

How Do Small Businesses Experience Energy Reports?

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ABSTRACT

How do small businesses experience energy reports that benchmark their performance relative to similar businesses and provide recommendations to save energy? There is a large body of research focused on energy feedback in the residential sector, but significantly less in the commercial sector. Studies in both sectors have focused on the effectiveness of feedback in terms of savings outcomes, while relatively little is known about how customers experience the interface itself. This paper presents a synthesis of results from a series of user research studies conducted with small- and medium-sized enterprises (SMEs) in Canada, the United States, and Australia. Results provide insights into aspects of energy reports business customers attend to or ignore, what information they value, whether and how they take action based on the reports, and barriers to taking action. Our findings highlight distinct areas utilities can focus on to improve business energy reports, including ways to reduce barriers to action and the need for energy reports to be carefully and precisely tailored.

Introduction

Behavior-based energy programs are those that target changes in energy behavior (e.g., purchase, maintenance, and/or use of energy consuming products) on the part of consumers. They have been studied in the residential sector for decades; significant research has explored and synthesized how behavioral strategies, such as feedback (Darby, 2006; Karlin, et al., 2015), competition (Vine & Jones, 2015), gamification (Grossberg, et al., 2015), and social norms (Schultz, 2010), can be effective in encouraging households to reduce their energy consumption (Abrahamse et al., 2005). In contrast, much less is known about the effectiveness of these same strategies to reduce energy consumption in the commercial sector. The commercial sector is a more complicated target for behavior-based energy programs due to vast diversity among businesses, in terms of stakeholders, practices, and buildings (Lehrer et al., 2014).

Randomized control trials (RCTs) are the industry standard for measurement and verification of energy savings in both residential and commercial behavior-based programs. RCTs of behavior-based energy programs evaluate energy savings primarily in terms of kilowatt-hours (Karlin et al. 2015), especially in commercial sector programs. This testing is vital to establish whether a particular intervention leads to energy savings, but it does not contribute to an understanding of how and for whom certain strategies work, and therefore how to optimize and improve programs. Such an understanding is especially critical in the commercial sector given its diversity. Research that captures customer awareness, attitudes, and actions in response to behavior-based energy programs is required to better understand how these programs can work in the commercial sector, and to gain insights that enable program optimization.

Business Energy Reports (BER) for small-to-medium-sized enterprises (SMEs) are one type of behavior-based energy program in the commercial sector. In BER programs, monthly or bi-monthly reports are sent to SMEs by their utility. Central components of BER are energy consumption feedback with peer-based benchmarking and tailored energy-saving behavioral recommendations. BER programs are only recently beginning to be piloted with SMEs, but energy savings from household energy report programs are well established, ranging from 1.2-10.0% with average savings of 5.2% (Ehrhardt-Martinez, et al. 2010). BER programs present an excellent opportunity to study customer response to a behavior-based energy program in the commercial sector; to-date, there has been virtually no research investigating customer experience of BER programs.

This report presents a synthesis of findings from multiple methods of user research with SME BER recipients. Study populations span the US West Coast, Midwest, and South, as well as Queensland in Australia and British Columbia in Canada. Our analysis aggregates and organizes a wealth of data about how business owners perceive and respond to BER, providing critical feedback to inform BER programs, as well as other SME utility programs.

Methodology

This paper presents findings from ten studies conducted in 2014 and 2015 with SME BER recipients from four utilities spanning three countries (Table 1). Study methodologies included interviews, focus groups, surveys, and user testing (Table 2). In general, the studies assessed the following questions. This paper focuses on question 2.

1. What do SMEs know, think, and do with regards to energy efficiency in general?
2. What do SMEs know, think, and do about Business Energy Reports?
3. What do SMEs know, think, and do about other utility programs?

Interviews and Focus Groups

In-person interviews of 16 SME customers in BC Hydro territory were conducted in lower mainland British Columbia in February-March 2015. Researchers recruited all BER recipients in the “Power Smart Check-Up” program within Metro Vancouver. These were 60 min interviews that followed a semi-structured interview protocol. The protocol included general questions about how the business was run, and specific questions about why they had opted in to receive reports, whether they read the email reports, what they remember about them, and specific prompting about the usability and understanding of the modules in the reports.

Two one-on-one interviews and one focus group (with four participants) were conducted with BER recipients in PG&E territory in February-March 2015. Participants were recruited from BER recipients in PG&E territory via a “tear-off” survey on one of their reports. We used the virtual platform Discuss.io for both the interviews and the focus group. Researchers showed customers examples of the BER, soliciting their input on specific report modules, and asked questions about knowledge gains, attitude changes, and actions taken in response to the BER.

Table 1. Utility-specific definitions of SME

Utility	Location	Monthly Peak Demand	Annual use
PG&E	California	< 500kW	---
Midwestern utility	Michigan	---	< 500kWh
Ergon	Australia	---	< 100,000 kWh
BC Hydro	British Columbia	< 150kW	< 550K kWh

Table 2. Summary of studies and samples

	Utility	Opt-in vs. Opt-out	Email vs. Print	Sample
Focus groups	PG&E	Opt-out	Print	6
Interviews	BC Hydro	Opt-in	Email	16
User testing with eye tracking	PG&E	Opt-out	Print	2
Remote user testing	Midwestern utility	Opt-out	Print	20
Online surveys	Ergon	Opt-in	Email	55
	Ergon	Opt-in	Email	108
	BC Hydro	Opt-in	Email	87
	BC Hydro	Opt-in	Email	11
Phone survey	Midwestern utility	Opt-out	Print	150
	PG&E	Opt-out	Print	271

“Opt-out” means a customer (enrolled in the BER program) was sent the report without being asked if they would like to participate. “Opt-in” means a customer was invited to the BER program and has expressly given permission to receive BER.

User Testing

Usability testing using a modified think-aloud procedure with Gazepoint eye tracking hardware and software was conducted with four PG&E SME customers in May 2015 (three restaurants, one place of worship). Participants were recruited via a call list of BER recipients in the San Francisco Metropolitan Area. We analyzed participants’ comments and responses regarding ease of use, interest, and engagement with BER, as well as eye tracking for two participants (one participant did not consent and another did not produce usable data).

Remote user testing was conducted with 20 BER recipients in the “EnergyCheck” program implemented by a midwestern utility in Michigan. Participants were recruited via a call list of all BER recipients. In video chat sessions using GoToMeeting conducted in April 2014, researchers showed participants examples of reports they received. Analysis focused on identifying most influential modules in the BER.

Online Surveys

Four online surveys were conducted with 163 Ergon and 98 BC Hydro customers. Participants were recruited by email by the utilities. The emails were sent to all customers who had opted in to receive BER at the time of the survey. The Ergon and BC Hydro studies both took place in September 2014 and May 2015. Analysis focused on value of energy reports, what users liked and disliked in the reports, motivations, actions taken, and interest in advanced features.

Telephone Surveys

Two phone survey studies were conducted. The first was with PG&E, in which calls were made to a random sample of report recipients with contact information; 271 calls were conducted. Using a telephone survey methodology (average interview length of 10 minutes), calls were conducted in September-October, 2014 among PG&E business customers included in the pilot program. The next set of 150 phone surveys was conducted for the midwestern utility BER recipients in January 2015. The sample for this survey included Energy Check report recipients who had been included in the sample frame for a company-wide, regularly scheduled, customer satisfaction survey.

Results

Results are organized according to three main topics: (1) general impressions of BER; (2) perceptions of report elements; and (3) actions taken and barriers to action. For reference, an example BER is shown in Figure 1.

General Impressions of BER

Awareness of BER. Overall, BER recipients’ awareness of the program was high. In one study, 82% of customers recalled receiving a BER (PG&E). It was also revealed that BER are reaching the “right person.” Nearly all (92%) report recipients indicated that they are either solely responsible (51%) or share responsibility (41%) for making energy efficiency decisions for the business (PG&E phone survey).

Preferences for BER delivery. There are two factors that characterize the delivery of a BER: the action required to access the BER and the delivery channel of the BER. When asked about the former, respondents largely preferred having BER pushed to them via email compared to needing to actively seek out the report themselves (Midwestern utility Remote Testing). As far as delivery channel, there was no dominant preference for electronic or paper BER across studies. In one study, 93% of participants preferred online

to paper (BC Hydro 1), while in another, 83% preferred to receive the BER as a paper insert alongside their energy bill (PG&E Phone Survey). Less preferred options included receiving BER as a separate piece of mail, online at the utility website, or in person through a utility representative (PG&E Phone Survey).

BER programs currently send reports monthly for the first 3 months, and then bi-monthly after that. When asked about the frequency of BER, some customers expressed a desire for quarterly reports, 66% of participants said the frequency was just about right, 29% thought BER came too frequently, and 1% thought they were sent too infrequently (Ergon 2; BC Hydro Interviews). One comment regarding timing suggested that BER should be made available simultaneously with the release of a bill (currently, BER come out after the bills) (Ergon 2).

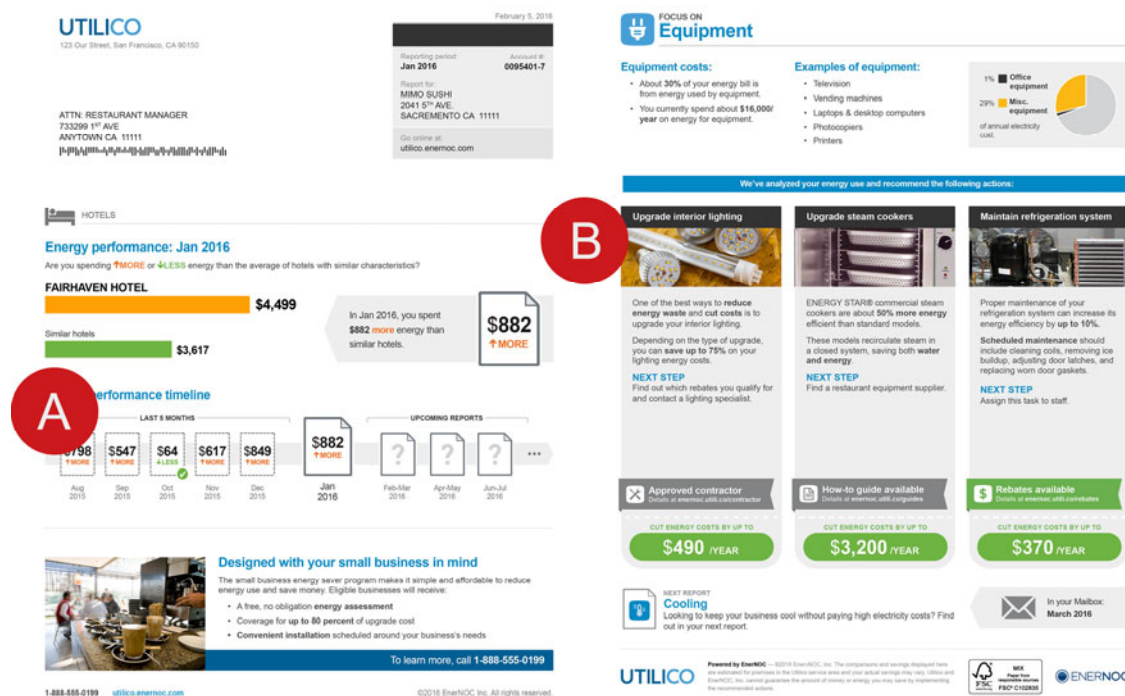


Figure 1. Example BER. “A” marks the benchmarking timeline while “B” marks the section of BER tips, both of which are referenced later in the report. *Source:* EnerNOC.

Satisfaction with BER. The question of satisfaction with BER was not standardized between studies so clear comparisons are difficult. Overall, however, the results are positive, but show room for improvement. Across three studies that assessed satisfaction with the same scale, the percentage of respondents who rated BER as either valuable or highly valuable was 76% (Ergon 1), 53% (Ergon 2), and 43% (PG&E Survey). Additional questions found that the majority of respondents reported positive responses (4 or 5 out of 5) for ease of understanding (77%), personalization (63%), helpfulness in understanding their energy use (61%; PG&E Phone Survey), accuracy of information (62%), relevance to business (62%), and look and feel of emailed reports (76%; Ergon 2).

Perceptions of Report Elements

Design. Qualitative analysis shed light on customer response to design components, expanding upon the relatively few number of feedback studies that assess usability of commercial feedback interfaces (Lehrer et al., 2014; Foster et al., 2012). Overall, our findings revealed that consumers do not spend much time actually engaging with the reports, and that recipients typically focus on their monthly energy cost as a big bold number (Midwestern utility Remote Testing, PG&E Usability with Eye Tracking). Further, unwanted content such as explanations of report content or basic instructions like how to go online, were generally considered distractions from the more important report content such as energy insights and tips. The inclusion of statistics and hard numbers was found to be highly important in communicating a sense of importance; without these, modules tended to be ignored.

Benchmarking. Peer benchmarking—comparing an SME’s energy use to that of its peers (based on business type, square footage, climate zone, and operating hours)—has been demonstrated to effectively encourage reductions in energy use in residential home energy reports (HER) (Ayres, et al. 2012). In our studies of benchmarking in commercial settings, benchmarking was both the most popular and most criticized report element. Benchmarking was typically one of the first elements customers noticed and read. Many respondents valued getting a sense of how their consumption compared to peers; e.g. “[Benchmarking] is why we really appreciate the reports...you give us some idea like how we’re doing in similar industry or similar facility,” and “We know what we consume and what we can do—the only thing we want to know is if we’re above or below everyone else” (BC Hydro Interviews).

Attitudes toward BER seemed to be strongly impacted by attitudes toward the peer benchmarking; e.g., customers that liked benchmarking liked the BER overall, and customers that disliked benchmarking disliked the BER overall (Midwestern utility Phone Survey). A common criticism of benchmarking was perceived lack of accuracy or relevance due to the uniqueness of the particular business; e.g., “This is like comparing apples and oranges”. Respondents expressed a desire for more details about the businesses to which they were being compared (BC Hydro 1). It is important to note, however, that recipients who were skeptical of peer benchmarking still paid attention to it first in every report (BC Hydro Interviews). This is consistent with prior research that establishes the strong effect of social norms on behavior despite the research subjects perceiving it to have very little influence (Nolan, et al., 2008).

Historical self-comparisons—of a business’s energy use over time—were by far one of the most appreciated components of the BER. Charts and visuals demonstrating energy use over time along with breakdowns of business energy use by end-use type were some of the other most used and well-understood portions of BER (BC Hydro 2). Energy consumption charts, annual cost breakdowns, and energy performance timelines and trends were consistently rated as the most important or most immediately viewed items within BER. Customers found the benchmarking timeline (Figure 1A) to provide a useful historical comparison. Our studies revealed that customers generally preferred a multiple month display to a single month comparison (Midwestern utility Remote Testing).

Energy-saving tips. Compared to benchmarking, energy saving tips (Figure 1B) were less frequently noticed or read (BC Hydro Interviews, PG&E Usability). When noticed, participants found suggestions about how to cut energy usage helpful (Ergon 2). Some respondents, however, complained that tips were not relevant to their business or were too vague, not clearly communicating specific directions that the business can take.

When asked to provide general feedback about tips, one respondent stated they had overlooked and/or never seen the tips as they never looked at the second page, revealing the importance of placement of information within BER. Several respondents were overwhelmed by “busy” tips with too much information or text. Respondents that had already taken action to conserve energy wished that tips accounted for past actions so that all tips were new and relevant (BC Hydro Interviews). Other comments included the suggestion that tips should include clear information about cost and payback of recommended action and that there should be more visuals to “show” what BER recipients can do. Respondents expressed strong desires for the report to identify the “low-hanging fruit”—actions with high reward for little effort.

Action Taken and Barriers to Action

Opting into BER program. Monetary savings, reducing energy bills, and increasing profitability were consistently noted as the main motivations to sign up to receive BER (in opt-in programs): “At the end of the day when you’re running a business, everything comes down to the numbers” (BC Hydro Interviews). Secondary reasons, perceived as less important than finances, pointed to environmental concerns, energy conservation in general, a desire to increase efficiency, and simple curiosity.

Engagement with reports. Throughout the studies, there was a large proportion of SMEs that regularly took initiative to read their BER. SMEs were most commonly found to read their BER only at the moment they are initially received: in one study, more than 70% of participants said they read and review their BER only once when they receive it, compared to just 29% who said they refer to it each time they get a utility bill (BC Hydro 2). The turnout regarding the extent to which recipients read these reports was mixed: one study found that 57% of participants read their reports “in detail” while 43% “only scan” them (Ergon 2). In another study, 67% of participants thoroughly read most or all of the reports, and very few (10%) did not read much of the reports (PG&E Phone survey).

Energy-saving actions. The proportion of SMEs who took action based on receiving BER, and what actions they took, varied across the studies. Common actions of customers who had taken action based on the BER included seeking out more information, visiting the utility website for more information, contacting the utility or a contractor, or logging onto an online portal. If direct energy-saving action was taken, this most commonly meant turning off unnecessary lights, installing lighting controls, energy efficient lighting or other equipment such as fan motors or refrigerators, scheduling HVAC and/or lighting maintenance, changing cooling set-points, and using smart power strips for electronics. While these survey responses are an indicator of whether SMEs have taken action as a result of receiving a BER, research has shown that self-report surveys are not necessarily accurate (Huffman, et al., 2014; Attari, et al., 2010). A summary of the results surrounding BER-inspired action is provided in Table 3.

Table 3. BER-inspired action across studies

	Ergon 1	Ergon 2	PG&E
Visited utility website	29%	18%	37%
Contacted electrician/contractor	24%	20%	-
Started/completed recommended action	25%	15%	41%
Researched energy efficiency programs	11%	9%	24
Contacted utility to discuss	11%	12%	15%
Registered for online portal	-	-	25%
Visited online portal to view energy use	-	-	22%
Signed up for utility energy efficiency program	-	-	12%
No Action	35%	45%	30%
Other	11%	9%	-

Actions completed by respondents after engaging with BER, compared across studies. Ergon customers were surveyed 3 months after program start and PG&E customers were surveyed 11 months after program start. Ergon customer start times varied. Note: cumulative percentages often add to over 100% as respondents were able to select all actions completed. Empty cells, marked with “-”, indicate when specific actions were not assessed in the surveys.

Barriers to action. A major goal of this research was to understand both why some BER recipients do not initiate any action and why they are unable to take action despite motivation to act. The studies revealed barriers at every step of a customer’s engagement with BER, from initially reading the BER to taking pro-conservation action. The most common barriers to action across all studies were time, up-front costs, low priority, reluctance, unwillingness, and unawareness of how to better conserve energy.

The first step of engaging with a BER is reading it carefully. When asked about reasons for not reading BER, time-constraints and low priority were most the commonly cited barriers (Eye Tracking; PG&E Phone Survey). There were also barriers blocking action in response to the information revealed or suggested by the BER for customers who do actually read the BER. These barriers included infeasibility of recommendations, difficulty of implementing actions, irrelevance of recommendations (i.e. if users had already completed the recommendations), not understanding specific next steps (e.g. where to buy equipment), and not knowing how to start taking action (PG&E BER; BC Hydro 1; BC Hydro 2; BC Hydro Interviews). Many respondents stated that they would not even consider recommendations that would require any sort of interruption to business (BC Hydro 2). Payback period was also another important barrier: action was often not taken when payback was poorly understood or if the payback period was perceived as too lengthy. Respondents were typically only interested in tips with a payback period of 1-3 years, or up to 5 for larger investments (BC Hydro Interviews).

Several other barriers exist particularly for businesses in the hospitality sector, in which business felt unable to control and/or attempt to curb how much energy their customers choose to use. These business owners, for whom the comfort of clients is a central concern, were further reluctant to change energy use for risk of making guests uncomfortable. Particularly in hot climates, hospitality business owners stated an inability to reduce energy use due to the risk of causing discomfort to guests or to themselves. Generally speaking, business owners who worked in the hospitality sector expressed a certain lack of control, describing a struggle to make guests aware of—let alone change—energy use patterns. One business owner in the hospitality sector stated that “effectively teaching our boarders to use electricity in our boarding houses is a problem,” while another respondent who worked in a caravan park said outright that they could not control what the vans in their park do and consume. In general, for businesses in the hospitality sector, there was an unwillingness to even see how they could possibly reduce their energy use.

Discussion and Recommendations

The results of these studies provide insight into customer interaction with BER overall and specific sections of the BER, including its content, design, benchmarking, tips, and, beyond the BER itself, the infrastructure supporting the suggestions made by the BER. Our recommendations are summarized in the Table 4. In general, our results revealed that customers do, albeit on a spectrum, engage with and interact with BER. For this reason, it is important to optimize the brief moment of communication between a utility and its commercial customers that a BER provides.

Considering benchmarking, these results suggest that benchmarking should provide more detail on the method of comparison and the comparison itself, as well as diversify the metrics of comparisons. Further, utilities should be careful not to discourage SMEs with benchmarking. Though there were many suggestions for improving tips, these studies overall suggested that tips are valuable. The perceived usefulness of tips or any recommendations was found to depend greatly on the accuracy of comparison groups, the extent to which recommendations were relevant to the business and industry, and whether or not the recommendation was something the business had already completed. These results suggest that BER tips should be kept as easily comprehensible as possible, and should clearly provide cost and payback information.

Beyond the actual content of the reports, our studies suggested an importance of integration with other energy efficiency programs and infrastructure and the personalization of reports. The ease of taking next steps, suggested by the BER, should be simplified by facilitating communication between customers and the appropriate vendors / services. The results also suggested the importance of personalization: Utilities need to remember that every business thinks it is unique, and expect to be communicated to as such. These findings are consistent with Lehrer’s assertion that the greater diversity in the commercial sector has the potential to complicate energy programs (Lehrer et al., 2014). To address this variety, we found that site specificity is extremely important for establishing credibility among customers as a customer’s perception that the report is accurate for their business affects their perception of the entire report.

Table 4. Recommendations for BER Design, Benchmarking, Tips, and Infrastructure

Component	Recommendation	Description
Design	Use front page wisely	Communicate the most important information quickly.
	Ensure each element is self-explanatory	Graphics and charts should be understandable at-a-glance.
		Clearly and concisely communicate the “so what” of each element.
		Explain calculations with accompanying text.
Benchmarking	Give more detail	Address distrust of benchmarking with greater detail about how the business is being compared to others.
	Add historical graphs	Incorporate timelines into benchmarking visualizations.
	Give praise	Add a ranking or score to business comparisons to give a clearer indication of whether they are doing well or not.
	Give them an out	Offer option to substitute peer benchmarking with more detailed historical self-comparison data.
	Do not chastise	BER should never make under-performers feel like the “bad guy”.
Tips	Keep it short and sweet	Tips should be clear and concise, with no more than two sentences and key words emphasized.
	Don’t wait until the end	Feature a tip on the front page and include a design element that draws readers to scroll down or turn over the page.
	Find low-hanging fruit	Prioritize tips that include actions with low effort and high reward.
	Complete the picture	Help SMEs decide that an action is worth pursuing by including cost and payback information.
Infrastructure	Include a human touch	Offer audits or in-person follow-ups for the SMEs that need extra help, or do not want to engage online or over the phone.
	Provide a special contact	Provide a specific contact person for any questions, and make the contact information easy to find.
	Approve vendors and products	Make the next step easier by providing the SME with a list of approved contractors and vendors/products.
	Simplify rebate program significantly	Address issues re: rebate processes being cumbersome and problematic by reducing the number of steps required
	Have them call you	For actions that require a contractor or a rebate, the next step should be very simple, such as requesting a call back.
	Recognize site specificity	Acknowledge the uniqueness of every business e.g., by investing in and utilizing smart meter data for site-specific insight and analysis.

Conclusion

While randomized control trials testing energy savings compared to a control group continue to be the “gold standard” for assessing *whether* behavior-based energy interventions work, additional user research provides significant insights into *how* such programs are (or are not) working and how they can be improved. This paper discusses findings from a series of user studies to provide insights and recommendations for future energy reporting programs. We hope that these insights, distilled from multiple research methodologies and diverse populations, will be useful to other businesses developing consumer-facing reports, with the ultimate goal of improving energy efficiency among small-medium businesses.

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