Smart Methods to Enable Direct Install Multi-system Retrofits in Small Commercial Grocery Stores

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ABSTRACT

Small business grocery stores are ready for retrofit across the country. They exhibit relatively high potential for energy efficiency and serve a critical function for neighborhoods and communities around the country. Because of their size and business ownership characteristics, these businesses are passed over by energy efficiency service providers in the absence of incentivized programs. In states that do have incentive programs directed to these businesses, the energy efficiency measures addressed through retrofit change based on the size and type of incentive program. Small business direct install (DI) programs which have the funding and resources to take small business owners through the lifecycle steps of a retrofit project- initiation, audit, measure recommendations, installation, and measurement and verification- are the way to deliver energy efficiency to the resource constrained small commercial grocery sector. After a year of fieldwork and technical analysis on these grocery stores in the Philadelphia area with energy contractor and non-profit community partners, this study offers two sets of findings. First, it offers a technical analysis for energy efficiency measures in DI programs poised to go beyond lighting only offerings through DI. It presents analysis of building energy consumption data and energy efficiency measure costs and corresponding energy savings benefits for a set of small grocery businesses in the City of Philadelphia. Because of the small grocery systems profile, this analysis can provide a reasonable estimate for national energy efficiency potential. Second, it offers research on best practice small business DI marketing methods and introduces a proposal for ways to reduce program marketing costs by sourcing lead generation activities through partner organizations already active in their communities. Finally, a nation-wide impact analysis is included to demonstrate the magnitude of savings that could be available in these small buildings if implemented across the US.

Introduction

This paper focuses on small, independently owned, commercial grocery stores of less than 10,000 square feet (SF) in size. These are otherwise known as convenience stores, bodegas, or corner stores. The focus area of this study includes Pennsylvania, New Jersey, Maryland, and New York territories with small business DI programs. The research of this paper isolates these stores from their larger regular and large grocery counterparts because there is a barrier to access to private sector energy efficiency business that occurs below the 10,000 SF range threshold (NREL 2015). In spite of market leader knowledge of the vast possibility for both business and emissions reductions present in small buildings, and in small grocery in particular, it is often only policy-derived energy efficiency programs like small business commercial DI that have the capacity to unlock energy efficiency in small businesses and their buildings (Funk 2012). For a variety of structural barriers, the energy efficient retrofit industry does not often appeal to these

business owners, finding it difficult to justify the high costs of lead generation, labor, and installation of technologies for the relatively small energy savings (McKinsey 2015). As a result, year after year, these businesses languish in inaction with energy bills that are disproportionately high for their size.

Many policy-driven energy efficiency programs are required to dedicate program resources to small business energy customers, and these programs provide this market with access to technology-specific retrofit projects with subsidized financing. But this only occurs in the areas these programs are available. Acquisition cost is the term used to describe the cost the program administrator pays to achieve a unit of energy efficiency, such as a kilowatt hour; these costs include marketing, labor for retrofit installation, and retrofit technologies. Acquisition costs for DI programs are higher than other, more common, programs like technology-specific prescriptive rebate programs. This is because a DI project takes a small business owner through the lifecycle steps of a multi-measure retrofit project- initiation, audit, measure recommendations, installation, and measurement and verification with a significant discount (usually 60% or greater) on the entire labor and technology package, where as a prescriptive rebate programs usually offer partial rebates on specific equipment without the labor and decision-making support. While higher cost, they are also more effective at implementing multi-system retrofits that achieve higher levels of energy efficiency per building (Funk 2012). Using existing small business DI programs in the study region as a starting point, this paper first examines the small commercial grocery business case for multi-system energy efficient retrofit through DI. The research looks at both CBECS and private sector business data to examine the size of the market to establish the relevance of addressing this market according to the energy efficiency economic development potential. Then, findings from energy consumption data analysis and energy audits performed on a sample set of stores in Philadelphia, Pennsylvania are presented. These findings offer technical measure packages to be implemented in stores across the country. Next, this study examines PA, NJ, MD, and NY DI programs in the context of their marketing practices they use to reach small commercial grocery stores. These findings lead to the introduction of a general model for ways program managers can shift costs from program marketing activities to the project implementation phase.

Small Commercial Grocery Store Market Segment Profile

The average US grocery store spends just under $4 per square foot (SF) on energy bills per year, with electricity accounting for $3.70 of that cost. Per SF, this is three to four times the amount spent per SF in commercial office space ($1.30 per SF), revealing how grocery stores demonstrate a high Energy Use Intensity (EUI). EUI is calculated by dividing the total energy consumed by the building by the gross area of the building, SF or square meters. Data collected on electricity and gas store energy spending in 12 small grocery stores in the city of Philadelphia, finding a wide range of annual electricity energy expenditure levels, from $2 to $13 a square foot for electricity and $.12 to $1.63 for gas. These prices were estimated using an average $.12 per kilowatt-hour and $.47 per CCF. From small grocery, to convenience stores, to bakeries, to meat markets, these businesses are more numerous than might be expected in urban, suburban, and rural communities in the US. This study looked at two databases to estimate the size of this market. Reference USA uses the term “food stores” to refer to these businesses; CBECS uses the term “food sales” to refer to these buildings. In this research, Reference USA is a database used to estimate small grocery businesses in the private sector market; second, the Commercial Building Energy Consumption Survey (CBECS) was used to estimate the small grocery

buildings. In the states studied here, food stores <10,000 SF comprise 65% of the food store market. According to Reference USA, small food stores average 2.5% of the total businesses occupying buildings less than 10,000 SF in these states included in this study (Table 1). Further, According to the most recent CBECS from 2012, there are 153,886 Food Sales buildings that are less that 10,000 SF in size, and they represents 2.7% of the commercial building population (CBECS 2012). Investigators also turned to IBISWorld market research reports on the non-fuel convenience store market. These reports revealed the top 50 companies control only 40% of industry sales in the US (First Research 2012). Because of the relatively low cost to establish a new business or buy an existing one, there are low barriers to enter the industry and this makes it attractive for first time business owners. Of national convenience stores that do not include gasoline sales, 68% of businesses have five or fewer employees and a 1.4% average profit margin (IBISWorld2015).

Table 1. Verified Food Stores in Region of Study and Nationally (Reference USA 2016)

	Very Small Food Stores (<2,500 SF)	Very Small Food Stores/ All Stores	Small Food Stores (<10,000 SF)	Small Food Stores/All Food Stores	All (all sizes)	Small Food Store (<10,00 SF) % of total small businesses
MD	1134	16%	3608	51%	7085	2%
NJ	6861	50%	10705	78%	13809	3%
NY	6244	21%	19167	64%	30048	3%
PA	5552	31%	11111	62%	17783	2%
Averages		31%		65%		3%

This project partnered with The Food Trust (TFT), a Philadelphia-based organization that has been instrumental in helping recruit small grocery store participants. TFT has gained national recognition for their *Healthy Corner Store Initiative*, a program funded by the Philadelphia Department of Public Health that helps hundreds of small grocery stores and convenience stores to provide healthy unprocessed foods in neighborhoods with high rates of obesity and diabetes (TFT 2012). By being the first to map the relationship between proximity to access to fresh, healthy food and income level in Philadelphia neighborhoods, The Food Trust has developed a set of public health programs around the "grocery gap" phenomenon- where urban communities lack a full-service grocery store, a key finding for those who study nutrition and public health. With the *Healthy Corner Store Initiative*, The Food Trust is working to address systemic public health issues on a store-by-store basis with incentives for offering healthy foods and a store certification that continues to mature with the program. After several years of work with small grocery stores, TFT corroborated investigator observations regarding energy challenges small, independently owned grocery stores face:

- Owners are often renters of a building or part of a building and have limited control of the systems
- Owners are often compelled to purchase their own stop-gap HVAC equipment such as window units or fans to supplement failing full-building systems
- Their HVAC and refrigeration equipment is often poor-performing, second hand, and at or beyond end-of-life
- The building electrical wiring is old, overloaded with equipment, and not up-to-code
- The building envelope is in poor condition, which, depending on the season can stress building HVAC and refrigeration equipment

Moving from Single to Multi-System Retrofits in Small Commercial Grocery Stores

Energy efficiency programs in commercial buildings are pressured to continuously improve energy efficiency outcomes while decreasing acquisition costs. DI programs are usually the most expensive program type, in terms of dollars per unit of energy efficiency achieved; for the region studied, the systems story is that the more developed programs are completing comprehensive lighting and comprehensive refrigeration retrofits (and in one case HVAC), while others have not yet moved into refrigeration. Within both refrigeration and lighting, there is a wide variety of measures covered across programs, with some programs implementing limited sets of measures within the two systems and some more comprehensive (Table 2, 3 & 4). In lighting, some programs have not yet brought in LEDs at scale; in refrigeration, some programs, like PECO's, only offer Electrically Commutated Motors and Door Heater Controls, while others, like BGE and SMECO offer more comprehensive refrigeration retrofits.

Table 2. Study DI programs, systems covered, budgets, and financing

Utility Programs	PECO	DL	PP&L	NJCEP	BGE	SMECO	CH	Coned	NG	NYSEG	O&R	RGE
Lighting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ref.	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y
HVAC				Y		N	Y	N	Y	Y	Y	
Plugload												
Hot Water												
Cooking												
Envelope												

Table 3. Lighting Technologies Implemented in Study DI Programs

Utility Programs	PECO	DL	PP&L	NJCEP	BGE	SMECO	CH	Coned	NG	NYSEG	O&R	RGE
Lighting Controls		Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
LED: Lamps	Y	Y	Y	Y	Y	Y	Y			Y		Y
LED: Ballasts		Y		Y	Y	Y			Y			Y
LED: Fixtures	Y	Y	Y	Y	Y	Y		Y		Y	Y	Y
Fluorescent Lighting	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Fluorescent: Lamps	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y
Fluorescent: Ballasts	Y	Y		Y	Y	Y				Y		Y

Table 4. Refrigeration Technologies Implemented in Study DI Programs

Utility Programs	PECO	DL	PP&L	NJCEP	BGE	SMECO	CH	Coned	NG	NYSEG	O&R	RGE
Evaporator Fan Control				Y	Y	Y		Y				
Evaporator Fan					Y	Y						
Anti-Sweat Control	Y			Y	Y	Y		Y				
Venting Machine Control												
Night Covers				Y	Y	Y	Y		Y	Y	Y	Y
Strip Curtains					Y	Y						
Door Gaskets							Y	Y	Y	Y	Y	Y
Door Closers												
Motors				Y	Y	Y	Y		Y	Y	Y	Y
ECM	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y
Suction Pipe Insulation												
Appliances												
Refrigerator LED				Y	Y	Y		Y				

Note: Information for Tables 2, 3, and 4 was gathered during phone calls with utility and/or contractor program staff during the months of February and March, 2016.

Field Study Findings In Small Grocery Stores in Philadelphia, PA

The study has collected data on a set of small grocery stores that represent a range of typical system profiles within this market segment. Seven of the 12 participating stores are building owner-occupied; five are renting their space. Eight of the stores are mid-block buildings; eight stores have walk-in coolers and/or freezers. Table 6 data indicates the majority of the stores are exceeding national averages for electricity and gas spending; 11 of 12 stores exceed the national average for grocery energy spending per SF. Four of the five stores for which gas data is available exceed the national average spending per SF for gas. The highest consuming store exceeds the average by 320% (Table 5). Part of this may be due to the long operating hours of these stores; when compared to all food retail, as many of these stores open early in the morning (7 am) and close late at night (10 pm). When normalized for operating hours on top of store area, store "6" and store "5" are revealed to be the most energy intensive, and store "8" and store "12" are the least.

Table 5. Study stores in Philadelphia, PA

	1	2	3	4	5	6	7	8	9	10	11	12
Operating Hours	3752	5876	5890	5890	2700	3640	2626	3744	4680	4888	3432	3692
Store SQ Ft	938	2025	2442	1945	900	1424	2856	4092	2300	1880	3204	702
Electric Charge per year (12c/kWh)	$6,311	$26,896	$12,536	$15,939	$10,201	$16,867	$12,413	$9,984	$12,625	$19,667	$18,911	$2,681
$/SF annual average	$7	$13	$5	$8	$11	$12	$4	$2	$5	$10	$6	$4
Gas Change per year (.48c/CCF)	NA	NA	$1,893	NA	NA	$2,316	NA	NA	$847	$902	NA	$86
$/SF annual average	NA	NA	$0.78	NA	NA	$1.63	NA	NA	$0.37	$0.48	NA	$0.12
Total	$6,311	$26,896	$14,429	$15,939	$10,201	$19,183	$12,413	$9,984	$13,472	$20,569	$18,911	$2,767

Note: Gas data will be available for some stores.

Figure 1. Annual kWh consumption of study stores

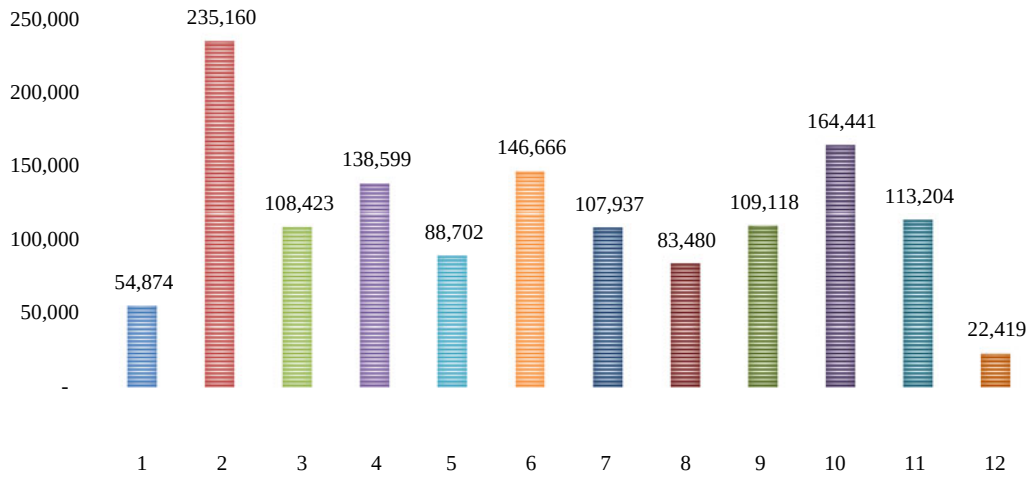


Figure 2. Size and Operating Hours Normalized Electricity Usage (kWh/SF/operating hr)

The data this study has collected from a sample of small grocery stores in Philadelphia, PA reveal that expanding programs to first, move from Florescent to LED installations and second, to include a more comprehensive approach to refrigeration retrofits will lead to dramatic improvements in the energy efficiency achieved for these businesses. CBEI research shows that by taking a comprehensive approach to lighting and refrigeration measures- measures that typically don't require landlord involvement, the stores could save 25% of their energy consumption. By taking a comprehensive approach to both lighting and refrigeration, the stores demonstrated, on average, a 25% energy savings potential. In face, Store 4 underwent an interior lighting retrofit in August of 2014 through PECO's DI program, a retrofit that led to a savings level of 10.5% annually. The study analysis concluded that by installing comprehensive LED lighting and refrigeration measures in Store 4, another 16% of energy efficiency was possible (CBEI 2015). This project has promoted comprehensive lighting and refrigeration measures as "priority" for adoption by DI programs to best serve this segment because they can be implemented in both rented and owned spaces without triggering the split incentive issue. The energy efficiency measures behind these estimates are included below, indicating the benefit of including each additional measure. The data below show the efficacy of lighting, refrigeration measures especially (Table 6).

Table 6. Energy Efficiency Measure and Savings Analysis for Small Commercial Grocery

Measures	Average kW Savings	Average kWh Savings	Average CCF Savings (Gas)	Average Cost	Average Annual Cost Savings
Lighting					
Interior Lighting	1.76	9312		$6,297.27	$942.39
Exterior Lighting	0.73	3562		$1,527.56	$383.75
Refrigeration					
Door Heater Controls (DHC)	0.37	4878		$3,488.65	$585.30
Cycling Evaporator Fans	0.13	w/ DHC		w/ DHC	w/ DHC
Electrically Commutated Motors (ECM) Motors	0.16	1754		$1,181.00	$210.48
Night Covers	N/A	w/ DHC		w/ DHC	w/ DHC
Case LEDs	0.30	9121		$3,001.00	$1,094.46
HVAC					
Ductwork extension	N/A	733	25	$250.00	$87.93
Variable Frequency Drive (VFD)	0.2	3298		$3,212.00	$395.70
Advanced Economizer	w/ VFD	351		w/ VFD	$210.48

Cool Demand Side Ventilation ((DSV)	w/ VFD	216	79	w/ VFD	$25.92
Envelope					
10" Foam Insulation-ceiling	N/A	5823	209	$6,416.00	$104.50
Basement air sealing	N/A	*w/ Insulation*	15	$185.00	$7.50
Basement rim joist	N/A	*w/ Insulation*	7	$390.83	$3.50
Duct sealing	N/A	500	25	$170.00	$60.00
Basement door	N/A	59	2	$300.00	$7.03
Plugload					
Advanced Power Strips	N/A	216	N/A	$120.00	$25.92

Note: Lighting energy efficiency measure data courtesy of Tri-State Light and Energy. Refrigeration system energy efficiency measure data courtesy of National Resource Management. HVAC measure analysis courtesy of Transformative Wave. Envelope measure analysis courtesy of Energy Coordinating Agency. Plugload measure analysis courtesy of Embertec.These organizations performed the audits and provided cost-benefit analysis. These estimates are based on Philadelphia, PA market pricing for parts and labor.

DI Programs and Market-Related Challenges To Acquiring Small Grocery Clients

The technical findings presented in the first portion of this paper suggest a strong public benefit and business economic argument exists for these stores to participate in energy efficiency programs. The second portion of the paper will concentrate on best practices DI programs can adopt to delve deeper into small, independently owned, small commercial grocery market segments. Over a decade of data from energy efficient program work shows how only the "turnkey" or "one-stop shop" comprehensive models have meaningful success with very small commercial energy customers (Quantum Consulting 2004). The caveat is that the program reach can remain limited in small businesses that occupy small buildings, where they are often tenants or only own the building the store uses. A set of well-documented factors contributes to this, enumerated below.

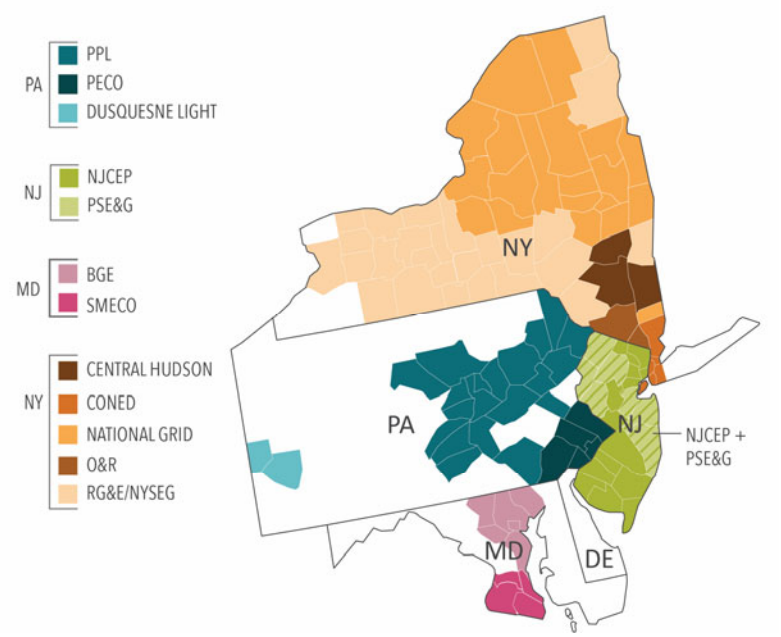
- Small business energy customers do not have basic knowledge and expertise about energy efficient retrofits (Quantum Consulting 2004).
- Small business energy customers do not have the the time to solicit services, as all of their time is spent on basic business operations (Quantum Consulting 2004).
- Small business energy customers do not have the available capital to complete projects (Quantum Consulting 2004).
- Small business owners are wary of unknown service providers, especially in deregulated energy markets where small businesses have switched providers and experienced exorbitant peak demand charges (S. Gray, Esquire, PA OSBA, pers. comm., January 13, 2016).

For these reasons, traditional marketing approaches prove ineffective with these energy customers, creating an opportunity to improve marketing methods so that these ratepayers more often benefit from DI program offerings.

Current DI Programs Marketing Practices in Region's Small Commercial Grocery Stores

This study addresses marketing methods with 12 energy efficiency program managers; 11 are run through utilities, and a state hired contractor runs one (Figure 3). This study conducted a survey of DI programs, where a set of questions was fielded either with utility program managers or their small business DI program contractor. The questions were designed to collect information on the means of outreach the utilities and program managers used to identify potential customers business customers of the programs. The findings indicate there are common ways the different DI programs generate leads as well as key differences. For programs that use a trade ally model, there is a broad network of registered organizations that are qualified to administer retrofits through the DI program. If a qualified contractor model is used, a few contractors go through a rigorous screening process during program launch or renewal cycles. The chosen contractor(s) subsequently perform(s) all the retrofit implementations on behalf of the incentive program manager. Industry professionals agree that there are benefits and drawbacks to each model. For the purpose of this discussion, it is important to note that those organizations practicing under the Trade Ally model do not experience the challenge of generating leads for retrofit because there are many contractors in the field operating on behalf of the DI program at any one time that can market the DI program to an existing client base. On the other hand, the programs that use a qualified contractor model give those contractors responsibility for generating all leads of the program. These programs may experience challenges generating enough leads to satisfy program energy efficiency goals. Thus, the market model proposed here might be especially valuable to these programs.

Figure 3. Study Area Small Business DI Program Map



By focusing on the ways energy efficiency program managers generate DI program leads within and beyond their paid contractor networks, this study captures and promotes a new model for DI program outreach to reduce marketing costs. Table 7 data encodes this work; in the row titled "Outside Org. Lead Generation", the data reveals seven of 12 programs have used approaches to generate leads for their small business DI programs through external channels in recent program years. Serving as an example, NJCEP and their small business DI program contractors worked with Sustainable New Jersey (SNJ), a state-wide program that provides tools, training and financial incentives to support communities as they pursue sustainability programs (Sustainable New Jersey 2016). SNJ has developed a municipal certification program that currently includes 80% of New Jersey jurisdictions. NJCEP and SNJ collaborated to promote enrollment in the DI small business program across New Jersey's patchwork of small town and city jurisdictions by offering points towards municipal certification for two categories of activities: first, for conducting an outreach campaign to the local business community to promote the small business DI energy efficiency program, and second, for achieving a target increase in local business participation in DI energy efficiency program uptake (Sustainable New Jersey 2016). By incentivizing municipalities to mobilize small businesses to complete energy efficiency retrofit, it created two layers of benefit for completing DI projects: one at the store level and one at the municipality level. Within the SNJ framework of incentives, the program piloted different types of outreach campaigns. One notable effort worked to address one of the main barriers to uptake by small business, the wariness in small business owners to trust unknown service providers who are approaching them to sell energy projects and other services. This effort piloted a program where the mayor sent mailers encouraging them to participate in the NJCEP and retrofit their businesses. Through programs like this within the SNJ framework, the contractors learned to partner with municipal governments to recruit businesses to reach their energy efficiency program targets.

Table 7. NY, PA, NJ, and MD Regional Small Business DI Program Marketing Practices

Utility	PECO	DL	PP&L	NJCEP	BGE	SMECO	CH	Coned	National Grid	NYSEG	O&R	RGE
CRM	Y	Y		Y			Y	Y	Y	Y	N	N
Trade Ally		Y	Y				Y		Y	Y	Y	Y
Door to Door Canvassing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Outside Org. Lead Gen.			Y	Y			Y		Y	Y	Y	Y
Passive marketing	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

As discussed, utility comissions closely manage the cost of energy efficiency programs to utility ratepayers; in most cases, the programs are funded directly through an upcharge through utility bills. Acquisition costs continue to drop across the country, a dynamic that forces energy efficiency programs to achieve more energy efficiency with less money. This is especially pronounced in longer running programs. Marketing or marketing-related activities can account for a large portion of a program budget. Depending on the level of the DI incentive, these activities combined can cost up to 25% of a program's total budget (Quantum Consulting 2014, 39). This level has been recorded for DI programs which provide a 60% customer reimbursement (Quantum Consulting 2014, 39).The higher the incentive level per customer, the lower the portion of project resources go to marketing; data records that at a 100% incentive level,

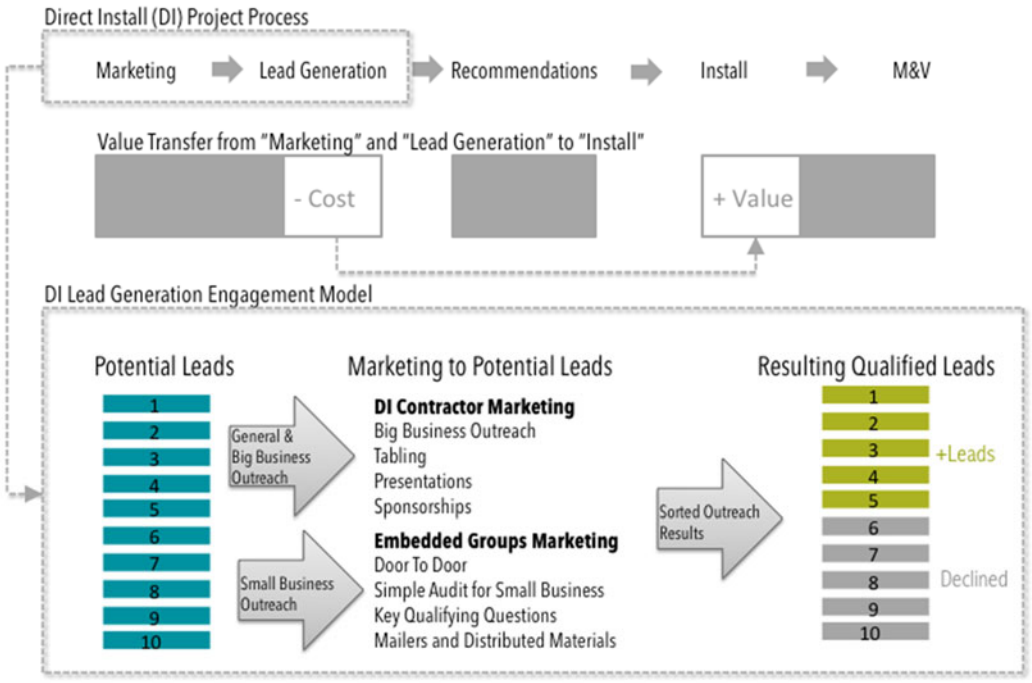
approximately 7% of the budget is dedicated to marketing. These activities involve the time and effort of utility, contractor, and sometimes, external consultants. They often involve a travel to events and presentations. There are also costs for advertising collateral and materials, such as for direct mailings or buying space in printed media, for digital media on the web, television, or radio. As some contractors have discussed over the course of the research, the project recruitment work is based on door to door canvassing of neighborhoods to build up a critical mass of projects to convince other businesses to opt-in (J. Adelsberger, Program Manager, ICF International, pers. comm., February 25, 2016).

Third-Party Lead Generation in Small Business DI

These findings suggest that normalizing best practice marketing or marketing-related activities involved in gaining a new customers can reduce the marketing portions of DI program budgets in exchange for a deeper investment in small business retrofits. By addressing the ways businesses gather information and how third-party individuals and organizations reinforce that information, program managers will gain the trust of the program without sending one contractor to do door-to-door canvassing. Other channels can inform business owners about programs, so they are prepared to trust the energy efficiency program and the potential benefit it can provide. Systems thinking terminology and definitions provide another way to understand why this type of adjustment in marketing strategy for energy efficiency program outreach might lead to cost savings and greater program resource efficiency during the marketing and lead generation phases of the DI project lifecycle. This research examines a system to deliver energy efficiency; by one definition, a system is an "interconnected set of elements that is coherently organized in a way that achieves something (Meadows 2008, 12-14)." Systems include elements, interconnections, and a function or a purpose. Elements are the tangible, identifiable, or quantifiable parts of a system; interconnections are the "relationships that hold a system together"; and a system function or purpose is captured by the behavior of a system (Meadows 2008). Interconnections are more difficult to observe than the elements themselves, but changing interconnections has far more impact on changing system behavior than changing elements (Meadows 2008). When thinking of system change or in this case, market transformation in small business commercial retrofit through DI programs, one way to study the issue is to decide whether to change system elements, interconnections, or system functions (Meadows 2008).

The function of statewide energy efficiency programs focused on buildings is to reduce the energy buildings consume through the activities of equipment and building retrofits. Example elements in this system are the buildings, the pieces of equipment within them, or the contractor project managers. Example interconnections in this system are how utilities choose their DI program contractor, how the state Public Utility Commissions manage energy efficiency program(s), and one topic of this research, how small business DI program managers communicate to a given population of small business owners. This study shows how existing DI rebate and incentive programs could better serve small grocery stores with comprehensive multi-system retrofit packages. Further, it proposes a way to change how information passes from the energy efficiency program managers to the small business owners in a way that transfers program resources from marketing activities so they can be spent on deeper, comprehensive technical packages that are the highlight of the early sections of this paper (Figure 2). In this way, the study proposes energy efficiency programs change the system interconnections involved in marketing and lead generation activities (Figure 2).

Figure 2. Proposed DI Lead Generation Engagement Model



As discussed, there are several marketing and lead generation activities bound up in identifying a new program client. In order to dismantle the common trust barrier that will keep a small business owner from saying yes to a financially beneficial energy retrofit project, DI contractors can recruit a set of "Embedded Groups" into their marketing and outreach schemes. These groups can be a variety of types of actors. Some example types include municipal governments and their mayors, city councils, or official departments (as seen in the SNJ case study), economic development organizations, not-for-profit sustainability organizations (e.g. The Food Trust), planning organizations, or any other organization that otherwise has plans to communicate regularly with this small business population to carry out their own work. The organizations best to work with are those that are already known to small businesses; some not-for-profit organizations host community meetings or fund grassroots organizers to do fieldwork and site visits with businesses. The key for energy efficiency programs is to identify organizational mission alignment. Those organizations that are focused on economic development and sustainability are obvious matches; they can bolster their own work by helping to deliver energy efficiency to small businesses. This alignment is an incentive for the embedded organization to work as hard as the contractors to achieve small business DI targets. The marketing practices discussed here have not yet been measured for their efficacy in reducing DI program marketing budgets. Investigators believe this is worthy of further study.

National energy efficiency impact

One of the goals of the project is to offer a national impact study for comprehensive retrofit of this slice of the small building market; this is a challenge because energy consumption data for these buildings is not included in publicly available databases. The Energy Star rating system does not assign scores to buildings less than 5,000 SF, and the majority of these buildings (82%) fall beneath this threshold. Further, these buildings fall below even the lowest size thresholds established through increasingly popular Benchmarking and Transparency (or

Disclosure) laws. Because the Department of Energy funds this study, it aims to provide an estimate of kW and kWh energy savings nationally for small grocery businesses. Data from the 2012 CBECS includes 95 entries in the "food sales" category for buildings less than 10,000SF; these entries represent a reported 153,886 buildings or 2.7% of total US buildings (CBECS 2012). The information that follows highlights general system characteristics that indicate high potential for energy efficiency retrofit in these buildings. For refrigeration, CBECS reports that 99% of these buildings have refrigeration technologies, and 81% have one or more walk-in refrigerators, and 36% have one or more open case refrigerators (CBECS 2012). For lighting, CBECS reports that 8% of buildings have LED lighting in 50% or more of the building area, and 86% of buildings have fluorescent lighting in 50% or more of the building area (CBECS 2012). By applying the average energy consumption savings per store to this sample to the buildings within the CBECS survey, this study approximates the energy efficiency impact of implementing the comprehensive lighting and refrigeration measures, which are those that have been identified as high priority from the research. According to this data, the energy efficiency potential of systematically addressing these two systems across the building population of food sales buildings less than 10,000 SF in size is 500,253 kilowatts and 4.25 billion kilowatt hours. The average savings estimates based on a sample of five of the participating buildings have been included within for further benchmarking and calculation.

Conclusions

Small businesses are often the least able to take advantage of the resources afforded by energy efficiency. For the small commercial grocery market segment, this is particularly true. This is a diffuse market; the businesses are extremely energy intensive to run with long operating hours, old equipment, and high lighting, refrigeration, and HVAC loads; further, access to capital is severely limited. This story is corroborated by the research shared here, which presents a detailed analysis of how deeper approaches to energy efficiency retrofit through DI could make a significant financial impact for businesses that typically collect very small profits.

This study makes the case for significant changes in the way program managers conduct outreach to stores. While it has long been established that program outreach through community-based channel partners is an effective method to market energy efficiency incentive and rebate programs, the ideas here go further and propose that "embedded" organizations should make first contact with small business owners on behalf of energy efficiency programs and can even take on some of the work of screening small businesses and preparing the basis for making energy efficiency measure recommendations. The program resources saved with this smart outreach strategy can be transferred over to the energy efficiency measures implemented within these small businesses.

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