Breaking Market Barriers to Major Demand Side Management Investments in a Large Financial Institution

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ABSTRACT

This paper presents the challenges, successes and methodologies of an innovative fleet-wide approach to Integrated Demand Side Management (IDSM) in large commercial buildings through an enhanced energy management approach. PG&E developed the More than a Million (MTM) offering which provides the full portfolio of IDSM programs and technical support for customers who commit to working toward a target of more than a million watts of peak demand reduction (hence MTM) for their building fleets. This paper explains how MTM works with the customers' capital budgets over a period of years, using real estate investment indicators like ROI, IRR and NPV to make IDSM investment decisions. It describes the methodology of the MTM's team approach, and customer collaboration with consultants and PG&E staff through a dedicated team, pursuing mutually agreed efficiency strategies and targets. It presents results of the ENERGY STAR Portfolio Manager benchmarking tool as a dashboard for identifying IDSM opportunities and monitoring implementation effectiveness. The paper summarizes successes resulting from the right combination of customer, consultants and utility staff by highlighting the workings of an MTM partnership between PG&E and a large financial institution. Within two years of this particular MTM offering, PG&E and the customer have achieved over a 300% increase in energy savings, compared to the traditional approach used prior to 2007. Energy efficiency activity has expanded to a substantial portion of the customer's buildings portfolio.

Introduction

The social, economic, environmental challenges from human induced global climate change puts emphasis on GHG emissions reductions. The utilities have a significant role in helping their customers reduce energy consumption as a means to achieve GHG emissions reduction goals being established by international agreement.

Traditionally California utilities and utilities from other states offering customer economic incentive programs for energy and demand savings have developed systems of working with large commercial customers that are based on local utility service representatives and or third party implementers making individual connections with building engineers and facilities managers on a building by building year by year basis. This method has been effective in establishing an increasing rate of IDSM energy and demand savings delivery, but has inherent limitations regarding pace of energy efficiency activity as well as potential to scale up rapidly.

Turnbull and Reed in their 2008 ACEEE paper, *The Commercial Building Market Structure: An Act with Five Players,* provided detailed market based information to understand the nature of ownership and decision-making in the large commercial segment, and the nature of the challenge. Based on the findings of this paper and subsequent studies, PG&E hypothesized designing and piloting a more customized, integrated, robust, financial, and informed approach where PG&E working with qualified, willing and able customers could accelerate the rate at

which IDSM energy and demand savings are delivered. Essentially PG&E envisioned using the structural complexity of the customer's and the utility's organization and programs as opportunities for synergies to improve the IDSM delivery rate.

New Methodology: Enhanced Energy Management Services (EEMS)

The new approach called Enhanced Energy Management Services (EEMS) had to address the deficiencies of the traditional approach, such as 1) inconsistency of IDSM efforts on the part of both the utility and the customer, 2) lack of coordination among customer's staff and service providers with those of the utility, 3) challenged access and appropriate communication with financial decision makers, and 4) large number of IDSM programs being offered to the customer at different times by different parties.

Figure 1: Energy Star Guidelines for Building Management

The new enhanced approach has critical differences to the traditional approach. First is to carefully select customers that are willing and able to make a commitment to savings targets and to doing the work required. At the utility, EEMS includes comprehensive consulting support services from outside consultants. EEMS establishes a working group that meets monthly and is composed of customer staff, service providers, utility staff and the EEMS Consultant. EEMS generally follows the Energy Star Guidelines for energy management of large commercial facilities[1] as seen in Figure 1 courtesy the Energy Star website.

[1] http://www.energystar.gov/index.cfm?c=guidelines.guidelines_index.

EEMS includes the creation of an action plan where activity is divided into annual cycles based on the customer's capital budget and expense cycles over several years. It uses Energy Star Portfolio manager as a key assessment tool for the building fleet's energy performance and as a dashboard for documentation of the impacts of the IDSM project work. Projects are often bundled together for presentation to the financial decision makers. The standard real estate investment indicators e.g., IRR, NPV, ROI, and SPP are calculated to provide financial decision makers with the values they traditionally need to make a quality investment decisions.

The More Than a Million (MTM) Offering

Key Terminology

Term	What it means
MTM	More Than a Million offering by PG&E
DTST	Dedicated Technical Support Team – a customer-PG&E-consultant team that operates the MTM initiative
IDSM	Integrated Demand Side Management
EEMS	Enhanced Energy Management Services

What Is an MTM?

MTM is a specific offering of the EEMS approach where it is estimated that there is a high likelihood for a reduction of more than a million watts (>MW) from total building fleet peak load, hence the offering name. The customer commits in principle to work with the utility and it's energy management consultant toward implementation of a IDSM project portfolio that will save approximately 1 MW or more of electric demand, with associated kWh and Therm savings. PG&E, in turn, commits resources and incentives for energy efficiency upgrades. Demand Response savings are also counted in the goal.

The goal for PG&E is to engage the highest levels of decision-makers in each customer organization, to understand their financial and social motivations for energy efficiency capital spending, and then to channel the PG&E portfolio of IDSM programs to support energy efficiency activities. The guiding principle is that engagement of the highest-level of decision-makers will enable a much more robust portfolio of projects than that which could be assembled site-by-site. This does not diminish the role of the individual site managers or engineers, but rather provides a platform to integrate their efforts and those of the various PG&E staff groups. The MTM is not another IDSM program in itself; rather it is a vehicle to deliver the existing mix of the utility IDSM programs in a more efficient, targeted manner to a larger share of a large customer's fleet.

A number of key activities define and separate the MTM approach from that of the traditional IDSM approach. In the MTM approach, the customer and PG&E:

- Establish a Dedicated Technical Support Team (DTST) to coordinate and lead the IDSM activities for the customer. This team includes the PG&E IDSM program staff and assigned customer representatives, customer representatives, and the energy efficiency consulting firm hired by PG&E to manage the DTST on a day-to-day basis.
- Establish and track efficiency at the building fleet level
- Establish criteria for project selection and funding

- Benchmark a mutually agreed set of facilities using the EPA Portfolio Manager
- Establish a project portfolio, schedule and savings target
- Select appropriate PG&E IDSM program for each project
- Execute PG&E program incentive applications/agreements in a timely manner
- Implement projects, and fulfill incentive program requirements
- Aggregate IDSM measures across facilities to maximize incentives and savings

The energy efficiency consulting firm hired by PG&E to manage the DTST and MTM process is chosen based on their expertise with energy efficiency in buildings of a particular type, but also based on their project management experience and team-building capabilities. The MTM approach depends on providing objective advice and forming a tight-knit team between the customer, PG&E staff and the consultant.

The MTM Value Proposition

Most customers want to increase their bottom-line profitability, and reducing utility costs can help with this objective. For some customers concerns about environmental stewardship, green image are also of concern. In the MTM approach, understanding the motivation of the customer and providing appropriate services to help the customer achieve those goals is emphasized. Whatever the mix of concerns and goals it is important to identify what they are and who has them. Different individuals within organizations have different objectives regarding financials and environmental goals. One also must understand the approval chain and who holds the approval authority for what level dollar amounts. In this approach we always attempt to work from the top down than from the bottom up. When a high level financial executive provides budget ballpark amounts that they are willing to consider if certain criteria are met or exceeded then all those in the downstream hierarchy are much more motivated to spent time on MTM goal achievement.

The MTM can provide benefits that the customer may not be aware of in the traditional IDSM approach. For example, benchmarking support provided by the MTM helps the customer with meeting CA AB 1103 requirements (see Benchmarking section below). Providing the customer investment instruments (IDSM project portfolios) that provide significant return on investment over the measure life can offer tangible investment income for the company. We typically used ten year stacked cash flow financial MS Excel spreadsheets for this analysis. It is important to understand that when the customer wins the utility wins as well so there is a natural alignment of goals and effort.

A Good Candidate for the MTM Approach

The first and perhaps the most significant step in an MTM agreement is selecting an appropriate market player or customer with whom to partner. A pre-requisite is that the customer have a well-defined portfolio of buildings that they own / operate / service / influence, with a significant footprint (many millions of square feet) in PG&E's service territory. The ideal customer should also have an existing process for evaluating capital expenditures for energy efficiency/iDSM projects. A customer who has established commitments for 'green' or 'sustainable' buildings, and especially one that has set aside capital budget to achieve those goals, is a great partner to work with through the MTM approach.

It is equally important to partner with the right individual from the customer's organization, since it is the individuals or 'point' persons from each organization that make the agreement work (or not). While most companies have an energy champion, that person may or may not be the ultimate decision-maker. In an ideal situation, the customer representative is the decision-maker (or part of a decision-making group), controls flow of funds (or is part of a group that controls funds), and is a motivator who can ensure actions from their peers so that any commitments can be followed-through to actionable iDSM projects. If the representative does not have all of those capabilities, then the person or persons who do must also be committed to and engaged with the MTM process.

An MTM Success Story

The MTM approach was first implemented with a large financial institution[2] that has hundreds of facilities in PG&E's service territory. This institution is a large multi-national company with presence in most US states. The facilities range from very small (<1000 sf) to very large (>1,000,000 sf) and include several building types - consumer financial centers to office buildings to Tier-I datacenters. A property management company manages all facilities. Some facilities have dedicated on-site facility and operations staff, but most facilities are too small for dedicated on-site facility staff and thus have one property manager and a pool of engineers assigned to multiple facilities. Decision makers that affect IDSM measures are both based locally - property managers, regional managers - and centrally through a national energy team.

The customer has an established long-term capital spending and energy management protocol that is based largely on a bottom-up process whereby local teams submit requests for funding to the national energy and capital team for approval. There is an annual planning process where projects for next year are identified in advance and funding requests submitted for projects that may not start until the next year. While the local teams know the buildings, the national team knows the funding criteria; both are necessary for projects to proceed. In addition, there are a few top-down national initiatives that are applied locally, and these have a very different process than any of the above.

The complex nature of the building fleet and the involvement of multiple capital and energy project decision makers led to a funding process often driven by conflicting priorities. Before the MTM involvement not all capital projects were viewed by the customer as having energy implications and thus efficiency gains were often not realized. Measures considered regular maintenance such as replacing fans, compressors, re-lamping of light fixtures were done independent of any energy efficiency initiatives and thus IDSM opportunities were missed. Contractors also drove many retrofit efforts rather than engineering staff, resulting in the lowest first-cost measures (typically lowest efficiency allowed by standards) being installed.

While there were the above-mentioned challenges, there was also fertile ground in that the customer had an established long-term capital spending and energy management protocol. The opportunity was there to identify stronger ties between the various capital and energy initiatives, but the missing piece was the dedicated effort needed to look at all capital funding through the lens of energy efficiency. This is where the MTM and the DTST stepped in to provide leadership and resources.

[2] The institution will not be named here, for customer confidentiality reasons. Further, PG&E has many MTM partners for whom similar stories can be told.

The MTM Process for this Customer

PG&E signed the MTM agreement with the national energy manager for this customer, and a DTST was established, in the spring of 2007. The Heschong Mahone Group Inc. (HMG) was assigned by PG&E as the paid consultant to coordinate activities of the DTST and the MTM.

The DTST started with a kickoff meeting to establish goals and protocols for the MTM. The customer and PG&E agreed to establish a master list of proposed projects through collaboration, and conduct supporting activities such as surveys, audits and benchmarking as needed. The first task was to understand the nature of projects and buildings in the customer's fleet. Potential projects and buildings were identified and categorized by priority as well as suitability for incentives. Special attention was paid to project types that could be applied across multiple facilities. A decision made at the kickoff meeting, and implemented to date is to not consider individual projects or buildings in isolation, but rather evaluate projects for applicability at the fleet level as much as feasible. This process resulted in significant savings in time and effort while increasing the pace and scope of implemented projects.

While we describe the various tasks conducted as part of this initiative below sequentially, it is important to note that the MTM is not a linear process. It is rather one of parallel, mutually supporting activities that are continually refined and repeated. The success of the MTM depends on generating a steady pipeline of projects and incentive activity.

Automated benchmarking as a diagnostic and tracking tool. One of the tools being used to identify buildings to target with IDSM activity is benchmarking the buildings in the customer's fleet. It is important to note that the benchmarking effort within the MTM does not target the 'best' buildings to show how good their scores are, but rather as a tool to identify the biggest energy users and identify where improvement is warranted and feasible.

The DTST kickoff meeting set in motion an effort to enroll the customer's properties in the ENERGY STAR Portfolio Manager[3] through PG&E's Automated Benchmarking Service (ABS)[4]. ABS is an innovative PG&E initiative that automatically provides the ENERGY STAR Portfolio Manager with historical energy usage data for benchmarked facilities, and updates it monthly so the customer does not have to enter meter data manually for each month. This customer became the first large commercial customer to take advantage of the ABS on a portfolio-wide basis. The DTST developed protocols to simplify the process to set up benchmarking of multiple properties at a time, instead of one-by-one, with assistance from PG&E's ABS staff.

In preparation for benchmarking, the DTST initiated billing analysis for all facilities owned/leased by the customer in PG&E's service territory. This analysis identified properties that were the highest users in total energy use as well as in energy use intensity. A set of thirty buildings was selected initially to represent the high energy users, and the list was gradually expanded to the current sixty-six to be representative of the overall portfolio of buildings.

The EPA Portfolio Manager website provides templates for uploading multiple buildings to the Portfolio Manager tool, and there are templates for various building types. To assist the customer in gathering required information, the DTST created a spreadsheet that identified

[3] The ENERGY STAR Portfolio Manager is the Environmental Protection Agency's (EPA) interactive energy management tool that allows one to track and assess energy and water consumption of buildings.
[4] http://www.pge.com/mybusiness/energysavingsrebates/analyzer/benchmarking/index.shtml

information required, which fields were mandatory, and which could be left out. Further, this spreadsheet tool has a number of data fields pre-filled, based on information that PG&E already knows about the properties, reducing the effort required by the customer. Once data is collected, the DTST compiles the information collected from the spreadsheet tool into the template provided by Portfolio Manager. PG&E's ABS staff then uploads the data to Portfolio Manager.

The MTM continues to enroll more buildings into the ABS service, and our goal is to benchmark each of the customer's buildings in PG&E's service territory by the end of this year.

Project identification and evaluation. Benchmarking provides a way to compare buildings, and identify where there are needs to improve, but it does not provide actionable information regarding how to improve the building stock. To gather such information, the DTST combines the knowledge base of its constituents as well as conducts investigative actions. Through constant contact with decision makers at all levels, the DTST maintains a database of energy improvement opportunities and a history of past IDSM activity. Where there are gaps in knowledge, data is collected through facility audits and surveys. These efforts enable the DTST to understand the nature of HVAC, lighting, controls and envelope conditions across the customer's fleet.

Within months of the MTM initiation, a few common patterns became apparent. As expected, IDSM projects were easier to identify and implement in larger properties due to long-term efficiency improvement goals and dedicated on-site facility and engineering staff. Smaller buildings do not have dedicated on-site engineering resources, and so emphasis was on facility maintenance rather than improving energy performance. Thus there was not a well-defined project pipeline for smaller buildings. The DTST started addressing this through information gathering from surveys and communication with local and regional managers and engineering teams. These efforts provided a clearer picture of the challenges and opportunities for IDSM activity.

HVAC systems in most small consumer financial centers were aging and ready for replacement. Changing the existing contractor-driven process based on lowest cost was critical to enable efficiency gains. Providing the national energy team specifications for minimum efficiency improvement targets was a starting point.

Lighting in most facilities was a mix of old T-12 fixtures, some T8 fixtures and some incandescent lamps. A national energy services company was tasked with re-lamping and maintenance of lighting in all small facilities through a maintenance contract, however their scope did not include lighting efficiency upgrades. HVAC controls were another area of potential efficiency improvement - most small facilities lacked on-site energy management systems.

Based on these findings, the DTST started working with the customer to establish a more robust project pipeline that both leveraged existing customer initiatives and, more importantly, started new ones.

Cost-effectiveness criteria. The traditional metric for energy efficiency investments is simple payback. It is common for efficiency projects, especially small ones or those considered within Operation and Maintenance (O&M) budgets, to be considered an expense that must be "paid back." For this customer this was the case for most projects in small buildings. This was in stark contrast to the sophisticated cost-effectiveness criteria used for larger projects and larger buildings. In evaluating large projects, this customer well understood that factors beyond simple payback are appropriate metrics indicating how an investment will perform over time. Return on

investment (ROI), for example, puts efficiency investments on equal footing with other types of investments the customer might make. Net operating income (NOI), capitalization rate (cap rate), and net present value (NPV) are other common metrics utilized by building owners and developers. These can be powerful levers for explaining energy efficiency investment benefits to such decision makers.

The DTST encouraged the customer to consider each potential IDSM activity, regardless of facility or project size as an investment that could pay a return and thus evaluated according to the appropriate financial metric. The DTST also encouraged changing the dynamic between capital and O&M budgets by recognizing that good O&M practices result in efficiency benefits, optimizing efficiency during retrofits reduces O&M costs.

The DTST created a simplified ROI calculator, based on the customer's more complex model but intended for individual property managers and site staff. This simplified tool has since been applied to evaluating project feasibility and cost-effectiveness at very early stages. Thus potential projects can be vetted and prioritized locally before going through the longer and potentially more expensive national review process. An example is in Figure 2 below where multiple efficiency options can be compared to provide the best cost-effectiveness based on energy and demand savings, incentives and IRR/ROI.

Figure 2: Simplified Return on Investment Calculation Spreadsheet

measure	estimated project cost (investment)	estimated annual savings				PG&E Incentives		simple payback	IRR	ROI
		kwh	*peak kw*	*therms*	*$, 1st year*	incentives	program			
Chiller Replacement - High Efficiency	$ 74,000	94,670	11.40	0	$14,201	$ 3,582	NRR	4.96	3.6%	252%
Chiller Replacement - Premium Efficiency	$ 78,000	102,261	17.10	0	$15,339	$ 5,290	NRR	4.74	5.2%	264%

Project implementation and follow-through. Once projects are identified, the DTST assists in preparing IDSM program applications, conducting initial estimation of energy and demand savings and shepherding the applications through the PG&E IDSM program process.

A signature achievement of the MTM effort is aggregating facilities so that those too small to individually qualify for IDSM programs can take advantage of them by grouping with like properties. Thus hundreds of small buildings get the same IDSM program treatment as a single million square-foot property. Combining multiple properties on one IDSM program application also reduces paperwork required from both the customer and PG&E.

The DTST team stays with the project until all measures are implemented and the customer gets paid its incentive. The DTST often serves as a facilitator, bringing the construction team, PG&E, and the customer's national energy team together to overcome obstacles that are typical of implementing retrofit projects.

The importance of documentation. The DTST maintains detailed records of projects that are potential, developing, in-process and completed. This ongoing list is integral to the MTM efforts; serving as both a means to document progress as well as to continually develop projects over a multi-year period. These records are available to the entire MTM team and discussed during monthly meetings for updates and improvements to the process. Continuous monitoring of progress and constant communication with all levels of decision makers enables this MTM to sustain a significant increase in this customer's IDSM activity.

Results to Date for This Customer

The results of this approach have exceeded customer and PG&E expectations as shown in Figure 3 below. Overall savings in the two years following the MTM agreement more than tripled the savings/incentives from the two years prior to the MTM agreement. The savings and IDSM activity continues, and as of end of 2009, the customer has cumulative "post" MTM savings of 2.16 MW, 8.04 GWh, and 8,944 Therms and received incentives totaling $708k.

The customer achieved these significant increases in energy and demand savings through a combination of increased number of projects and, more importantly, significant increase in the number of facilities participating in IDSM programs. Savings come from projects that were incented by various PG&E core energy efficiency programs, demand response programs, and third-party programs. In many instances, the MTM started new initiatives at the customer's national energy team that contributed to this increased activity.

Figure 3: Comparing Pre and Post MTM Savings for the Large Financial Institution[5]

	Program Year	project sites	Savings MW	GWh	Therms	Incentives ($1,000)
PRE MTM	**2005 - 2006**	16	0.26	1.98	1,095	$135
POST MTM	**2007 - 2008**	270	1.73	6.15	1,098	$564
% improvement		*1588%*	*565%*	*211%*	*0.3%*	*318%*

It is important to note that the results for this customer are a direct result of the partnership between the customer and PG&E, but also aided by energy efficiency policies established by the customer at a national level – policies that in many cases were in turn developed through the MTM process. Thus, the ongoing working relationship and commitments by both customer and DTST is critical to success. A couple of examples are:

Lighting upgrades. The existing lighting maintenance contract did not provide any incentives for efficiency upgrades, but fortuitously for the MTM, the contract was up for renewal. The DTST worked with the customer's national energy team to create a significantly re-worked contract with specifications requiring the latest generation high-efficacy T8 lamps and ballasts as incented through PG&E's New Efficiency Options (NEO) program[6]. The DTST collaborated with NEO staff to provide lamp/ballast specifications and provided ROI calculations to justify the high-efficacy upgrades. In addition, where the high-efficiency NEO lighting upgrades were not feasible (even after ROI analysis), the DTST encouraged upgrades to standard T8 (from T12), lighting controls and de-lamping through rebates. The DTST worked with the customer to aggregate facilities into limited number of applications to reduce paperwork, and enhance incentives. The resulting lighting contract and retrofits have resulted in systemic lighting upgrades in over two hundred of the customer's facilities in PG&E service territory in a span of

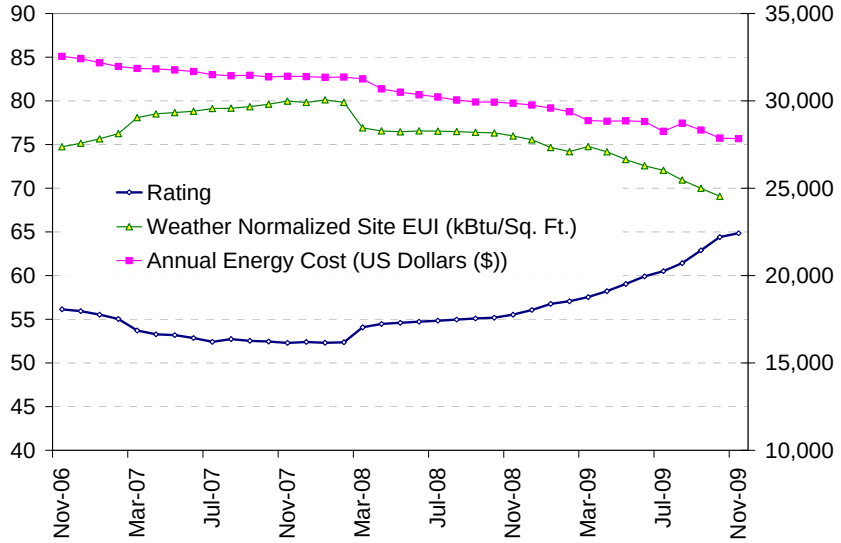
[5] Savings based on installed energy efficiency measures in a given year.
[6] http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/neo/

eight months. Further, the MTM effort enabled several hundred other customer properties outside of PG&E territory covered by the same contract to get the benefits of energy efficiency upgrades.

HVAC upgrades. The DTST assisted property managers with evaluating HVAC equipment retrofit projects to justify installing higher efficiency units rather than lowest first-cost units. The DTST provided ROI calculations to support this decision-making and recommended specific efficiency levels by equipment type. To extend this effort, and to greatly reduce time and efforts for individual projects, the DTST provided specifications language to the customer's national energy team, so they could be inserted in the customer's national energy standards. This enables high efficiency measures to be considered by default in future HVAC retrofits. While these national standards are still being refined, the efficiency levels proposed by the DTST were included in most of the HVAC replacement projects done in 2008/09, increasing IDSM activity.

The energy, demand, and cost savings are perhaps best understood through the lens of the ENERGY STAR Portfolio Manager trends in building rating, weather adjusted energy use intensity (EUI), and annual energy cost. These parameters are shown in Figure 4 below averaged over the sixty-six customer facilities currently benchmarked.

Figure 4: MTM Customer Fleet-wide ENERGY STAR Portfolio Manager Performance



The currently benchmarked building set has improved its overall rating from 54 to 63, and reduced its weather-adjusted percent total energy use reduced by 4.3% from the baseline year – both very positive developments for the customer and the MTM approach. Even more encouraging is to see an accelerated trend towards improved fleet performance and reduced energy costs.

Conclusions

The MTM's holistic approach to building fleets resonates well with customers and other market players. This approach opens doors at high levels within the customer's organization. MTM creates a critical mass of IDSM activity such that results are meaningful to high-level

decision makers—something that is not true of the traditional building-by-building strategy. This approach also encourages changes in equipment replacement policies and procedures, helping to overcome ingrained, first-cost dominated thinking and decisions.

MTM provides opportunities to greatly increase energy savings and the rate of improved fleet efficiency for target customers, even when the average project size is smaller. By providing an avenue to aggregate smaller facilities and projects, the MTM approach makes a larger number of smaller projects feasible and attractive to customers and utilities.

The MTM approach has been pioneered by PG&E for customers in its service territory, though these customers often have facilities in other parts of the country. Some of these facilities have also benefited from the MTM efforts. Opportunity exists for an approach similar to MTM to be implemented across utility service territories to better serve a customer where the individual utility territory is a small fraction of the customers' building footprint.

References

Turnbull et al, "**The Commercial Building Market Structure: An Act with Five Players**," 2008 ACEEE Summery Study, Monterey CA, June 2008

Abhijeet Pande, "**The PG&E More Than A Million Program**," 2009 BECC Conference, Washington DC, November 2009

Duane Larson, "**Influence Models and More than a Million**," Capitol Hill Staff briefing, Washington DC, October 2009