



Tapping Energy Savings from an Overlooked Source: Results from Behavioral Change Pilot Program Targeting Mid-Sized Commercial Customers

Authored by:

Gajus Miknaitis, John Lux, Deb Dynako, Agentis Energy
Mark Hamann, William Burns, Commonwealth Edison

For 2014 ACEEE Summer Study on Energy Efficiency in Buildings

Commonwealth Edison Company (ComEd) and Agentis Energy report the results from the first year of a pilot program promoting energy efficiency through behavior change to mid-sized commercial customers. Six-thousand mid-sized commercial accounts were selected and divided evenly into a treatment group, which received mailed reports and access to a web platform, and a control group which did not. These customers, with an average annual usage of 1,000,000 kWh, often represent a significant opportunity for untapped savings. By analyzing interval data, recommendations for improving energy use are customized for each customer. To motivate business owners and operators to take action, performance metrics are compared

to peers in one of 19 business types. For example, by determining the operating schedule for a restaurant, high usage during off-hours can be identified and compared to peer norms, with specific recommendations provided to improve performance.

Implementation in this sector differs in key ways from residential behavioral programs. This paper will address challenges such as finding the right contact person at the business, as well as opportunities to generate higher savings by reaching businesses with multiple locations and allowing benchmarking across these locations.

...

Usage for these customers can be substantial, with average customer usage in this class totaling approximately 1,000,000 kWh annually. Taken as a whole, this class of customers represents a significant opportunity for energy efficiency.

1. General Outline of the Agentis Energy / ComEd Program

Beginning in October of 2012, ComEd and Agentis Energy partnered to launch a pilot program promoting energy efficiency (EE) through behavior change to mid-sized commercial customers (100 - 1,000 kW range). This program targeted a wide range of business customers, across a variety of business types (see Table 1) including independent businesses as well as branches of regional and national chains. The majority of these customers, those in the 100-500 kW range, do not have individual account managers at the utility, which can be a significant communication channel to the customer, thereby limiting the opportunity to directly promote efficiency measures. Usage for these customers can be substantial, with average customer usage in this class totaling approximately 1,000,000 kWh annually. Taken as a whole, this class of customers represents a significant opportunity for energy efficiency. Even modest savings as a percentage of total use can add to large net savings across the approximately 20,000 ComEd customers in this class.

The availability of electricity consumption data, consisting of usage recorded in half-hour intervals, provided the opportunity to promote energy efficiency by presenting customers with detailed visualizations and analysis of their specific energy use patterns. However, making effective use of this data requires careful distillation of this data into presentations that motivate and drive action instead of complicated technical graphs and charts that confuse most customers.

The first year of the commercial customer pilot was solely focused on behavioral change because ComEd wanted to avoid the potentially confounding effect of a combined behavioral and energy-efficiency implementation program. The pilot used both a direct mail campaign and a web platform to engage the customer.

...

Recognizing that customers will have varied knowledge levels about their energy consumption and efficiency opportunities, these reports contextualize their electricity use in an easy-to-understand format.

Direct Mail Campaign:

Customers selected for inclusion in the pilot study were first mailed an initial introductory letter and brochure, announcing the program. Approximately one month later, these customers began receiving a direct mailed “Business Efficiency Report.” Recognizing that customers will have varied knowledge levels about their energy consumption and efficiency opportunities, these reports contextualize their electricity use in an easy-to-understand format.

ComEd provided a customer contact name for a set of specific accounts for direct mail purposes. ComEd was able to obtain 362 unique names for 463 accounts. Agentis Energy and ComEd chose not to change the mailing methods for the names that had multiple accounts. When one name was tied to one account, the address was changed to include the contact name. Agentis Energy receives additional 1,395 names and starts adding them to direct mail reports for the upcoming mailers. Agentis Energy also experimented with different generic job titles: energy manager, general manager, etc. The result of these experimentations was that the change in names and titles did not lead to significant web platform conversions.

A redesigned direct mail piece was incorporated during Pilot Year 1 based on user feedback. The language included more prominent URL, QR code and language introducing the pilot and “Business Efficiency Report.” Additionally Agentis Energy added the name of the first web Platform user at any specific business so that user would be sure to receive the “Business Efficiency Reports.”

...

Commercial customers also express some apprehension about energy benchmarking against peers. As a method of addressing these misgivings, rather than comparing total usage, Agentis Energy compares businesses to the average trends in energy usage in their business type.

ComEd’s Smart Ideas® Business Energy Analyzer Web Platform:

Customers are encouraged in their direct mailed communications to create an account on the Agentis web platform, also known as ComEd’s Smart Ideas® Business Energy Analyzer (BEA). The direct mailed “Business Efficiency Report” and BEA were designed with five key philosophies:

1. Simplify the information and keep it concise as customers generally have limited time to read and understand the reports.
2. Provide businesses with benchmarks against industry peers—a familiar tool as benchmarking is used in many other areas of their businesses.
3. Provide a few targeted recommendations selected based on analysis of the customer’s own data.
4. Present data in dollars, instead of energy units, allowing the customer to access the efficiency measures using the same metric as other business choices.
5. Drive users to an online platform using calls-to-action, URLs, and QR codes, thus enabling highly engaged users to explore and understand their energy use more deeply.

Residential customers are known to express skepticism about the appropriateness of peer comparisons because of differences such as size of homes and number of residents. Commercial customers also express some apprehension about energy benchmarking against peers. As a method of addressing these misgivings, rather than comparing total usage, Agentis Energy compares businesses to the average trends in energy usage in their business type.

In addition to benchmarking users against similar businesses, business customers are provided with comparisons to their own past performance, using simple metrics that compares usage to the same period “last year” and expressed as lost or saved dollars. Energy reports also include prompts that make use of “loss aversion” language, which

...

Each recommendation has an associated estimate of the potential savings value, which can be presented in either dollars or energy (kWh). Recommendations are also assigned ease scores, so that customers can identify the “low hanging fruit” that are simplest to implement.

emphasizes that valuable savings dollars are being left on the table, provoking business owners to think more about their usage habits.

Analysis of interval data provides deeper insight into customer’s usage patterns. By algorithmically identifying periods of low usage, during which the business is likely closed, average hourly use when open and when closed can be measured. This information is then used to benchmark businesses against industry peers to identify those with potential for better and more consistent shutdown procedures. Similarly, by analyzing the correlation between the energy use of each business with temperature data and comparing to business type peers, businesses that may be using more energy than necessary to cool their facility can be identified.

Energy-saving “recommendations” are provided to business customers. Each industry has specific recommendations appropriate to that type. Using data from the U.S. Department of Energy’s Commercial Building Energy Consumption Survey (CBECS) to understand how each industry consumes energy, recommendations are ranked according to highest savings potentials. For instance, restaurants use more energy for refrigeration than do other industries. Therefore, refrigeration recommendations are given a higher priority when linked to a restaurant account. Each recommendation has an associated estimate of the potential savings value, which can be presented in either dollars or energy (kWh). Recommendations are also assigned ease scores, so that customers can identify the “low hanging fruit” that are simplest to implement. Both savings and ease scores appear in an easy-to-read graphical presentation.

...

Much was learned specifically about business customer behavior and subsequent findings were incorporated into the BEA's evolution.

2. Customer Research

Prior to and during the ComEd pilot program, Agentis Energy conducted user interviews to discover the most relevant energy-use information business customers needed and to further refine the messaging/platform surrounding the program. Agentis Energy actively sampled end-users and non-users of BEA. In all, more than 100 customers and potential users were surveyed and more than 300 customer calls were made to recruit new users. During the process, much was learned specifically about business customer behavior and subsequent findings were incorporated into the BEA's evolution.

Various tactics were tried to recruit new users and increase the number of interviews, particularly when it came to the difficulty of scheduling in-person interviews. Agentis Energy created postcards that explained the company, the product, and purpose of the interview. These were left behind during visits when the "right person" was away from the business. However, these postcards yielded no responses. Agentis Energy also offered to make a small donation to a charity of the interviewee's choosing. This proved helpful in both recruitment and general sentiment towards the work, and will be deployed again in future "voice-of-customer" research.

Ongoing Research for Product Refinement:

Product research with local companies prior to ComEd launch was performed in the summer of 2012. This research consisted of 30-45 minute in-person meetings that were conducted with 20 local business owners. These businesses included hotels, manufacturers, offices, restaurants, retail, and houses of worship. Below is a summary of our findings:

- There was no real preference between receiving outbound energy information via direct mail or email, and the response on preference was split nearly 50/50.
- Verbal communication was considered the most prevalent form of inter-office communication with email second and very little attention paid to office posters and postings.
- Electricity was; not surprisingly, a low priority amongst business owners who struggled to believe that their use was anything they could affect.

...

It was very important for users to have a consistent “look” between the different mediums of communication—email, direct mail, web platform, etc.

- Money was a primary motivator to make any substantial change, but guilt of not doing anything was a surprisingly close second.
- Users expressed a lot of concern around air-conditioning and associated thermostat set points—most likely because of the hot Chicago summer that was underway at the time.

Next, Agentis Energy conducted 15-minute phone consultations with 40 active BEA users. The intent was to gather insights into the usefulness of the materials presented. The results:

- Seventy percent (70%) of active users claimed to have discussed or shared information with someone else within their organization.
- Seventy-five percent (75%) of users claimed to have taken efficiency action or planned to take action after receiving the materials.
- Eighty percent (80%) of users claimed to have a willingness to continue using BEA.

Then, approximately 20 business professionals, including design consultants, design school students, and business owners were asked to give feedback on the direct mailed BERs, web BEA, and lists of energy-reduction recommendations. These findings included:

- It was very important for users to have a consistent “look” between the different mediums of communication—email, direct mail, web platform, etc.
- Most users explained a willingness to return to the site once a month—and would like to be notified when data was updated.
- Unless data is updated frequently, a majority of users saw no reason to return.
- Users really liked and hoped for expanded benchmarking to industry peers despite skepticism about relevance due to being a “unique” business.
- Recommendations that were perceived as too basic or generic could be disappointing and discourage continued site use.

...

The consistent theme among these grocers was that finding ways to reduce energy was definitely interpreted as finding ways to save money. At the conclusion of each interview, it was determined that BEA helped each grocer identify areas where real energy savings could be realized.

A Deep Dive into Customer Use:

Beginning in the autumn of 2013 and after the rollout of ComEd's Smart Ideas® Business Energy Analyzer (BEA), Agentis Energy conducted interviews with frequent users who had access to multiple accounts. Agentis Energy chose to select users who operated in the grocery store business segment.

The resulting in-depth interviews were carried out with two independent grocery store chains with multiple locations and one large regional grocery store chain. The consistent theme among these grocers was that finding ways to reduce energy was definitely interpreted as finding ways to save money. At the conclusion of each interview, it was determined that BEA helped each grocer identify areas where real energy savings could be realized.

In two of the cases—the large regional grocery chain and the larger of the two independent grocers—finding ways to save on energy expenditures as a part of their overall business savings plan is already a reality, but comparing and reporting out energy savings has been tedious and unorganized work. The smaller of the two independents hadn't really considered how energy savings could impact the business' bottom line, but after using BEA saw that energy savings via recommendations could be significantly beneficial for the business.

...

BEA enables the Sustainability Manager to visualize where energy efficiency improvements can be made. As different stores are different ages (some built without EE in mind) he also appreciates detailed and customized recommendations and capital program suggestions that can help further reduce demand in individual stores.

The Regional Grocery Store Chain:

- Nearly 200 regional locations (both urban and suburban) with more openings slated
- Energy Efficiency has become a priority as a means to reduce costs
- Operations are directed through corporate headquarters with a full-time manager devoted to energy-related issues

This large grocery business operates through its headquarters to determine operations direction and has an energy division with a full-time Sustainability Manager. This Sustainability Manager “aggressively” finds ways to become more energy efficient and strategically implement EE programs throughout the chain. These programs have included employee training, lighting retrofits and timers, HVAC, and refrigerator and freezer-related projects.

The Sustainability Manager keeps a constant eye on energy costs, and specifically focuses on ways to reduce demand throughout each store. Typically, the team is given no specific direction, but has a budget and is told to reduce energy costs enterprise-wide. Through trial and error, the team has found ways to make reductions in use, but is “looking for a formula” that can be rolled-out consistently through the chain.

BEA enables the Sustainability Manager to visualize where energy efficiency improvements can be made. As different stores are different ages (some built without EE in mind) he also appreciates detailed and customized recommendations and capital program suggestions that can help further reduce demand in individual stores.

With the BEA, the Sustainability Manager is able to compare stores directly, as well as compare each store to similar businesses in the area. He can then report to his accounting department directly from the BEA, and show ROI and cost reductions. He can also validate that projects have worked to save the company money. “Validating the EE work we are doing to our company is key,” the Sustainability Manager said, “and this tool makes it much easier to show them real savings.”

...

This particular Store Manager is highly tuned-in to all the facets of his individual store and makes all efforts to find ways to reduce overall business costs.

The Larger Local Grocery Store Chain:

- Four stores in suburban locations
- Energy Efficiency is one large part of everyday cost reductions at one store
- No EE directive, Store Manager dedicating time to finding energy-related savings

Company dynamics at this larger independent grocer find one Store Manager leading the way on energy efficiency implementation—at his location only. There is no formal protocol or company-wide initiative. Though the Store Manager manages only one store in the chain, he shares his findings with and can have influence over the other store managers at the company’s other locations. The individual stores do not share a budget, each having their own budgets to undertake EE initiatives if they choose to do so.

This particular Store Manager is highly tuned-in to all the facets of his individual store and makes all efforts to find ways to reduce overall business costs. He has his store running on sophisticated software that helps him monitor everything related to his business. When he is in office, his phone is constantly ringing and he is always busy with minimal “down” time throughout the day.

The Store Manager has been keeping a detailed report for his particular location on various Excel spreadsheets so that he could discover the ROI of his EE investments by directly comparing the “before” and “after” costs with data taken from his monthly electric bill. He also tracks how his store is doing compared to the other three stores in his chain (also via spreadsheets). Since he began actively pursuing an EE strategy in 2009, he has spent around \$80K to reduce his electric use through ComEd Energy Efficiency program participation as well as his own initiatives. Many of these initiatives involve LED lighting, refrigeration and air handling.

...

The grocer's accountant pointed out that energy costs at one particular store were significantly higher than the other stores in the chain. Prior to the web UI, the Store Manager at that location had been trying to keep track of costs by writing notes on his paper bill every month.

Most of the other store managers believe that the ROI for some of the projects he has completed “is too long.” Based on his own BEA use experience, the Store Manager believes that helping the other store managers see savings would incentivize them to find energy efficiency programs that would help them reduce use.

Using the multi-account functionality in the “Analysis” section, he could actually “see” that during a certain time period after an EE installation, he was down 18% vs. another of his stores down only 4%. “It puts a smile on my face,” the Store Manager said. “In this business, every penny counts because our margins are slim. I’ve spent \$80K on what I’ve done...it’s good to see it’s paying off.”

The Smaller Local Grocery Store Chain:

- Four stores in urban locations
- Energy Efficiency has not been a priority
- No management initiative to find energy-related savings

The smaller independent grocery store chain has had no prior guidance or roadmap for EE. This particular location was the original location and first store of the chain. Though rebuilt within the last 10 years, energy efficiency was not taken into consideration in the design of the new building. And until recently, and directly because of BEA direct mail and web platform, management hadn’t considered energy use and energy costs to be something they could control. Currently, of the four store managers, one Store Manager utilizes BEA on a regular basis and one store manager uses BEA on a less consistent basis.

The grocer’s accountant pointed out that energy costs at one particular store were significantly higher than the other stores in the chain. Prior to the web UI, the Store Manager at that location had been trying to keep track of costs by writing notes on his paper bill every month. He would highlight things that would happen to cause spikes in energy use, like hot weather, so he could point to these events with his accountant when they met.

...

This smaller grocer provides a unique opportunity to fully test BEA's potential. Management here now has the desire to make EE changes, but still needs direction and guidance—a customized plan—to implement a meaningful program. They want to be “told” what to do.

When the Store Manager gained access to BEA, he began tracking energy use on a more regular basis and started implementing recommendations. He decided to invest in a capital improvement program for lighting retrofits, and worked with a ComEd trade ally to do the installation. The retrofit was started in May and completed in September 2013. The Store Manager was concerned that from his investment, he wouldn't see his ROI “for a while.” When shown how he was performing October 2012 to October 2013, following the retrofit, he was surprised to see the significant reduction in his year-over-year energy use. He said “My President would like to see this data because he was wasn't convinced it would be worth the expense. Now I can show him that we are saving because of [the retrofit].”

This smaller grocer provides a unique opportunity to fully test BEA's potential. Management here now has the desire to make EE changes, but still needs direction and guidance—a customized plan—to implement a meaningful program. They want to be “told” what to do.

...

This matching of accounts according to usage was recommended by the evaluator as a more robust method to ensure that both control and treatment groups contained similar distributions in annual usage.

3. Experimental Design and Pilot Results

The total number of accounts for the pilot was 6,009. NAICS industry codes were purchased from a third-party vendor, which were then translated to business types. These business types are based on the building types in 2003 CBECS data. At the start of the pilot accounts fell into the following business types: Office, Retail Other Than Mall, Food Service, Food Sales, Religious Worship, Lodging, Other, Nursing, Strip Shopping Mall, Service, Non-Refrigerated Warehouse, and Public Assembly. All accounts for which no NAICS were available were assigned to the “Other” business type. Users are able to update their business type upon login. This proves necessary because industry codes do not in some cases unambiguously categorize a business into one of these broad types.

In order to create a comparison group to be used to assess the effectiveness of the pilot, accounts were divided up by business type. Then within each business type, accounts were sorted according to annual usage in the year prior to the beginning of the pilot and then alternately assigned to control or treatment group. This matching of accounts according to usage was recommended by the evaluator as a more robust method to ensure that both control and treatment groups contained similar distributions in annual usage. A standard t-test was used after the sorting and assignment processes to verify that the two groups had similar distributions in usage. (See Table 1.)

Table 1

Business Type	Treatment	Control
Education	0	1
Food Sales	310	309
Food Service	411	409
Inpatient Health Care	1	0
Lodging	332	333
Non-Refrigerated Warehouse	17	12
Office	828	831
Other	23	21
Public Assembly	9	9
Religious Worship	232	232
Retail Other Than Mall	543	547
Service	39	38
Strip Shopping Mall	105	105
Unknown	158	152

...

While the pilot was conducted for one full year, we present here the results from a third-party evaluation based on the first seven (7) months of the program, corresponding to ComEd Program Year 5.

While the pilot was conducted for one full year, we present here the results from a third-party evaluation based on the first seven (7) months of the program, corresponding to ComEd Program Year 5. Savings were estimated using standard panel regression methods. The model used lagged energy use for the same calendar month of the pre-program period as a control for any small systematic differences between the treatment and control customers and also contains monthly fixed effects to account for the average impact of effects such as weather on all customers.

The savings by business type are given in *Table 2*. The overall estimated savings is 0.19% of participants' baseline electric usage. The customer savings, as a percentage of energy use, are much lower than has been seen in similar residential behavioral programs. However, at 1,883 kWh savings per customer per year are quite substantial. For comparison, the average household use 10.8 MWh (EIA) and similar residential behavioral programs typically result in a 2-3% savings (*Schick and Goodwin, 2011*) or around 200-300 kWh per participant. Because the overall savings are small, the statistical significance of the estimates is also low. After reviewing the results of the first year, ComEd and Agentis Energy have restructured the program in its second year, as detailed in *Table 2*.

...

The savings by business type are given in Table 2. The overall estimated savings is 0.19% of participants' baseline electric usage. The customer savings, as a percentage of energy use, are much lower than has been seen in similar residential behavioral programs. However, at 1,883 kWh savings per customer per year are quite substantial.

Table 2

Business Type	Average Daily kWh Savings per Customer (Standard Error)	Percent Savings
Food Sales	47.28 (50.48)	1.00%
Food Service	-5.64 (13.33)	-0.38%
Lodging	-52.03 (34.14)	-1.78%
Non-Refrigerated Warehouse	314.14 (153.86)	15.67%
Office	29.12 (30.89)	1.07%
Public Assembly	-109.07 (81.02)	-5.12%
Religious Worship	-8.55 (14.29)	-0.81%
Retail Other Than Mall	-35.50 (37.75)	-1.13%
Service	-13.56 (37.13)	-0.82%
Strip Shopping Mall	-17.41 (42.23)	-0.92%
Other	-328.04 (428.68)	-6.58%
Unknown	-37.99 (53.84)	-1.44%
Overall	-5.16 (13.78)	-0.19%

...

The Business Energy Analyzer has been redesigned based on Pilot Year 1 feedback and “persona-based” research. Agentis Energy defined individual personas for what are believed to be the four most common users of the web Platform—much of which came out of customer research.

4. Conclusions

Achieving measurable savings with medium- to large-sized commercial customers through mailed reports has proven challenging. After seven (7) months, the program resulted in an estimated savings of 5.16 ± 13.78 average daily kWh savings per customer. In a residential setting, a mailed report can be sent to the premise and will likely be opened by a resident who is both responsible for paying the bills and has control over how energy is used in their home. For each commercial account, ComEd maintains address records for the premise, where the energy is consumed, and a separate billing address, which often differs from the premise address. This poses a question: Who is more likely to take action regarding energy use at a business—someone who works at the location or the person who has responsibility for paying for energy use? Additionally, since the State of Illinois is a deregulated market, the billing address can in some cases be that of an Alternative Retail Electric Supplier (ARES), in cases where a customer purchases power from a third party. Ambiguities about where and to whom to mail reports likely diminished the effectiveness of the mailed reports.

The Business Energy Analyzer has been redesigned based on Pilot Year 1 feedback and “persona-based” research. Agentis Energy defined individual personas for what are believed to be the four most common users of the web Platform—much of which came out of customer research. These four roles were identified as office staff, facility manager, sustainability manager and business owner. Each role was intimately different in their understanding of energy and efficiency, and what drove and motivated their decisions to participate. Each role was assigned demographic information such as a visual picture, age, location, and education level. The Agentis Energy team then collaborated to develop experience goals, end goals, expectations, common tasks, and pain points for the four personas. Having these four personas represented influenced our every design decision and they were constantly referred back to during the design process. The product needed to work for all four, provide sufficient education for the least sophisticated, and make available more advanced tools for the sophisticated persona.

The main improvements for Year 2 surround the inclusion of utility incentivized capital programs, personalized load-disaggregation, a redesigned landing page and functionality for multi-account owners who

...

Initial feedback from implementers and customers has been overwhelmingly positive.

want to not only benchmark against peers but also against themselves within their multiple locations. The Business Energy Analyzer web UI has been expanded to include data and analysis for all commercial and industrial customers above 100 kW. This will allow any customers in this class to access the web UI by creating a login and password. In addition, the Business Energy Analyzer has been integrated into ComEd's Energy Efficiency program marketing and training of outreach personnel is underway. Initial feedback from implementers and customers has been overwhelmingly positive.

References

EIA (Energy Information Administration). Frequently Asked Questions. <http://www.eia.gov/tools/faqs/faq.cfm?id=97&t=3>

Schick, S., Goodwin, S., 2011. Residential Behavior Based Energy Efficiency Program Profiles 2011. http://www.bpa.gov/energy/n/pdf/BBEE_Res_Profiles_Dec_2011.pdf

...