Con Edison's Targeted Demand Side Management Program: Replacing Distribution Infrastructure with Load Reduction

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ABSTRACT

In 2003, with several electric distribution networks within its service territory approaching capacity, Con Edison was facing large capital expenditures to reinforce its distribution system. With much of this network underground, building new infrastructure represented a difficult and expensive endeavor.

Instead, Con Edison embarked on a large-scale Targeted Demand Side Management Program, developing a pilot effort to achieve 47 MW of load reduction over a four-year period, primarily from commercial and industrial customers in several affected daytime peaking networks. The company contracted with ESCOs (who acted as aggregators to recruit customers) to provide guaranteed, long-term savings, with the first tranche to be in place in Spring 2005. To ensure the load reductions were achieved and precisely determine the actual savings, Con Edison instituted substantial liquidated damages for shortfalls and contracted with ICF International to perform stringent measurement and verification, requiring 100% inspection of every site before and after installation of the load reduction measures.

The program was subsequently expanded to 149 MW and extended to cover a much larger portion of the company's service territory, including residential customers in certain night-time peaking networks. To date, over 47,000 customers have participated, generating 89 MW of load reduction (through May 2010). Con Edison estimates that the program will ultimately achieve a benefit/cost ratio of 2.8 and avoid $223 million in capital expenditures.

This paper describes the first five years of this innovative and unique program, detailing not only its successes, but the challenges faced and efforts taken to overcome them.

"Dig We Must" or "Save We Must?"

For those readers of a certain age hailing from the New York metropolitan area, "Dig We Must" should bring back memories of the signage used years ago by Con Edison workers engaged in repair or new construction work. Today, those signs are no longer used, but the digging continues, with all its associated disruptions to traffic flow and city life.

In 2003, with a number of its electric distribution networks approaching capacity and an expectation for substantial future load growth, Con Edison was facing large capital expenditures to in New York City and Westchester County. With much of this network underground and entwined with other utility services, building new infrastructure represented (as always) a difficult and expensive endeavor.

Recognizing that targeted load reduction achieved via energy efficiency could be more effective and financially attractive than upgrading infrastructure, Con Edison embarked on an innovative, unique, and large-scale program to defer or eliminate the need for capital projects through energy efficiency measures – The Targeted Demand Side Management (DSM) Program.

Program Design – Drivers

Con Edison was not new to energy efficiency programs, having implemented an educational campaign called “Save-a-Watt” in the 1970s and the highly successful “Enlightened Energy” program (a $630 million program that achieved 740 MW of demand reduction) in the 1980s and 1990s. Still, the idea of relying directly on marketed energy efficiency programs to preserve system reliability in specific networks (rather than installing additional wires and equipment) was a major leap of faith for a company with such a strong engineering culture.

Relying on energy efficiency as an alternative to capital improvements meant not having sufficient transmission and distribution (T&D) capacity available if the Targeted DSM Program fell short of its load reduction goals. Nevertheless, to realize maximum value from the achieved load reductions, Con Edison chose not to hedge its bets by continuing the T&D planning and implementation process in parallel with the program. Instead, energy efficiency was considered as a valid *alternative* to system reinforcement in the planning process, and, where cost effective, was the *sole* solution implemented.

These decisions affected program design in a number of significant ways. First, the company wanted assurance that reported load reductions were accurate, leading to the development of a rigorous measurement and verification (M&V) process. Second, the long planning and implementation process for typical T&D projects meant that system reinforcement was not a viable fallback option in the event contracted load reductions were not achieved. To ensure performance, Con Edison incorporated significant upfront security and downstream liquidated damage provisions into its contracts with each Energy Service Company (ESCO). ESCO contracts called for guaranteed load reduction, and the financial penalties were meant to ensure performance (ESCOs were also responsible for ensuring that customers maintained the installed load reduction measures). Finally, the requirement that load reductions be coincident with the relevant network peaks limited the potential measures available as well as the target customer set (*i.e.*, commercial or residential, day or evening peaking).

Choosing the Critical Networks and Soliciting Bids

Con Edison’s planning process involves estimating potential peak loads in each of its 81 networks from the previous summer experience, and then predicting future growth via a combination of top-down and bottom-up models. A ten-year load relief plan is then generated to bridge any forecasted shortfalls at the transmission, sub-transmission, and area substation levels. (Con Edison has 61 area substations supplying network and non-network loads, operating at voltages from 4kV to 33kV. Each typically feeds one or two networks and averages 250 MW in capacity.) Load relief projects can range in scale and cost from installing transformer cooling (< $1 million) to the construction of an entirely new area substation (> $100 million).

Each of these load relief projects was a candidate for deferral via the Targeted DSM Program. In practice, the program considered projects with need dates up to 5 years out, and — though there was no specific rule — required load relief that totaled less than 3% to 4% of the predicted network peak. For each potential infrastructure project, carrying costs were calculated with and without a deferral period and the net present value (NPV) of the deferral was then determined. This value, when combined with the expected NPV of the energy savings, capacity savings, and avoided line losses determined the maximum price that could be paid to ESCOs for delivering the required load reductions. If viable bids were received below this threshold (expressed in $/kW), the DSM solution was chosen. If not, a capital improvement was executed.

The results of the analyses were used to develop a request for proposals from ESCOs to provide load reduction in multiple networks. The threshold price for load reduction, which varied from network to network, was not disclosed in the pilot (or Phase I of the program). Numerous ESCO bids were evaluated on cost and capability to provide the needed load relief, and contracts were ultimately issued to three ESCOs meeting Con Edison's evaluation criteria. They contracted to provide guaranteed load reduction in nine networks: five in midtown Manhattan, three in Brooklyn, and one in the Bronx (in the case of Manhattan, multiple ESCOs were awarded contracts in some networks).

In subsequent phases (II through IV), the threshold price was disclosed to the ESCOs, and this resulted in fewer and more precisely priced proposals being received. (And, as might be expected, pricing was typically close to the threshold price.) Contracts were issued to one Phase I ESCO and three new firms. Phases II to IV included 13 additional networks throughout Manhattan, four networks on Staten Island, and four networks in Westchester County.

Eligible Measures

Table 1 shows the list of acceptable load reduction measures Con Edison initially developed. Each was well known and would typically qualify for any type of energy efficiency program. These are all hardware solutions that result in load reduction. Over time, advances in technology allowed this list to be expanded to include some new products. For instance, LED replacements for fluorescent and incandescent lighting sources, not available at the program's inception, are now being applied by ESCOs in a number of applications. Measures that rely on control systems or changes in control settings were not allowed because the opportunity to alter the controls to reduce or eliminate the load reduction could not easily be monitored.

Table 1. Eligible Load Reduction Measures

Lighting
• Replace existing lamps or other lighting equipment with lower wattage equipment through the use of hard wired fixtures, permanent socket modifiers or locking devices • Replace existing incandescent fixtures, HID or metal halide with lower wattage fluorescent fixtures • Replace existing incandescent lamps with hard-wired compact fluorescent • Replace exit signs with LED exit signs or lower wattage than existing exit signs • Replace standard fluorescent with higher efficiency lamps • Replace existing ballasts with higher efficiency ballasts • Replace fluorescent fixture with high efficiency lamp and high efficiency ballast
HVAC
• Replace electric air conditioning with more efficient units or upgrades that increase the overall efficiency • Replace electric air conditioning with gas or steam air conditioning • Install thermal storage for on-peak cooling • Replace electric refrigeration with more efficient units or upgrades which increase overall efficiency • Replace existing electric water heaters with alternative fueled water heaters or with heat pump water heaters
Mechanical/Other
• Replace existing motors with higher efficiency motors • Install clean distributed generation ("DG") that is isolated from the Con Edison electric system • Other measures proposed by ESCOs and deemed acceptable by Con Edison

Screw-in compact fluorescent lamps (CFLs) were required to have some sort of locking device to prevent or discourage later replacement with incandescent lamps; the ESCOs employed modified-based CFLs along with socket modifiers – disks that prevented a standard Edison base incandescent lamp from being used. Customers accepted the use of these types of CFLs, and ESCOs committed to providing replacements to the customers.

For distributed generation (DG), Con Edison imposed limits on emissions ("clean DG," consistent with New York City and State regulations), and required that the loads served by the DG system be permanently isolated from the Con Edison grid; the Con Edison network could not be used as a back-up in the event of DG failure.

Load reduction under the program was based on connected load, and the load had to be in use during peak period hours: from noon to 6 pm for daytime peaking networks and from 6 pm to midnight for evening peaking networks, May 1 through September 30. Some exceptions to the connected load criterion were made. For instance, load reduction associated with replacement of a chiller plant was based only on the units in use; back-up units were not credited since they would not normally be in service. Permanent removals were allowed, but not on a wholesale basis. Thus, the load associated with a building that was to be demolished could not be counted. On the other hand, in a space with 100 lighting fixtures upgrading 50 and permanently removing the other 50 would be allowed, as long as there was no overall degradation in the quality of the lighting. Finally, load reduction associated with plug loads for commercial and industrial customers was not allowed; table lamps and other non-hardwired equipment were unacceptable unless hardwiring was carried out as part of the upgrade. This requirement was relaxed in Phases II through IV, but only for residential customers in evening peaking networks.

To ensure the load reductions would persist for the duration of the planned infrastructure deferral, Con Edison initially required that ESCOs maintain the measures for 10 years following installation. ESCOs were required to provide an annual certification to Con Edison that the installed load reduction measures were still in place, had been restored, or, if "lapsed," had been replaced with equivalent load reductions at new customer sites. In Phases II through IV, this requirement was reduced to the duration of the planned deferral, typically 2 – 5 years. In addition to these certifications, Con Edison required ESCOs to provide access to customer locations with 30 days notice in order to verify the status of load reduction measures during the deferral period.

The M&V Process – Ensuring Permanent Load Reduction

A unique aspect of the Targeted DSM Program is the rigorous measurement and verification process employed. Con Edison, recognizing the importance of this program to ensuring system reliability, requires 100% verification of existing equipment (to determine the base load) *and* 100% verification of replacement equipment (to determine the final load) in order to precisely determine the load reduction achieved. This process is carried out through pre-installation and post-installation inspections at each commercial and industrial customer site that participates. These are supplemented by additional inspections, carried out at various times after the post-installation process is completed, to ensure the persistence of the load reduction.

Con Edison contracted with ICF International to provide turnkey M&V services to the program. Working with Con Edison, ICF developed the M&V inspection protocols and the reporting processes both to and from the ESCOs. ICF also monitors and reports to Con Edison on each ESCO's progress toward its load reduction targets.

A key and unique feature of the M&V process is that no instrumented measurements are made to determine the actual load reductions. As explained below, the M&V process is carried out pre-installation and post-installation, and includes a visual verification of the affected equipment. For lighting projects, this is not an issue, since the wattage of lamps and lamp and ballast combinations are well documented. Equipment operating hours are not important since only the kW impacts are considered, not the kWh impacts. For more complex projects, such as large air conditioning or chiller projects, a combination of visual confirmation, manufacturers' literature and specifications, and engineering calculations are employed.

A huge amount of data is tracked by the program, as will be made clear below. The following sections summarize the M&V process used for the commercial and industrial customers participating in the program. A description of the modified process used for residential customers is presented later in this paper.

Pre-Installation Process

The M&V process begins when the ESCO submits an Implementation Report (IR), which provides basic information about the customer (name, address and Con Edison account number). It also includes an inventory of the existing equipment to be replaced (characterized by type of equipment, number and unit wattage), a description of the replacement equipment to be installed (type of equipment, number, and unit wattage), and a signed agreement for each customer. Con Edison verifies customer eligibility to participate (valid account without issues and location in one of the targeted networks), and ICF verifies that the existing and replacement equipment are acceptable. Discrepancies are transmitted to the ESCO for correction.

If there are no issues with the IR, a pre-installation inspection of each site is scheduled so that ICF can verify that the equipment listed in the IR is actually in place. This check includes verifying the types of equipment, the wattages, the quantities, and the locations (the ICF inspector has a site-specific inspection worksheet pre-loaded with information from the IR). The inspector is required to verify 100% of the existing equipment at the customer site, noting any discrepancies on the worksheet. A representative from the ESCO is also present to ensure access and quick identification of locations and equipment.

The results of the pre-installation inspection are provided to the ESCOs in the form of an IR Discrepancy Report, which is basically a modified IR with columns indicating "as submitted" and "as found" that correspond to each line of the original IR (with lines added if there is additional equipment found at the site). This establishes the base load for the customer location. At this point, the ESCO can proceed with the retrofit work.

Post-Installation Process

The post-installation process is similar to the pre-installation process. It begins when the ESCO submits a post-installation report (PR). It is similar in form to the IR, providing basic customer information and details concerning the actual retrofits installed. The PR is reviewed to make sure that only equipment verified at the pre-installation inspection is included, and that the installed measures are eligible under the program. If there are issues with the PR, it is returned to the ESCO for correction; otherwise a post-installation inspection is scheduled.

The post-installation inspection process is similar to that employed for the pre-installation inspection. Again, the ICF inspector is required to verify 100% of the equipment at the customer site, and an ESCO representative is present to ensure access and quick identification of locations and equipment. To maintain the integrity of the process, the inspector who carried out the pre-installation inspection typically does not carry out the post-installation inspection.

The results of the post-installation inspection are provided to the ESCOs in the form of a PR Discrepancy Report, which is a modified PR with columns indicating “as submitted” and “as found” that correspond to each line of the original PR. This establishes the (reduced) load represented by the new equipment and allows the overall load reduction to be computed.

The ESCO is paid an amount per kW of load reduction achieved, with the price varying from among networks as described above. ESCOs can invoice for 90% of the amount due after the post-installation inspection is complete, with the balance paid in equal increments over the deferral period to ensure maintenance of the measures. (Phase I payment terms were less standardized but generally followed this same pattern.)

Follow-up Inspections

Follow-up inspections are carried out on a regular basis to verify the persistence of load reduction during the deferral period. These inspections are initiated by Con Edison from a random sample (or in some cases, a targeted sample) of customer sites. They are carried out in a similar fashion to the post-installation inspections described above.

Data Tracking

The M&V process is integral to the program’s data tracking efforts. Load reduction (actual or estimated) is tracked at each step of the program (IR submittal, before and after the pre-installation inspection, before and after the post-installation inspection, and during the maintenance period). The robust data tracking system allows a snapshot of program status to be developed on a weekly basis. It also provides Con Edison with weekly progress toward load reduction targets, by program phase, by vendor, and by network. The system is also integral to determining the amount and timing of any liquidated damages due for load reduction shortfalls.

Program Evolution – Adding Residential Customers

The program was expanded in Phase II to include evening peaking networks comprised mostly of residential customers. Con Edison allowed residential lighting measures, including plug loads, as they appeared most able to provide coincident load reductions at these hours. ESCOs quickly adopted a business model that offered comprehensive, free CFL change outs to residential customers. In this model, the ESCO would visit a home or apartment and change all the bulbs at once, removing the old bulbs and CFL packaging for later verification. The concept proved very easy to market and convenient for customers. ESCOs providing this service had no problem achieving their load reduction goals and in some cases had to turn customers away.

A new verification process called “tag-and-bag” was developed to minimize the disruption that multiple, on-site inspections would have created for residential customers. Tag-and-bag works as follows: ESCO installers are required to save the lamps removed from each residence as well as the packaging from installed CFLs. (The predominant measure implemented is incandescent lamp replacements with CFLs.) A customer agreement is executed (with valid customer account information) that includes an inventory of incandescent lamps removed and

CFLs installed. The lamps, packaging, and agreement/inventory are bagged together and delivered to the ESCO's warehouse, where in ICF inspector verifies the contents of each bag. Inspectors tally the total wattage of the lamps removed and the total wattage of the CFLs installed (from the packaging) to determine the load reduction. ICF retains a copy of the customer agreement/inventory for data entry and performs a 100% QA/QC check. The incandescent lamps and packaging are defaced with a permanent marker by the inspectors to prevent ESCOs from re-using them. A limited number of follow up inspections are performed to ensure ESCOs don't overstate the number of replacements or claim credit for unapproved locations such as closets.

Successes

Load Reduction Achievements

Figure 1 shows the progress towards load reduction targets from 2005 through early 2010. While significant progress has been made, there have been some shortfalls. For instance, Phase I was expected to deliver 47 MW of load reduction but achieved slightly less than 40 MW. Consequently, sizable liquidated damages were collected from several ESCOs. Progress to date in Phases II through IV has been mixed. Load reduction in the evening peaking networks has been delivered ahead of schedule, while ESCOs targeting commercial customers in daytime peaking networks have struggled somewhat due to the economic recession. Fortunately, the recession has also reduced demand, ameliorating the impacts of most shortfalls.

Figure 2 shows the breakdown of load reduction by measure, with linear fluorescent and CFL installations shown separately for residential and commercial/industrial customers. Higher efficiency lighting is the predominant source of load reduction, accounting for over 96% of achievements to date. For residential customers, the predominant measure employed is replacement of incandescent lamps by CFLs (a small amount of residential load reduction was achieved by upgrading kitchen and bathroom linear fluorescent systems in a single master-metered high-rise apartment complex). For commercial and industrial customers, load reduction is mostly due to linear fluorescent or CFL replacements.

This breakdown highlights an important aspect of the Targeted DSM Program's design: it relies purely on market-based mechanisms to determine the lowest cost mix of efficiency measures necessary to generate a given load reduction. For customers, lighting retrofits typically provide rapid payback and can be highly subsidized to minimize up front capital outlays. For ESCOs, lighting upgrades afford high margins and are easier to market than other measures. In the end, ESCOs are free to meet their load reduction obligations as they see fit.

As a result, there have been very few mechanical projects (HVAC and motors) to date, probably because of the significant customer cost share required. However, where load reduction goals are high and further penetration of lighting measures becomes difficult, ESCOs are being driven to seek more load reduction from HVAC and mechanical upgrades. In particular, this has been observed in lower Manhattan where contracted goals are very ambitious.

Despite the inclusion of distributed generation among the acceptable load reduction technologies, to date no DG projects have been developed by the ESCOs (though several are in the pipeline). This is likely due to a number of factors, including the high cost, the requirement to forego backup service for the load reduced, and the presence in the market of other (NYSERDA) programs that can offer higher incentives with fewer drawbacks.

Figure 1. Progress toward Load Reduction Targets (Total Goal = 149 MW by May 2012)

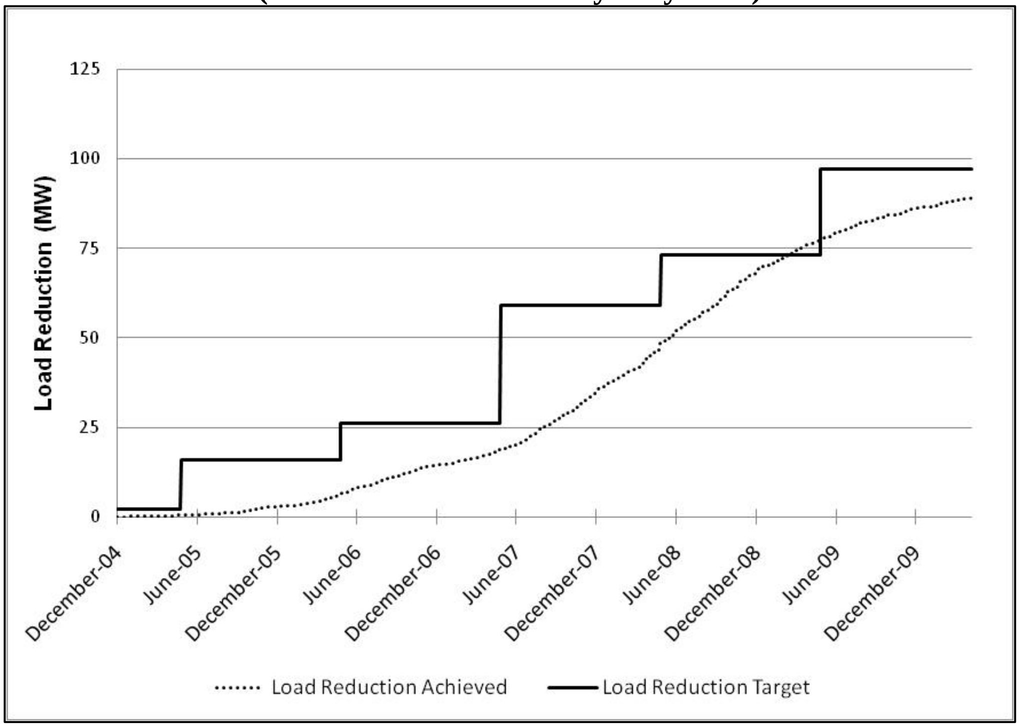
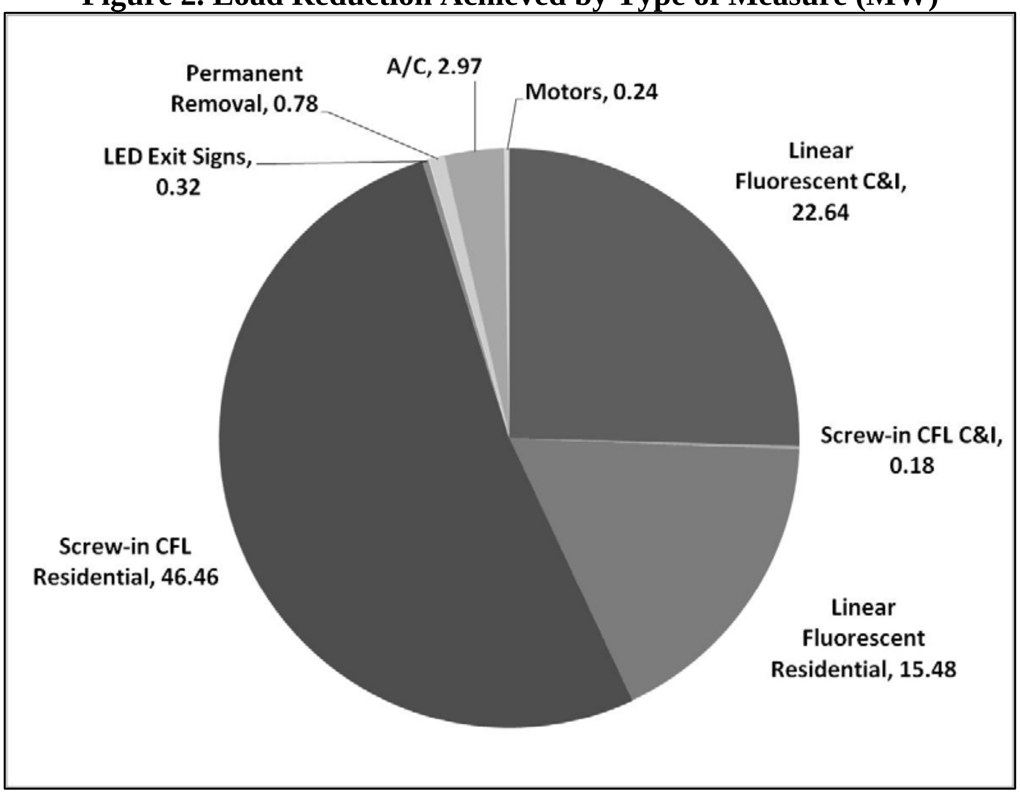


Figure 2. Load Reduction Achieved by Type of Measure (MW)



Numbers and Types of Customers Engaged

Table 2 shows load reduction results by type of customer. Residential customers living in apartment buildings and single-family homes account for 85% of participants and slightly more than 50% of the total load reduction to date. The next largest end-use sector is the commercial sector, which includes a diverse group of businesses ranging from small storefronts (for example, delis, dry cleaners, beauty salons, and restaurants) to large retail establishments. The program also includes among its participants numerous houses of worships, country clubs, government buildings, educational institutions, commercial office buildings, and such well-known New York City landmarks as the Intrepid Museum and Penn Station.

Cost-Benefit Calculations

Con Edison's most recent estimates indicate that the Total Resource Cost (TRC) of the Targeted DSM Program will ultimately range from 2.2 to 2.8 after adjustment for coincidence, free-ridership, and other relevant factors. Table 3 summarizes various TRC estimates by project. Note that Navigant Consulting was retained early in the program to perform an independent evaluation of Phases II – IV. (Navigant 2009) As a result of both the Navigant findings and reductions in forecasted load following the economic recession, Con Edison instituted large-scale changes to contractual goals, pricing, and program delivery that have dramatically raised expected TRC values. In particular, contracted DSM was reduced by 45 MW and price reductions up to 30% were negotiated with ESCOs. The revised TRC estimates are provided in the far right columns of Table 3.

A major driver behind the increase in TRC estimates is the effect of the recent economic recession, which has significantly extended the deferral of some T&D projects. This was an important outcome: using DSM to defer projects bought time for demand uncertainty to resolve, leading to better capital decision making. Moreover, widespread policy and cultural shifts favoring energy efficiency may further defer some projects to the point where they are never needed (shown in Table 3 as "Perpetual Deferral"). In fact, Con Edison has projected that in the absence of this program it would have installed up to $85 million in capacity expansions that may never have been needed.

Examining TRC estimates on a more detailed level reveals that commercial measures were much more cost effective than residential (2.4 to 3.1 vs. 1.5 to 1.8). Navigant's independent evaluation found that the coincidence factor for residential CFL lighting ranged from 19 to 34% (higher in Manhattan, lower in the suburbs); therefore, many residential DSM contracts had TRC values under 1.0, except in cases where the recession significantly extended deferral periods. As a result of this finding, Con Edison negotiated price reductions to existing contracts that improved TRC values somewhat; but there are no plans to continue using this measure in the future, unless ways can be found to deliver it at a much lower cost.

Figure 3 shows the contributions of various cost and benefit metrics to the TRC (before utility incentives). Importantly, the relative benefit from T&D savings is much higher than in general, non-targeted DSM programs. Con Edison believes that successful targeting of DSM increases the T&D benefit substantially and the Targeted DSM Program appears to confirm this. Internal simulations indicate that small amounts (under 100 MW) of targeted DSM can currently increase Con Edison's avoided T&D costs by a factor of 10 to 100 over the same amounts of non-targeted (randomly distributed) DSM.

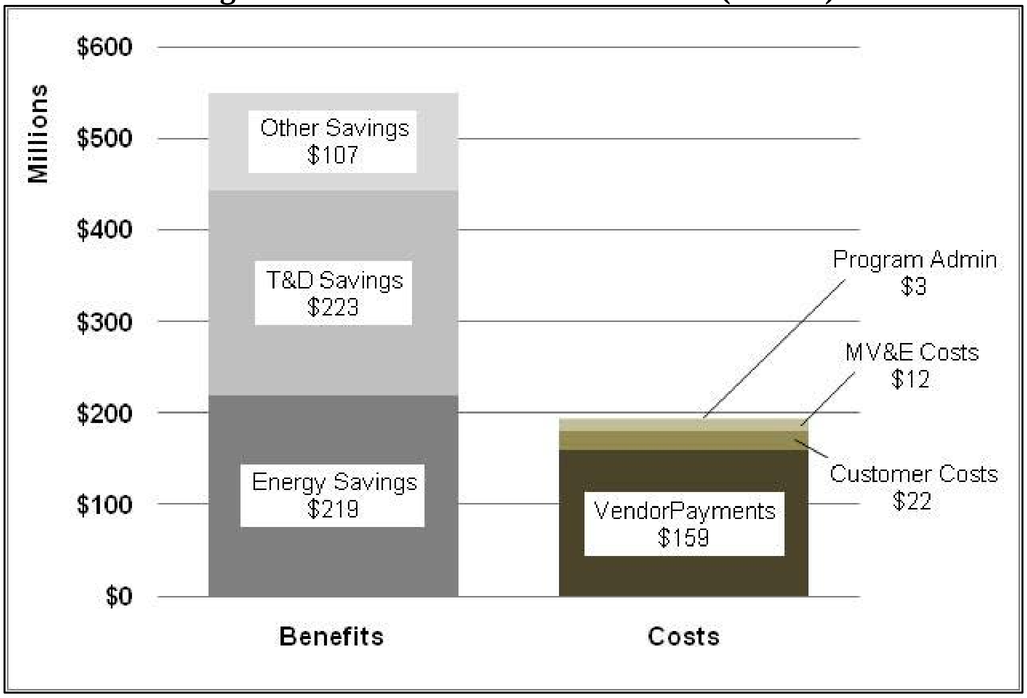
Table 2. Load Reduction Results by Type of Customer

Customer End-Use Sector	Load Reduction by Type of Customer		Number of Participating Customers	
	MW	**% of total**	**Number**	**% of total**
Commercial	18.0	20.2	3,724	8.4
Commercial Services	0.3	0.4	85	0.2
Education	3.8	4.3	424	1.0
Government	0.4	0.5	15	0.0
Hotel	2.9	3.2	78	0.2
House of Worship	1.4	1.6	197	0.4
Manufacturing	1.7	1.9	211	0.5
Medical	1.3	1.5	253	0.6
Non-Profit	2.8	3.2	355	0.8
Office Building	6.9	7.8	687	1.6
Private Club	0.6	0.7	59	0.1
Residential Apartment	35.9	40.3	32,365	73.1
Residential Single Family	12.3	13.8	8,588	19.4
Theater	0.6	0.7	42	0.1
TOTAL	**89.0**	**100.0%**	**47,083**	**100.0%**

Table 3. Summary of TRC Calculations by Targeted Project

Phase	Load Area	Peak	Project Cost (M)	DSM (MW)	Navigant TRC	Con Edison TRC	Perpetual Deferral
1	Fordham	Day	10.0	6.5		5.3	n/a
	Astor	Day	145.0	14.3		2.9	n/a
	Brownsville	Day	7.1	18.7		2.1	2.6
2	Bensonhurst 2	Evening	7.0	15.4	0.5	2.1	2.7
	White Plains	Day	10.6	15.1	1.3	1.2	2.1
	Woodrow	Evening	29.0	4.4	0.8	0.7	n/a
	Fox Hills	Evening	0.5	8.8	0.4	2.0	2.1
	Willowbrook	Evening	0.5	5.5	0.4	0.6	n/a
3	Avenue A	Day	15.0	4.0	1.8	6.9	n/a
	Hellgate	Evening	5.5	6.6	0.4	0.8	n/a
	Harrison	Day	0.5	6.2	0.9	1.4	1.4
3 & 4	Wainwright	Evening	1.7	2.2	0.6	1.2	2.6
4	East 13th Street	Day	36.5	38.0	1.6	2.4	3.6
	Millwood West	Evening	1.2	1.1	0.4	1.3	3.3
Total	Residential	Evening		44	0.6	1.5	1.8
Total	Commercial	Day		103	1.7	2.4	3.1
Total	Program	All		147	1.5	2.2	2.8

Figure 3: Relative TRC Contributions (dollars)



Challenges

Degradation of Load Reduction – Customer Turnover

The New York Metropolitan area is typified by change. With the economic downturn, many local small businesses have closed. Others have relocated, expanded, and/or remodeled. Residential housing turnover can also be high, particularly in rental units. And buildings are continually being demolished to make way for newer and larger versions.

To ensure load reductions are maintained, each ESCO is required by contract to annually certify that the load reduction achieved is sustained over the length of the planned deferral. Any degradation in load reduction is to be cured by the ESCO within 30 days of discovery. As discussed previously, Con Edison holds back 10% of invoiced payments to ensure that ESCOs deliver on this commitment.

However, with over 40,000 participating customers, the certification and verification of load reduction in each site by the ESCOs is a daunting task. As part of the M&V process, follow-up inspections were attempted or carried out at several hundred participating customer sites. Some sites were chosen at random, others because of changes in the status of the customer account. As would be expected, most of the replacement equipment remained in place and there was no degradation in the load reduction. In some cases, however, some or all of the load reduction equipment was removed due to factors such as relocation, remodeling, or failure.

The scheduling and completion of these follow-up inspections is time-consuming and costly, both to Con Edison and to the ESCOs. In addition, lower demand as a result of the recent economic downturn has reduced the need for this maintenance in many networks. Instead of continuing this verification process, Con Edison and ICF developed a plan to carry out a series of "degradation" inspections in a small but statistically significant random sample of customers in each ESCO's contracted networks. The degradation results, expressed in percent load reduction degradation per year, were used to modify the tail payments based on the amount of load reduction actually sustained.

The results of the inspections and analysis showed that the annual degradation in load reduction ranged from about 1% to 6% per year for a random sample – indicative of the total population of affected customers. For the long Phase I tail, Con Edison converted the remaining modified stream of payments to a net present value, and offered to buy out the ESCO's recurring tail payments with a one-time payment. Several of the ESCOs have accepted this buy-out (the processing is continuing for other ESCOs as of this writing).

Marketing the Program and Engaging Customers

In the original program design ECSOs were responsible for all marketing, sales, installation, and maintenance of DSM measures, with Con Edison providing only administration, oversight, and M&V (through ICF). In particular, ESCOs were not given access to any customer data, nor were they allowed to leverage the Con Edison brand in their marketing. They were provided only a simple letter of introduction. This especially hindered sales for ESCOs targeting commercial customers, as New York City businesses were characteristically skeptical when approached by ESCOs marketing the program. Sales to commercial customers were also severely affected by the economic recession in 2009. (The recession did not significantly affect uptake among residential customers, as these programs required no customer cost share.)

With the launch of numerous, non-targeted energy efficiency programs in late 2009 under its own brand, Con Edison relaxed previous restrictions and allowed co-branding and other joint marketing efforts in the Targeted DSM program. It is believed this will enhance sales and achievement of targets. Direct experience from a pilot initiative demonstrated that when Con Edison staff accompanied ESCO's in door-to-door sales calls to make an introduction, customer willingness to listen to the initial pitch rose from 30% to over 90%. However, the increase in further conversion rates was not as dramatic, suggesting that other factors (like economics) were still primary drivers to program uptake. In general, customer satisfaction was found to be very high, although some noted that the time from contracting to installation was long.

Where Do We Go From Here? Higher Precision Targeting

Con Edison considers the use of DSM to defer infrastructure investments in the primary distribution system to be a success, and is now turning its attention to targeting the secondary distribution system. This is more challenging because the affected area may be only a few city blocks, meaning the pool of potential customers may be very limited. The targeted customers could include a handful of businesses; a few thousand residential customers along a suburban feeder; or, in one case currently being tested, a single building housing a number of data centers.

Local targeting also requires much more effort to identify and prioritize load relief projects. The strategy employed is to collect a list of potentially overloaded circuits across the service territory, and then work with each engineering region to identify test cases. Because the planning and implementation cycle for secondary load relief is shorter (from September to May), it was decided not to initially address reinforcements needed for the following summer. Instead, medium-priority reinforcements were targeted. Con Edison has over 100 such projects that are not funded in the current year. Ultimately, each will be prioritized by capital savings per kW of required load relief, but collecting the requisite cost data is still in progress.

The next step is to examine the customer set served by each transformer or feeder against the set of available energy efficiency programs offering coincident measures to determine if there is sufficient load relief potential available through efficiency. For selected projects, existing energy efficiency programs are aggressively marketed to the targeted customers. Con Edison has filed with the Public Service Commission for a New Targeted Program that would provide additional efficiency funds specifically for secondary load relief. If approved, the company plans to solicit bids for megawatt sized blocks of DSM capacity from ESCOs and then deploy this capacity in smaller chunks as needed to target selected circuits.

Con Edison is currently testing these concepts in networks covered by the current Targeted DSM program and also in areas where non-targeted efficiency programs can be leveraged. The sole completed case involves an effort to defer transformer vaults around a four block zone in Manhattan. Con Edison staff partnered with the ESCO and ICF in several door-to-door marketing campaigns. The gains from this effort, coupled with other vendor achievements in this area, were sufficient to defer a transformer vault, saving at least $500,000 in capital costs. This savings is incremental to the T&D deferral savings in the primary distribution system that justified the original load reduction contract and should significantly outweigh any incremental costs from the effort, ultimately increasing the expected TRC. Con Edison believes that creating savings on multiple system levels from the same efficiency projects is the best strategy for further enhancing the value of the Targeted DSM program.

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Reference

Navigant Consulting, Inc. 2009. "**Evaluation of Targeted Demand Side Management Program**," prepared for Consolidated Edison Company of New York.