "These projects now more than ever seem to be a no-brainer."

Ability to meet load reduction targets may also be hampered by changes in the NYSERDA Existing Facility Program which raised certain rebate levels and reportedly streamlined the application process, according to one contractor. At least one contractor is marketing both programs to customers, based on which program best meets the customer's needs. Due to the recent changes in the NYSERDA program, incentives sometimes are as high as or higher than those available through the Con Edison program. The NYSERDA program in these cases may be siphoning off participants who otherwise might participate in the Con Edison program.

No vendor marketing plans were provided and this makes it impossible to compare the marketing plans to actual sales performance in the field, to gauge likelihood of future success as a function of approach to market. These plans were viewed by the vendors as confidential information.

Sales and Marketing Process

The program vendors are using a variety of business models. One is an arranger and organizer of projects that are later subcontracted to channel partners/contractors. Another is a fully integrated marketer and installer; others use a hybrid model.

Generally, a combination of marketing approaches is being used by the vendors. These include network marketing using local civic agencies, officials, public safety and community organizations; direct mail and follow-up telemarketing; vehicle signage which can stimulate additional calls when a crew is in a neighborhood doing installations; door-to-door canvassing.

Most of the vendors schedule their installation crews two weeks to two months ahead of time, and track sales and sales pipeline activity electronically.

One vendor reported the differences between sales cycles of different size commercial customers:

- Smaller offices and business – 2-3 weeks
- Mid-size customers (50,000-100,000 sq. ft.) – 6-8 weeks
- Large customers – Up to 3 months

Most vendors use a mix of fixed and performance-based commission compensation to sell Targeted DSM program jobs, rewarding ESCOs and contractors for work they bring in.

One vendor reported using a sales management process where contacts and leads yield prospective customers, additional information is provided to qualify and narrow down the

selected costumers, and then an audit followed by a proposal is provided. For simpler residential CFL programs, the sales cycle can be short and of limited duration and a work order can be signed on the first visit and the measures installed.

Vendors reported tracking the customer sales process in terms of elapsed time and total cost to closing a sale. Most vendors, however, preferred to not report what this cost is.

Vendor sales processes can take a few hours for residential measures to months and up to a year for commercial target customers. It varies by customer and measures identified. The sophistication of the sales process also varies by type of customer and measures identified.

Specific findings on the sales and marketing process for the commercial market include:

- Firms tend to have a sales and marketing process, including "pipelines", and advanced prospect development before neighborhood or block campaigns occur.
- Both base and variable incentives are used for field crews.
- Both neighborhood direct marketing, including door-to-door marketing, and direct installation methods are used.
- Commercial vendors also rely on some channel partner incentives for sales and leads – payment on a $/kW basis.
- Direct sales are more effective and more controllable than channel partner sales, according to one vendor. The former is also a faster sales cycle.
- Vendors use sales tracking tools – one reported an Excel-based sales tracking system.
- Energy cost savings and then energy and carbon savings and payback are stressed to customers as benefits for participating. (Often stress less than one-year payback).
- Contractors value using Con Edison brand equity even without using the Con Edison logo directly, and wish that Con Edison would allow more collaborative marketing.

Specific marketing insights gained from vendors marketing to the residential market include:

- Community-based, network marketing used – use community groups, local civic and police precinct contacts
- Almost all measures are CFL lamps.
- Some commercial lamp/ballast changeouts occur but not frequently.
- Areas are sometimes approached using local media, elected officials, flyers and door hangers, public events, and church groups. Other times, direct mail campaigns with telemarketing follow-up are used.
- Multi-stage sweeps or rounds – one to three rounds in a neighborhood.
- Some vendors do not feel the need to do cold calling. Others use this method.
- Vans with signage on the side of them also help with marketing in a neighborhood.

- Value proposition centers on the fact that the measures are free and they are "green."
- One vendor stresses that electric bill savings can be $10-15/month.
- Vendors sometimes have a central office taking calls and organizing neighborhood visits.
- One vendor reports that they create need in neighborhoods by getting the word out of a planned visit over a two-week period. Then, their van being in the neighborhood creates additional calls and referrals.
- Vendors are willing to work a neighborhood with additional sweeps over a one-year period.
- Vendors may do neighborhood calling and scheduling up to two months out for two good weeks of direct field installation.
- Some vendors have weekly and monthly job quotas established and track quotas closely.
- Customer response does vary slightly by season, monthly bill cost, and daily weather, according to one vendor.
- Vendors leave extra lamps for customers in case of breakage or faulty product.

The evaluation results indicate that retired customers are somewhat over-represented among program participants. When asked whether they actually target retired customers, one vendor indicated that this was not the case but that it is certainly possible that telemarketing efforts might find a higher percentage of retired customers at home when calls are made, resulting in a higher rate of participation by them relative to other, more difficult-to-reach customers.

One vendor reports that the major barriers to residential customer participation in the program are (1) the vendor's credibility, (2) fear of being slammed regarding retail purchase of electricity (due to negative experiences with ESCOs marketing retail electricity), and (3) being in arrears already with Con Edison and not wanting further association with the company.

Implementation Issues

Some vendors expressed concern that customers are sometimes overwhelmed by the number of visits and number of people visiting a site (salespeople, inspectors and accompanying vendor staff). They also noted a number of logistical problems with working with the M&V contractor, which have been worked through over time to mutual satisfaction.

Some vendors are unabashed about the importance of high customer satisfaction and use post-installation surveys to ensure that customers are satisfied and happy with the work that has been done, and the friendliness and neatness of the staff performing the work.

One vendor noted that working both the NYSERDA and Con Edison programs together at a single facility is problematic in that each has its own M&V and inspection requirements that would be overwhelmingly inconvenient to the customer. If there were some way to combine these inspection efforts, that might result in greater coordination of the programs for individual customers.

Relationship with Con Edison

Vendors uniformly report a desire for more involvement by Con Edison. As one vendor put it, "Nothing in New York City is free, and so offering free CFLs raises a credibility issue with customers." They feel that better association of the vendors with Con Edison might help to address this issue. Further, one participating vendor indicated that attitudes toward Con Edison on the part of its customers appear to be more positive than attitudes of customers in other areas toward their utility, based on the vendor's experience. This is another reason for believing that being able to point to a closer involvement with Con Edison could help to address customer concerns.

Vendors suggest that much more extensive cooperation with Con Edison would be a win-win proposition that helps ensure that targets are met, increases customer satisfaction, reduces customer acquisition costs, and delivers load reductions faster. In addition to a letter from Con Edison that explains that the vendor is part of a Con Edison program but makes no assurances about the vendor's work, which Con Edison provides now, vendors had some ideas for closer cooperation, including the following:

- Encourage employees who live in targeted areas to encourage neighbors to participate or at least to be informed enough about the program to confirm to neighbors that it is legitimate.
- Allow vendors to use the Con Edison logo or at least Con Edison envelopes for mailings to customers.
- Mention the program in bill stuffers and/or in other contacts with customers.
- Joint marketing efforts including customer service representatives, vendors and larger customers at least for introduction purposes
- Have Con Edison customer service staff meet with each participating vendor. This has been an issue, according to one vendor, who reported that a customer was suspicious regarding the vendor's claim that the program was real. The vendor suggested that the customer call Con Edison and confirm the existence of the program. When they did so, the customer was told that the program did not exist. In another instance, the customer was told that the program had ended.

- Provide a description of the program on the Con Edison web site, including listing participating vendors and their subcontractors, so that vendors can easily help customers confirm the existence of the program and the vendor's/subcontractor's truthfulness regarding their role in it.
- Provide either customer listings or some greater level of detail on targeted areas that would allow vendors to have a better idea ahead of time regarding customers who are qualified and customers who are not qualified (located on the targeted networks).

One vendor noted that in hindsight, if they had more detailed discussions with Con Edison during the proposal development phase, they would have learned more about the zones they were proposing on and this would have changed their proposal.

Customer Survey Findings

Telephone surveys were conducted with participating and non-participating customers in both the residential and commercial sectors. The surveys were used to gather important data for estimating impact adjustment factors such as free ridership, spillover, coincidence factors, etc. These findings have already been presented above. Presented below are the process evaluation findings from these surveys with respect to participant and non-participant characteristics, how well the program is working from their perspective, perceived efficiency opportunities of customers and reasons for/barriers preventing participation in the program.

Residential Survey Findings

Participant homes had an average of 23 CFLs installed through the program and had an additional 2.4 CFLs (or about 10%) replacement CFLs they could use in case something happened to the CFLs that had been installed. The vendors installed 99% of the installed CFLs, and customers reported installing the remaining 1%.

CFL Removals

As noted earlier, at the time of the survey almost all (98.6%) of the number of CFLs reported as having been installed were reported by respondents still to be installed. About 25% of the respondents had removed at least one CFL for one reason or another, most because they had burned out. However, most of these were replaced by the customer, typically from the replacement bulbs left behind by the installers. Reasons for removals are shown in Table 57.

Table 57: Reasons for CFL Removal

Reason for CFL Removal	Percentage of Those Removed (n = 52)
Burned out	72.7%
Comes on too slow	11.4%
Not bright enough	9.9%
Broke	4.8%
Wrong type of bulb	0.4%
Too bright	0.3%
Don't know	0.5%

Location of Program CFLs

The most frequent locations in the home for CFL installations installed through the Targeted DSM program were bedrooms, bathrooms, kitchens and living rooms, presented in Table 58.

Table 58: Average Number of CFLs Installed Per Participant Home, by Vendor

	Average Number of CFLs Installed Per Participant Home		
	All Respondents (n = 210)	Free Lighting Respondents (n = 103)	QCS Respondents (n = 108)
Bedroom	5.3	5.9	4.0
Bathroom	3.5	2.9	2.4
Kitchen	3.4	4.0	2.0
Living room	3.3	3.8	2.1
Hallway	1.9	2.1	1.5
Dining room	1.8	1.9	1.5

Table 59 presents the same information but by type of home.

Table 59: Average Number of CFLs Installed Per Participant Home, by Home Type

	Average Number of CFLs Installed Per Participant Home		
	Single-Family (n = 70)	2- to 4-Family (n = 71)	Other (n = 70)
Bedroom	6.3	4.8	3.0
Bathroom	4.0	3.4	1.8
Kitchen	1.7	2.4	2.9
Living room	3.6	3.4	1.8
Hallway	2.2	1.8	1.3
Dining room	1.6	2.4	1.2

CFL Penetration Prior to Program

Prior to participating in the Targeted DSM program, the majority of residential participants did not already have any CFLs in their homes. The majority of non-participants, however, did have CFLs already in place, as shown in Table 60. This suggests either fortuitous targeting of marketing efforts or that those not having CFLs in their homes already are more likely to participate than those having them. Among those who already had CFLs in their homes, the non-participants tended to have more CFLs per home. About three-fourths of participants reported they were already aware of the advantages of CFLs prior to having them installed in their homes. More than 90% of non-participants reported they were aware of these advantages at the time of the survey.

Table 60: Residential CFL Penetration Prior to Program Participation

	Already Had CFLs in Home	Average (Mean) Number of CFLs Per Home	Average (Median) Number of CFLs Per Home	Aware of CFL Advantages*
Program Participants (n = 211)	40%	4.5	3.0	72%
Program Non-participants (n = 210)	70%	7.0	4.0	93%

- "Already aware" prior to program participation for participants, and "currently aware" at time of evaluation survey for non-participants

Sources of Information on CFL Advantages

Most (72%) of program participants and 93% of non-participants were aware of CFLs advantages prior to receiving their CFLs through the program. Customers' sources of

information about CFLs and their advantages are varied, with word-of-mouth playing a major role in conveying this information, presented in Table 61.

Table 61: Source of Information about CFLs, Weighted to Reflect Total Population

First heard about CFL advantages from:	Residential Participants (n = 148)	Residential Non-participants (n = 171)
Friends/family/coworkers	37.7%	21.27%
Installing vendor	2.3%	0.93%
Newspaper	22.6%	10.94%
Utility bill insert	0.8%	6.31%
TV/Radio	18.5%	22.41%
Don't Know	5.6%	21.61%
Other	15.7%	20.34%

Initial Contact with Program Vendor

The most frequent type of pre-installation contact participants had with their program vendor prior to the day they received their CFLs was telephone contact. Others received notices in the mail or had no contact until the day the vendor showed up, as presented in Table 62.

Table 62: Program Vendor-Participant Contacts Prior to CFL Installation

Type of Contact	Percentage* (n = 211)
Telephone call	45%
No contact, vendor just showed up	18%
Mailing from vendor	12%
Vendor left a notice	5%
Other	14%
Don't know	7%

*Percentages rounded

Potential for Confusion or Overlap with NYSERDA/NYPA Programs

Almost no customers (0.7 percent) even considered participating in another program when they made their decision to participate in the Con Edison program. No confusion due to the existence of more than one program to choose from was reported.

Reasons CFLs Were Installed

Participants and those non-participants who installed CFLs in 2008 were asked why they chose to install their CFLs. In addition, participants were asked what they thought their CFL installer could say to make other customers more interested in having CFLs installed. Energy and bill savings appear to be the two main reasons for installing CFLs, according to these respondents. Results are presented in Table 63.

Table 63: Reasons Why CFLS Were Installed

Question	Why Did You Install CFLs Now? Residential Participants (n = 211)	Why Did You Install CFLs This Year? Residential Non-participants (n = 96)	What Should Installer Say To Maximize CFL Installations? Residential Participants (n=211)
Lower electric bill	60%	39%	51%
Save energy	46%	50%	41%
Help the environment	6%	16%	6%
Use more lighting & not pay more	0%	1%	3%
Free CFLs	22%	N/A	20%
High-quality CFLs now	4%	0%	5%
Good selection of bulb types/ wattages	1%	0%	1%
Lasts longer than regular bulbs	0%	4%	0%
Other	16%	13%	28%
Don't know	0.4%	0%	7%

Barriers to Replacing CFLs with New CFLs When They Burn Out

About half of participants (46%) and non-participants (55%) said there was nothing that would keep them from replacing their CFLs with new CFLs when they burn out. The most frequent response given by respondents for why they might not replace their CFLs with new CFLs once they burn out was the cost. Cost is more of a barrier for program participants than for program non-participants, who had purchased and installed CFLs during 2008 on their own (i.e., outside of the program).

Table 64: Possible Barriers to Replacing CFLs with New CFLs upon Burnout

Potential Barrier to Replacing CFLs with CFLs	Participants (n = 211)	Non-participants (n = 133)
No barriers	46.4%	55.3%
Expense/cost	25.5%	13.6%
Not bright enough	4.4%	4.4%
If bulb life claims are incorrect	2.8%	1.5%
Don't like the color	1.6%	0.5%
Special CFLs/hard to find	1.3%	0.0%
Unattractive	1.2%	1.2%
Was experimenting/don't like them	1.0%	0.0%
Don't fit in fixtures	0.3%	3.8%
Environmental disposal issues	0.3%	3.3%
If I need to use a dimmer switch	0.0%	2.5%
If I can't find them/availability	0.0%	2.1%
Other	7.2%	8.9%
Don't know	11.0%	11.0%

Customer Satisfaction

In general, participants were very satisfied with their Con Edison program experience. Also, when asked to rate their agreement with statements that their CFLs had saved them energy and money, and helped improve the environment, at least 60% strongly or somewhat strongly agreed (rating of 4 or 5 on a 5-point scale). Table 65 summarizes the responses.

Table 65: Program Satisfaction and Opinion on CFL Economic & Environmental Benefits

Satisfaction (1=Not at all satisfied; 10=Extremely satisfied)	Percentage (n = 210)
1	3.3%
2	0.3%
3	0.3%
4	0.7%
5	7.6%
6	3.9%
7	6.6%
8	12.8%
9	13.2%
10	51.3%
Mean	8.49
Median	10.00

Non-participant CFL purchasers also agreed that their CFLs had performed as noted above, but to slightly lesser extent, as shown in Table 66. When asked whether they would recommend purchasing CFLs to others, 92% of participants said they would. When asked if they would recommend them to others if others had to pay full price for them, 76% of participants and 87% of non-participants responded affirmatively.

Table 66: Level of Agreement: CFLs Save Energy and Money and Help the Environment

Rating of CFL Benefit Statement	Participants	Non-participants
My CFL has saved me energy	**(n = 211)**	**(n = 133)**
1-2	4.0%	1.2%
3	24.3%	27.4%
4	16.4%	19.0%
5	46.0%	45.8%
Don't know	9.4%	6.7%
My CFL has saved me money	**(n = 211)**	**(n = 133)**
1-2	7.3%	3.4%
3	18.9%	24.2%
4	17.8%	19.5%
5	45.6%	43.4%
Don't know	10.5%	9.6%
My CFL has helped improve the environment	**(n = 211)**	**(n = 133)**
1-2	1.9%	2.5%
3	14.8%	13.3%
4	22.7%	22.3%
5	51.3%	56.5%
Don't know	9.3%	5.5%

Program Participant Demographics

Table 67 presents the demographic characteristics of the participant population and also those of the non-participant population. Of note are the following:

- About three-fourths of respondents own their home.
- About 15% have plans to move within the next four years.
- A higher percentage of the non-participant population has a college or graduate school degree.
- The average participant household size (mean=2.73, median=3.0) was a bit larger than the average non-participant household size (mean=2.56, median=2.0).

- A high percentage of respondents were retired persons, especially among the participant population.

Table 67: Respondent Demographics

Demographic Characteristic	Participants (n = 211)	Non-participants (n = 210)
Homeownership:		
Own	75.2%	69.5%
Rent	22.3%	30.1%
Refused	2.6%	0.4%
Mobility:		
Have plans to move in next 4 years	12.8%	15.8%
Educational Status:		
High school degree or less	39.3%	31.8%
Vocational-technical/some college	27.5%	22.6%
College/graduate degree	30.3%	44.7%
Refused	2.8%	0.8%
Average Household Size:		
Mean	2.73	2.56
Median	3.00	2.00
Employment Status:		
Full time	24.4%	35.4%
Part-time/self-employed	11.5%	13.8%
Homemaker	6.6%	6.8%
Student	0.6%	0.8%
Retired	48.3%	35.2%
Unemployed	5.2%	8.0%
Refused	3.3%	0%
Annual Household Income:		
<$20,000	12.4%	9.3%
$20,000 - <$40,000	18.3%	13.2%
$40,000 - <$60,000	12.1%	14.7%
$60,000 - <$80,000	5.3%	12.4%
$80,000 - <$100,000	8.7%	2.1%
$100,000 - <$150,000	5.8%	12.9%
$150,000+	4.9%	4.5%
Refused	32.5%	30.9%

Commercial Survey Findings

About 16% of surveyed program commercial participants reported that they had replaced some portion of the lighting equipment that their program vendor had installed. Those who had replaced some of their efficient lighting equipment on average reported replacing about 24% of it (though the median percentage replaced was only 15%). As discussed earlier, only 18% of the replacements were reported to be with equipment that had a lower efficiency than the equipment installed by the program vendor (see Commercial Adjustment Factors discussion).

Lighting Upgrades Made

In the three years prior to 2008, about 18% of participants and 12% of non-participants had made lighting equipment efficiency upgrades. Of these, 11% of participants and 6% of non-participants had participated in some sort of program to make these improvements. The majority of the improvements made involved CFLs and efficient linear fluorescent lights, as shown in Table 68. However, CFL installations were much more frequent among participants than among non-participants.

Table 68: Lighting Upgrades Made by Participants and Non-participants Prior to Participation

Type of Lighting Efficiency Upgrade	Participants (n = 140)	Non-participants (n = 143)
CFLs	62.6%	31.0%
Efficient linear fluorescent lights	13.2%	29.6%
High-efficient fixtures	1.1%	19.0%
High-efficiency lamps and ballasts	6.6%	16.1%
Other	17.6%	26%

As with residential respondents, Table 69 indicates most commercial non-participants obtained information about the advantages of CFLs through word of mouth. (Participants were not asked this question.)

Table 69: Source of Information on CFLs among Commercial Non-participants

First heard about CFL advantages from:	Commercial Non-participants (n = 121)
Friends/family/coworkers	33.98%
Installing vendor	5.57%
Newspaper	14.45%
Utility bill insert	1.97%
TV/Radio	9.14%
Don't Know	18.51%
Other	26.30%

Marketing Lighting Upgrades

According to participants, the program vendor promoted the annual savings/lower energy costs of efficient lighting upgrades most often. Most participants believe this was the most persuasive argument for making the decision to participate. Table 70 summarizes these findings.

Table 70: Most Frequently Promoted and Persuasive Value Propositions for Lighting Upgrades

Benefit of Efficiency Measure	Benefits Emphasized by Installer (n = 140)	More Persuasive Argument (n = 140)
Low cost of measure	24%	11%
Quick payback	6%	1%
Annual savings/lower energy costs	71%	61%
Ease of participation	1%	0%
Environmental	17%	6%
Don't know	6%	6%
Other	30%	16%

Among the reasons participants reported for having participated in the program were that they were approached by the vendor and the low cost of the project. This suggests that, while annual bill savings was the most persuasive argument for making upgrades, low cost and the vendor impetus may have been the catalysts to installation. Table 71 summarizes the responses.

Table 71: Participant Reasons for Having Contractor Install Lighting Measures

Reasons for Having Measures Installed by Program Contractor	Percentage Giving Response (n = 140)
Contractor approached customer	31%
Low cost of project	31%
Seemed easy to participate	0.2%
Needed to replace lighting anyway	4%
To help environment/be a "green" business	13%
To save money	46%
To save energy	36%
Don't know	0.2%
Other	25%

The program contractor did not recommend efficiency improvements other than lighting, according to 98% of the participants. This is likely purposeful on the contractor's part, in light of the longer sales cycle for non-lighting measures and the pressure to achieve substantial kW reduction within a specified time period, and is consistent with vendor interviews.

Customer Decision-making Regarding Efficiency Improvements

Most surveyed commercial customers reported that they use payback as their primary criteria for making energy efficiency investments (Table 72). The maximum acceptable payback period for making such investments, on average, was two years.

Table 72: Customer Decision-making Criteria for Lighting Efficiency Upgrades

Efficiency Measure Decision-making Criteria	Participants (n = 140)	Non-participants (n = 143)
A - Payback	65%	37%
B - Payback & Other Criteria	8%	12%
C - Other Criteria:	18%	35%
D - Don't Know	9%	16%
Other Criteria (for B & C):		
Lowest cost among alternative investments	0.2%	0.3%
Minimum IRR	6%	0%
Total cost	0%	11%
Life-cycle analysis	0%	3%
Don't know	17%	1%
Other	2%	32%

As noted above under "Commercial Impact Adjustment Factors," the overwhelming majority of participants reported that they would not have been very likely to have made the same lighting upgrades they made through the program, if they had had to pay full price, most indicating that they would have taken no action with respect to lighting that year. (Table 73 and Table 74)

Table 73: Likelihood of Paying Full Price for Lighting Efficiency in Absence of Program

Likelihood of Paying Full Price to Make Program's Efficiency Improvements	Percentage (n = 140)
Extremely likely	3.1%
Very likely	13.8%
Somewhat likely	24.9%
Not very likely	27.4%
Not at all likely	25.7%
Don't know	5.1%

Table 74: Likely Action Taken in Absence of Program

Likely Action in Absence of program	Percentage (n = 140)
Pay full price for all same upgrades	9.1%
Pay full price for some of same upgrades	25.8%
Take no action regarding lighting that year	59.8%
Other	1.2%
Don't know	4.5%

Virtually no participants reported having experienced any costs due to the program, other than (some participants) paying to have the equipment installed. However, most reported additional benefits of having the installation performed, as presented in Table 75.

Table 75: Reported Changes in Several Factors Due to Program Participation

Factor (n = 140)	Increased	Decreased	Stayed the Same	Don't Know
Maintenance costs	3.7%	32.1%	39.6%	24.5%
Productivity	5.4%	1.6%	87.0%	5.9%
Quality of lighting	45.7%	13.0%	39.6%	1.7%
Attractiveness of lighting	27.7%	11.6%	58.6%	2.1%

Customer Satisfaction

Satisfaction with the Targeted program is quite high. When asked to rate their overall satisfaction with the Targeted DSM Program on a 10-point scale, with a score of "10" meaning "extremely satisfied" and a score of "1" meaning "not at all satisfied", the average score provided was 8.5 and the median score was 9.0, as shown in Table 76.

Respondent satisfaction likely was tied mostly to the amount of money they felt they had saved or the low cost of the measures, because most had suggestions for how the program could be improved. These suggestions were quite diverse, and some of the complaints offered may or may not have been accurate, though they certainly represented the perspective of the customers who made them.

Table 76: Participant Satisfaction with the Targeted Program

Satisfaction (1=Not at all satisfied; 10=Extremely satisfied)	Percentage (n = 140)
1	2.1%
2	1.2%
3	0.9%
4	0.2%
5	1.9%
6	2.4%
7	10.1%
8	23.2%
9	22.1%
10	35.7%
Mean	8.5
Median	9.0

A sampling of respondent comments follows:

- The process should be a lot more convenient. Some respondents suggested that contractors perform their installation before the workday, so as not to disrupt the organization's business. There were a number of complaints about how long the installation took to complete, how long it took between the first contact and the installation, or between the walk-through and the installation. (This delay prior to installation was an issue echoed by some of the contractors in terms of unreasonable delays on the part of the M&V contractor, though they indicated that such problems were worked out over time.) There were also complaints about the number of visits made to complete the job and the number of individuals involved in completing the job. As one respondent put it:

  > "It became a joke around here like how many Irishmen does it take to replace a light bulb. The cost must have been astronomical to Con Edison. I thought they should know how this was handled."

- Involve Con Edison more and market the program better. A couple of respondents suggested that Con Edison play a more active role in the program, one saying that the contractor should be properly introduced by Con Edison. Several suggested a much more robust marketing effort was needed, sometimes mentioning that Con Edison "should get the information out there so people know about it" or that the vendors should "put emphasis on Con Edison – the name expresses confidence." Many more respondents indicated that a higher level of marketing efforts should be implemented, without mentioning Con Edison by name. As one put it, "They should advertise better. I came across it by accident."

- The contractors should be more knowledgeable and quality of work much higher. Some respondents thought some of the contractor staff did not know enough about the lighting equipment they were selling, sometimes installed lighting that was clearly too bright or not bright enough, or conveyed the impression that they were not experienced enough to be doing the job they were doing. Some respondents complained about missed lighting retrofits. One said the installer ruined the wiring so that now he has to turn on all lights at once, and that the installer missed two exit lights. One respondent indicated substantial dissatisfaction:

  > "Use a different company. They were here 34 times and we still aren't satisfied."

  One said the vendor at first brought the wrong equipment, so they wasted time. (The knowledge level of staff was also brought up in some of the stakeholder interviews, mostly by contractors about M&V inspectors, or by M&V staff about contractor sales staff. However, in that context, it was described as a problem that was worked through and addressed over time as contractors and inspectors came up the learning curve and figured out how best to do their job. It may be that the customers who complained in the survey were the ones who experienced this learning curve from the customers' point of view.)

- The contractors should have offered much better customer service. There were many complaints about calls not being returned. Some contractors were deemed not polite enough or not friendly enough. Some complained of the mess the contractor left behind. Respondents thought that extra (replacement) bulbs should have been left behind, especially in cases where the contractor installed "specialty" lighting that might be hard for the customer to find replacements for later.

- The contractors should be more truthful – about how long the lights would last, how bright they would be, whether they would return and replace them when they burned out, etc. One respondent said the contractor should:

  > "Tell the customer the truth, get back to people when they burn out, say that some lights don't work on dimmer switches and are not very bright. No one told me that."

  Another said:

"When they came to install lights there were four [lights] they didn't have. They said they'd come back with them but never did, and I've called them and they never call back. It would be nice if they finished the job they started."

- The services offered should be more comprehensive. Some respondents wanted more of their lighting to be replaced but the contractor for whatever reason did not do so. Others said they wanted additional efficiency measures such as efficient air conditioning or refrigeration to be installed.

- Con Edison should be more involved. Some respondents thought Con Edison was not doing enough to educate customers about the program, even through bill stuffers. One respondent said the program should:

"Put emphasis on Con Ed. The name expresses confidence."

Table 77 shows the most frequent types of complaints/recommended improvements.

Table 77: Most Frequent Customer Complaints/Recommended Improvements

Complaint/Recommendation	Percentage (n = 140)
More Con Edison involvement/better marketing	15.1%
Time delays/excessive number of visits	11.4%
Better contractor performance and truthfulness, more knowledgeable staff	10.3%
More comprehensive efficiency measures (more lighting or measures for other end uses	5.6%
No improvements needed	10.7%
Don't know	35.3%

Confusion Regarding Multiple Programs

Only 1 percent of participants considered participating in another program when they were making their decision to participate in the Con Edison program. No confusion due to having multiple programs in the market was reported.

Efficient Lighting Upgrade Costs

While some participants reported paying nothing for their lighting efficiency upgrades, on average, participant costs in making their lighting upgrades were about 10 percent of total project costs, as reported by the participants. Average customer cost was $217, while the average total project cost was $2,167. That is a very persuasive price point and likely to have been one that dwarfed any negative participation experiences participants may have had with the program (messy workmen, vendor failure to return calls, etc.).

Commercial Customer Demographics

To date, the program's non-residential participant population has not reflected the breakdown of the general non-residential customer population in the targeted areas. In particular, Manhattan customers are under-represented, as shown in Table 78.

Table 78: Commercial Customer Demographics – Manhattan v. Non-Manhattan

Building Type	Program Participants (n=921)	General Population (n=50,356)
Manhattan offices/small retail	5.2%	25.0%
Non-Manhattan offices/small retail	37.5%	9.2%
Manhattan non-offices/small retail	6.7%	49.9%
Non-Manhattan non-offices/small retail	50.6%	15.9%

Compared to program non-participants, program participants tended to be more likely to own their facilities, be in business and at the same address for more than ten years, and be less likely to have annual revenues of less than $500,000 (though the refusal rate on this last question was somewhat high, at 24%, for participants), as shown in Table 79.

Table 79: Commercial Customer Demographics – Other Characteristics

Demographic Characteristic	Program Participants (n = 140)	Program Non-participants (n = 143)
Own the facility they are in	39.0%	17.8%
Years in business:		
5 or less	12.7%	17.4%
6-10	5.0%	21.5%
>10	82.3%	61.1%
Years at current address:		
5 or less	20.8%	30.8%
6-10	11.8%	23.9%
>10	67.4%	45.2%
Number of full-time staff:		
<10	74.8%	82.2%
10-25	18.6%	17.0%
>25	4.8%	0.8%
Refused/Don't know	1.8%	0.0%
Number of part-time staff:		
<10	84.3%	94.5%
10-25	4.5%	1.9%
>25	4.1%	3.5%

Demographic Characteristic	Program Participants (n = 140)	Program Non-participants (n = 143)
Refused/Don't know	7.1%	0.0%
Annual revenues/budget:		
<$500,000	31.1%	48.2%
$500,000 - <$2 million	30.3%	28.5%
$2 million or more	15.0%	10.2%
Refused/Don't know	23.6%	13.1%